

# TIMKEN

Where You Turn



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#### TIMKEN'S GLOBAL LOCATIONS





## TIMKEN. WHERE YOU TURN.

*The world turns to Timken for innovation to move ahead of the competition. Our contributions to advancing work and living standards – through innovations surrounding friction management and power transmission – are invaluable. We have played a role in virtually all major technologies that have shaped our age, from automobile travel to artificial hearts. You'll find our products wherever you turn – on land, sea and in space.*

*When customers turn to us, they are turning to a worldwide team of 26,000 associates. Because of our ability to help their products perform better, customers honor us with more than 300 awards each year. Whether it is a wheel assembly for a family vehicle, bearings for a roller coaster, repair services for rail bearings or steel for an aircraft engine shaft, we supply the products and services that help keep the world turning.*

## FRICITION MANAGEMENT SOLUTIONS – A TOTAL SYSTEM APPROACH

As needs change and advanced motion control systems evolve, Timken is leveraging its knowledge of friction management to offer a broader array of bearings, related products and integrated services to the marketplace. We supply quality products and services that extend beyond bearings to help all systems run smoothly.

We are committed to providing a wide array of friction management solutions. Customers can benefit by having Timken, a trusted name for more than 100 years, evaluate entire systems, not just individual components. This approach provides cost-effective solutions, while also helping to achieve specific objectives.

## RESEARCH & DEVELOPMENT

Our bearing and steel manufacturing is strongly backed by Timken's technology centers. Each year, we commit more than \$50 million to our global technology organization. We invest in people, attracting scholars, engineers and specialists from around the world. We invest in tools – computers, manufacturing equipment and state-of-the-art laboratories. And we invest in the future by identifying new concepts that will help Timken and its customers make their mark for years to come. Innovation is one of our core values.

The return on our technology investment has grown exponentially. Our associates increase the reliability of Timken® products and create designs that can set new performance standards. We refine processes and suggest improvements to enhance performance and reduce costs. We help customers solve their immediate system issues, while developing the systems of tomorrow.

Our teams of engineers and scientists are dedicated to using everything they know about friction management and power transmission. They translate the scientific aspects of metallurgy, bearing operating characteristics, lubrication, torque, noise, heat treatment, advanced processing concepts and application development into friction management solutions.

Because our teams are located at technology centers in North America, Europe and Asia – as well as in our manufacturing facilities and field offices on six continents – customers have access to ideas and resources to transform concepts into reality. Our research focuses on products, materials, processes and emerging technology to create new solutions.





### **BRANDS YOU CAN TRUST**

Timken has built a strong tradition of quality, technology and innovation. A long list of customer certifications provides solid evidence that our products have earned customer trust. As our founder, Henry Timken, said, “Don’t set your name to anything you will ever have cause to be ashamed of.”

The Timken® brand also reflects the well-known quality of Torrington® and Fafnir® product lines. By leveraging the benefits of these brands – from design to distribution – Timken is giving customers expanded options and the security of knowing that each box contains an industry-trusted product.

### **ABOUT THE TIMKEN COMPANY**

- Timken is a global Fortune 500 company.
- The company has ranked among the 250 largest U.S. industrial corporations since the 1920s, and it has been listed on the New York Stock Exchange since 1922.
- Timken has 13 technical and engineering centers in North America, Europe and Asia.
- Timken has more than 66 plants and 105 sales offices, customer service centers and distribution centers in 27 countries on six continents.



As a Timken customer, you receive an uncompromising standard of quality across the broadest range of bearings and related products. Brands like Timken, Torrington and Fafnir reflect an extensive line of tapered, needle, spherical, cylindrical, ball bearings and mounted units ideal for virtually every industrial application. Complementing our core products is an ever-growing line of friction management solutions including lubricants, single-point lubricators, maintenance tools, safety equipment, condition monitoring systems and repair services that help keep operations running smoothly.

### SAFETY END CAPS

These easily installed caps offer a high degree of protection to maintenance personnel as well as to the bearings integrated within a housing.

### HOUSED UNITS

Ball and spherical roller bearing pillow block units, featuring a unique sealing design, are easily installed.

### CONDITION MONITORING DEVICES

From wireless units to online systems, condition monitoring devices give you powerful diagnostic tools to help detect potential bearing failure, while helping to maximize machine uptime and lowering maintenance costs.



### LUBRICANTS

Industrial lubricant formulas contain a portfolio of greases, including formulations developed by our tribology experts. These lubricants keep bearings running smoothly in a variety of industrial conditions, including high heat, food processing and high speed. Timken also offers a line of single-point lubricators to simplify the delivery of grease.



### REPAIR AND REPLACEMENT OPTIONS

By choosing to have bearings and other elements remanufactured, customers save money in replacement costs and maintain a steady supply of parts instead of purchasing new parts during downtimes. Timken provides bearing repair services for any type of roller bearing design, regardless of manufacturer.

### MAINTENANCE HANDLING TOOLS

Convenient handling devices give technicians the tools they need to install, remove and service bearings. Products include: impact fitting tools, induction heaters and hydraulic pullers.



### INDUSTRIAL SEALS

Timken industrial seals are available in small-bore sizes, zero- to 13-inches, as well as in metric and high-temperature varieties. We also provide tools to speed installation, deter seal and bearing damage and prevent premature seal leakage. The seals and tools can be applied in a full range of equipment used in thousands of applications, including manufacturing, off-highway, power transmission and oil refineries.



## ABOUT THIS CATALOG

Timken offers an extensive range of bearings in both imperial and metric sizes. For your convenience, size ranges are indicated both in millimeters and inches. Contact your Timken sales representative to learn more about our complete line for the special needs of your application.

## USING THIS CATALOG

We are committed to providing our customers with maximum service and quality. This catalog contains dimensions, tolerances and load ratings, as well as an engineering section describing fitting practices for shafts and housings, internal clearances, materials, and other features of bearings. It can provide valuable assistance in the initial consideration of the type and characteristics of the bearing which may be most suitable for your particular needs.

The data contained in this catalog is intended for reference purposes and will assist you in part number and external bearing dimension identification. Every effort has been made to ensure the accuracy of the information contained, but no liability can be accepted for errors, omissions or any other reason.

## CATALOG FEATURES

Dimension and load rating data for the various types and styles of bearings is organized by size.

ISO, DIN, and ABMA, as used in this catalog, refer to the International Organization for Standardization, Deutsches Institut für Normung EV and the American Bearing Manufacturers Association.



## TERMS AND CONDITIONS OF SALE

All products described in this catalog are sold subject to Timken's Terms and Conditions of Sale, copies of which are available from your Timken sales office.

It is understood that the buyer, in selecting and ordering from this catalog, which supersedes all previous editions, accepts all Terms and Conditions of Sale, outlined on page 8.

**NOTE:** *Product performance is affected by many factors beyond the control of The Timken Company. Therefore, the suitability and feasibility of all designs and product selection should be validated by you. This catalog is provided solely to give you, a customer of The Timken Company or its parent or affiliates, analysis tools and data to assist you in your design. No warranty, expressed or implied, including any warranty of fitness for a particular purpose, is made by Timken. Timken products are sold subject to the Limited Warranty which is set forth in Timken's terms and conditions of sale.*



### **LIMITED WARRANTY**

We warrant for a period of one year from the date of shipment that our products shall be free of defects in material and workmanship, as shall be determined by our manufacturing standards, and shall conform to the description on the face of this acknowledgment. THE WARRANTY DESCRIBED HEREIN SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. The terms contained herein constitute the entire agreement of the parties and the warranty representations of the seller. There are no other representations, warranties, or guarantees applicable to the sale of our products unless otherwise expressly agreed to by us in writing.

### **PURCHASER'S EXCLUSIVE REMEDY/SELLER'S EXPRESS LIMIT OF LIABILITY**

Purchaser's exclusive remedy for any warranty claim, or for any claim arising out of the purchase or use of our products, shall be the replacement of said products. We will replace our products, without charge to the purchaser, f.o.b. our point of shipment. We will not be liable for any consequential, incidental, or other damages sustained by purchaser, including but not limited to, loss of profits or revenue, loss of use of product, cost of capital, cost of substituted product, facilities, services, or claims of purchaser's customers for any damages. Any warranty claim of purchaser must be made within one year of the date of shipment of the product. This exclusive remedy applies regardless of the nature of purchaser's claim, whether in contract, tort, express or implied warranty, negligence or strict liability, upon which damages are claimed and regardless of whether the same is due to our negligence or any defect in our product.

### **SPECIAL APPLICATIONS**

Some products, such as for aerospace applications, are made to special standards, and only the original equipment manufacturer can determine if a particular bearing is suitable for use in their equipment.

## **WARNING**

Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure creating a risk of serious bodily harm. Never spin a bearing with compressed air. The rollers may be forcefully expelled creating a risk of serious bodily harm.

## SHELF LIFE AND STORAGE OF GREASE-LUBRICATED BEARINGS AND COMPONENTS SHELF LIFE POLICY

The Timken policy for the shelf life of grease lubricated rolling element bearings, components and assemblies is set forth below. The shelf life values are based on test data and experience. Shelf life should be distinguished from lubricated bearing/component service life as follows:

### SHELF LIFE

The shelf life of the grease lubricated bearing/component is a measure of the anticipated aggregate usage (hereinafter referred as "Service Life"). Variations in lubricant bleed rates, oil migration, operating condition, installation conditions, temperature, humidity and extended storage make it impossible to accurately predict service life.

The bearing shelf life is related primarily to the lubricant's ability to maintain the bearing's original manufactured radial internal clearance and freedom to rotate.

The component shelf life is related to the ability of the component to function as originally intended.

The shelf life values, available from a Timken sales office, represent the period of time prior to use or installation. Due to the broad range of applications, Timken cannot anticipate the performance of the grease lubricant after the bearing or component is installed or placed in service.

These shelf life values are to be used as a maximum limit—assuming adherence to the Timken suggested storage and handling policy. Deviations from Timken's storage and handling policy may reduce shelf life. Any specification or operating practice that defines a shorter shelf life should be used.

## TIMKEN DISCLAIMS RESPONSIBILITY FOR THE SHELF LIFE OF ANY BEARING/COMPONENT LUBRICATED BY ANOTHER PARTY.

### STORAGE POLICY

The Timken policy suggests the following storage guidelines for its finished products (bearings, components, and assemblies, hereinafter referred to as "Products"):

- Unless directed otherwise by Timken, products should be kept in their original packaging until they are ready to be placed into service.
- Do not remove or alter any labels or stencil markings on the packaging.
- Products should be stored in such a way that the packaging is not pierced, crushed or otherwise damaged.
- After a Product is removed from its packaging, it should be placed into service as soon as possible.
- When removing a Product that is not individually packaged from a bulk pack container, the container should be resealed immediately after the Product is removed.
- Do not use Product that has exceeded its shelf life as defined in Timken's shelf life policy statement.
- The storage area temperature should be maintained between 0° C (32° F) and 40° C (104° F); temperature fluctuations should be minimized.
- The relative humidity should be maintained below 60 percent.
- The storage area should be kept free from airborne contaminants such as, but not limited to: dust, dirt, harmful vapors, etc.
- The storage area should be isolated from undue vibration.
- Extreme conditions of any kind should be avoided.

In as much as Timken is not familiar with a customer's particular storage conditions, these guidelines are strongly suggested. However, the customer may very well be required by circumstance or applicable government requirements to adhere to stricter storage requirements.

Most bearing types are typically shipped protected with a corrosion preventive compound that is not a lubricant. Such bearings may be used in oil lubricated applications without removal of the corrosion preventive compound. When using some specialized grease lubrication it is advisable to remove the corrosion preventive compound before packing the bearings with suitable grease.

Some bearing types in this catalog are pre-packed with general purpose grease suitable for their normal application. For instance, yoke and stud type track rollers are pre-packed with medium temperature grease. Frequent replenishment of the grease may be necessary for optimum performance. Care must be exercised in lubricant selection, however since different lubricants are often incompatible.

When specified by the customer, other bearings may be ordered pre-lubricated with suitable greases and oils.

Upon receipt of a bearing shipment, it should be ensured that the bearings are not removed from their packaging until they are ready for mounting so that they do not become corroded or contaminated. Bearings should be store in an appropriate atmosphere in order that they remain protected for the intended period.

Any questions concerning the shelf life or storage policy should be directed to your local sales office.



## HOW TO ORDER A REPLACEMENT BEARING

The ordering of correct replacement bearings is vital to minimizing downtime and assuring the correct interchanges. Timken suggests that you follow these simple steps to identify your bearings and then proceed to the appropriate catalog section for correct bearing catalog number.

If no identification number is legible, measure the following dimensions:

1. Inner ring bore
2. Outer ring outside diameter

3. Inner width and outer width (not always the same dimension)
4. Shape of the outer ring: beveled vs. straight O.D.
5. List the unique features of the bearing or components such as: relubrication holes in the outer ring, wireloc (snap ring) groove in the outer ring O.D. Replacement and nomenclature information for Timken bearings is found under the "Introduction" section for each bearing type.

## BALL BEARINGS

### To identify: RADIAL BALL BEARINGS

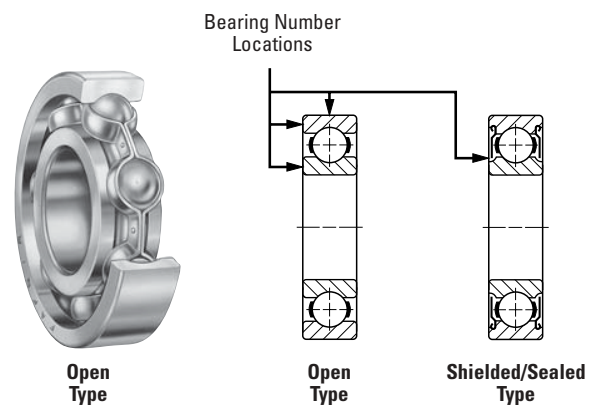
#### OPEN TYPE

The size and type of an open type (unshielded or unsealed) radial ball bearing is identified by the bearing number located on either the inner or outer ring face or bearing O.D. (e.g., 205K).

#### SHIELDED/SEALED TYPE

The size and type of a shielded/sealed type radial ball bearing is identified by the bearing number located on the shield or seal cap (e.g. 205PP).

For a comprehensive description of radial bearing nomenclature, see page D2, and for extra and superprecision ball bearings, see page D144.



### To identify: WIDE INNER RING BALL BEARINGS

#### OPEN TYPE

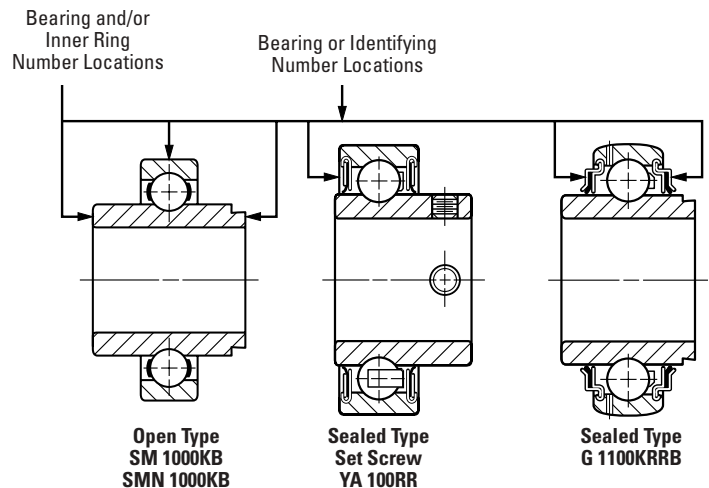
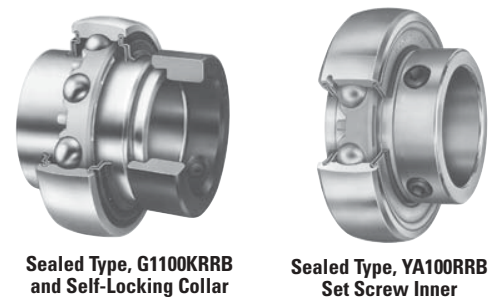
As a general rule, the complete bearing number is either marked on the outside diameter or on the inner ring face (e.g., SM1203K). This number, plus the appropriate suffix letter if applicable, constitutes the full bearing number (e.g., SM 1203KB).

#### SEALED TYPE

In some cases, the complete bearing number is marked on the seal cap. In others, an identifying number is marked on the seal cap. Although not the full bearing number, this marking will help identify the bearing type (e.g., RA100/R indicates the (G)RA-RR(B) Series; 1100/R indicates the (G)1100KRR(B) Series).

**Note:** On bearings with self-locking collars, only the collar number is stamped on the collar (e.g., S1008K). This is not a bearing number and is used only to order the collar. It is not used when ordering replacement bearings.

For a comprehensive description of wide inner ring bearing nomenclature, see page D48.



ROLLER BEARINGS

To identify: SPHERICAL ROLLER BEARINGS

The basic bearing number, plus any applicable modification codes, is marked on the outer ring face (e.g., 22315 CJ W33).

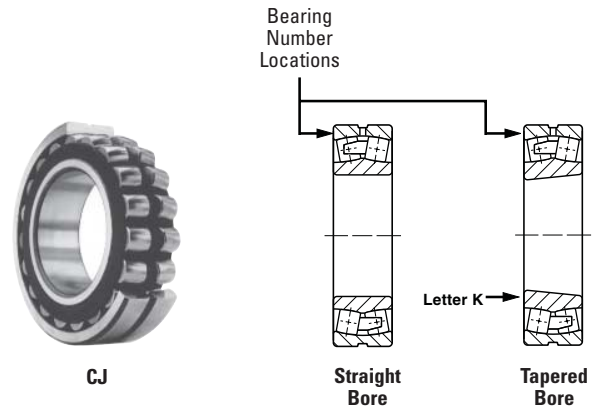
If the bearing has a tapered inner ring bore, the letter K is marked on the inner ring face (in addition to the above outer ring face marking).

Replacement bearings, if straight bore, should be ordered by specifying bearing number plus the suffix nomenclature marked on outside face (e.g., 22315 CJ W33).

Replacement bearings, if a tapered bore, should be ordered as described above, except include the suffix "K" following basic bearing number (e.g., 22315 CJ W33).

**Note:** Letter symbols marked on recessed pads on ring faces are not part of bearing nomenclature and therefore not relevant to replacement bearing number identification.

For a comprehensive description of spherical roller bearing nomenclature, see page B352.



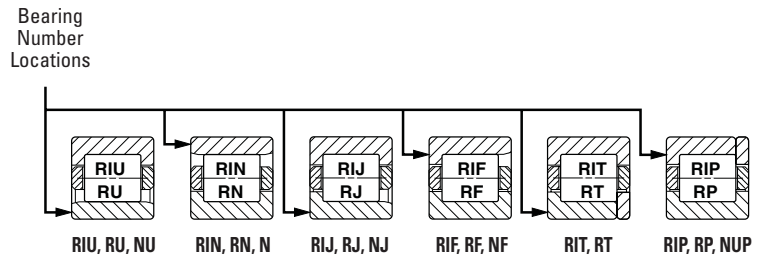
To identify: CYLINDRICAL ROLLER BEARINGS

The bearing number, plus radial clearance symbol and other applicable modification codes, is marked on the outer or inner ring faces as follows:

For types NU, NIU, NJ, NIJ, NT, NIT Series, the inner ring is marked (e.g. 160NIU92R3).

For types NN, NIN, NF, NIF, NP, NIP Series, the outer ring is marked (e.g., 160NN92R3).

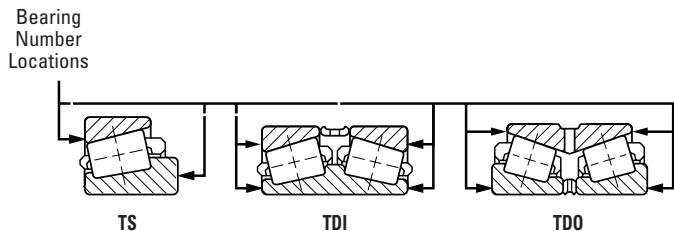
For a comprehensive description of radial cylindrical roller bearing nomenclature, see page B326.



To identify: TAPERED ROLLER BEARINGS

Inner ring (cone) part numbers are marked on a face, and outer ring (cup) part numbers on a face or the outside diameter surface.

For a comprehensive description of tapered roller bearings, see pages B15, B195, B237, B297 and B311.



The term "modification code" refers to additional information, describing details and requirements, for specific bearing applications. A basic Timken bearing part number may be produced in a variety of special modifications to meet different application needs. The word "modification" in this context refers to all changes from standard for both commercial and non-commercial applications. This meaning is different from the term "modified for use in military applications" referred to in the ITAR regulations.

## NEEDLE ROLLER BEARINGS

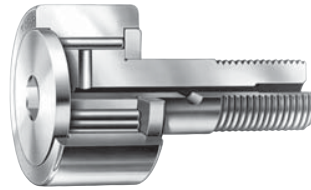
### To identify: NEEDLE ROLLER AND CAGE RADIAL ASSEMBLY

As general rule, there are no identifiable markings on needle roller and cage radial assemblies to indicate the bearing part number. Parts are specified by bore diameter, outside diameter, and width (e.g. K24x28x10H).



### To identify: STUD TYPE TRACK ROLLERS

The complete bearing part number is marked on the stud face or stamped on the face of the outer ring (e.g. KRE22.2RS). Yoke type track rollers (without stud, not shown) have the part stamped on the face of the inner or outer ring.



### To identify: NEEDLE ROLLER THRUST BEARINGS

As general rule, there are no identifiable markings on needle roller and cage radial assemblies to indicate the bearing part number. Parts are specified by bore diameter and outside diameter (e.g. AXK1024).



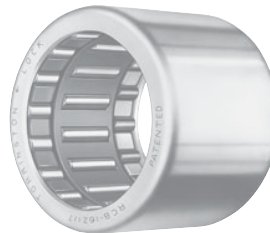
### To identify: COMBINATION BEARINGS

As general rule, there are no identifiable markings on combination bearings to indicate the bearing part number. Parts are specified by the product series and bore diameter (e.g. RAXZ510).



### To identify: DRAWN CUP NEEDLE ROLLER BEARINGS AND DRAWN CUP ROLLER CLUTCHES

The complete bearing part number is stamped on the face of the outer ring (e.g. HK1412, FCL-10-K). Also, on clutch assemblies, the mounted clutch assembly engages when the housing is rotated relative to the shaft in the direction of the arrow and the word LOCK stamped on the outer ring.



### To identify: NEEDLE/CYLINDRICAL ROLLERS

As general rule, there are no identifiable markings on loose rollers to indicate the part number. They are packaged in bulk or in strips. Loose rollers are specified by the product series, end geometry, diameter, and nominal length (e.g. NRO.B 1.5x11.8 G2).





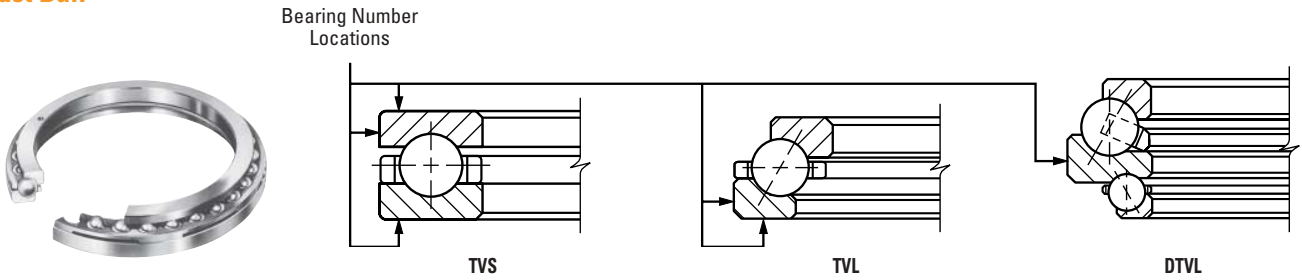
**THRUST BEARINGS**

**To identify: THRUST BEARINGS**

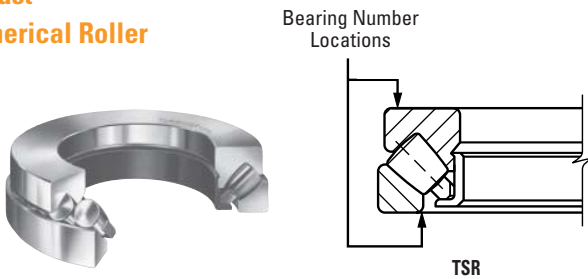
There are four basic designs of thrust bearings: ball, spherical roller, cylindrical roller and tapered roller.

All have assembly numbers marked on one or more components of the bearing.

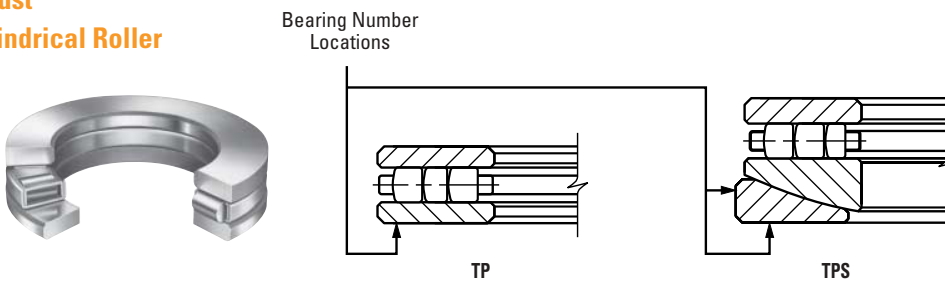
**Thrust Ball**



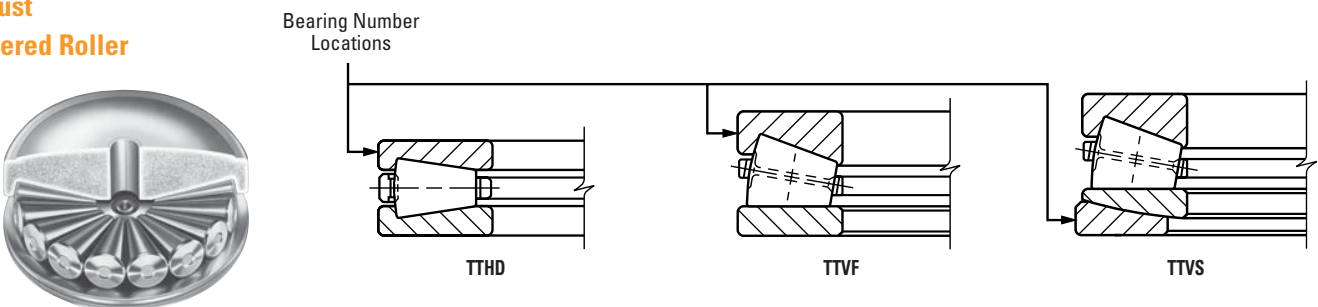
**Thrust Spherical Roller**



**Thrust Cylindrical Roller**



**Thrust Tapered Roller**



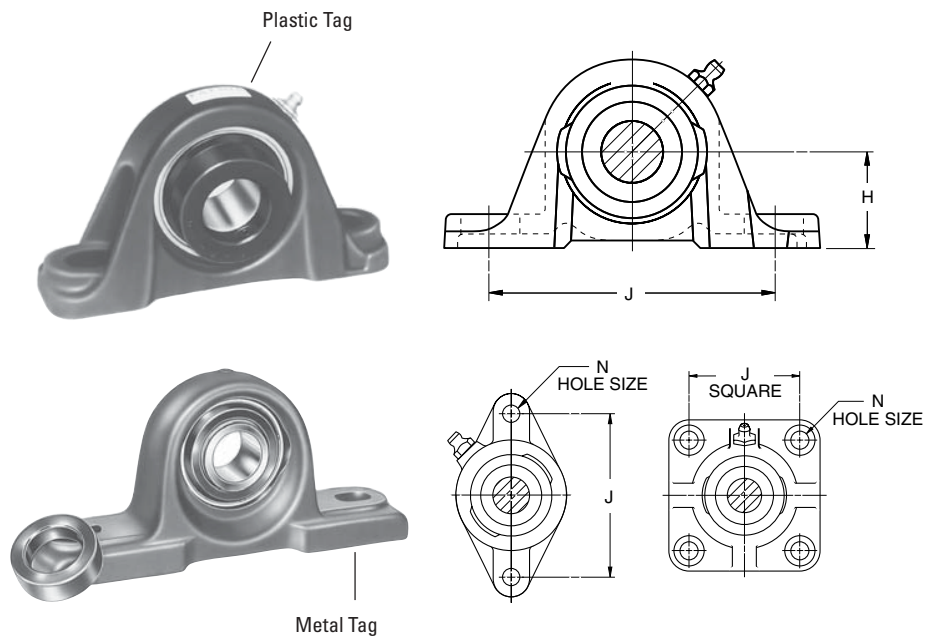
## HOUSED UNITS

### To identify: BALL BEARING PILLOW BLOCKS AND FLANGED UNITS

The housed unit is identified by a plastic or metal tag on the unit. All housed units are factory equipped with this tag. This identification number is the bearing housing assembly number which can be ordered from this catalog (e.g., RAK 1).

If the tag is removed from the housed unit, measure the bolt hole center dimensions (J), and (on pillow blocks) base to center height (H). Also, note any number cast or stamping on the housing. On some sizes, check the bottom of the unit for this number. This is the "housing only" number and can be used along with the bearing number (see ball bearing description) to identify the two parts that make up the housed unit.

For a comprehensive description of pillow block and flanged unit nomenclature, see page B384.



### To identify: SPHERICAL ROLLER BEARING PILLOW BLOCK

The end cap and/or base housing is marked with a pillow block housing number (e.g., SAF517). The pillow block assembly number is closely affiliated with the housing number (e.g., SAF 22517). Here, pillow block assembly uses the pillow block housing SAF517.

For a comprehensive description of spherical roller bearing pillow block nomenclature, see page B384.



**A**

***ENGINEERING***

**B**

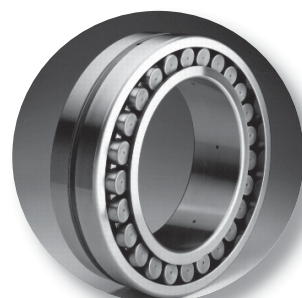
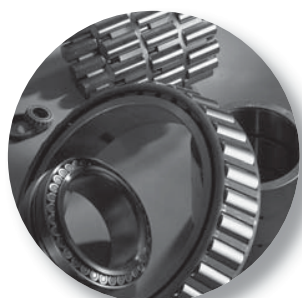
***ROLLER BEARINGS***

**C**

***NEEDLE BEARINGS***

**D**

***BALL BEARINGS***



## ENGINEERING

A

**A** ENGINEERING

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# ENGINEERING



## INTRODUCTION

Timken is a leader in the advancement of bearing technology. Expert craftsmanship, well-equipped production facilities, and a continuing investment in technology programs ensure that our products are synonymous with quality and reliability. Today, our plants manufacture thousands of bearing types and sizes to handle a wide range of application requirements.

Anti-friction bearings inherently manage broad ranges of speed and many combinations of radial and thrust loads. Other important environmental conditions, such as low and high temperature, dust and dirt, moisture, and unusual mounting conditions, affect bearing operation.

This engineering section is not intended to be comprehensive, but does serve as a useful guideline in bearing selection. Where more complex bearing applications are involved, your Timken

representative should be consulted. The following topics are covered within this section:

- Bearing types
- Cages
- Internal clearances
- Tolerances
- Shaft and housing fits and shoulders
- Load ratings and life calculations
- Lubrication
- Materials
- Limiting speeds
- Duplex bearings and preloading

## BEARING SELECTION PROCESS

Bearing selection is a process for evaluating the suitability of bearings for specific industrial applications. The quality of the information available to make these selections will play a major role in determining the success of the bearing choice.

The first step in bearing selection is identifying the proper roller element type, whether it is a ball, needle, cylindrical, spherical or tapered roller bearing. Each roller bearing type has advantages and disadvantages that are specific to each design and will affect such things as the loads and speeds that the bearing can sustain in the application.

Next, assess the size constraints of the bearing envelope or available space. This is done by considering the minimum shaft diameter, maximum housing bore and available width within the application for the bearing. After the bearing envelope is defined, search the catalog for bearings with bores, outer diameters and widths that will fit within the bearing envelope. There may be several bearings with different load-carrying capacities available that fit within the envelope.

Determine which of these bearings will give the desired life in the application by performing a bearing life analysis for each bearing. The following sections in this catalog give a detailed explanation of how to perform bearing life analysis.

Once you have chosen the right bearing to handle the load requirements of your application, and the design options are chosen, the bearing selection is completed. These options include such features as cage type, cylindrical roller bearing flange arrangements, radial internal clearance or setting, precision level and lubrication. These options are selected based on the application's speed, temperature, mounting and loading conditions, and will enable you to achieve optimum bearing performance and life.

For a closer look, your Timken representative can provide you with expert computer analysis to give you the most detailed information for your bearing application.

| Characteristic                   | Tapered Roller Bearing | Thrust Tapered Roller Bearing | Cylindrical Roller Bearing | Thrust Cylindrical Roller Bearing | Spherical Roller Bearing | Thrust Spherical Roller Bearing | Ball Bearing | Thrust Ball Bearing | Needle Roller Bearing | Thrust Needle Roller Bearing |
|----------------------------------|------------------------|-------------------------------|----------------------------|-----------------------------------|--------------------------|---------------------------------|--------------|---------------------|-----------------------|------------------------------|
| Pure Radial Load                 | Excellent              | Unsuitable                    | Excellent                  | Unsuitable                        | Excellent                | Unsuitable                      | Good         | Poor                | Excellent             | Unsuitable                   |
| Pure Axial Load                  | Good                   | Excellent                     | Unsuitable                 | Good                              | Fair                     | Excellent                       | Fair         | Excellent           | Unsuitable            | Excellent                    |
| Combined Load                    | Excellent              | Fair                          | Fair                       | Unsuitable                        | Excellent                | Fair                            | Good         | Poor                | Unsuitable            | Unsuitable                   |
| Moment Load                      | Fair                   | Poor                          | Unsuitable                 | Unsuitable                        | Unsuitable               | Unsuitable                      | Good         | Poor                | Fair                  | Unsuitable                   |
| High Stiffness                   | Excellent              | Excellent                     | Good                       | Excellent                         | Good                     | Good                            | Fair         | Good                | Good                  | Excellent                    |
| Quiet Running                    | Fair                   | Fair                          | Good                       | Poor                              | Fair                     | Poor                            | Excellent    | Good                | Good                  | Fair                         |
| Low Friction                     | Fair                   | Fair                          | Good                       | Poor                              | Fair                     | Fair                            | Excellent    | Excellent           | Good                  | Good                         |
| Misalignment                     | Poor                   | Poor                          | Poor                       | Unsuitable                        | Excellent                | Excellent                       | Good         | Poor                | Poor                  | Poor                         |
| Locating Position (Fixed)        | Excellent              | Good                          | Fair                       | Fair                              | Good                     | Good                            | Good         | Excellent           | Unsuitable            | Excellent                    |
| Non-Locating Position (Floating) | Good                   | Unsuitable                    | Excellent                  | Unsuitable                        | Fair                     | Unsuitable                      | Good         | Unsuitable          | Good                  | Unsuitable                   |
| Speed                            | Good                   | Good                          | Good                       | Poor                              | Fair                     | Fair                            | Excellent    | Excellent           | Good                  | Poor                         |

# A BEARING TYPES AND CAGES

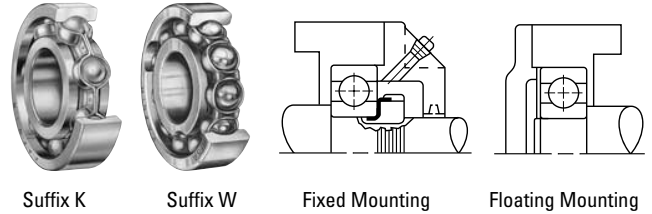
## BEARING TYPES

### RADIAL BALL BEARINGS

The basic types of Timken ball bearings are shown here. They are the non-filling slot or Conrad, which is identified by the suffix K and the filling slot designated by the suffix W.

The non-filling slot or Conrad bearing has uninterrupted raceway shoulders and is capable of supporting radial, thrust or combined loads. The filling slot type, which is assembled with more balls than a K-Type of the same size, has a greater capacity than the K-Type, but has limited thrust capacity due to the filling slots in the raceway shoulders.

Both K and W can be mounted with or without locknuts and either fixed or floating in their housings as illustrated here.



### ANGULAR CONTACT BALL BEARINGS

#### Single-Row Type

Single-row, angular contact ball bearings are designed for combination loading with high thrust capacity in one direction, and are suggested for applications where the magnitude of the thrust component is high enough to preclude the use of radial type ball bearings. They are dimensionally interchangeable with single-row radial bearings of corresponding sizes.

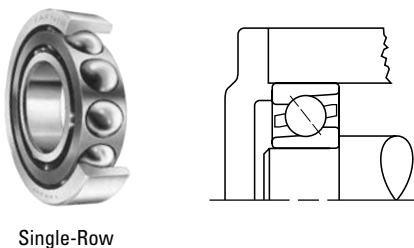
The angular contact ball bearing has a relatively large contact angle, high race depths, and a maximum complement of balls assembled through a counterbore in the outer ring. These features provide bearings with significantly more thrust capacity than radial bearings of the same size.

Angular contact bearings are used in such applications as gear reducers, pumps, worm drives, vertical shafts and machine tool spindles, where they are frequently mounted in various duplex arrangements as described in the duplex section.

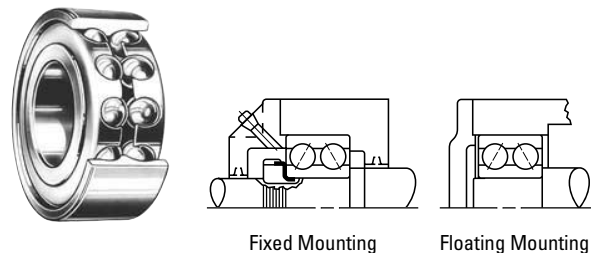
#### Double-Row Type

Double-row, angular contact ball bearings are used effectively where heavy radial, thrust or combined loads demand axial rigidity of the shaft. This type is similar to a duplex pair of single-row bearings by virtue of its two rows of balls and angular-contact construction, which provide greater axial and radial rigidity than can be obtained by using a single-row radial bearing.

With the exception of small sizes, double-row ball bearings are made in the filling slot construction, and therefore, do not have as much thrust capacity as equivalent size single-row, angular contact bearings mounted in duplex pairs. Fixed and floating mountings of double-row bearings are shown. Smaller sizes are supplied with polymeric retainers.



Single-Row



Fixed Mounting Floating Mounting  
Typical Mountings for Double Row, Angular contact Ball Bearings

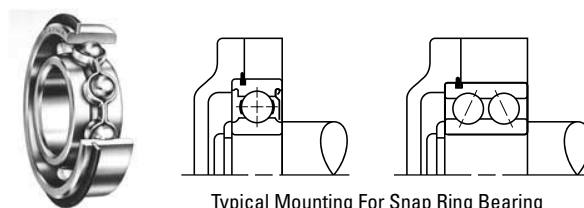
**BEARING TYPES AND CAGES** – *continued***BALL BEARINGS WITH SNAP RINGS (WIRELOC)**

Single-row radial bearings including those with seals or shields and open and shielded double-row types are available with snap rings, which provide a shoulder integral with the bearing, designed for mounting in through-bored housings. This feature is designated by adding the suffix "G" to the standard bearing number. Single shielded or sealed bearings with snap rings can be supplied with the snap ring on the same side or that opposite the shield or seal position.

These bearings are advantageous in automobile transmission design and in all applications where compactness is essential, or where it is difficult and costly to machine housing shoulders.

snap ring provides an adequate shoulder for the bearings without a sacrifice in bearing capacity. The thrust capacity of the snap ring in shear is considerably above the thrust capacity of the bearing.

Typical designs illustrating how mounting simplification can be accomplished through the use of snap ring bearings are shown (below).

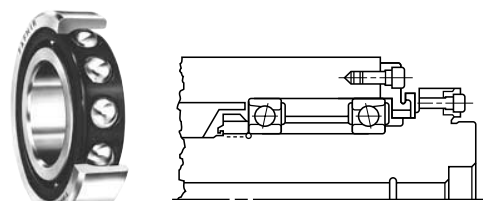


Typical Mounting For Snap Ring Bearing

**SUPER PRECISION BALL BEARINGS**

Every Timken Fafnir ball bearing manufactured is made to precision tolerances. The standard tolerances established by the Annular Bearing Engineers Committee (ABEC) are adhered to, and even the most liberal classification, ABEC 1 ensures a precision product by nature. Many applications in numerous types of machinery can be satisfactorily operated with ABEC 1 tolerance bearings.

However, for applications involving high speeds, extreme accuracy and rigidity in such equipment as high-grade machine tools, woodworking machines, gas turbines and sensitive precision instruments, a complete line of Timken Fafnir super precision ball bearings is manufactured to ABEC 7 and ABEC 9 tolerances.



Typical Application For Super Precision Bearing



**BEARING TYPES AND CAGES – continued**

**BALL BEARINGS WITH LOCKING DEVICES**

By virtue of their independent locking devices, these bearings are suitable for mounting on straight shafting (no shoulders, etc.). They are often supplied with spherical outer rings for self-alignment at mounting. Mounted alignment is usually required because these bearings are generally assembled into pillow blocks or flanged cartridges, or other housings bolted to pedestals or frames independent of each other.

**Self-Locking (Eccentric) Collar**

Timken invented the eccentric self-locking collar to facilitate mounting of wide inner ring bearings. The self-locking collar eliminates the need for locknuts, lockwashers, shoulders, sleeves and adapters.

The locking collar has a counterbored recess eccentric with the collar bore. This eccentric recess engages or mates with an eccentric cam end of the bearing inner ring when the bearing is assembled on the shaft.

The collar is engaged on the inner ring cam of the bearing. This assembly grips the shaft tightly with a positive binding action that increases with use. No adjustments of any kind are necessary. The collar setscrew provides supplementary locking.

Easiest of all to install, wide inner ring ball bearings with self-locking collars are available in various sizes. These bearings shown with various seal and inner ring width variations serve many purposes in farm and industrial applications.



RA-RR Series  
Extended Inner Ring  
with Locking Collar



Shroud-Seal KRRB Series  
Wide Inner Ring  
with Locking Collar

**Setscrew Series Bearings**

The GYA-RRB and the GY-KRRB series relubricatable and non-relubricatable bearings are extended inner ring and wide inner ring type bearings with specially designed setscrews to lock on shafting. Positive contact land-riding R-Seals provide protection against harmful contaminants and retain lubricant. Extended inner ring bearings are used when space is at a premium and overturning loads are not a problem. The new wide inner ring setscrew series is available when additional surface contact on the shaft is a requirement for added stability.



YA-RR Series

**Concentric Collar**

Using the concentric collar, the bearing is locked to the shaft by two setscrews, 120 degrees apart, tightened in the collar and passing through drilled holes in the inner ring. These units are suited for applications where space is limited and reversing shaft rotation is encountered.



GC-KRRB Series

**BEARING TYPES AND CAGES – continued****NEEDLE ROLLER BEARINGS**

Timken needle roller bearings are an economical alternative for applications requiring minimal space to carry a given load at a desired speed. Needle roller bearings can be an ideal choice because of their ability to handle a given level of speed and load capacity, yet have the smallest cross-section of all roller bearing types – and, at a very attractive price.

Timken offers both inch and metric nominal bearings in popular designs such as: drawn cups, radial caged needle rollers, machined ring, track rollers, thrust bearings, combined bearings, and drawn cup roller clutches. Most of these bearing types can be operated directly on a machined shaft of suitable quality, or with a matching inner ring where this requirement cannot be conventionally satisfied.

**Radial Caged Needle Rollers**

Timken Torrington needle roller and cage radial assemblies have a steel cage that provides both inward and outward retention for the needle rollers. The designs provide maximum cage strength consistent with the inherent high load ratings of needle roller bearings. Accurate guidance of the needle rollers by the cage bars allows for operation at high speeds. Needle roller and cage assemblies are manufactured with either one or two rows of needle rollers.

**Drawn Cup Bearings**

The outer ring in the form of a cup is accurately drawn, and no subsequent machining is performed to build the outer raceway. Drawn cup needle roller bearings are available in open ends or single, closed (to protect the shaft) end designs. They are also available with one or two integral seals. Other options include a single lubricating hole, and matching inner ring.

**Heavy-Duty (Machined) Needle Roller Bearings**

These bearings are available in a wide range of inch and metric sizes plus an array of design features including: integral seals, side flanges (or separate end washers), inner rings, oil holes, and single or double caged sets (or full complement) of rollers.

**Track Rollers**

Timken Torrington track rollers listed in this catalog have been designed with outer rings of large radial cross section to withstand heavy rolling and shock loads on track type or cam-controlled equipment. The outside diameters of the outer rings are either profiled or cylindrical. Profiled track rollers are designed to alleviate uneven bearing loading resulting from deflection, bending or misalignment in mounting. Stud type track rollers are available with or without lip contact seals, or with shields. Yoke type track rollers are designed for straddle mounting. Each yoke type is available with either needle roller and cage radial assemblies, or with a single (or double) full complement row of cylindrical or needle rollers.

**Thrust Bearings**

Needle roller and cage thrust assemblies are available in a variety of inch or metric sizes. All types have very small cross-sections. If the back up surfaces cannot be used as raceways, hardened washers are available. Thrust bearings are available with needle rollers or heavier cylindrical rollers for high load carrying capacity.

**Combined (Radial and Thrust) Bearings**

Timken combined bearings consist of a radial bearing (needle roller bearing) and a thrust bearing (needle or other roller bearing). Some combined bearings are constructed similar to drawn cups, but with an added thrust bearing component. Like other needle bearings, these combined bearings can be matched with an optional inner ring or thrust washer as the opposing raceway.

**Roller Clutches**

Drawn cup roller clutches transmit torque between the shaft and housing in one direction and allow free overrun in the opposite direction. When transmitting torque, either the shaft or the housing can be the input member. Applications are generally described as indexing, backstopping or overrunning.

In many respects, construction is similar to that of drawn cup bearings, utilizing the same low profile radial section as drawn cup bearings. The precisely formed interior ramps provide surfaces against which the needle rollers wedge to positively lock the clutch with the shaft when rotated in the proper direction. These ramps formed during the operation of drawing the cup, are case hardened to assure long wear life. The incorporation of ramp forming into the cup drawing operation is a Timken manufacturing innovation that contributes much to the low cost of the unit.

BEARING TYPES AND CAGES – continued

NEEDLE ROLLER BEARING SELECTION

Because of the possible combinations of roller complement orientation, bearing cross-section thickness, and raceway construction, needle roller bearings should be given extra consideration for roller bearing applications selection. The table below should be used as a general guideline for the application of Timken needle roller bearings.

NEEDLE ROLLER BEARING CAPABILITY COMPARISON BASED ON SUITABLE OIL LUBRICATION

| Bearing Design<br>Design<br>Bearing<br>Capability | Needle Roller<br>Type<br>Assembly | Drawn Cup<br>& Cage Radial<br>Bearing Caged | Drawn Cup Needle<br>Needle Roller<br>Full Complement | Needle Roller<br>Roller Bearing<br>Inner Ring | Track Roller<br>Bearing &<br>Assembly | Needle Roller<br>& Cage Thrust | Needle Rollers | Combination |
|---------------------------------------------------|-----------------------------------|---------------------------------------------|------------------------------------------------------|-----------------------------------------------|---------------------------------------|--------------------------------|----------------|-------------|
| Radial Load                                       | High                              | Moderate                                    | High                                                 | High                                          | Moderate                              | None                           | Very high      | High        |
| Axial Load                                        | None                              | None                                        | None                                                 | None                                          | Low                                   | Very high                      | None           | High        |
| Limiting Speed                                    | Very high                         | High                                        | Moderate                                             | Very high                                     | Moderate                              | High                           | Moderate       | Moderate    |
| Slope Tolerance                                   | Moderate                          | Moderate                                    | Very low                                             | Moderate                                      | Moderate                              | Low                            | Very low       | Low         |
| Grease Life                                       | High                              | High                                        | Low                                                  | High                                          | Moderate                              | Low                            | Low            | Low         |
| Friction                                          | Very low                          | Very low                                    | High                                                 | Very low                                      | Low                                   | Moderate                       | High           | Moderate    |
| Precision                                         | Very high                         | Moderate                                    | Moderate                                             | High                                          | High                                  | High                           | Very high      | High        |
| Cross Section                                     | Very low                          | Low                                         | Low                                                  | Moderate                                      | High                                  | Very low                       | Very low       | High        |
| Cost                                              | Low                               | Low                                         | Low                                                  | High                                          | High                                  | Moderate                       | Very low       | Very high   |



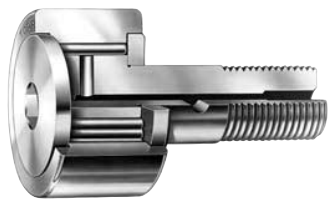
Radial Caged Needle Roller



Drawn Cup Needle Roller



Heavy-Duty Needle Roller



Track Roller



Thrust Needle Roller



Combined Needle Roller



Drawn Cup Roller Clutch

BEARING TYPES AND CAGES – *continued***RADIAL SPHERICAL ROLLER BEARINGS**

The principle styles of radial spherical roller bearings are offered by Timken: CJ, YM, YMB, VCF, VCSJ and VM.



CJ



YM/ YMB

Tapered Bore Bearing with  
Adapter Sleeve Assembly

YM bearings offer the greatest range of sizes in all series. They combine Timken design experience with proven performance in many industries.

All of the newer styles (CJ, YM, YMB and VCF) offer higher load ratings for longer life. CJ bearings include a stamped steel cage and are suitable for a broad range of general service applications. For extreme conditions of use, the YM and YMB style, with a machined brass cage, should be considered.

The VCF-style spherical roller bearing uses a cage made of high-performance, glass-fiber reinforced polyamide. The maximum continuous operating temperature under normal working conditions is 120° C (250° F).

All styles are available in straight or tapered bores. Tapered bore bearings can be ordered by placing a "K" immediately after the numbers in the bearing description (e.g., 22311KYM).

Tapered bore bearings are available with adapter sleeve assemblies consisting of sleeve, locknut and washer. Adapter sleeve assemblies are designated SNW (e.g., SNW117).

Timken spherical roller bearings have been developed to accommodate radial and axial loads. The internal geometry allows the inner ring to accommodate misalignment. This capability is unique to spherical roller bearings allowing machine designers more tolerance and less restrictive assembly. Other data is listed.

Timken spherical roller bearings are available in ten dimensional series conforming to ISO and ANSI/ABMA standards. An illustration is presented below.

Optional features available with Timken spherical roller bearings:

**W33 Lubrication Groove and Oil Holes**

A lubrication groove and three oil holes are provided in the bearing outer ring. This eliminates the expense of machining a channel in the housing bore for introducing lubricant to the bearing. This design feature allows the lubricant to flow between the roller paths, through a single lubrication fitting. The lubricant moves laterally outward from the center of the bearing, reaching all contact surfaces and "flushing" the bearing. To order, add the suffix "W33" to the bearing number (e.g., 22216W33).

**W22 Selected Outside Diameter Bearings**

Bearings with selected outside diameters are required in some applications. Timken spherical roller bearings are available with reduced outside diameter tolerance. This allows a close control of the fit between the bearing and housing.

To specify this feature, add the suffix "W22" to the bearing number (e.g., 22216W22).

Additional features are available, consult your Timken representative for more information.

**RADIAL CYLINDRICAL ROLLER BEARINGS****Standard Styles**

A Timken cylindrical roller bearing consists of an inner and outer ring, a roller retaining cage, and a complement of controlled contour cylindrical rollers. Depending on the type of bearing, either the inner or the outer ring has two roller guiding ribs. The other ring is separable from the assembly and has one rib or none. The ring with two ribs axially locates the position of the roller assembly. The ground diameters of these ribs may be used to support the roller cage. One of the ribs may be used to carry light thrust loads when an opposing rib is provided.

The decision as to which ring should be double-ribbed is normally determined by considering assembly and mounting procedures in the application.

Types RU and RIU have double-ribbed outer and straight inner rings. Types RN and RIN have double-ribbed inner and straight outer rings. The use of either type at one position on a shaft is ideal for accommodating shaft expansion or contraction. The relative axial displacement of one ring to the other occurs with minimum friction while the bearing is rotating. These bearings may be used in two positions for shaft support if other means of axial location are provided.



SERIES

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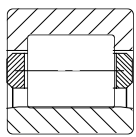
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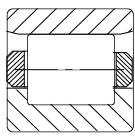
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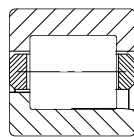
BEARING TYPES AND CAGES – continued



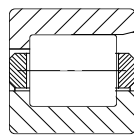
RIU, RU, NU



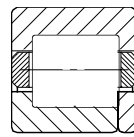
RIN, RN, N



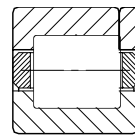
RIJ, RJ, NJ



RIF, RF, NF



RIT, RT, NUP



RIP, RP, NP

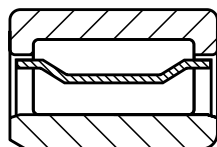
Types RJ and RIJ have double-ribbed outer and single-ribbed inner rings. Types RF and RIF have double-ribbed inner and single-ribbed outer rings. Both types can support heavy loads, as well as light unidirectional thrust loads. The thrust load is transmitted between the diagonally opposed rib faces in a sliding action. When limiting thrust conditions are approached, lubrication can become critical. Your Timken representative should be consulted for assistance in such applications. When thrust loads are very light, these bearings may be used in an opposed mounting to locate the shaft. In such cases, shaft endplay should be adjusted at time of assembly.

Types RT and RIT have double ribbed outer and single ribbed inner ring with a loose rib that allow the bearing to provide axial location in both directions. Types RP and RIP have a double-ribbed inner ring and a single-ribbed outer ring with a loose rib.

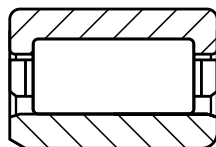
Types RT and RP (as well as RIT and RIP) can carry heavy radial loads and light thrust loads in both directions. Factors governing the thrust capacity are the same as for types RF and RJ bearings.

A type RT or RP bearing may be used in conjunction with type RN or RU bearings for applications where axial shaft expansion is anticipated. In such cases, the fixed bearing is usually placed nearest the drive end of the shaft to minimize alignment variations in the drive. Shaft endplay (or float) is determined by the axial clearance in the bearing.

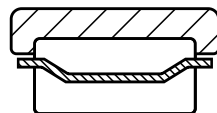
The type NU, N, NJ, NF, NUP and NP are similar in construction to their 'R' counterparts, however, they conform to ISO and DIN standards for loose rib rings (thrust collars) and typical industry diameters over or under roller.



A-52xx-WS



A-52xx-WM



52xx-WS



A-52XX

5200 Metric Series

This series features enhanced radial load rating due to its internal design proportions. In this series, the outer ring is double-ribbed and the inner ring is full-width with a cylindrical O.D. The bearing also can be furnished without an inner ring for applications where radial space is limited. When so used, the shaft journal must be hardened to HRC 58 minimum, and the surface finished to 15 RMS maximum.

The bearing is usually furnished with a rugged stamped steel cage ("S" designation) and is land-riding on the outer ring ribs. The cage features depressed bars, which not only space rollers evenly, but retain them as a complete assembly with the outer ring. Cages of machined brass ("M" designation) are available for applications

where reversing loads or high speeds might indicate their need. Outer rings are made from bearing quality alloy steel. The inner rings are deep-case hardened to accommodate the hoop stresses resulting from heavy press fits.

The standard bearing is furnished with radial internal clearances designated as R6, tabulated in Radial Cylindrical Roller Section. Other internal clearances can be supplied upon request. Proper roller guidance is assured by integral ribs and roller end clearance control.



## BEARING TYPES AND CAGES – continued

## TAPERED ROLLER BEARINGS

## SINGLE-ROW BEARINGS

**TS - Single-Row**

This is the basic and the most widely used type of tapered roller bearing. It consists of the cone assembly and the cup. It is usually fitted as one of an opposing pair (see choice of mounting configuration). During equipment assembly, single-row bearings can be “set” to the required clearance (endplay) or preload condition to optimize performance.



TS

**TSF - Single-row, with flanged cup**

Variation on the basic single-row bearing-type TSF has a flanged cup to facilitate axial location and accurately aligned seats in a through-bored housing.



TSF

## TWO-ROW BEARINGS

**TDO - Double cup**

This has a one-piece (double) cup and two single cones. It is usually supplied complete with a cone spacer as a pre-set assembly. This configuration gives a wide effective bearing spread and is frequently chosen for applications where overturning moments are a significant load component. TDO bearings can be used in fixed (locating) positions or allowed to float in the housing bore, for example to compensate for shaft expansion. TDODC or TDODD cups also are available in most sizes. These cups have holes in the O.D. that permit the use of pins to prevent cup rotation in the housing.

**TNA - Non-adjustable****TNASW - Non-adjustable with lubricant slots****TNASWE - Non-adjustable with lubricant slots and extended back face rib**

These three bearing types are similar to the TDO – comprised of a one-piece (double) cup and two cones. The cone front faces are extended so they abut, eliminating the need for a separate cone spacer. Supplied with a built-in clearance to give a standard setting range, as listed, these bearings provide a solution for many fixed or floating bearing applications where optimum simplicity of assembly is required.

Types TNASW and TNASWE are variations having chamfers and slots on the front face of the cone to provide lubrication through the shaft. Type TNASWE have extended back face ribs on the cones which are ground on the O.D. to allow for the use of a seal or stamped closure – typically for use on stationary shaft applications.

**TDI - Double cone****TDIT - Double cone with tapered bore**

Both comprise a one-piece (double) cone and two single cups. They are usually supplied complete with a cup spacer as a pre-set assembly. TDI and TDIT bearings can be used at fixed (locating) positions on rotating shaft applications. For rotating housing applications, the double cone of Type TDI can be used to float on the stationary shaft. Type TDIT has a tapered bore to facilitate removal when an interference fit is essential, yet regular removal is required.



TDI



TDIT



TNA



TNASW



TNASWE

**BEARING TYPES AND CAGES – continued**

**SPACER ASSEMBLIES**

Any two single-row bearings (Type-TS) can be supplied as a two-row, pre-set, ready-to-fit assembly by the addition of spacers, machined to pre-determined dimensions and tolerances. This principle is adopted in two standard ranges of spacer assemblies listed in the main sections of this guide: types “SS” and “SR”.

However, the concept can be applied to produce custom-made two-row bearings to suit specific applications. In addition to providing a bearing that automatically gives a pre-determined setting at assembly without the need for a manual setting, it is possible to modify the assembly width to suit an application, simply by varying the spacer lengths.

**SS - Two single-row assembly**

Often referred to as “snap-ring assemblies”, Type-SS consist of two basic single-row bearings (Type-TS). They are supplied complete with cone and cup spacers to give a pre-determined bearing setting when assembled. Type-SS have a specified setting range to suit the duty of the application. They have a cone spacer and a snap-ring, which also serves as the cup spacer, to give axial location in a through-bored housing.



SS



SR

**SR - Set-Right™ assembly**

Type-SR are made to a standard setting range, based on Timken’s Set-Right™ automated setting technique suitable for most industrial applications. They have two spacers and an optional snap-ring that may be used for axial location. Because both types are made up of popular sizes of single-row bearings, they provide a low cost option for many applications.

**THERE ARE THREE BASIC TYPES OF SPACER ASSEMBLIES**

**TYPE 2TS-IM (INDIRECT MOUNTING)**

These consist of two single-row bearings with a cone and cup spacer. In some applications the cup spacer is replaced by a shoulder in the bearing housing.

**TYPE 2TS-DM (DIRECT MOUNTING)**

These consist of two single-row bearings, with cones abutting and a cup spacer. They are generally used at fixed (locating) positions on rotating shaft applications.

**TYPE 2TS-TM (TANDEM MOUNTING)**

Where combined radial and thrust load capacity is required, but the thrust component is beyond the capacity of a single bearing (within a given maximum O.D.), two single-row bearings can be mounted in tandem. Appropriate cone and cup spacers are supplied. Consult your Timken representative for the most effective and economical solution.



2TS-IM



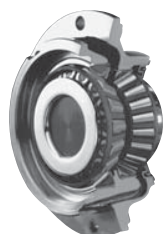
2TS-DM



2TS-TM

## BEARING TYPES AND CAGES – continued

## PACKAGED BEARINGS



PINION PAC™



UNIPAC™



UNIPAC-PLUS™



AP™



SPT™

**Pinion Pac™**

The Pinion Pac™ bearing is a ready to install, pre-set and sealed package consisting of two rows of tapered roller bearings mounted in a carrier. It is custom designed for the final drive pinions of heavy commercial vehicles. The package gives the differential pinion builder considerable improvements in reliability, ease of assembly and supply logistics.

**UNIPAC™**

The UNIPAC™ bearing is a two-row tapered roller bearing, supplied as a maintenance free, pre-set, pre-lubricated and sealed package. Originally designed for the high-volume needs of passenger car wheels, the UNIPAC bearing now has wider application in wheel hubs of heavy vehicles as well as in industrial equipment.

The UNIPAC bearing provides improvements in reliability, ease of assembly and supply logistics.

**UNIPAC-PLUS™**

The UNIPAC-PLUS™ bearing is a ready-to-install, pre-set, sealed and lubricated-for-life two-row assembly with a flanged outer ring. It is a maintenance-free, heavy vehicle wheel package. The package enables a reduction in the wheel weight by eliminating the traditional wheel hub and has the advantage of improving reliability, assembly and supply logistics. An added advantage for disc-brake equipped axles is ease of mounting.

**AP™ Bearing**

The AP™ bearing is a self-contained assembly, made in a wide range of sizes. It consists of two single cones, a counterbored double cup, a backing ring, two radial seals, an end cap and cap screws. The AP bearing is supplied as a pre-set, pre-lubricated and sealed package.

**SPT™ Bearing**

Similar in concept to AP bearings, the SPT™ bearing is designed specifically for journal bearings on high-speed rail applications. The SP bearing type differs from the AP bearing in that SP bearings have labyrinth seals, are more compact in size, and are manufactured to metric boundary dimensions.

## SEALED BEARINGS

**TSL**

The TSL incorporates a DUO-FACE® PLUS seal, making it an economical choice for grease lubricated applications at moderate speeds.



TSL

BEARING TYPES AND CAGES – continued

PRECISION BEARINGS

TS and TSF single-row bearings

These bearings are similar in design to the types described on page A11. They are only produced in high-precision quality, to be used in machine tool spindles, printing press cylinders and other applications where accuracy of rotation is required.

TSHR - Hydra-Rib™ bearing with preload adjustment device

For many applications, notably in the machine tool industry, bearings are required to run at high speeds with a controlled preload setting. The Hydra-Rib™ bearing has a “floating” cup rib controlled by hydraulic or pneumatic pressure, which ensures that the required bearing preload is maintained irrespective of the differential expansions or changes in loading taking place within the system.



TSHR

HIGH SPEED BEARINGS

TSMA - Single-row, with axial oil provision

Some applications require extreme high-speed capability, where special lubrication methods must be provided.

The TSMA is a single-row bearing with a special provision for lubrication of the critical roller-rib contact area to ensure adequate lubrication at high speeds. The concept works by capturing oil in a manifold (attached to the cone), which is then directed to the rib-roller contact area through holes drilled axially through the large cone rib. Consult your Timken representative for other high-speed bearing designs with specialized lubrication methods.



TSMA

TXR - Crossed roller bearing

A crossed roller bearing is two sets of bearing races and rollers brought together at right angles – with alternate rollers facing opposite directions – within a section height not much greater than that of a TS bearing. The steep angle, tapered geometry of the bearing causes the load-carrying center of each of the races to be projected along the axis, resulting in a total effective bearing spread many times greater than the width of the bearing itself. This type of bearing offers a high resistance to overturning moments.

The normal design of the bearing is type TXRDO, which has a double cup and two cones, with rollers spaced by polymer separators. Crossed roller bearings are manufactured in precision classes.



TXR

OTHER TWO-ROW BEARINGS

Type TDIE - Extended double cone

Type TDIA

These two-row bearings are designed for applications where it is required to lock the loose-fitted cone to a shaft, with provision also for effective closure or sealing – (typically on pillow blocks, disc-harrow and similar agricultural machinery shafts and line shafts).

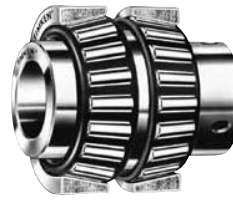
Type TDIE is available in two forms: cylindrical bore with the cone extended at both ends and provisions for setscrews and locking collars at each end, or with an inherently self-locking square bore – ideal for farm machinery applications.

Type TDIA is similar to type TDIE with a cylindrical bore. There is a provision for a locking collar at one end only. The compact configuration is suited to pillow blocks and similar applications.

On all types, the hardened and ground O.D. of the cone extension provides an excellent surface for effective closure or sealing.



TDIE



TDIA



TDIE (Square Bore)

Type TNASWH - Non adjustable, heavy-duty, double cup

Type TNASWHF - Non adjustable, heavy-duty, with flanged double cup

These are two-row bearing assemblies with two cones and a one-piece cup, similar to type TNASWE listed in this guide.

The cups have a heavy wall section, allowing the bearings to be used directly as steady rest rollers, in sheet and strip levellers or, with a flange (Type-TNASWHF), as a complete wheel assembly for use on rails.

The cup is extended at both ends and counterbored to accept stamped closures. The bearings can be supplied with these ready-fitted as a unit assembly (but not pre-lubricated).

Rubbing seals are available for certain sizes.



TNASWHF



TNASWH



**BEARING TYPES AND CAGES – continued****FOUR-ROW BEARING ASSEMBLIES**

Four-row bearings combine the inherent high-load, radial/thrust capacity and direct/indirect mounting variations of tapered roller bearings into assemblies of maximum load rating in a minimum space. Their main application is on the roll necks of rolling mill equipment.

All four-row bearings are supplied as pre-set matched assemblies, with all components numbered to ensure correct installation sequence.

**Type-TQO  
Type-TQOW**

These pairs of directly mounted bearings consist of two double cones, two single and one double cup, with a cone spacer and two cup spacers. These types are used on roll necks of low- and medium-speed rolling mills, applied to the necks with a loose fit. When the fillet and/or filler rings do not have lubrication slots, they are provided in the faces of the bearing cones (Type-TQOW). Slots in the cone spacer permit lubricant to flow from the bearing chamber to the roll neck. The cone spacers also are hardened to minimize face wear.



TQO



TQOW



TQITS



TQITSE

**Sealed roll neck**

The sealed roll neck bearing is similar to the TQO. A specially designed sealing arrangement is incorporated in the bearing to endure highly contaminated environments. The special seal design is built into the bearing to eliminate contamination from outside the bearing envelope and extend the useful life.



Sealed Roll Neck Bearing

**Type-TQITS  
Type-TQITSE**

The main feature of these bearings is a tapered bore – the taper being matched and continuous through the cones. This permits an interference fit on the backup rolls of high-speed mills, where a loose cone fit of a straight bore type TQO bearing could result in excessive neck wear.

These four-row bearings consist of two pairs of indirectly mounted bearings: two single and one double cone, four single cups and three cup spacers. The relevant faces of the cones are extended so that they abut, eliminating the need for cone spacers. The indirect mounting of the bearing pairs increase the overall effective spread of the bearing, to give optimum stability and roll rigidity.

Type TQITSE is the same as TQITS, but has an extension to the large bore cone adjacent to the roll body. This not only provides a hardened, concentric and smooth surface for radial lip seals, but also improves roll neck rigidity by eliminating a fillet ring. This allows the centerline of the bearing to move closer to the roll body. It also permits shorter and less costly rolls.

**THRUST BEARINGS**

Standard types of thrust bearings manufactured by Timken are included in this section. Each type is designed to take thrust loads, but four types (TVL, DTVL, TTHD and TSR) accommodate radial loads as well. All types reflect advanced design concepts, with large rolling elements for maximum capacity. In roller thrust bearings, controlled contour rollers are used to insure uniform, full-length contact between rollers and raceways with resultant high capacity. Thrust bearings should operate under continuous load for satisfactory performance.

- Type TVB** – Grooved race thrust ball bearing
- Type TVL** – Angular contact thrust ball bearing
- Type DTVL** – Two direction angular contact thrust ball bearing
- Type TP** – Thrust cylindrical roller bearing
- Type TPS** – Self-aligning thrust cylindrical roller bearing
- Type TTHD** – Thrust tapered roller bearing
- Type TSR** – Thrust spherical roller bearing
- Type TTVF** – V-Flat thrust tapered roller bearing
- Type TTVS** – Self-aligning V-Flat thrust tapered roller bearing
- Type TTSP** – Steering pivot thrust cylindrical roller bearing

BEARING TYPES AND CAGES – *continued*

**Thrust Ball Bearings**

Thrust ball bearings are used for lighter loads and higher speeds than thrust roller bearings.

Type TVB ball thrust bearing is separable and consists of two hardened and ground steel washers with grooved raceways, and a cage that separates and retains precision-ground and lapped balls. The standard cage material is brass, but this may be varied according to the requirements of the application. Timken Standard Tolerances for Type TVB bearings are equivalent to ABEC 1 where applicable, but higher grades of precision are available.

Type TVB bearing provides axial rigidity in one direction and its use to support radial loads is not suggested. Usually the rotating washer is shaft-mounted. The stationary washer should be housed with sufficient O.D. clearance to allow the bearing to assume its proper operating position. In most sizes both washers have the same bore and O.D. The housing must be designed to clear the O.D. of the rotating washer, and it is necessary to step the shaft to clear the bore of the stationary washer.

Type TVL is a separable angular contact ball bearing primarily designed for unidirectional thrust loads. The angular contact design, however, will accommodate combined radial and thrust loads since the loads are transmitted angularly through the balls.

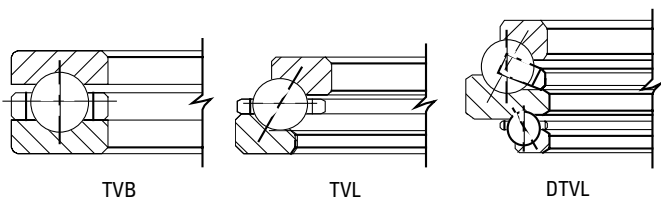
The bearing has two hardened and ground steel rings with ball grooves and a one-piece brass cage that spaces the ball complement. Although not strictly an angular ball bearing, the larger ring is still called the outer ring, and the smaller the inner ring. Timken Standard Tolerances for type TVL bearings are equivalent to ABEC 1 where applicable, but higher grades of precision are available.

Usually the inner ring is the rotating member and is shaft-mounted. The outer ring is normally stationary and should be mounted with O.D. clearance to allow the bearing to assume its proper operating position. If combined loads exist, the outer ring must be radially located in the housing.

Type TVL bearings should always be operated under thrust load. Normally, this presents no problem as the bearing is usually applied on vertical shafts in oil field rotary tables and machine tool indexing tables. If constant thrust load is not present, it should be imposed by springs or other built-in devices.

Low friction, cool running and quiet operation are advantages of this type of TVL bearing, which may be operated at relatively high speeds. The bearing also is less sensitive to misalignment than other types of rigid thrust bearings.

DTVL is similar in design to TVL except the DTVL has an additional washer and ball complement permitting it to carry moderate thrust in one direction and light thrust in the other direction.



**Thrust Cylindrical Roller Bearings**

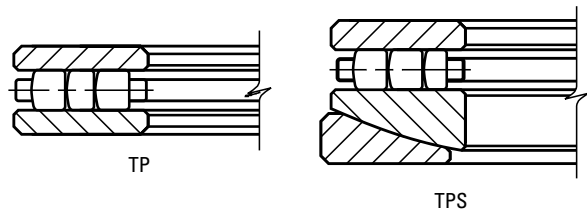
Thrust cylindrical roller bearings withstand heavy loads at relatively moderate speeds. Standard bearings can be operated at bearing O.D. peripheral speeds of 3000 fpm (15 m/s). Special design features can be incorporated into the bearing and mounting to attain higher operating speeds.

Because loads are usually high, extreme pressure (EP) lubricants should be used with roller thrust bearings. Preferably, the lubricant should be introduced at the bearing bore and distributed by centrifugal force.

All types of thrust roller bearings are made to Timken Standard Tolerances. Higher precision may be obtained when required.

Type TP thrust cylindrical roller bearing has two hardened and ground steel washers, with a cage retaining one or more controlled contour rollers in each pocket. When two or more rollers are used in a pocket, they are of different lengths and are placed in staggered position in adjacent cage pockets to create overlapping roller paths. This prevents wearing grooves in the raceways and prolongs bearing life.

Because of the simplicity of their design, Type TP bearings are economical. Since minor radial displacement of the raceways does not affect the operation of the bearing, its application is relatively simple and often results in manufacturing economies for the user. Shaft and housing seats, must be square to the axis of rotation to prevent initial misalignment problems.

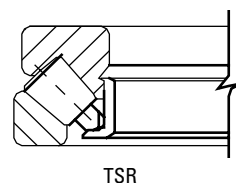


Type TPS bearings are the same as Type TP bearings except one washer is spherically ground to seat against an aligning washer, thus making the bearing adaptable to initial misalignment. Its use is not suggested for operating conditions where alignment is continuously changing (dynamic misalignment).

**Thrust Spherical Roller Bearings**

**Type-TSR**

The TSR thrust spherical roller bearing design achieves a high thrust capacity with low friction and continuous roller alignment. The bearings can accommodate pure thrust loads as well as combined radial and thrust loads. Typical applications are air regenerators, centrifugal pumps and deep well pumps. Maximum axial misalignment between inner and outer ring is  $\pm 2.5$  degrees.



**BEARING TYPES AND CAGES – continued**

**Thrust Tapered Roller Bearings**

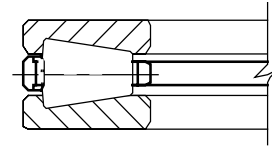
**Type-TTHD**

Type TTHD thrust tapered roller bearing has an identical pair of hardened and ground steel washers with conical raceways, and a complement of controlled contour tapered rollers equally spaced by a cage.

In the design of Type TTHD, the raceways of both washers and the tapered rollers have a common vertex at the bearing center. This assures true rolling motion.

TTHD bearings are well-suited for applications such as crane hooks, where extremely high thrust loads and heavy shock must be resisted and some measure of radial location obtained.

For very low-speed, heavily loaded applications, these bearings are supplied with a full complement of rollers for maximum capacity and are identified in the table of dimensions. For application review of the full complement Type TTHD bearing, consult your Timken representative.



TTHD

**Type-TTVF**

**Type-TTHDFL**

**Type-TTHDSX**

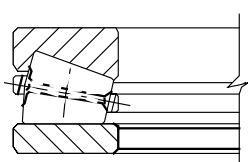
V-Flat Tapered Roller bearings (TTVF and TTVS) combine the best features of thrust tapered and cylindrical roller bearings, offering the highest possible capacity of any thrust bearing of its size. V-Flat design includes one flat washer and the second with a tapered raceway matching the rollers. Design was originally developed for screwdown applications in metal rolling mills where thrust loads exceeding one million pounds are common. These bearings have exceptional dynamic capacity within a given envelope and provide superior static capacity. They have been highly successful in heavily loaded extruders, in cone crushers and other applications where a wide range of operating conditions are found.

**Type-TTVS**

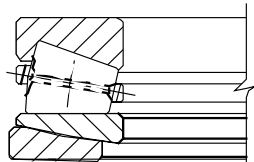
**Type-TTHDSV**

Most sizes utilize cages with hardened pins through the center of the rollers, allowing closer spacing of the rollers to maximize capacity. Smaller sizes have cast brass cages, carefully machined to permit full flow of lubricant.

Self-aligning V-Flat bearings (TTVS) employ the same basic roller and raceway design, except the lower washer is in two pieces, with the contacting faces spherically ground permitting self-alignment under conditions of initial misalignment. TTVS bearings should not be used if dynamic misalignment (changing under load) is expected.



TTVF



TTVS



TTHDFL



TTHDSV



TTHDSX

**TTC - Cageless**

**TTSP - Steering pivot**

There are two basic types of Timken thrust bearings designed for specific fields of duty where the only load component is thrust, TTC and TTSP. The TTC bearing uses a full complement of rollers without a cage and is used when the speeds are slow. The TTSP bearing uses a cage and was designed for the oscillating motion of steering pivot positions.



TTC



TTSP

## BEARING TYPES AND CAGES – continued

### CAGES

Cages (sometimes referred to as rolling element separators or retainers) perform an important function in the proper operation of rolling bearings. They serve to maintain uniform rolling element spacing in the races of the inner and outer rings of the bearings as the rolling elements pass into and out of the load zones. Cage types in several materials and configurations have been developed by Timken to meet various service requirements. Temperature limitations are described later in this section.

Some of the materials from which cages are made include pressed steel, pressed brass, machined brass, machined steel and compositions of various synthetic materials.

### STEEL CAGES FOR RADIAL BALL BEARINGS

Steel cages are generally ball-piloted and are available in the following types:

#### Pressed Steel Finger Type Cages (SR)

Light in weight and made from strong, cold rolled steel, the pressed steel cage because of its compactness is the optimum design for use in shielded and sealed bearings which must conform to ABEC boundary dimensions. This is a general purpose design and is frequently used for ABEC 1 ball bearing sizes.



#### Pressed Steel Welded Cages (WR)

The welded steel cage provides greater strength, increased rigidity, and better pocket alignment than the finger type. The projection welding of the cage halves eliminates weakening notches or holes and fingers or rivets. It assures better mating of cage halves circumferentially and radially.



This construction also provides more uniformity of ball to pocket clearance. Improved pocket geometry permits higher speeds, reduces cage wear, provides cooler operation, and improves and extends lubricant life. This cage is standard in most radial non-filling slot bearings of the open, shielded, and sealed types.

### MOLDED CAGES FOR RADIAL BALL BEARINGS

Molded cages are either ball piloted or land piloted and are available in the following types:

#### Nylon (PRB)

One-piece molded snap-in 6/6 nylon cages are specially processed to provide:

- Toughness at moderately high and low temperatures
- Resistance to abrasion
- Resistance to organic solvents, oils and grease
- Natural lubricity
- Long term service at temperatures up to +120° C (+250° F)
- Dimensional stability

These cages offer superior performance in applications involving misalignment due to their greater flexibility.



PRB molded nylon cages provide uniformity of ball pocket clearances for consistent operation. They are suitable for temperatures up to +120° C (+250° F) continuous operation and can tolerate +150° C (+300° F) for short periods.

These cages are available in conrad (K) bearings and are standard for the more popular wide inner ring bearing series.

**BEARING TYPES AND CAGES – continued****Reinforced Nylon (PRC)**

Molded 6/6 nylon reinforced with 30 percent (by weight) glass fibers. This material is used primarily for one-piece ring piloted cages used in precision grades of angular contact bearings.

PRC cages offer outstanding strength and long term temperature resistance. Molded to very close tolerances and uniformity, combined with light weight design, they permit higher speeds and reduced noise. They are suitable for temperatures up to +150° C (+300° F).

PRC cages are usually the one piece outer piloted "L" type design, but are also available in one piece ball controlled designs.

**Special Molded Cages**

For very high speeds or very high temperature applications special materials can be used. Nylon with a PTFE additive is available for molded cages required for high speed applications. For applications involving high operating temperatures (up to +232° C, +450° F) molded cages made of fiber reinforced polyphenylene sulfide can be made.

For availability of these special cages please consult your Timken representative.

**Brass and Steel Cages**

Brass cages are generally installed in bearings which are designed for use on heavily loaded applications, such as, deep well pumps, woodworking machinery, and heavy construction machinery. The following types of Timken brass cages are available:

**Iron Silicon Brass Cage (SMBR) and Machined Steel Cage (MSR)**

The SMBR and MSR cages are ring piloted. The advantages of these cages are high strength even at elevated temperatures (see chart on page A167) as well as high-speed capability due to the ring piloted construction. In many cases these cages are silver plated for use in applications requiring high reliability.

They are available in both ball and roller bearings.

**Cast Brass Cage (BR)**

This cage, a ball piloted brass retainer designated by the letters BR, utilizes two identical halves which are riveted together.



BR



MBR

**Machined Brass Cage (MBR)**

These cages are machined all over to provide ring riding surfaces and good static and dynamic balance. They are commonly incorporated as inner ring piloted designs in the 7000 angular contact product family. Because of their superior strength, these cages are generally used on heavily loaded applications such as, deep well pumps, woodworking machinery, and heavy construction machinery.

**Composition Cages (CR)**

Composition cages combine light weight, precision and oil-absorbing features which are particularly desirable for use on high speed applications. This (CR) cage, is a ring piloted type and is particularly associated with the outer-ring piloted, extra precision WN series bearings.

**Special Cages**

For certain very high contact angle, light section aircraft bearings, molded nylon "snake" cages are employed. Cages are also made with high temperature materials (see page A167) in the various configurations described above.

For availability of special cages please contact your Timken representative.





### BEARING TYPES AND CAGES – *continued*

## CAGES FOR SPHERICAL ROLLING BEARINGS

### Brass Cages

YM Bearing cages are one-piece design centrifugally cast and precision machined. The rugged construction of this cage type provides an advantage in more severe applications. Due to its design this cage permits YM bearings to incorporate greater load carrying capabilities.

The open end design permits lubricant to reach all surfaces easily assuring ample lubrication and a cooler running bearing.

### Stamped Steel Cages (CJ)

These cages are used in CJ bearings and are designed to permit extra load carrying capabilities in the bearing. Two independent cages, one for each row of rollers, are assembled in an individual bearing.

### Pin Type Cages

Large diameter spherical roller bearings can be supplied with these cages. The design of pin type cages permits an increased roller complement thus giving the bearing enhanced load carrying ability. Consult your Timken representative for suggestions on the application of this cage.



YM Cage



CJ

## CAGES FOR RADIAL CYLINDRICAL ROLLER BEARINGS

### Brass Cages

These are primarily roller guided cages with cylindrical bored pockets. They are used with the standard style roller bearings.

### Stamped Steel Cages

Stamped steel cages of varying designs are available in the standard style cylindrical roller bearings.

The stamped steel cage for the 5200 series is a land riding cage piloted by the outer ring ribs. The cage features depressed bars which not only space rollers evenly but retain them as a complete assembly with the outer ring.



Brass Cage

## CAGES FOR TAPERED ROLLER BEARINGS

### Stamped Steel Cages

The cages are of compact space savings design and in some cases permit increased load-carrying capabilities to be incorporated into the bearing. They are roller riding with bridges positioned above the pitch line to retain the rollers within the cone.

### Machined Cages

These heavy section ruggedly constructed cages are fully machined and are land riding on the thrust and toe flange O.D. of the cone (inner ring). The bridges between the straight through machined roller pockets are staked above the pitch line to retain the rollers with the cone.

### Pin Type Cages

This steel cage design features a pin which fits closely with a bored hole in the roller. The rollers can thus be retained with a minimum space between the rollers so that an increased complement of rollers can be incorporated. This results in greater load carrying capabilities in the bearing.

## DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS

## SUMMARY OF SYMBOLS USED TO DETERMINE APPLIED LOADS AND BEARING ANALYSIS

| Symbol                          | Description                                                                      | Units                         | Symbol                                           | Description                                                                              | Units                                  |
|---------------------------------|----------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------|
| a <sub>1</sub>                  | Reliability Life Factor                                                          |                               | k                                                | Centrifugal Force Constant                                                               | lbf/RPM <sup>2</sup>                   |
| a <sub>2</sub>                  | Material Life Factor                                                             |                               | k <sub>1</sub>                                   | Bearing Torque Constant                                                                  |                                        |
| a <sub>3</sub>                  | Operating Condition Life Factor                                                  |                               | k <sub>4</sub> , k <sub>5</sub> , k <sub>6</sub> | Dimensional Factor to calculate heat generation                                          |                                        |
| a <sub>3d</sub>                 | Debris Life Factor                                                               |                               | K                                                | Tapered Roller Bearing Radial-to-Axial Dynamic Load Rating Factor                        |                                        |
| a <sub>3h</sub>                 | Hardness Life Factor                                                             |                               | l                                                | Thrust Needle Roller Length                                                              | mm, in.                                |
| a <sub>3k</sub>                 | Load Zone Life Factor                                                            |                               | L                                                | Lead, Axial Advance of a Helix for One Complete Revolution                               | mm, in.                                |
| a <sub>3l</sub>                 | Lubrication Life Factor                                                          |                               | L                                                | Distance between bearing geometric center lines                                          | mm, in.                                |
| a <sub>3m</sub>                 | Misalignment Life Factor                                                         |                               | m                                                | Gearing Ratio                                                                            |                                        |
| a <sub>3p</sub>                 | Low Load Life Factor                                                             |                               | M                                                | Bearing Operating Torque or Moment                                                       | N-m, N-mm, lb-in.                      |
| a <sub>e</sub>                  | Effective Bearing Spread                                                         | mm, in.                       | n                                                | Bearing Operating Speed or General Term for Speed                                        | rot/min, RPM                           |
| b                               | Tooth Length                                                                     | mm, in.                       | n <sub>G</sub>                                   | Gear Operating Speed (RPM)                                                               | rot/min, RPM                           |
| c <sub>1</sub> , c <sub>2</sub> | Linear Distance (positive or negative)                                           | mm, in.                       | n <sub>P</sub>                                   | Pinion Operating Speed (RPM)                                                             | rot/min, RPM                           |
| C                               | Dynamic Radial Load Rating                                                       | N, lbf                        | n <sub>W</sub>                                   | Worm Operating Speed (RPM)                                                               | rot/min, RPM                           |
| C <sub>0</sub>                  | Static Load Rating                                                               | N, lbf                        | N <sub>G</sub>                                   | Number of Teeth in the Gear                                                              |                                        |
| C <sub>p</sub>                  | Specific Heat of Lubricant                                                       | J/(kg · °C),<br>BTU/(lb × F°) | N <sub>P</sub>                                   | Number of Teeth in the Pinion                                                            |                                        |
| d                               | Bearing bore diameter                                                            | mm, in.                       | N <sub>S</sub>                                   | Number of Teeth in the Sprocket                                                          |                                        |
| d <sub>0</sub>                  | Mean inner race diameter                                                         | mm, in.                       | P <sub>0</sub>                                   | Static Equivalent Load                                                                   | N, lbf                                 |
| d <sub>c</sub>                  | Distance Between Gear Centers                                                    | mm, in.                       | P <sub>0a</sub>                                  | Static Equivalent Thrust (Axial) Load                                                    | N, lbf                                 |
| d <sub>m</sub>                  | Mean Bearing Diameter                                                            | mm, in.                       | P <sub>0r</sub>                                  | Static Equivalent Radial Load                                                            | N, lbf                                 |
| d <sub>s</sub>                  | Shaft inside diameter                                                            | mm, in.                       | P <sub>r</sub>                                   | Dynamic Equivalent Radial Load                                                           | N, lbf                                 |
| D                               | Bearing outside diameter                                                         | mm, in.                       | Q                                                | Generated Heat or Heat Dissipation Rate                                                  | W, BTU/min                             |
| D <sub>0</sub>                  | Mean outer race diameter                                                         | mm, in.                       | T                                                | Torque                                                                                   | N-m, lb-in.                            |
| D <sub>H</sub>                  | Housing outside diameter                                                         | mm, in.                       | v                                                | Vertical (used as subscript)                                                             |                                        |
| D <sub>m</sub>                  | Mean Diameter or Effective Working Diameter of a Sprocket, Pulley, Wheel or Tire | mm, in.                       | V                                                | Linear Velocity or Speed                                                                 | km/h, mph                              |
| D <sub>mG</sub>                 | Mean or Effective Working Diameter of the Gear                                   | mm, in.                       | V <sub>r</sub>                                   | Rubbing, Surface or Tapered Roller Bearing Rib Velocity                                  | m/s, fpm                               |
| D <sub>mP</sub>                 | Effective Working Diameter of the Pinion                                         | mm, in.                       | X                                                | Dynamic Radial Load Factor                                                               |                                        |
| D <sub>mW</sub>                 | Effective Working Diameter of the Worm                                           | mm, in.                       | X <sub>0</sub>                                   | Static Radial Load Factor                                                                |                                        |
| D <sub>pG</sub>                 | Pitch Diameter of the Gear                                                       | mm, in.                       | Y                                                | Dynamic Thrust (Axial) Load Factor                                                       |                                        |
| D <sub>pP</sub>                 | Pitch Diameter of the Pinion                                                     | mm, in.                       | Y <sub>0</sub>                                   | Static Thrust (Axial) Load Factor                                                        |                                        |
| D <sub>pW</sub>                 | Pitch Diameter of the Worm                                                       | mm, in.                       | Y <sub>G</sub>                                   | Bevel Gearing – Gear Pitch Angle                                                         | deg.                                   |
| e                               | Life Exponent                                                                    |                               | Y <sub>P</sub>                                   | Hypoid Gearing – Gear Root Angle                                                         | deg.                                   |
| f                               | Lubricant Flow Rate                                                              | L/min, U.S. pt/min            | Y <sub>P</sub>                                   | Bevel Gearing – Pinion Pitch Angle                                                       | deg.                                   |
| f <sub>0</sub>                  | Viscous Dependent Torque Coefficient                                             |                               | α                                                | Hypoid Gearing – Pinion Face Angle                                                       | deg.                                   |
| f <sub>1</sub>                  | Load Dependent Torque Coefficient                                                |                               |                                                  | Coefficient of linear expansion                                                          | mm/mm/°C,<br>in./in./°F                |
| f <sub>B</sub>                  | Belt or Chain Pull Factor                                                        |                               | δ <sub>S</sub>                                   | Interference fit of inner race on shaft                                                  | mm, in.                                |
| F                               | General Term for Force                                                           | N, lbf                        | δ <sub>H</sub>                                   | Interference fit of outer race in housing                                                | mm, in.                                |
| F <sub>a</sub>                  | Applied Thrust (Axial) Load                                                      | N, lbf                        | η                                                | Efficiency, Decimal Fraction                                                             |                                        |
| F <sub>ai</sub>                 | Induced Thrust (Axial) Load due to Radial Loading                                | N, lbf                        | θ <sub>1</sub> , θ <sub>2</sub> , θ <sub>3</sub> | Gear Mesh Angles Relative to the Reference Plane                                         | deg.                                   |
| F <sub>ac</sub>                 | Induced Thrust (Axial) Load due to Centrifugal Loading                           | N, lbf                        | θ <sub>i</sub> , θ <sub>o</sub>                  | Oil inlet or outlet temperature                                                          | C°, F°                                 |
| F <sub>aG</sub>                 | Thrust Force on Gear                                                             | N, lbf                        | λ                                                | Worm Gear Lead Angle                                                                     | deg.                                   |
| F <sub>aP</sub>                 | Thrust Force on Pinion                                                           | N, lbf                        | μ                                                | Coefficient of Friction                                                                  |                                        |
| F <sub>aW</sub>                 | Thrust Force on Worm                                                             | N, lbf                        | v                                                | Lubricant Kinematic Viscosity                                                            | cSt                                    |
| f <sub>B</sub>                  | Belt or Chain Pull                                                               | N, lbf                        | σ <sub>0</sub>                                   | Approximate Maximum Contact Stress                                                       | MPa, psi                               |
| F <sub>c</sub>                  | Centrifugal Force                                                                | N, lbf                        | Φ <sub>G</sub>                                   | Normal Tooth Pressure Angle for the Gear                                                 | deg.                                   |
| F <sub>r</sub>                  | Applied Radial Load                                                              | N, lbf                        | Φ <sub>P</sub>                                   | Normal Tooth Pressure Angle for the Pinion                                               | deg.                                   |
| F <sub>sG</sub>                 | Separating Force on Gear                                                         | N, lbf                        | ψ <sub>G</sub>                                   | Helix (Helical) or Spiral Angle for the Gear                                             | deg.                                   |
| F <sub>sP</sub>                 | Separating Force on Pinion                                                       | N, lbf                        | ψ <sub>P</sub>                                   | Helix (Helical) or Spiral Angle for the Pinion                                           | deg.                                   |
| F <sub>sW</sub>                 | Separating Force on Worm                                                         | N, lbf                        | ΔT                                               | Temperature difference between shaft/inner race + rollers and housing/bearing outer race | C°, F°                                 |
| F <sub>te</sub>                 | Tractive Effort on Vehicle Wheels                                                | N, lbf                        | ρ                                                | Lubricant Density                                                                        | kg/m <sup>3</sup> , lb/ft <sup>3</sup> |
| F <sub>tG</sub>                 | Tangential Force on Gear                                                         | N, lbf                        |                                                  |                                                                                          |                                        |
| F <sub>tP</sub>                 | Tangential Force on Pinion                                                       | N, lbf                        |                                                  |                                                                                          |                                        |
| F <sub>tW</sub>                 | Tangential Force on Worm                                                         | N, lbf                        |                                                  |                                                                                          |                                        |
| F <sub>W</sub>                  | Force of Unbalance                                                               | N, lbf                        |                                                  |                                                                                          |                                        |
| h                               | Horizontal (used as subscript)                                                   |                               |                                                  |                                                                                          |                                        |
| H                               | Power (kW or HP)                                                                 | kW, HP                        |                                                  |                                                                                          |                                        |
| HF <sub>s</sub>                 | Static Load Rating Adjustment Factor for Raceway Hardness                        |                               |                                                  |                                                                                          |                                        |

DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS - continued

DETERMINATION OF APPLIED LOADS

The following equations are used to determine the forces developed by machine elements commonly encountered in bearing applications.

GEARING

Spur gearing (Fig. A-1)

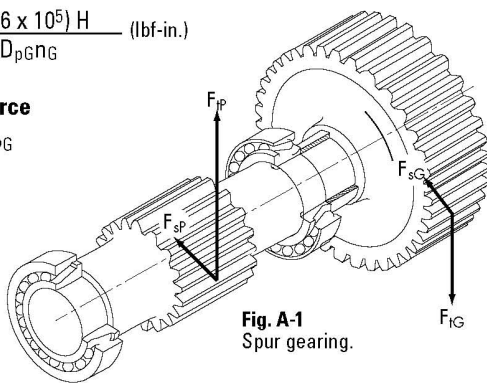
Tangential force

$$F_{tG} = \frac{(1.91 \times 10^7) H}{D_{pG} n_G} \text{ (newtons)}$$

$$= \frac{(1.26 \times 10^5) H}{D_{pG} n_G} \text{ (lbf-in.)}$$

Separating force

$$F_{sG} = F_{tG} \tan \phi_G$$



Single helical gearing (Fig. A-2)

Tangential force

$$F_{tG} = \frac{(1.91 \times 10^7) H}{D_{pG} n_G} \text{ (newtons)}$$

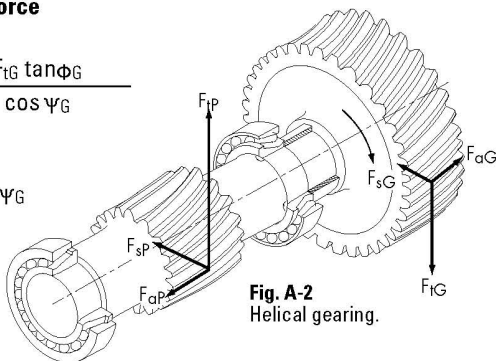
$$= \frac{(1.26 \times 10^5) H}{D_{pG} n_G} \text{ (lbf-in.)}$$

Separating force

$$F_{sG} = \frac{F_{tG} \tan \phi_G}{\cos \psi_G}$$

Thrust force

$$F_{aG} = F_{tG} \tan \psi_G$$



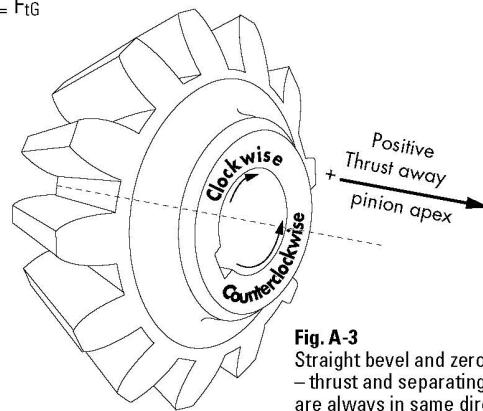
Straight bevel and zerol gearing with zero degrees spiral (Fig. A-3)

In straight bevel and zerol gearing, the gear forces tend to push the pinion and gear out of mesh, such that the direction of the thrust and separating forces are always the same regardless of direction of rotation. (Fig. A-3) In calculating the tangential force, ( $F_{tP}$  or  $F_{tG}$ ), for bevel gearing, the pinion or gear mean diameter, ( $D_{mP}$  or  $D_{mG}$ ), is used instead of the pitch diameter, ( $D_{pP}$  or  $D_{pG}$ ). The mean diameter is calculated as follows:

$$D_{mG} = D_{pG} - b \sin \gamma_G \quad \text{or} \quad D_{mP} = D_{pP} - b \sin \gamma_P$$

In straight bevel and zerol gearing

$$F_{tP} = F_{tG}$$



Pinion

Tangential force

$$F_{tP} = \frac{(1.91 \times 10^7) H}{D_{mP} n_P} \text{ (newtons)}$$

$$= \frac{(1.26 \times 10^5) H}{D_{mP} n_P} \text{ (lbf-in.)}$$

Thrust force

$$F_{\phi P} = F_{tP} \tan \phi_P \sin \gamma_P$$

Separating force

$$F_{sP} = F_{tP} \tan \phi_P \cos \gamma_P$$

DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS - continued

**Straight bevel gear (Fig. A-4)**

**Tangential force**

$$F_{tG} = \frac{(1.91 \times 10^7) H}{D_{mG} n_G} \text{ (newtons)}$$

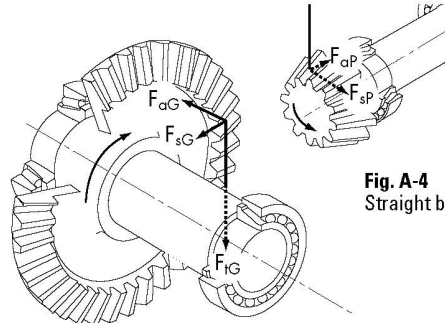
$$= \frac{(1.26 \times 10^5) H}{D_{mG} n_G} \text{ (lbf-in.)}$$

**Thrust force**

$$F_{aG} = F_{tG} \tan \phi_G \sin \gamma_G$$

**Separating force**

$$F_{sG} = F_{tG} \tan \phi_G \cos \gamma_G$$



**Fig. A-4**  
Straight bevel gearing.

**Spiral bevel and hypoid gearing (Fig. A-5)**

In spiral bevel and hypoid gearing, the direction of the thrust and separating forces depends upon spiral angle, hand of spiral, direction of rotation, and whether the gear is driving or driven (see Table 1). The hand of the spiral is determined by noting whether the tooth curvature on the near face of the gear (Fig. A-5) inclines to the left or right from the shaft axis. Direction of rotation is determined by viewing toward the gear or pinion apex.

In spiral bevel gearing

$$F_{tP} = F_{tG}$$

In hypoid gearing

$$F_{tP} = \frac{F_{tG} \cos \psi_P}{\cos \psi_G}$$

Hypoid pinion effective working diameter

$$D_{mP} = D_{mG} \left( \frac{N_p}{N_G} \right) \left( \frac{\cos \psi_G}{\cos \psi_P} \right)$$

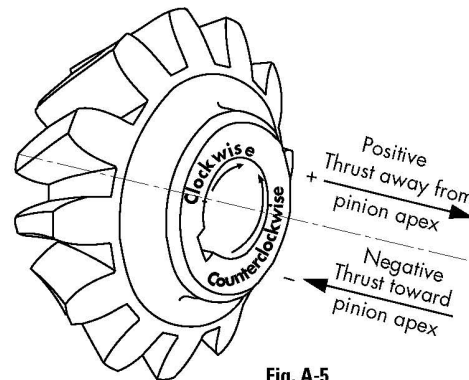
**Tangential force**

$$F_{tG} = \frac{(1.91 \times 10^7) H}{D_{mG} n_G} \text{ (newtons)}$$

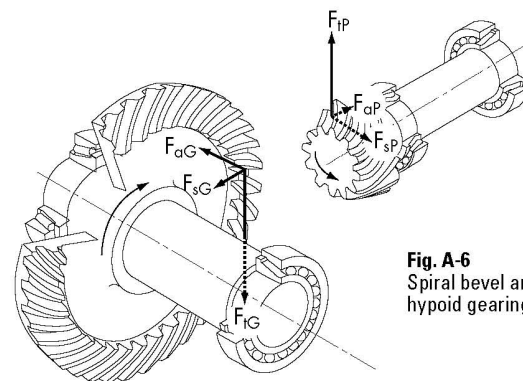
$$= \frac{(1.26 \times 10^5) H}{D_{mG} n_G} \text{ (lbf-in.)}$$

Hypoid gear effective working diameter

$$D_{mG} = D_{pG} - b \sin \gamma_G$$



**Fig. A-5**  
Spiral bevel and hypoid gears – the direction of thrust and separating forces depends upon spiral angle, hand of spiral, direction of rotation, and whether the gear is driving or driven.



**Fig. A-6**  
Spiral bevel and hypoid gearing.



DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS - continued

TABLE 1

SPIRAL BEVEL AND HYPOID GEARING EQUATIONS

| Driving member rotation                                                | Thrust force                                                                                                    | Separating force                                                                                                |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Right hand spiral clockwise<br>or<br>Left hand spiral counterclockwise | Driving member<br>$F_{aP} = \frac{F_{tP}}{\cos \psi_P} (\tan \phi_P \sin \gamma_P - \sin \psi_P \cos \gamma_P)$ | Driving member<br>$F_{sP} = \frac{F_{tP}}{\cos \psi_P} (\tan \phi_P \cos \gamma_P + \sin \psi_P \sin \gamma_P)$ |
|                                                                        | Driven member<br>$F_{aG} = \frac{F_{tG}}{\cos \psi_G} (\tan \phi_G \sin \gamma_G + \sin \psi_G \cos \gamma_G)$  | Driven member<br>$F_{sG} = \frac{F_{tG}}{\cos \psi_G} (\tan \phi_G \cos \gamma_G - \sin \psi_G \sin \gamma_G)$  |
| Right hand spiral counterclockwise<br>or<br>Left hand spiral clockwise | Driving member<br>$F_{aP} = \frac{F_{tP}}{\cos \psi_P} (\tan \phi_P \sin \gamma_P + \sin \psi_P \cos \gamma_P)$ | Driving member<br>$F_{sP} = \frac{F_{tP}}{\cos \psi_P} (\tan \phi_P \cos \gamma_P - \sin \psi_P \sin \gamma_P)$ |
|                                                                        | Driven member<br>$F_{aG} = \frac{F_{tG}}{\cos \psi_G} (\tan \phi_G \sin \gamma_G - \sin \psi_G \cos \gamma_G)$  | Driven member<br>$F_{sG} = \frac{F_{tG}}{\cos \psi_G} (\tan \phi_G \cos \gamma_G + \sin \psi_G \sin \gamma_G)$  |

Straight worm gearing (Fig. A-7)

WORM

Tangential force

$$F_{tW} = \frac{(1.91 \times 10^7) H}{D_{pW} \eta_W} \text{ (newtons)}$$

$$= \frac{(1.26 \times 10^5) H}{D_{pW} \eta_W} \text{ (lbf-in.)}$$

Thrust force

$$F_{aW} = \frac{(1.91 \times 10^7) H \eta}{D_{pG} \eta_G} \text{ (newtons)}$$

$$= \frac{(1.26 \times 10^5) H \eta}{D_{pG} \eta_G} \text{ (lbf-in.)}$$

or

$$F_{aW} = \frac{F_{tW} \eta}{\tan \lambda}$$

Separating force

$$F_{sW} = \frac{F_{tW} \sin \phi}{\cos \phi \sin \lambda + \mu \cos \lambda}$$

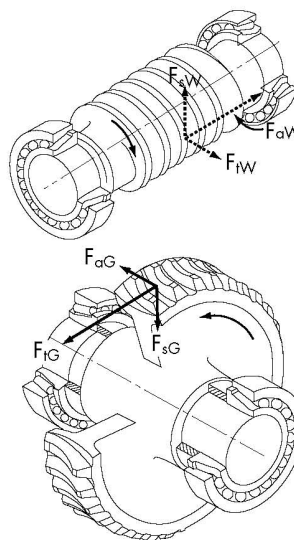


Fig. A-7  
Straight worm gearing.



## DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS - continued

**Worm Gear****Tangential force**

$$F_{tG} = \frac{(1.91 \times 10^7) H \eta}{D_{pG} n_G} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H \eta}{D_{pG} n_G} \quad (\text{lbf-in.})$$

or

$$F_{tG} = \frac{F_{tW} \eta}{\tan \lambda}$$

**Thrust force**

$$F_{aG} = \frac{(1.91 \times 10^7) H}{D_{pW} n_W} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H}{D_{pW} n_W} \quad (\text{lbf-in.})$$

**Separating force**

$$F_{sG} = \frac{F_{tW} \sin \Phi}{\cos \Phi \sin \lambda + \mu \cos \lambda}$$

where:

$$\lambda = \tan^{-1} \left( \frac{D_{pG}}{m D_{pW}} \right) = \tan^{-1} \left( \frac{L}{\pi D_{pW}} \right)$$

$$\eta = \frac{\cos \Phi - \mu \tan \lambda}{\cos \Phi + \mu \cot \lambda}$$

**Metric system**

$$\mu^* = (5.34 \times 10^{-7}) V_r^3 + \frac{0.146}{V_r^{0.09}} - 0.103$$

$$V_r = \frac{D_{pW} n_W}{(1.91 \times 10^4) \cos \lambda} \quad (\text{meters per second})$$

**Inch system**

$$\mu^* = (7 \times 10^{-14}) V_r^3 + \frac{0.235}{V_r^{0.09}} - 0.103$$

$$V_r = \frac{D_{pW} n_W}{3.82 \cos \lambda} \quad (\text{feet per minute})$$

\*Approximate coefficient of friction for the 0.015 to 15 m/s (3 to 3000 ft/min) rubbing velocity range.

**Double enveloping worm gearing****Worm****Tangential force**

$$F_{tW} = \frac{(1.91 \times 10^7) H}{D_{mW} n_W} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H}{D_{mW} n_W} \quad (\text{lbf-in.})$$

**Thrust force**

$$F_{aW} = 0.98 F_{tG}$$

Use this value for calculating torque in subsequent gears and shafts. For bearing loading calculations, use the equation for  $F_{aW}$ .

**Separating force**

$$F_{sW} = \frac{0.98 F_{tG} \tan \Phi}{\cos \lambda}$$

**WORM GEAR****Tangential force**

$$F_{tG} = \frac{(1.91 \times 10^7) H m \eta}{D_{pG} n_W} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H m \eta}{D_{pG} n_W} \quad (\text{lbf-in.})$$

or

$$F_{tG} = \frac{(1.91 \times 10^7) H \eta}{D_{pG} n_G} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H \eta}{D_{pG} n_G} \quad (\text{lbf-in.})$$

Use this value for  $F_{tG}$  for bearing loading calculations on worm gear shaft. For torque calculations, use the following  $F_{tG}$  equations.

**Thrust force**

$$F_{aG} = \frac{(1.91 \times 10^7) H}{D_{mW} n_W} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H}{D_{mW} n_W} \quad (\text{lbf-in.})$$

**Separating force**

$$F_{sG} = \frac{0.98 F_{tG} \tan \Phi}{\cos \lambda}$$

where:

$\eta$  = efficiency (refer to manufacturer's catalog)

$$D_{mW} = 2d_c - 0.98 D_{pG}$$

Lead angle at center of worm

$$\lambda = \tan^{-1} \left( \frac{D_{pG}}{m D_{pW}} \right) = \tan^{-1} \left( \frac{L}{\pi D_{pW}} \right)$$

**DETERMINATION OF APPLIED LOADS AND BEARING ANALYSIS - continued**

**Belt and chain drive factors (Fig. A-8)**

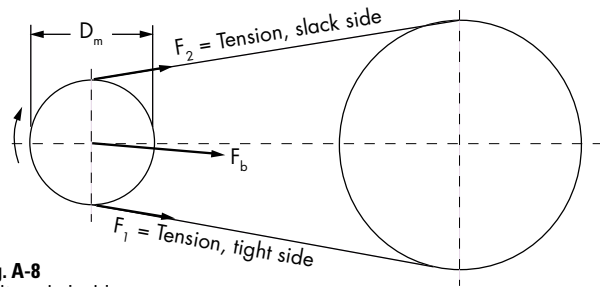
Due to the variations of belt tightness as set by various operators, an exact equation relating total belt pull to tension F1 on the tight side and tension F2 on the slack side (Fig. A-8) is difficult to establish. The following equation and Table 2 may be used to estimate the total pull from various types of belt and pulley, and chain and sprocket designs:

$$F_b = \frac{(1.91 \times 10^7) H f_B}{D_m n} \quad (\text{newtons})$$

$$= \frac{(1.26 \times 10^5) H f_B}{D_m n} \quad (\text{lbf-in.})$$

Standard roller chain sprocket mean diameter

$$D_m = \frac{P}{\sin\left(\frac{180}{N_s}\right)}$$



**Fig. A-8**  
Belt or chain drive.

| Type                 | f <sub>B</sub> |
|----------------------|----------------|
| Chains, single ..... | 1.00           |
| Chains, double ..... | 1.25           |
| "V" belts.....       | 1.50           |

**Table 2**  
Belt or chain pull factor based on 180 degrees angle of wrap.

**CENTRIFUGAL FORCE**

Centrifugal force resulting from imbalance in a rotating member:

$$F_c = \frac{F_w r n^2}{8.94 \times 10^5} \quad (\text{newtons})$$

$$= \frac{F_w r n^2}{3.52 \times 10^4} \quad (\text{lbf-in.})$$

**SHOCK LOADS**

It is difficult to determine the exact effect that shock loading has on bearing life. The magnitude of the shock load depends on the masses of the colliding bodies, their velocities, and deformations at impact.

The effect on the bearing depends on how much of the shock is absorbed between the point of impact and the bearings, as well as whether the shock load is great enough to cause bearing damage. It also is dependent on frequency and duration of shock loads.

At a minimum, a suddenly applied load is equivalent to twice its static value. It may be considerably more than this, depending on the velocity of impact.

Shock involves a number of variables that generally are not known or easily determined. Therefore, it is good practice to rely on experience. The Timken Company has years of experience with many types of equipment under the most severe loading conditions. Your Timken representative should be consulted on any application involving unusual loading or service requirements.

**GENERAL FORMULAS**

**Tractive effort and wheel speed**

The relationships of tractive effort, power, wheel speed and vehicle speed are:

**Metric system**

$$H = \frac{F_{te} V}{3600} \quad (\text{kW})$$

$$n = \frac{5300 V}{D_m} \quad (\text{rev/min})$$

**Inch system**

$$H = \frac{F_{te} V}{375} \quad (\text{HP})$$

$$n = \frac{336 V}{D_m} \quad (\text{rev/min})$$

**Torque to power relationship**

**Metric system**

$$T = \frac{60\,000 H}{2\pi n} \quad (\text{N-m})$$

$$H = \frac{2\pi n T}{60\,000} \quad (\text{kW})$$

**Inch system**

$$T = \frac{395\,877 H}{2\pi n} \quad (\text{lbf-in.})$$

$$H = \frac{2\pi n T}{395\,877} \quad (\text{HP})$$

## BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE

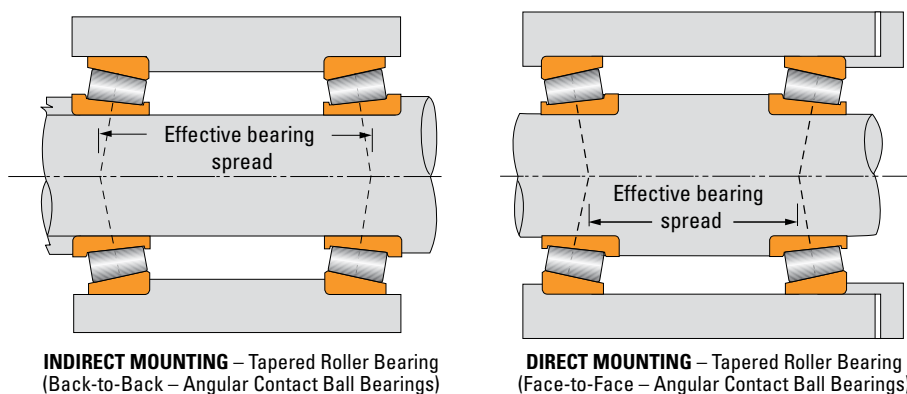
### BEARING REACTIONS

Equations and procedure for determining bearing reactions follow.

#### Effective spread

When a load is applied to a tapered roller or angular contact ball bearing, the internal forces at each rolling element to outer raceway contact act normal to the raceway. These forces have radial and axial components. With the exception of the special case of pure thrust loads, the inner ring and the shaft will experience moments imposed by the asymmetrical axial components of the forces on the rollers.

It can be demonstrated mathematically that, if the shaft is modeled as being supported at its effective bearing center rather than at its geometric bearing center, the bearing moment may be ignored when calculating radial loads on the bearing. Only externally applied loads need to be considered, and moments are taken about the effective centers of the bearings to determine bearing loads or reactions. Fig. A-9 shows single-row bearings in a direct and indirect mounting configuration. The choice of whether to use direct or indirect mounting depends upon the application and duty.



**Fig. A-9**  
Choice of mounting configuration for single-row bearings, showing position of effective load carrying centers.

#### Shaft on two supports

Simple beam equations are used to translate the externally applied forces on a shaft into bearing reactions acting at the bearing effective centers.

With two-row tapered and angular contact ball bearings, the geometric center of the bearing is considered to be the support point except where the thrust force is large enough to unload one row. Then, the effective center of the loaded row is used as the point from which bearing load reactions are calculated. These approaches approximate the load distribution within a two-row bearing, assuming rigid shaft and housing. These are statically indeterminate problems in which shaft and support rigidity can significantly influence bearing loading and require the use of computer programs to solve.

#### Shaft on three or more supports

The equations of static equilibrium are insufficient to solve bearing reactions on a shaft having more than two supports. Such cases can be solved using computer programs if adequate information is available.

In such problems, the deflections of the shaft, bearings and housings affect the distribution of loads. Any variance in these parameters can significantly affect bearing reactions.

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

CALCULATION EQUATIONS

| Symbols Used      |                                                                               |               |
|-------------------|-------------------------------------------------------------------------------|---------------|
| $a_e$             | Effective bearing spread                                                      | mm, in.       |
| A, B, ...         | Bearing position, used as subscripts                                          |               |
| $c_1, c_2, \dots$ | Linear distance (positive or negative)                                        | mm, in.       |
| $D_{pG}$          | Pitch diameter of the gear                                                    | mm, in.       |
| F                 | Applied force                                                                 | N, lbf        |
| $F_r$             | Radial bearing load                                                           | N, lbf        |
| h                 | Horizontal (used as subscript)                                                |               |
| M                 | Moment                                                                        | N-mm, lbf-in. |
| v                 | Vertical (used as subscript)                                                  |               |
| $\theta_1$        | Gear mesh angle relative to plane of reference defined in Figure A-10         | degree        |
| $\theta_2$        | Angle of applied force relative to plane of reference defined in Figure A-10  | degree        |
| $\theta_3$        | Angle of applied moment relative to plane of reference defined in Figure A-10 | degree        |

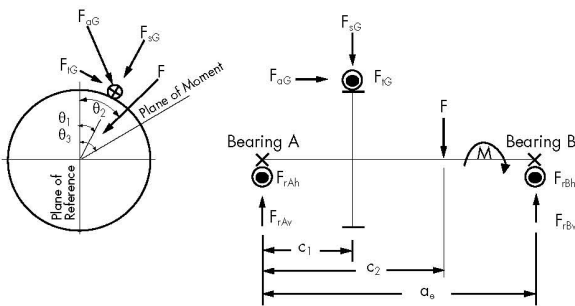


Fig. A-10  
Bearing radial reactions.

Bearing radial loads are determined by:

1. Resolving forces applied to the shaft into horizontal and vertical components, relative to a convenient reference plane.
2. Taking moments about the opposite support.
3. Combining the horizontal and vertical reactions at each support into one resultant load.

Shown are equations for the case of a shaft on two supports with gear forces  $F_t$  (tangential),  $F_s$  (separating), and  $F_a$  (thrust), an external radial load  $F$ , and an external moment  $M$ . The loads are applied at arbitrary angles ( $\theta_1$ ,  $\theta_2$ , and  $\theta_3$ ) relative to the reference plane indicated in Fig. A-10. Using the principle of superposition, the equations for vertical and horizontal reactions ( $F_{rv}$  and  $F_{rh}$ ) can be expanded to include any number of gears, external forces or moments. Use signs as determined from gear force equation.

Care should be used when doing this to ensure proper supporting degrees of freedom are used. That is, tapered roller bearings and ball bearings support radial loads, moment loads and thrust loads in both directions. Spherical roller bearings will not support a moment load, but will support radial and thrust loads in both directions. Cylindrical roller bearings support radial and moment loading, but can only support slight thrust loads depending upon thrust flange configuration. Finally, needle roller bearings only support radial and moment loading.

Vertical reaction component at bearing position B

$$F_{rBv} = \frac{1}{a_e} \left[ c_1 (F_{sG} \cos \theta_1 + F_{tG} \sin \theta_1) + \frac{1}{2} (D_{pG} - b \sin \gamma_G) F_{aG} \cos \theta_1 + c_2 F \cos \theta_2 + M \cos \theta_3 \right]$$

Horizontal reaction component at bearing position B

$$F_{rBh} = \frac{1}{a_e} \left[ c_1 (F_{sG} \sin \theta_1 - F_{tG} \cos \theta_1) + \frac{1}{2} (D_{pG} - b \sin \gamma_G) F_{aG} \sin \theta_1 + c_2 F \sin \theta_2 + M \sin \theta_3 \right]$$

Vertical reaction component at bearing position A

$$F_{rAv} = F_{sG} \cos \theta_1 + F_{tG} \sin \theta_1 + F \cos \theta_2 - F_{rBv}$$

Horizontal reaction component at bearing position A

$$F_{rAh} = F_{sG} \sin \theta_1 - F_{tG} \cos \theta_1 + F \sin \theta_2 - F_{rBh}$$

Resultant radial reaction

$$F_{rA} = (F_{rAv}^2 + F_{rAh}^2)^{1/2}$$

$$F_{rB} = (F_{rBv}^2 + F_{rBh}^2)^{1/2}$$

## BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - *continued*

### Equivalent dynamic radial bearing loads ( $P_r$ )

To calculate the  $L_{10}$  life, it is necessary to calculate a dynamic equivalent radial load, designated by  $P_r$ . The dynamic equivalent radial load is defined as a single radial load that, if applied to the bearing, will result in the same life as the combined loading under which the bearing operates.

$$P_r = XF_r + Y_1F_a$$

Where,

$P_r$  = Dynamic Equivalent Radial Load

$F_r$  = Applied Radial Load

$F_a$  = Applied Axial Load

$X$  = Radial Load Factor

$Y$  = Axial Load Factor

For spherical roller bearings, the values for  $X$  and  $Y$  can be determined using the equations below. Calculate the ratio of the axial load to the radial load. Compare this ratio to the  $e$  value for the bearing.

In equation form,

$$P_r = F_r + Y_2 F_a \quad \text{for } F_a/F_r \leq e, \text{ and}$$

$$P_r = 0.67F_r + Y_2 F_a \quad \text{for } F_a/F_r > e.$$

Note that values for  $e$ ,  $Y_1$  and  $Y_2$  are available in the bearing tables.

Needle roller bearings are designed to carry radial load with zero thrust load under normal conditions. With the thrust load equal to zero equivalent radial load ( $P_r$ ) is equal to the design radial load ( $F_r$ ). Your Timken representative should be consulted on any applications where thrust load is involved, as the resulting increase in internal friction may require cooling to prevent increased operating temperatures.

For cylindrical roller bearings with purely radial applied load:

$$P = F_r \text{ (kN)}$$

Note: The maximum dynamic radial load that may be applied to a cylindrical roller bearing should be  $\leq C/3$ .

If, in addition to the radial load, an axial load  $F_a$  acts on the bearing, this axial load is taken into consideration when calculating the life of a bearing (with  $F_a \leq F_{az}$ ;  $F_{az}$  is the allowable axial load).

| Dimension Series | Load ratio          | Equivalent Dynamic Load               |
|------------------|---------------------|---------------------------------------|
| 10.. 2..E, 3..E  | $F_a/F_r \leq 0.11$ | $P = F_r$                             |
|                  | $F_a/F_r > 0.11$    | $P = 0.93 \cdot F_r + 0.69 \cdot F_a$ |
| 22..E, 23..E     | $F_a/F_r \leq 0.17$ | $P = F_r$                             |
|                  | $F_a/F_r > 0.17$    | $P = 0.93 \cdot F_r + 0.45 \cdot F_a$ |

Tapered roller bearings use the equations based on the number of rows and type of mounting utilized. For single-row bearings in direct or indirect mounting, the table on page A31 can be used based on the direction of the externally applied thrust load. Once the appropriate design is chosen, review the table and check the thrust condition to determine which thrust load and dynamic equivalent radial load calculations apply.



**BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued**

For ball bearings, the dynamic equivalent radial load can be found in Table 3. The required Y factors are found in the Table 4.

**TABLE 3**

| Bearing Description (ref.)                                                                               | Contact Angle | Single-Row and Tandem Mountings                                                    | Double-Row and Preload Pair Mountings                                                                                        |
|----------------------------------------------------------------------------------------------------------|---------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Bearing Type and or Series</b>                                                                        |               | $K_T = \frac{F_a}{(\# \text{ of bearings}) \times C_o}$                            | $K_T = \frac{F_a}{C_o}$                                                                                                      |
| <b>RADIAL TYPE BALL BEARINGS Use larger of Resulting "P" Value*</b>                                      |               |                                                                                    |                                                                                                                              |
| M9300K,MM9300K<br>M9100K,MM9100K<br>M200K,MM200K<br>M300K,MM300K                                         | 0°            | P = F <sub>r</sub> or<br>P = 0.56F <sub>r</sub> + Y <sub>1</sub> F <sub>a</sub>    | P = F <sub>r</sub> + 1.20Y <sub>1</sub> F <sub>a</sub> or<br>P = 0.78F <sub>r</sub> + 1.625Y <sub>1</sub> F <sub>a</sub>     |
| Small inch and Metric<br>9300,9100,200,300<br>and derivatives<br>XLS Large Inch<br>W and GW Tri-Ply      | 0°            | P = F <sub>r</sub> or<br>P = 0.56F <sub>r</sub> + Y <sub>1</sub> F <sub>a</sub>    |                                                                                                                              |
| WIDE INNER RING BALL<br>BEARINGS HOUSED UNITS                                                            | 0°            | P = F <sub>r</sub> or<br>P = 0.56F <sub>r</sub> + Y <sub>1</sub> F <sub>a</sub>    |                                                                                                                              |
| <b>ANGULAR CONTACT BALL BEARINGS Use larger of Resulting "P" Value</b>                                   |               |                                                                                    |                                                                                                                              |
| 7200K, 7200W<br>7300W, 7400W<br>5200K-5300W<br>5311W-5318W<br>5218W, 5220W, 5407W<br>5221W, 5214W        | 20°           | P = F <sub>r</sub><br>or<br>P = 0.43F <sub>r</sub> + F <sub>a</sub>                | P = F <sub>r</sub> + 1.09F <sub>a</sub><br>or<br>P = 0.70F <sub>r</sub> + 1.63F <sub>a</sub>                                 |
| 5200, 5200W (see 20° exceptions)<br>5300, 5300W (see 20° exceptions)<br>5400, 5400W (see 20° exceptions) | 30°           | P = F <sub>r</sub><br>or<br>P = 0.39F <sub>r</sub> + 0.76F <sub>a</sub>            | P = F <sub>r</sub> + 0.78F <sub>a</sub><br>or<br>P = 0.63F <sub>r</sub> + 1.24F <sub>a</sub>                                 |
| 7200WN<br>7300WN<br>7400WN                                                                               | 40°           | P = F <sub>r</sub><br>or<br>P = 0.35F <sub>r</sub> + 0.57F <sub>a</sub>            | P = F <sub>r</sub> + 0.55F <sub>a</sub><br>or<br>P = 0.57F <sub>r</sub> + 0.93F <sub>a</sub>                                 |
| 2M9300WI<br>2M9100WI,2MM9100WI<br>2M200WI, 2MM9100WI<br>2MM300WI                                         | 15°           | P = F <sub>r</sub><br>or<br>P = 0.44F <sub>r</sub> + Y <sub>2</sub> F <sub>a</sub> | P = F <sub>r</sub> + 1.124Y <sub>2</sub> F <sub>a</sub><br>or<br>P = 0.72F <sub>r</sub> + 1.625Y <sub>2</sub> F <sub>a</sub> |
| 2MM9100WO                                                                                                |               | P = F <sub>r</sub><br>or<br>P = 0.44F <sub>r</sub> + Y <sub>3</sub> F <sub>a</sub> | P = F <sub>r</sub> + 1.124Y <sub>3</sub> F <sub>a</sub><br>or<br>P = 0.72F <sub>r</sub> + 1.625Y <sub>3</sub> F <sub>a</sub> |
| 3M9300WI<br>3M9100WI,3MM9100WI<br>3M200WI, 3MM200WI<br>3MM300WI                                          | 25°           | P = F <sub>r</sub><br>or<br>P = 0.41F <sub>r</sub> + 0.87F <sub>a</sub>            | P = F <sub>r</sub> + 0.92F <sub>a</sub><br>or<br>P = 0.67F <sub>r</sub> + 1.41F <sub>a</sub>                                 |

\* Note: If P > C<sub>o</sub> or P > 1/2 C<sub>E</sub> consult with your Timken representative on Life Calculations.

**TABLE 4**

| K <sub>T</sub> | Y <sub>1</sub> | Y <sub>2</sub> | Y <sub>3</sub> |
|----------------|----------------|----------------|----------------|
| 0.015          | 2.30           | 1.47           | 1.60           |
| 0.020          | 2.22           | 1.44           | 1.59           |
| 0.025          | 2.10           | 1.41           | 1.57           |
| 0.030          | 2.00           | 1.39           | 1.56           |
| 0.040          | 1.86           | 1.35           | 1.55           |
| 0.050          | 1.76           | 1.32           | 1.53           |
| 0.060          | 1.68           | 1.29           | 1.51           |
| 0.080          | 1.57           | 1.25           | 1.49           |
| 0.100          | 1.48           | 1.21           | 1.47           |
| 0.120          | 1.42           | 1.19           | 1.45           |
| 0.150          | 1.34           | 1.14           | 1.42           |
| 0.200          | 1.25           | 1.09           | 1.39           |
| 0.250          | 1.18           | 1.05           | 1.35           |
| 0.300          | 1.13           | 1.02           | 1.33           |
| 0.400          | 1.05           | 1.00           | 1.29           |
| 0.500          | 1.00           | 1.00           | 1.25           |
| 0.600          | —              | —              | 1.22           |
| 0.800          | —              | —              | 1.17           |
| 1.000          | —              | —              | 1.13           |
| 1.200          | —              | —              | 1.10           |

**Equivalent Dynamic Thrust Bearing Loads (P<sub>a</sub>)**

For thrust ball, cylindrical and tapered roller bearings, the existence of radial loads introduces complex load calculations that must be carefully considered. If radial load is zero, the equivalent dynamic thrust load (P<sub>a</sub>) will be equal to the applied thrust load (F<sub>a</sub>). If any radial load is expected in the application, consult your Timken representative for advice on bearing selection.

For thrust angular contact ball bearings, the equivalent dynamic thrust load is determined by:

$$P_a = X_r F_r + Y F_a$$

The minimum permissible thrust load to radial load ratios (F<sub>a</sub>/F<sub>r</sub>) and X and Y factors are listed in the bearing dimension tables in the thrust bearing section.

Thrust spherical roller bearing dynamic thrust loads are determined by:

$$P_a = 1.2F_r + F_a$$

Radial load (F<sub>r</sub>) of a thrust spherical roller bearing is proportional to the applied axial load (F<sub>a</sub>) with F<sub>r</sub> ≤ 0.55 F<sub>a</sub>. Because of the steep roller angle and the fact that the bearing is separable, a radial load will induce a thrust component (F<sub>ai</sub> = 1.2 F<sub>r</sub>), that must be resisted by another thrust bearing on the shaft or by an axial load greater than F<sub>ai</sub>.

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

**BEARING EQUIVALENT LOADS AND REQUIRED RATINGS FOR TAPERED ROLLER BEARINGS**

Tapered roller bearings are ideally suited to carry all types of loadings - radial, thrust, and any combination of both. Due to the tapered design of the bearing, a radial load will induce a thrust reaction within the bearing which must be opposed by an equal or greater thrust load in order to keep the bearing cone and cup from separating. The ratio of the radial to the thrust load and the bearing included cup angle determine the load zone in a given bearing. The number of rollers in contact as a result of this ratio determines the load zone in the bearing. If all the rollers are in contact, the load zone is referred to as being 360 degrees.

When only radial load is applied to a tapered roller bearing, for convenience it is assumed in using the traditional calculation method that half the rollers support the load – the load zone is 180 degrees. In this case, induced bearing thrust is:

$$F_{a(180)} = \frac{0.47 F_r}{K}$$

The equations for determining bearing thrust reactions and equivalent radial loads in a system of two single-row bearings are based on the assumption of a 180-degree load zone in one of the bearings and 180 degrees or more in the opposite bearing.

**Dynamic Equivalent Radial Load**

The basic dynamic radial load rating,  $C_{90}$ , is assumed to be the radial load carrying capacity with a 180-degree load zone in the bearing. When the thrust load on a bearing exceeds the induced thrust,  $F_{a(180)}$ , a dynamic equivalent radial load must be used to calculate bearing life.

The dynamic equivalent radial load is that radial load which, if applied to a bearing, will give the same life as the bearing will attain under the actual loading.

The equations presented give close approximations of the dynamic equivalent radial load assuming a 180-degree load zone in one bearing and 180 degrees or more in the opposite bearing.

Tapered roller bearings use the equations based on the number of rows and type of mounting utilized. For single-row bearings in direct or indirect mounting, the following table can be used based on the direction of the externally applied thrust load. Once the appropriate design is chosen, review the table and check the thrust condition to determine which thrust load and dynamic equivalent radial load calculations apply.

**SINGLE-ROW MOUNTING**

To use this table for a single-row mounting, determine if bearings are direct or indirect mounted and to which bearing, A or B, thrust  $F_{ae}$  is applied. Once the appropriate design is established, follow across the page opposite that design, and check to determine which thrust load and dynamic equivalent radial load equations apply.

| Design | Thrust Condition                                                               | Thrust Load                                                                    | Dynamic Equivalent Radial Load                  |
|--------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------|
|        | $\frac{0.47 F_{rA}}{K_A} \leq \left( \frac{0.47 F_{rB}}{K_B} + F_{ae} \right)$ | $F_{aA} = \frac{0.47 F_{rB}}{K_B} + F_{ae}$ $F_{aB} = \frac{0.47 F_{rB}}{K_B}$ | $*P_A = 0.4 F_{rA} + K_A F_{aA}$ $P_B = F_{rB}$ |
|        | $\frac{0.47 F_{rA}}{K_A} > \left( \frac{0.47 F_{rB}}{K_B} + F_{ae} \right)$    | $F_{aA} = \frac{0.47 F_{rA}}{K_A}$ $F_{aB} = \frac{0.47 F_{rA}}{K_A} - F_{ae}$ | $P_A = F_{rA}$ $*P_B = 0.4 F_{rB} + K_B F_{aB}$ |
|        | $\frac{0.47}{K_B} \leq \left( \frac{0.47 F_{rA}}{K_A} + F_{ae} \right)$        | $F_{aA} = \frac{0.47 F_{rA}}{K_A}$ $F_{aB} = \frac{0.47 F_{rA}}{K_A} + F_{ae}$ | $P_A = F_{rA}$ $*P_B = 0.4 F_{rB} + K_B F_{aB}$ |
|        | $\frac{0.47 F_{rB}}{K_B} > \left( \frac{0.47 F_{rA}}{K_A} + F_{ae} \right)$    | $F_{aA} = \frac{0.47 F_{rB}}{K_B} - F_{ae}$ $F_{aB} = \frac{0.47 F_{rB}}{K_B}$ | $*P_A = 0.4 F_{rA} + K_A F_{aA}$ $P_B = F_{rB}$ |

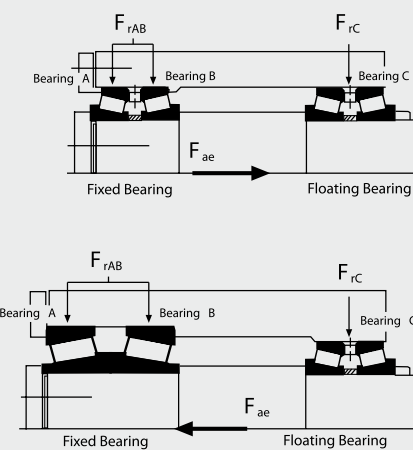
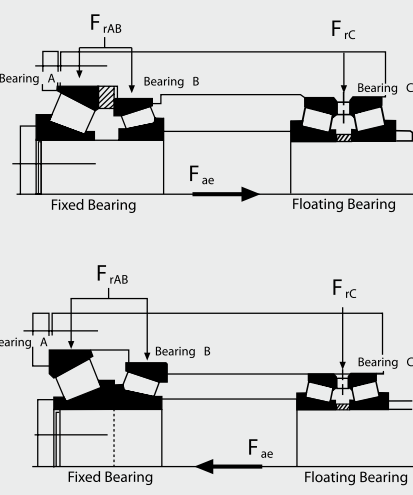
\* If  $P_A < F_{rA}$ , use  $P_A = F_{rA}$  and if  $P_B < F_{rB}$ , use  $P_B = F_{rB}$ .

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

**TWO-ROW MOUNTING, FIXED OR FLOATING (WITH NO EXTERNAL THRUST,  $F_{AE} = 0$ ) SIMILAR BEARING SERIES**

For double-row tapered roller bearings, the following table can be used. In this table, only bearing A has an applied thrust load. If bearing B has the applied thrust load, the A's in the equations should be replaced by B's and vice versa.

For two-row similar bearing series with no external thrust,  $F_{ae}=0$ , the dynamic equivalent radial load, P, equals  $F_{rAB}$  or  $F_{rC}$ . Since  $F_{rAB}$  or  $F_{rC}$  is the radial load on the two-row assembly, the two-row basic dynamic radial loads rating,  $C_{90(2)}$ , is to be used to calculate bearing life.

| Design                                                                                                                                              | Thrust Condition                      | Dynamic Equivalent Radial Load                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <p>SIMILAR BEARING SERIES,<br/><math>K_A = K_B</math></p>         | $F_{ae} \leq \frac{0.6 F_{rAB}}{K_A}$ | $P_A = 0.5 F_{rAB} + 0.83 K_A F_{ae}$<br>$P_B = 0.5 F_{rAB} - 0.83 K_A F_{ae}$                                         |
|                                                                                                                                                     | $F_{ae} > \frac{0.6 F_{rAB}}{K_A}$    | $P_A = 0.4 F_{rAB} + K_A F_{ae}$<br>$P_B = 0$                                                                          |
| <p>DISSIMILAR BEARING SERIES,<br/><math>K_A \neq K_B</math></p>  | $F_{ae} \leq \frac{0.6 F_{rAB}}{K_A}$ | $P_A = \frac{K_A}{K_A + K_B} (F_{rAB} + 1.67 K_B F_{ae})$<br>$P_B = \frac{K_B}{K_A + K_B} (F_{rAB} - 1.67 K_A F_{ae})$ |
|                                                                                                                                                     | $F_{ae} > \frac{0.6 F_{rAB}}{K_A}$    | $P_A = 0.4 F_{rAB} + K_A F_{ae}$<br>$P_B = 0$                                                                          |

Note:  $F_{rAB}$  is the radial load on the two-row assembly. The single-row basic dynamic radial load rating,  $C_{90}$ , is to be applied when calculating life based on the above equations.

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

**OPTIONAL APPROACH FOR DETERMINING DYNAMIC EQUIVALENT RADIAL LOADS**

The following is a general approach to determining the dynamic equivalent radial loads. Here, a factor “m” has to be defined as +1 for direct-mounted single-row or two-row bearings or -1 for indirect mounted bearings. Also a sign convention is necessary for the external thrust  $F_{ae}$  as follows:

- a. In case of external thrust applied to the shaft (typical rotating cone application),  $F_{ae}$  to the right is positive; to the left is negative.
- b. When external thrust is applied to the housing (typical rotating cup application)  $F_{ae}$  to the right is negative; to the left is positive.

**1. SINGLE-ROW MOUNTING**

| Design                          | Thrust Condition                                                  | Thrust Load                                                                      | Dynamic Equivalent Radial Load                 |
|---------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------|
| <p>Indirect Mounting (m=-1)</p> | $\frac{0.47 F_{rA}}{K_A} \leq \frac{0.47 F_{rB}}{K_B} - m F_{ae}$ | $F_{aA} = \frac{0.47 F_{rB}}{K_B} - m F_{ae}$ $F_{aB} = \frac{0.47 F_{rB}}{K_B}$ | $P_A = 0.4 F_{rA} + K_A F_{aA}$ $P_B = F_{rB}$ |
| <p>Direct Mounting (m=1)</p>    | $\frac{0.47 F_{rA}}{K_A} > \frac{0.47 F_{rB}}{K_B} - m F_{ae}$    | $F_{aA} = \frac{0.47 F_{rA}}{K_A}$ $F_{aB} = \frac{0.47 F_{rA}}{K_A} + m F_{ae}$ | $P_A = F_{rA}$ $P_B = 0.4 F_{rB} + K_B F_{aB}$ |

Note: If  $P_A < F_{rA}$ , use  $P_A = F_{rA}$  or if  $P_B < F_{rB}$ , use  $P_B = F_{rB}$

**2. TWO-ROW MOUNTING – FIXED BEARING WITH EXTERNAL THRUST,  $F_{ae}$  (SIMILAR OR DISSIMILAR SERIES)**

| Design                                        | Thrust Condition                      | Dynamic Equivalent Radial Load                                                                                          |
|-----------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <p>Fixed Bearing Indirect Mounting (m=-1)</p> | $F_{ae} \leq \frac{0.6 F_{rAB}}{K^*}$ | $P_A = \frac{K_A}{K_A + K_B} (F_{rAB} - 1.67 m K_B F_{ae})$ $P_B = \frac{K_B}{K_A + K_B} (F_{rAB} + 1.67 m K_A F_{ae})$ |
| <p>Fixed Bearing Direct Mounting (m=1)</p>    | $F_{ae} > \frac{0.6 F_{rAB}}{K^*}$    | $P_A = 0.4 F_{rAB} - m K_A F_{ae}$ $P_B = 0.4 F_{rAB} + m K_B F_{ae}$                                                   |

Note:  $F_{rAB}$  is the radial load on the two-row assembly. The single-row basic dynamic radial load rating,  $C_{90}$ , is to be applied when calculating life based on the above equations.

## BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

When the loading is static, it is usually suggested that the applied load be no greater than the basic static load rating divided by the appropriate factor (HF<sub>s</sub>) as shown in the table below.

| Hardness Factors to Modify<br>BASIC STATIC LOAD RATING |                                    |
|--------------------------------------------------------|------------------------------------|
| Raceway<br>Hardness HRC                                | Hardness<br>Factor HF <sub>s</sub> |
| 58                                                     | 1.00                               |
| 57                                                     | 1.06                               |
| 56                                                     | 1.13                               |
| 55                                                     | 1.21                               |
| 54                                                     | 1.29                               |
| 53                                                     | 1.37                               |
| 52                                                     | 1.46                               |
| 51                                                     | 1.55                               |
| 50                                                     | 1.65                               |
| 49                                                     | 1.76                               |
| 48                                                     | 1.88                               |
| 47                                                     | 2.00                               |
| 46                                                     | 2.13                               |
| 45                                                     | 2.27                               |
| 44                                                     | 2.41                               |
| 43                                                     | 2.57                               |
| 42                                                     | 2.74                               |
| 41                                                     | 2.92                               |
| 40                                                     | 3.10                               |

### MINIMUM BEARING LOAD

Slippage can occur if loads are too light and, if accompanied by inadequate lubrication, cause damage to the bearings. The minimum load for radial cylindrical, spherical and full-complement needle roller bearings is  $P/C = 0.04$  (P is the dynamic load and C is the basic dynamic load rating).

Thrust needle roller bearings also have an added design requirement such that the minimum thrust load is satisfied to prevent the rollers from skidding on the raceway. (The equation for the thrust loading force is different for needle rollers versus cylindrical rollers as noted):

$$\begin{aligned} \text{(needle rollers)} \quad F_{a \min} &= C_0/2200 \text{ kN} \\ \text{(cylindrical rollers)} \quad F_{a \min} &= 0.1 C_0/2200 \text{ kN} \end{aligned}$$

Centrifugal force in thrust spherical roller bearings tends to propel the rollers outward. The bearing geometry converts this force to another induced thrust component which must be overcome by an axial load. This induced thrust (F<sub>ac</sub>) is given by:

$$F_{ac} = kn^2 \times 10^{-5} \quad (\text{lbf})$$

The minimum required working thrust load on a thrust spherical roller bearing (F<sub>a min</sub>) is then computed by:

$$F_{a \min} = 1.2 F_r + F_{ac} \geq \frac{C_{0a}}{1000} \quad (\text{lbf})$$

In addition to meeting the above calculated value, the minimum required working thrust load (F<sub>a min</sub>) should be equal to or greater than 0.1 percent of the static thrust load rating (C<sub>0a</sub>).

### CYLINDRICAL ROLLER BEARING MAXIMUM ALLOWABLE AXIAL LOAD

Metric series cylindrical roller bearings of NUP, NP, NF, as well as NU or NJ designs with a thrust collar, can transmit axial loads if they are radially loaded at the same time. The allowable axial load ratio F<sub>a</sub>/C of 0.1 maximum depends to a great extent on the magnitude of radial load, the operating speed, type of lubricant used, the operating temperature, and heat transfer conditions at the bearing location. The heat balance achieved at the bearing location is used as a basis for determination of the allowable axial load.

The nomogram on page A35 should be used to determine the allowable axial load F<sub>az</sub> based on the following operating conditions:

- The axial load is of constant direction and magnitude
- Radial load ratio  $F_r/C \leq 0.2$
- Ratio of axial load to radial load  $F_a/F_r < 0.4$
- The temperature of the bearing is 80° C (176° F) at an ambient temperature of 20° C (68° F).
- Lubricating oil is ISO VG 100 or greater using oil bath lubrication or circulating oil.
- As an alternative, the bearing may be lubricated with a grease using the above specified base oil and viscosity. Use of EP additives will be necessary, although considerably shorter relubrication intervals may be expected than with purely radially loaded radial cylindrical roller bearings.

### Example of using the nomogram

From the lower part of the nomogram, determine the intersection point of the inner ring bore diameter and the dimension series of the bearing. From the upper part, the allowable axial load ratio F<sub>az</sub>/C can be found as a function of the operating speed, n.

For a cylindrical roller radial bearing NU2207E.TVP  
 C = 63 kN; d = 35 mm  
 n = 2000 RPM  
 F<sub>r</sub> = 10 kN

From the nomogram:  
 F<sub>az</sub>/C = 0.06  
 Then F<sub>az</sub> = 0.06 • 63  
 The calculated allowable axial load F<sub>az</sub> is 3.78 kN

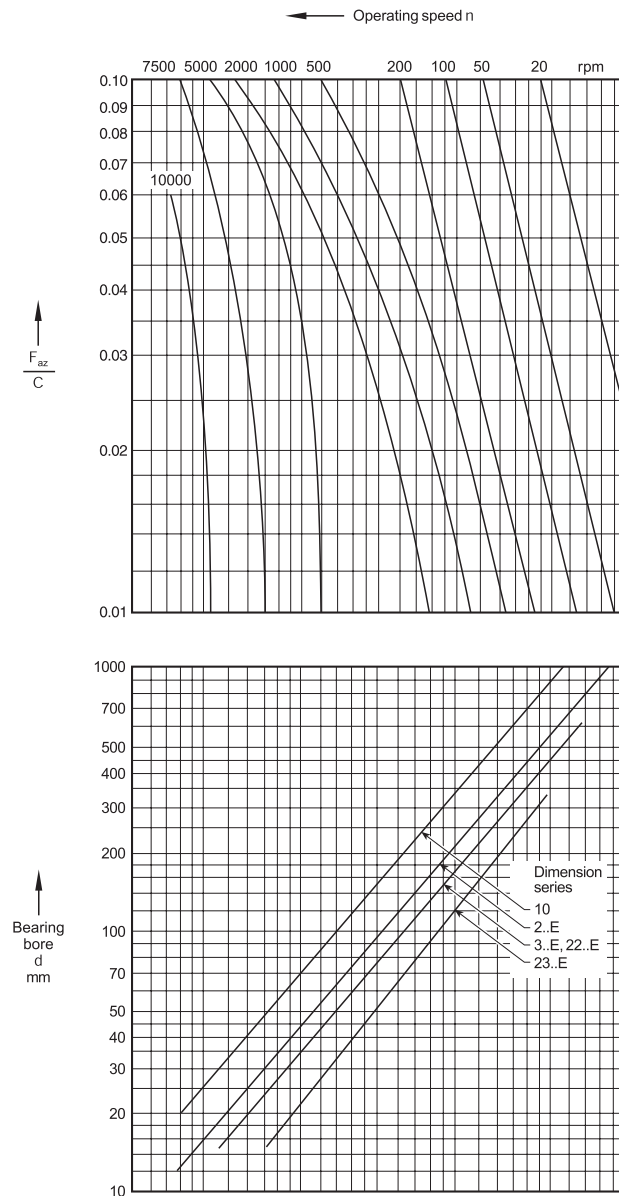
It should be noted that an axial load as high as that determined by means of the nomogram should not be applied if an oil of rated kinematic viscosity lower than ISO VG 100 is used. Suitable EP additives, which are known for fatigue life improving qualities, may allow for an increase in applied axial load subject to thorough testing.

### Higher applied axial loads

Axial loads greater than those determined by means of the nomogram may be considered, providing they are to be applied intermittently. Also, the bearing should be cooled using circulating oil lubrication and if the operating temperature, due to the internal friction and the higher axial load, exceeds 80° C (176° F), a more viscous oil must be used.



BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued



The basic dynamic load rating and the static load rating are commonly used for bearing selection. The basic dynamic load rating is used to estimate life of a rotating bearing. Static load ratings are used to determine the maximum permissible load that can be applied to a non-rotating bearing.

The basic philosophy of The Timken Company is to provide the most realistic bearing rating to assist our customers in the bearing selection process. Published ratings for Timken bearings include the basic dynamic radial load rating  $C$ . This value is based on a basic rating life of one million revolutions. Timken tapered roller bearings also include the basic dynamic load rating  $C_{90}$ , which is based on rating life of ninety million revolutions. The basic static radial load rating is  $C_0$ .

**Static load rating**

The basic static radial load rating and thrust load rating for Timken bearings are based on a maximum contact stress within a non-rotating bearing of 4000 MPa (580 ksi) for roller bearings and 4200 MPa (607 ksi) for ball bearings, at the center of contact on the most heavily loaded rolling element.

The 4000 MPa (580 ksi) or 4200 MPa (607 ksi) stress levels may cause visible light brinell marks on the bearing raceways. This degree of marking will not have a measurable effect on fatigue life when the bearing is subsequently rotating under a lower application load. If sound, vibration or torque are critical, or if a pronounced shock load is present, a lower load limit should be applied. For more information on selecting a bearing for static load conditions, consult your Timken representative.

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

**STATIC RADIAL AND/OR AXIAL EQUIVALENT LOADS**

The static equivalent radial and/or axial loading is dependent on the bearing type selected. For bearings designed to accommodate only radial or thrust loading, the static equivalent load is equivalent to the applied load.

For all bearings, the maximum contact stress can be approximated using the static equivalent load and the static rating.

For roller bearings:

$$\sigma_0 = 4000 \cdot \left( \frac{P_0}{C_0} \right)^{1/2} \text{ MPa}$$

$$\sigma_0 = 580 \cdot \left( \frac{P_0}{C_0} \right)^{1/2} \text{ ksi}$$

For ball bearings:

$$\sigma_0 = 4200 \cdot \left( \frac{P_0}{C_0} \right)^{1/3} \text{ MPa}$$

$$\sigma_0 = 607 \cdot \left( \frac{P_0}{C_0} \right)^{1/3} \text{ ksi}$$

**Radial ball bearings**

The dynamic equivalent radial load is used for comparison with the static load rating. Refer to the Dynamic Equivalent Radial and/or Axial Loads section.

**Thrust ball bearings**

Similar to radial ball bearings, thrust ball bearings use the same equation for equivalent static and dynamic loading.

$$P_{0a} = X \cdot F_r + Y \cdot F_a$$

The X and Y factors are listed in the bearing tables along with the minimum required thrust load-to-radial load ratio for maintaining proper operation.

**Radial spherical roller bearings**

The load factors X<sub>0</sub> and Y<sub>0</sub>, which are listed in the bearing tables, are used with the following equation to estimate the static radial equivalent load.

$$P_{0r} = X_0 \cdot F_r + Y_0 \cdot F_a$$

**Thrust spherical roller bearings**

The following equation is used for thrust spherical roller bearings.

$$P_{0a} = F_a + 2.7 F_r$$

Thrust spherical roller bearings require a minimum thrust load for proper operation. P<sub>0a</sub> = should not be greater than 0.5 C<sub>0a</sub>. If conditions exceed this, consult your Timken representative.

**Tapered roller bearings**

To determine the static equivalent radial load for a single-row mounting, first determine the thrust load, (F<sub>a</sub>), then use the equations in this section, depending on the appropriate thrust load condition.

**Needle roller bearings**

Because radial needle roller bearings are not designed to accept thrust loading, their equation to determine static radial equivalent load is:

$$P_{0r} = F_r$$

Thrust needle roller bearings are not designed to accept radial loading, so their equation to determine static thrust equivalent load is:

$$P_{0a} = F_a$$

**Static equivalent radial load (two-row bearings)**

The bearing data tables do not include static rating for two-row bearings. The two-row static radial rating can be estimated as:

$$C_{0(2)} = 2C_0$$

where:

C<sub>0(2)</sub> = two-row static radial rating

C<sub>0</sub> = static radial load rating of a single row bearing, type TS, from the same series

| Thrust Condition                                                | Net Bearing Thrust Load                                                        | Static Equivalent Radial Load (P <sub>0</sub> )                                                                                                                              |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\frac{0.47 F_{rA}}{K_A} \leq \frac{0.47 F_{rB}}{K_B} + F_{ae}$ | $F_{aA} = \frac{0.47 F_{rB}}{K_B} + F_{ae}$ $F_{aB} = \frac{0.47 F_{rB}}{K_B}$ | $P_{0B} = F_{rB}$ for $F_{aA} < 0.6 F_{rA} / K_A$<br>$P_{0A} = 1.6 F_{rA} - 1.269 K_A F_{aA}$ for $F_{aA} > 0.6 F_{rA} / K_A$<br>$P_{0A} = 0.5 F_{rA} + 0.564 K_A F_{aA}$    |
| $\frac{0.47 F_{rA}}{K_A} > \frac{0.47 F_{rB}}{K_B} + F_{ae}$    | $F_{aA} = \frac{0.47 F_{rA}}{K_A}$ $F_{aB} = \frac{0.47 F_{rA}}{K_A} - F_{ae}$ | for $F_{aB} > 0.6 F_{rB} / K_B$<br>$P_{0B} = 0.5 F_{rB} + 0.564 K_B F_{aB}$ for $F_{aB} < 0.6 F_{rB} / K_B$<br>$P_{0B} = 1.6 F_{rB} - 1.269 K_B F_{aB}$<br>$P_{0A} = F_{rA}$ |

Please refer to illustrations on page A169.

where:

F<sub>r</sub> = applied radial load

F<sub>a</sub> = net bearing thrust load. F<sub>aA</sub> and F<sub>aB</sub> calculated from equations.

Note: Use the values of P<sub>0</sub> calculated for comparison with the static rating, C<sub>0</sub>, even if P<sub>0</sub> is less than the radial applied, F<sub>r</sub>.

## BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

### Static equivalent radial load (two-row bearings)

The bearing data tables do not include static rating for two-row bearings. The two-row static radial rating can be estimated as:

$$C_{0(2)} = 2C_0$$

where:

$C_{0(2)}$  = two-row static radial rating

$C_0$  = static radial load rating of a single row bearing, type TS, from the same series

### BEARING LIFE

Many different performance criteria exist that dictate how a bearing should be selected. These include bearing fatigue life, rotational precision, power requirements, temperature limits, speed capabilities, sound, etc. This publication deals primarily with bearing life as related to material associated fatigue. Bearing life is defined here as the length of time, or number of revolutions, until a fatigue spall of 6 mm<sup>2</sup> (0.01 in.<sup>2</sup>) develops. Since metal fatigue is a statistical phenomenon, the life of an individual bearing is impossible to precisely predetermine. Bearings that may appear to be identical can exhibit considerable life scatter when tested under identical conditions. Thus it is necessary to base life predictions on a statistical evaluation of a large number of bearings operating under similar conditions. The Weibull distribution function is commonly used to predict the life of a population of bearings at any given reliability level.

### RATING LIFE

Rating life, ( $L_{10}$ ), is the life that 90 percent of a group of apparently identical bearings will complete or exceed before a fatigue spall develops. The  $L_{10}$  life also is associated with 90 percent reliability for a single bearing under a certain load.

### BEARING LIFE EQUATIONS

Traditionally, the  $L_{10}$  life has been calculated as follows for bearings under radial or combined loading where the dynamic equivalent radial load, ( $P_r$ ), has been determined:

$$L_{10} = \left( \frac{C}{P_r} \right)^e (1 \times 10^6) \text{ revolutions}$$

or,

$$L_{10} = \left( \frac{C}{P_r} \right)^e \left( \frac{1 \times 10^6}{60n} \right) \text{ hours}$$

For thrust bearings, the above equations change to the following.

$$L_{10} = \left( \frac{C_a}{P_a} \right)^e (1 \times 10^6) \text{ revolutions}$$

or,

$$L_{10} = \left( \frac{C_a}{P_a} \right)^e \left( \frac{1 \times 10^6}{60n} \right) \text{ hours}$$

$e = 3$  for ball bearings

$= 10/3$  for roller bearings

Tapered roller bearings often use a dynamic load rating based on ninety million cycles, as opposed to one million cycles, changing the equations as follows.

$$L_{10} = \left( \frac{C_{90}}{P_r} \right)^{10/3} (90 \times 10^6) \text{ revolutions}$$

or,

$$L_{10} = \left( \frac{C_{90}}{P_r} \right)^{10/3} \left( \frac{90 \times 10^6}{60n} \right) \text{ hours}$$

and

$$L_{10} = \left( \frac{C_{90a}}{P_a} \right)^{10/3} (90 \times 10^6) \text{ revolutions}$$

or,

$$L_{10} = \left( \frac{C_{90a}}{P_a} \right)^{10/3} \left( \frac{90 \times 10^6}{60n} \right) \text{ hours}$$

As the first set of equations for radial bearings with dynamic ratings based on one million revolutions is the most common form of the equations, this will be used through the rest of this section. The equivalent dynamic load equations and the life adjustment factors are applicable to all forms of the life equation.

With increased emphasis on the relationship between the reference conditions and the actual environment in which the bearing operates in the machine, the traditional life equations have been expanded to include certain additional variables that affect bearing performance. The approach whereby these factors, including a factor for useful life, are considered in the bearing analysis and selection, has been termed Bearing Systems Analysis (BSA).

The ISO/ABMA expanded bearing life equation is:

$$L_{10a} = a_1 a_2 a_3 L_{10}$$

Where,

$a_1$  = Reliability Life Factor

$a_2$  = Material Life Factor

$a_3$  = Operating Condition Life Factor

(to be specified by the manufacturer)

The Timken expanded bearing life equation is:

$$L_{10a} = a_1 a_2 a_{3d} a_{3h} a_{3k} a_{3l} a_{3m} a_{3p} \left( \frac{C}{F_r} \right)^e (1 \times 10^6)$$

Where,

$a_1$  = Reliability Life Factor

$a_2$  = Material Life Factor

$a_{3d}$  = Debris Life Factor

$a_{3h}$  = Hardness Life Factor

$a_{3k}$  = Load Zone Life Factor

$a_{3l}$  = Lubrication Life Factor

$a_{3m}$  = Misalignment Life Factor

$a_{3p}$  = Low Load Life Factor

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - *continued*

**Reliability Life Factor (a<sub>1</sub>)**

The equation for the life adjustment factor for reliability is:

$$a_1 = 4.26 \cdot \left( \ln \frac{100}{R} \right)^{2/3} + 0.05$$

ln = natural logarithm (base e)

To adjust the calculated L<sub>10</sub> life for reliability, multiply by the a<sub>1</sub> factor. If 90 (90 percent reliability) is substituted for R in the above equation, a<sub>1</sub> = 1. For R = 99 (99 percent reliability), a<sub>1</sub> = 0.25. The following table lists the reliability factor for commonly used reliability values.

| R (percent) | L <sub>n</sub>   | a <sub>1</sub> |
|-------------|------------------|----------------|
| 90          | L <sub>10</sub>  | 1.00           |
| 95          | L <sub>5</sub>   | 0.64           |
| 96          | L <sub>4</sub>   | 0.55           |
| 97          | L <sub>3</sub>   | 0.47           |
| 98          | L <sub>2</sub>   | 0.37           |
| 99          | L <sub>1</sub>   | 0.25           |
| 99.5        | L <sub>0.5</sub> | 0.175          |
| 99.9        | L <sub>0.1</sub> | 0.093          |

Note that the equation for reliability adjustment assumes there is a short minimum life below which the probability of bearing damage is minimal (e.g., zero probability of bearing damage producing a short life). Extensive bearing fatigue life testing has shown the minimum life, below which the probability of bearing damage is negligible, to be larger than shown above. For a more accurate prediction of bearing lives at high levels of reliability, consult your Timken representative.

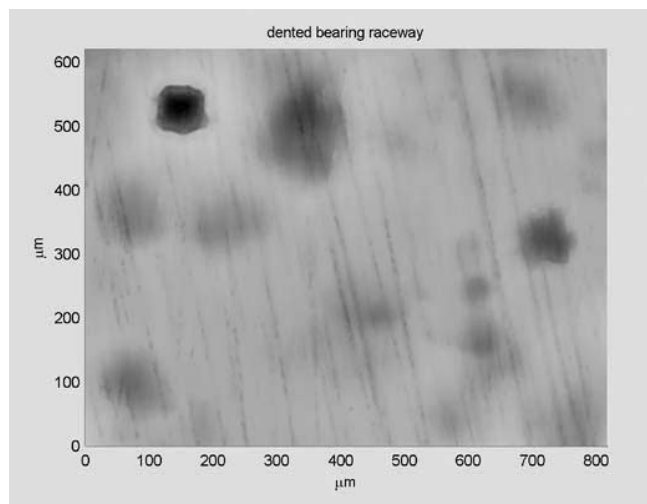
**Material Life Factor (a<sub>2</sub>)**

The life adjustment factor for bearing material, (a<sub>2</sub>), for standard Timken bearings manufactured from bearing quality steel is 1.0. Bearings also are manufactured from premium steels, containing fewer and smaller inclusion impurities than standard steels and providing the benefit of extending bearing fatigue life (e.g., DuraSpexx™). Application of the material life factor requires that fatigue life is limited by nonmetallic inclusions, that contact stresses are approximately less than 2400 MPa (350 ksi), and adequate lubrication is provided. It is important to note that improvements in material cannot offset poor lubrication in an operating bearing system. Consult your Timken representative for applicability of the material factor.

**Debris Life Factor (a<sub>3d</sub>)**

Debris within a lubrication system reduces the life of a roller bearing by creating indentations on the contacting surfaces, leading to stress risers. The Timken life rating equations were developed based on test data obtained with 40 μm oil filtration, and measured ISO cleanliness levels of approximately 15/12, which is typical of cleanliness levels found in normal industrial machinery. When more or less debris is present within the system, the fatigue life predictions can be adjusted according to the measured or expected ISO lubricant cleanliness level to more accurately reflect the expected bearing performance.

As opposed to determining the debris life factor based on filtration and ISO cleanliness levels, a Debris Signature Analysis™ can be performed for more accurate bearing performance predictions. The Debris Signature Analysis is a process for determining the effects of the actual debris present in your system on the bearing performance. The typical way in which this occurs is through measurements of dented/bruised surfaces on actual bearings run in a given application. This type of analysis can be beneficial because different types of debris cause differing levels of performance, even when they are of the same size and amount in the lubricant. Soft, ductile particles can cause less performance degradation than hard, brittle particles. Hard, ductile particles are typically most detrimental to bearing life. Brittle particles can break down, thus not affecting performance to as large of a degree as hard ductile particles. For more information on Debris Signature Analysis or the availability of Debris Resistant bearings for your application, consult your Timken representative.



Surface map of a bearing raceway with debris denting.

BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued

**Hardness Life Factor ( $a_{3h}$ )**

Both the dynamic and static load ratings of Timken bearings are based on a minimum raceway hardness equivalent to 58 on the Rockwell C scale (HRC) [ASTM E-18]. If the raceway hardness must be decreased, these load ratings also will be decreased. For Timken bearings supplied as a full assembly, the hardness life factor will be unity. For bearing applications designed to use the shaft or housing surfaces as raceways, this factor can be used to estimate performance when the required 58 HRC minimum hardness cannot be achieved.

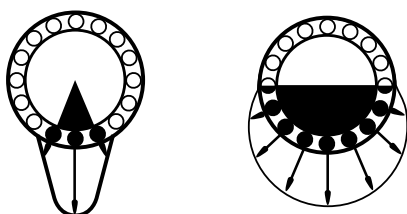
The effective raceway hardness affects the life of a bearing application as shown in the following table. If values for raceway hardness below 45 HRC are required, consult your Timken representative.

| Raceway Hardness (HRC) | $a_{3h}$ |
|------------------------|----------|
| 58                     | 1.00     |
| 57                     | 0.81     |
| 56                     | 0.66     |
| 55                     | 0.53     |
| 54                     | 0.43     |
| 53                     | 0.35     |
| 52                     | 0.28     |
| 51                     | 0.22     |
| 50                     | 0.18     |
| 49                     | 0.14     |
| 48                     | 0.11     |
| 47                     | 0.09     |
| 46                     | 0.07     |
| 45                     | 0.06     |

**Load Zone Life Factor ( $a_{3k}$ )**

The fatigue life of a bearing is a function of the stresses in rollers and raceways and the number of stress cycles that the loaded bearing surfaces experience in one bearing revolution. The stresses depend on applied load and on how many rollers support that load. The number of stress cycles depends on bearing geometry and, again, on how many rollers support the load. Therefore, life for a given external load is related to the loaded arc, or load zone, of the bearing.

The load zone in a bearing is dominated by the internal clearance, either radial or axial depending on the bearing type. Neglecting preload, less clearance in a bearing results in a larger load zone and subsequently longer bearing life.



Bearing Load Zones and Roller-Raceway Contact Loading.

Using the dynamic equivalent load ( $P_r$ ) instead of the applied radial load ( $F_r$ ) in the equation for  $L_{10a}$  roughly approximates the load zone factor for combined loading only. If a more accurate assessment of the load zone adjusted life is necessary (e.g., including the effects of internal clearance or fitting practice), consult your Timken representative.

**Lubrication Life Factor ( $a_{3l}$ )**

The influence of lubrication film due to elasto-hydrodynamic (EHL) lubrication on bearing performance is related to the reduction or prevention of asperity (metal-metal) contact between the bearing surfaces. Extensive testing has been done at Timken Research to quantify the effects of the lubrication related parameters on bearing life. It has been found that the roller and raceway surface finish, relative to lubricant film thickness, has the most notable effect on improving bearing performance. Factors such as bearing geometry, material, loads and load zones also play an important role in bearing performance.

The following equation provides a method to calculate the lubrication factor for a more accurate prediction of the influence of lubrication on bearing life ( $L_{10a}$ ).

$$a_{3l} = C_g \cdot C_l \cdot C_j \cdot C_s \cdot C_v \cdot C_{gr}$$

Where:

- $C_g$  = geometry factor
- $C_l$  = load factor
- $C_j$  = load zone factor
- $C_s$  = speed factor
- $C_v$  = viscosity factor
- $C_{gr}$  = grease lubrication factor

Note: The  $a_{3l}$  maximum is 2.88 for all bearings. The  $a_{3l}$  minimum is 0.200 for case carburized bearings and 0.126 for through hardened bearings.

A lubricant contamination factor is not included in the lubrication factor because Timken endurance tests are typically run with a 40  $\mu$ m filter to provide a realistic level of lubricant cleanliness for most applications.

**Geometry factor -  $C_g$**

$C_g$  is given for most part numbers in the bearing tables. The geometry factor also includes the material effects and load zone considerations for non-tapered roller bearings, as these also are inherent to the bearing design. However, it should be noted that the primary effect of the load zone is on roller load distributions and contact stresses within the bearing, which are not quantified within the lubrication factor. Refer to the previous section Load Zone Life Factor ( $a_{3k}$ ) for more information.

Note that the geometry factor ( $C_g$ ) factor is not applicable to our DuraSpexx™ product. For more information on our DuraSpexx™ product, consult your Timken representative.

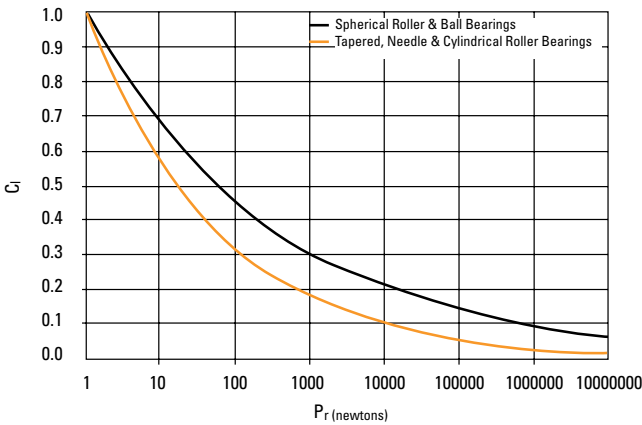


**BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued**

**Load factor -  $C_L$**

The  $C_L$  factor is obtained from the following figure. Note that the factor is different based on the type of bearing utilized.  $P_r$  is the equivalent load applied to the bearing in Newtons and is determined in the Equivalent Bearing Loads ( $P_r$ ) section.

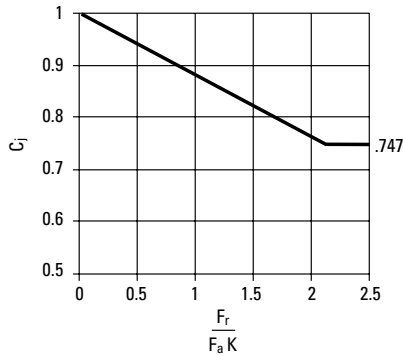
**LOAD FACTOR ( $C_L$ ) VS. EQUIVALENT BEARING LOAD ( $P_r$ )**



**Load zone factor -  $C_J$**

As mentioned previously, for all non-tapered roller bearings the load zone factor is unity. For tapered roller bearings, the load zone factor can be taken from the graph based on the thrust load applied to that bearing.

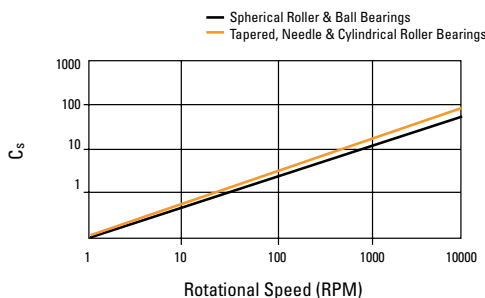
**LOAD ZONE FACTOR ( $C_J$ ) VS. TAPERED BEARING THRUST LOAD ( $F_A$ )**



**Speed factor -  $C_s$**

$C_s$  is determined from the following figure, where rev/min (RPM) is the rotational speed of the inner ring relative to the outer ring.

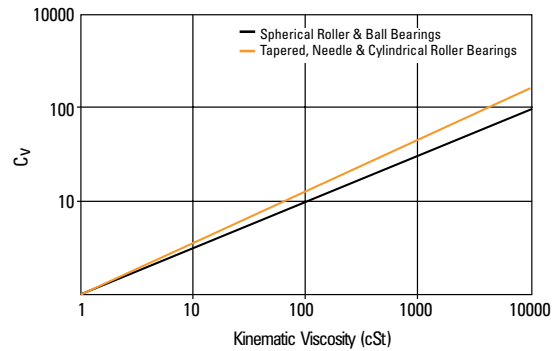
**SPEED FACTOR ( $C_s$ ) VS. ROTATIONAL SPEED**



**Viscosity factor -  $C_v$**

The lubricant kinematic viscosity [centistokes (cSt)] is taken at the operating temperature of the bearing. The operating viscosity can be estimated by using the figure in the Speed, Heat and Torque section. The viscosity factor ( $C_v$ ) can then be determined from the following figure.

**VISCOSITY FACTOR ( $C_v$ ) VS. KINEMATIC VISCOSITY**



**Grease lubrication factor -  $C_{gr}$**

For grease lubrication, the EHL lubrication film becomes depleted of oil over time and is reduced in thickness. Consequently, a reduction factor ( $C_{gr}$ ) should be used to adjust for this effect.

$C_{gr} = 0.79$

**Misalignment life factor ( $a_{3m}$ )**

The effect of bearing life depends on the magnitude of the angle of misalignment, on the internal bearing geometry, and on the applied loads.

The misalignment life factor for spherical bearings is equal to one,  $a_{3m}=1$ , due to the self-aligning capabilities of a spherical roller bearing. The allowable misalignment in a spherical roller bearing is between 1 degree and 2.5 degrees, depending upon the series of the bearing as detailed in the following table. Life will be reduced if these limits are exceeded, due to roller-raceway contact truncation.

**MAXIMUM PERMISSIBLE MISALIGNMENTS FOR SPHERICAL ROLLER BEARINGS BASED ON SERIES**

| Bearing Series          | Maximum Misalignment |
|-------------------------|----------------------|
| 238                     | $\pm 1.0^\circ$      |
| 222, 230, 231, 239, 249 | $\pm 1.5^\circ$      |
| 223, 240                | $\pm 2.0^\circ$      |
| 232, 241                | $\pm 2.5^\circ$      |

**BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - continued**

For needle roller bearings, the following table gives the misalignment limitations based on bearing width.

| Bearing Width |        | Maximum Slope |                 |
|---------------|--------|---------------|-----------------|
| mm            | inches | Caged         | Full Complement |
| > 50          | > 2    | 0.0005        | 0.0005          |
| 25-50         | 1-2    | 0.0010        | 0.0005          |
| < 25          | < 1    | 0.0015        | 0.0010          |

For all other bearing types, accurate alignment of the shaft relative to the housing is critical for best performance. The life prediction using the method defined in this publication is relatively accurate up to the limits listed within, based on bearing type. The base condition for which the load rating of the roller bearings are defined is 0.0005 radians misalignment.

For cylindrical roller bearings, the misalignment factor also is a measure of the effect of bearing axial load on life. Axial loading of the bearing causes a moment to be generated about the roller center, thus shifting the roller-raceway contact stresses toward the end of the roller, similar to bearing misalignment.

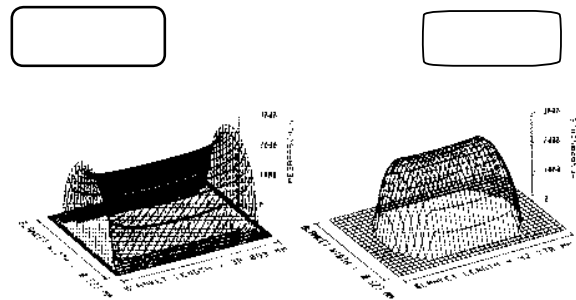
Performance of all Timken bearings under various levels of misalignment, radial and axial load can be predicted using sophisticated computer programs. Using these programs, Timken engineers can design special bearing contact profiles to accommodate the conditions of radial load, axial load and/or bearing misalignment in your application. Consult your Timken representative for more information.

**Needle rollers with relieved ends**

Needle roller bearing life is affected by the distribution of contact stress between roller and raceways. Even when non-profiled needle rollers are loaded under conditions of ideal alignment, the contact stress is not uniform along the length of the rollers, but rather is concentrated towards the ends. Misalignment causes even greater roller contact stress. This effect is illustrated below.

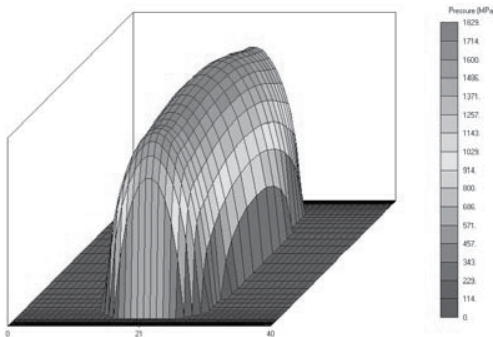
Needle Roller – Cylindrical

Needle Roller- Relieved Ends (exaggerated for clarity)

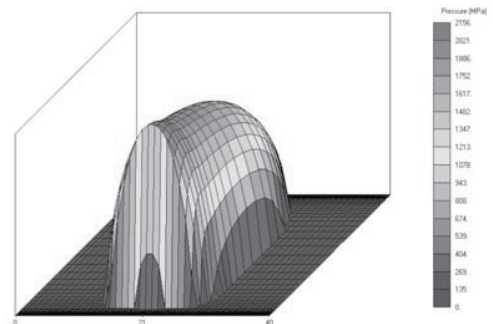


**Fig. A-11**  
Comparative Stress Patterns

The use of needle rollers with relieved ends helps to reduce stress concentration at the ends of rollers, both under misalignment or ideal alignment, and results in more uniform stress distribution and optimum bearings performance.



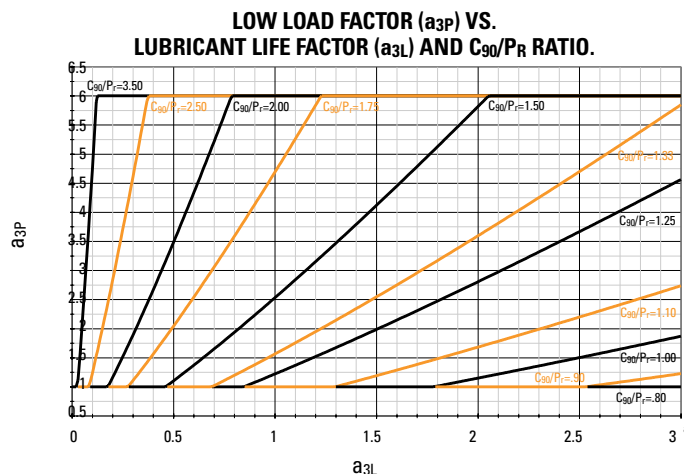
Roller-inner raceway contact stress without misalignment.



Roller-inner raceway contact stress with high misalignment and special profile.

**Low load life factor ( $a_{3P}$ )**

Bearing life tests at the Timken Technology Center have shown greatly extended bearing fatigue life performance is achievable when the bearing contact stresses are low and the lubricant film is sufficient to fully separate the micro-scale textures of the contacting surfaces. Mating the test data with sophisticated computer programs for predicting bearing performance, Timken engineers have developed a low load factor for use in the catalog to predict the life increase expected when operating under low bearing loads. The following figure shows the low load factor ( $a_{3P}$ ) as a function of the lubricant life factor ( $a_{3L}$ ) and the ratio of bearing dynamic rating to the bearing equivalent load.



## BEARING REACTIONS, DYNAMIC EQUIVALENT LOADS & BEARING LIFE - *continued*

### LIFE - THRUST SPHERICAL, CYLINDRICAL AND TAPERED ROLLER BEARINGS

The life formula, below, is the radial roller bearing life equation restated in terms of thrust instead of radial ratings and radial equivalent loads.

$$L_{10} = \frac{16667}{n} \left[ \frac{C_t}{T_e} \right]^{10/3} \text{ (Hours)}$$

The calculations of bearing life may also be performed by using logarithmic factors for rotational speed ( $N_f$ ) and life ( $L_f$ ) based on the formula:

$$L_{10} = 500 (L_f)^{10/3} \text{ (Hours)}$$

$$\text{where } L_f = \left[ \frac{C_t n_f}{T_e} \right]$$

$$\text{where } N_f = \left[ \frac{1}{.03n} \right]^{3/10}$$

Referring back to the above equation it may be advisable, as previously noted with radial bearings, under certain operating conditions to include an application factor  $a_3$  and calculate life according to the formula:

$$L_{10} = \frac{16667}{n} a_3 \left[ \frac{C_t}{T_e} \right]^{10/3} \text{ or } L_{10} = 500 a_3 (L_f)^{10/3} \text{ (Hours)}$$

$a_3$  is the factor based on application conditions. Under optimum conditions  $a_3 = 1$ . Depending on lubricant contamination, temperatures, impact loading and load reversals  $a_3$  may be less than 1 and as low as 0.05. Consult your Timken representative for assistance with your specific application requirements.

### LIFE - THRUST BALL BEARINGS

$$L_{10} = \frac{16667}{n} \left[ \frac{C_t}{T_e} \right]^3 \text{ (Hours)}$$

It may be advisable under certain operating conditions to include an application factor  $a_3$  and calculate life according to the formula:

$$L_{10} = \frac{16667}{n} a_3 \left[ \frac{C_t}{T_e} \right]^3 \text{ (Hours)}$$

$a_3$ , the life factor based on application conditions, can be assigned values as described above.

# BEARING TOLERANCES, INCH & METRIC

## TOLERANCES

Standards defining practices for ball and roller bearing usage are listed in the following tables. These standards are provided for use in selecting bearings for general applications in conjunction with the bearing mounting and fitting practices offered in later sections.

## RADIAL BALL, SPHERICAL AND CYLINDRICAL ROLLER BEARINGS

Depending on your specific application requirements, various degrees of bearing accuracy may be required.

Timken maintains ball diameter and sphericity tolerances, close control of race contours and internal clearances, accuracy of cage construction, and unusually fine surface finishes.

| STANDARD ABEC / RBEC TOLERANCES - INNER RING                                   |                        |                              |             |             |            |             |                          |          |          |          |          |                                |          |          |          |          |                             |           |          |                               |          |          |                                                         |              |              |
|--------------------------------------------------------------------------------|------------------------|------------------------------|-------------|-------------|------------|-------------|--------------------------|----------|----------|----------|----------|--------------------------------|----------|----------|----------|----------|-----------------------------|-----------|----------|-------------------------------|----------|----------|---------------------------------------------------------|--------------|--------------|
| All tolerances in number of micrometers (µm) and ten-thousandths inch (.0001") |                        |                              |             |             |            |             |                          |          |          |          |          |                                |          |          |          |          |                             |           |          |                               |          |          |                                                         |              |              |
| Bearing Bore                                                                   | Bore Numbers Reference | Bore Diameter $\Delta_{dmp}$ |             |             |            |             | Width Variation $V_{Bs}$ |          |          |          |          | Raceway Radial Runout $K_{ia}$ |          |          |          |          | Face Runout With Bore $S_d$ |           |          | Raceway Axial Runout $S_{ia}$ |          |          | Width Inner & Outer Rings $\Delta_{Bs}$ & $\Delta_{Cs}$ |              |              |
|                                                                                |                        | +0.000 mm<br>+0.0000"        |             |             |            |             |                          |          |          |          |          |                                |          |          |          |          |                             |           |          |                               |          |          | +0.000 mm<br>+0.0000"                                   |              |              |
| mm                                                                             |                        | ABEC                         |             |             |            |             | ABEC                     |          |          |          |          | ABEC                           |          |          |          |          | ABEC                        |           |          | ABEC                          |          |          | ABEC                                                    |              |              |
| over incl.                                                                     |                        | RBEC                         |             | RBEC        |            |             | RBEC                     |          | RBEC     |          |          | RBEC                           |          | RBEC     |          |          | RBEC                        |           |          | RBEC                          |          |          |                                                         |              |              |
|                                                                                |                        | 1                            | 3           | 5           | 7          | 9           | 1                        | 3        | 5        | 7        | 9        | 1                              | 3        | 5        | 7        | 9        | 5                           | 7         | 9        | 5                             | 7        | 9        | 1,3                                                     | 5,7,9        |              |
|                                                                                |                        | mm in.                       | mm in.      | mm in.      | mm in.     | mm in.      | mm in.                   | mm in.   | mm in.   | mm in.   | mm in.   | mm in.                         | mm in.   | mm in.   | mm in.   | mm in.   | mm in.                      | mm in.    | mm in.   | mm in.                        | mm in.   | mm in.   | mm in.                                                  | mm in.       |              |
| 2.5                                                                            | 10                     | 30-39                        | -8<br>-3    | -7<br>-3    | -5<br>-2   | -4<br>-1.5  | -1<br>-1                 | 15<br>6  | 15<br>6  | 5<br>2   | 2.5<br>1 | 1.5<br>0.5                     | 10<br>4  | 6<br>2.5 | 4<br>1.5 | 2.5<br>1 | 1.5<br>0.5                  | 7<br>3    | 3<br>1   | 1.5<br>0.5                    | 7<br>3   | 3<br>1   | 1.5<br>0.5                                              | -120<br>-50  | -40<br>-15   |
| 10                                                                             | 18                     | 00-03                        | -8<br>-3    | -7<br>-3    | -5<br>-2   | -4<br>-1.5  | -2.5<br>-1               | 20<br>8  | 20<br>8  | 5<br>2   | 2.5<br>1 | 1.5<br>0.5                     | 10<br>4  | 7<br>3   | 4<br>1.5 | 2.5<br>1 | 1.5<br>0.5                  | 7<br>3    | 3<br>1   | 1.5<br>0.5                    | 7<br>3   | 3<br>1   | 1.5<br>0.5                                              | -120<br>-50  | -80<br>-30   |
| 18                                                                             | 30                     | 04-06                        | -10<br>-4   | -8<br>-3    | -6<br>-2.5 | -5<br>-2    | -2.5<br>-1               | 20<br>8  | 20<br>8  | 5<br>2   | 2.5<br>1 | 1.5<br>0.5                     | 13<br>5  | 8<br>3   | 4<br>1.5 | 3<br>1   | 2.5<br>1                    | 8<br>3    | 4<br>1.5 | 1.5<br>0.5                    | 8<br>3   | 4<br>1.5 | 2.5<br>1                                                | -120<br>-50  | -120<br>-50  |
| 30                                                                             | 50                     | 07-10                        | -12<br>-4.5 | -10<br>-4   | -8<br>-3   | -6<br>-2.5  | -4<br>-1                 | 20<br>8  | 20<br>8  | 5<br>2   | 2.5<br>1 | 1.5<br>0.5                     | 15<br>6  | 10<br>4  | 5<br>2   | 4<br>1.5 | 2.5<br>1                    | 8<br>3    | 4<br>1.5 | 1.5<br>0.5                    | 8<br>3   | 4<br>1.5 | 2.5<br>1                                                | -120<br>-50  | -120<br>-50  |
| 50                                                                             | 80                     | 11-16                        | -15<br>-6   | -12<br>-4.5 | -9<br>-3.5 | -7<br>-3    | -4<br>-1.5               | 25<br>10 | 25<br>10 | 6<br>2.5 | 4<br>1.5 | 1.5<br>0.5                     | 20<br>8  | 10<br>4  | 5<br>2   | 4<br>1.5 | 2.5<br>1                    | 8<br>3    | 5<br>2   | 1.5<br>0.5                    | 8<br>3   | 5<br>2   | 2.5<br>1                                                | -150<br>-60  | -150<br>-60  |
| 80                                                                             | 120                    | 17-24                        | -20<br>-8   | -15<br>-6   | -10<br>-4  | -8<br>-3    | -5<br>-2                 | 25<br>10 | 25<br>10 | 7<br>3   | 4<br>1.5 | 1<br>0.5                       | 25<br>10 | 13<br>5  | 6<br>2.5 | 5<br>2   | 2.5<br>1                    | 9<br>3.5  | 5<br>2   | 2.5<br>1                      | 9<br>3.5 | 5<br>2   | 2.5<br>1                                                | -200<br>-80  | -200<br>-80  |
| 120                                                                            | 150                    | 26-30                        | -25<br>-10  | -18<br>-7   | -13<br>-5  | -10<br>-4   | -7<br>-3                 | 30<br>12 | 30<br>12 | 8<br>3   | 5<br>2   | 2.5<br>1                       | 30<br>12 | 18<br>7  | 8<br>3   | 6<br>2.5 | 2.5<br>1                    | 10<br>4   | 6<br>2.5 | 1<br>0.5                      | 10<br>4  | 7<br>3   | 2.5<br>1                                                | -250<br>-100 | -250<br>-100 |
| 150                                                                            | 180                    | 32-36                        | -25<br>-10  | -18<br>-7   | -13<br>-5  | -10<br>-4   | -7<br>-3                 | 30<br>12 | 30<br>12 | 8<br>3   | 5<br>2   | 1.5<br>0.5                     | 30<br>12 | 18<br>7  | 8<br>3   | 6<br>2.5 | 5<br>2                      | 10<br>4   | 6<br>2.5 | 1<br>0.5                      | 10<br>4  | 7<br>3   | 2.5<br>1                                                | -250<br>-100 | -250<br>-100 |
| 180                                                                            | 250                    | 38-50                        | -30<br>-12  | -22<br>-8.5 | -15<br>-6  | -12<br>-4.5 | -8<br>-3                 | 30<br>12 | 30<br>12 | 10<br>4  | 6<br>2.5 | 5<br>2                         | 40<br>16 | 20<br>8  | 10<br>4  | 8<br>3   | 5<br>2                      | 11<br>4.5 | 7<br>3   | 5<br>2                        | 13<br>5  | 8<br>3   | 5<br>2                                                  | -300<br>-120 | -300<br>-120 |
| 250                                                                            | 315                    | 52-60                        | -35<br>-14  | -25<br>-10  | -18<br>-7  | —           | —                        | 35<br>14 | 35<br>14 | 13<br>5  | —        | —                              | 50<br>20 | 25<br>10 | 13<br>5  | —        | —                           | 13<br>5   | —        | —                             | 6<br>—   | —        | —                                                       | -350<br>-140 | -350<br>-140 |
| 315                                                                            | 400                    | 64-80                        | -40<br>-16  | -30<br>-12  | -23<br>-9  | —           | —                        | 40<br>16 | 40<br>16 | 15<br>6  | —        | —                              | 60<br>24 | 30<br>12 | 15<br>6  | —        | —                           | 15<br>6   | —        | —                             | 20<br>8  | —        | —                                                       | -400<br>-160 | -400<br>-160 |
| 400                                                                            | 500                    |                              | -45<br>-18  | -35<br>-14  | —          | —           | —                        | 50<br>18 | 45<br>18 | —        | —        | —                              | 65<br>26 | 35<br>14 | —        | —        | —                           | —         | —        | —                             | —        | —        | —                                                       | -450<br>-180 | —            |
| 500                                                                            | 630                    |                              | -50<br>-20  | -40<br>-16  | —          | —           | —                        | 60<br>24 | 50<br>20 | —        | —        | —                              | 70<br>28 | 40<br>16 | —        | —        | —                           | —         | —        | —                             | —        | —        | —                                                       | -500<br>-200 | —            |
| 630                                                                            | 800                    |                              | -75<br>-30  | —           | —          | —           | —                        | 70<br>28 | —        | —        | —        | —                              | 80<br>31 | —        | —        | —        | —                           | —         | —        | —                             | —        | —        | —                                                       | -750<br>-300 | —            |

The tolerances in this table are in conformance with ANSI ABMA Standard 20 - 1987.

| ABMA / ISO Symbols - Inner Ring |                                                                                                                                                                                                 | ABMA / ISO Symbols - Outer Ring |                                                                                                  |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------|
| $\Delta_{dmp}$                  | Single plane mean bore diameter deviation from basic bore diameter, e.g., bore tolerance for a basically tapered bore, $\Delta_{dmp}$ refers only to the theoretical small bore end of the bore | $\Delta_{Dmp}$                  | Single plane mean outside diameter deviation from basic outside diameter, e.g., O.D. tolerance   |
| $K_{ia}$                        | Radial runout of assembled bearing inner ring, e.g., radial runout of raceway                                                                                                                   | $K_{ea}$                        | Radial runout of assembled bearing outer ring, e.g., radial runout of raceway                    |
| $V_{Bs}$                        | Inner ring width variation, e.g., parallelism                                                                                                                                                   | $V_{Cs}$                        | Outer ring width variation, e.g., parallelism                                                    |
| $S_d$                           | Inner ring reference face runout with bore, e.g., squareness - bore to face                                                                                                                     | $S_D$                           | Outside cylindrical surface runout with outer ring reference face, e.g., squareness O.D. to face |
| $S_{ia}$                        | Axial runout of assembled bearing inner ring, e.g., lateral (axial) runout of raceway                                                                                                           | $S_{ea}$                        | Axial runout of assembled bearing outer ring, e.g., lateral (axial) runout of raceway            |
| $\Delta_{Bs}$                   | Single inner ring width deviation from basic, e.g., width tolerance                                                                                                                             | $\Delta_{Cs}$                   | Outer ring width deviation from basic, e.g., width tolerance                                     |

# ENGINEERING

## A BEARING TOLERANCES, INCH & METRIC - continued

These standards, coupled with proprietary design, material and processing specifications, ensure that our bearings offer the maximum performance.

Among the tolerance classes, ABEC 1 applies to ball bearings for normal usage. The other classes ABEC 3, 5, 7, 9 apply to ball bearings of increased precision as required. RBEC 1 applies to roller bearings for normal usage. RBEC 3 and 5 apply to roller bearings of increased precision as required.

| STANDARD ABEC/RBEC TOLERANCES - OUTER RING                                       |                    |                               |                 |            |            |            |            |                       |         |          |            |           |                      |          |        |                            |          |        |            |         |          |            |     |     |
|----------------------------------------------------------------------------------|--------------------|-------------------------------|-----------------|------------|------------|------------|------------|-----------------------|---------|----------|------------|-----------|----------------------|----------|--------|----------------------------|----------|--------|------------|---------|----------|------------|-----|-----|
| All tolerances in number of micrometers (µm) and ten-thousandths inches (.0001") |                    |                               |                 |            |            |            |            |                       |         |          |            |           |                      |          |        |                            |          |        |            |         |          |            |     |     |
| Bearing O.D.                                                                     | Ball Bearing Sizes | Outside Diameter (1)<br>ΔDmp  | Width Variation |            |            |            |            | Raceway Radial Runout |         |          |            |           | Raceway Axial Runout |          |        | Outside Diameter With Face |          |        |            |         |          |            |     |     |
|                                                                                  |                    |                               | Vcs             |            |            |            |            | Kea                   |         |          |            |           | Sea                  |          |        | Sp                         |          |        |            |         |          |            |     |     |
|                                                                                  |                    | +0.000 mm<br>+0.0000"         |                 |            |            |            |            |                       |         |          |            |           |                      |          |        |                            |          |        |            |         |          |            |     |     |
|                                                                                  |                    | ABEC                          |                 |            |            |            | ABEC       |                       |         |          |            | ABEC      |                      |          |        |                            | ABEC     |        |            |         |          |            |     |     |
|                                                                                  |                    | RBEC                          |                 |            |            |            | RBEC       |                       |         |          |            | RBEC      |                      |          |        |                            | RBEC     |        |            |         |          |            |     |     |
| mm                                                                               |                    | 1                             | 3               | 5          | 7          | 9          | 1,3        | 5                     | 7       | 9        | 1          | 3         | 5                    | 7        | 9      | 5                          | 7        | 9      | 5          | 7       | 9        |            |     |     |
| over                                                                             | incl.              | mm in.                        | mm in.          | mm in.     | mm in.     | mm in.     | mm in.     | mm in.                | mm in.  | mm in.   | mm in.     | mm in.    | mm in.               | mm in.   | mm in. | mm in.                     | mm in.   | mm in. | mm in.     | mm in.  | mm in.   |            |     |     |
| 0                                                                                | 18                 | 30-39                         | -8<br>-3        | -7<br>-3   | -5<br>-2   | -4<br>-1.5 | -2.5<br>-1 | 15<br>6               | 5<br>2  | 2.5<br>1 | 1.5<br>0.5 | 15<br>6   | 8<br>4               | 5<br>2   | 3<br>1 | 1.5<br>0.5                 | 8<br>3   | 5<br>2 | 1.5<br>0.5 | 8<br>3  | 4<br>1.5 | 1.5<br>0.5 |     |     |
| 18                                                                               | 30                 | 9300-9303<br>9100-9101<br>200 | -9              | -8         | -6         | -5         | -4         | 20                    | 5       | 2.5      | 1.5        | 15        | 9                    | 6        | 4      | 2.5                        | 1.5      | 1      | 3          | 2       | 1        | 3          | 1.5 | 0.5 |
|                                                                                  |                    | 200-204<br>9304-9306          | -11             | -9         | -7         | -6         |            | 20                    | 5       | 2.5      | 1.5        | 20        | 10                   | 7        | 5      | 2.5                        | 8        | 5      | 2.5        | 8       | 4        | 1.5        |     |     |
| 30                                                                               | 50                 | 9102-9105<br>300-303          | -4.5            | -3.5       | -3         | -2.5       | -1.5       | 8                     | 2       | 1        | 0.5        | 8         | 4                    | 3        | 2      | 1                          | 3        | 2      | 1          | 3       | 1.5      | 0.5        |     |     |
|                                                                                  |                    | 205-208<br>9307-9312          | -13             | -11        | -9         | -7         | -4         | 25                    | 6       | 3        | 1.5        | 25        | 13                   | 8        | 5      | 4                          | 10       | 5      | 4          | 8       | 4        | 1.5        |     |     |
| 50                                                                               | 80                 | 9106-9110<br>304-307          | -5              | -4.5       | -3.5       | -3         | -1.5       | 10                    | 2.5     | 1        | 0.5        | 10        | 5                    | 3        | 2      | 1.5                        | 4        | 2      | 1.5        | 3       | 1.5      | 0.5        |     |     |
|                                                                                  |                    | 209-213<br>9313-9317          | -15             | -13        | -10        | -8         | -5         | 25                    | 8       | 4        | 2.5        | 35        | 18                   | 10       | 6      | 5                          | 11       | 6      | 5          | 9       | 5        | 2.5        |     |     |
| 80                                                                               | 120                | 9111-9115<br>308-311          | -6              | -5         | -4         | -3         | -2         | 10                    | 3       | 1.5      | 1          | 14        | 7                    | 4        | 2.5    | 2                          | 4.5      | 2.5    | 2          | 3.5     | 2        | 1          |     |     |
|                                                                                  |                    | 214-217<br>9318-9322          | -18             | -15        | -11        | -9         | -5         | 30                    | 8       | 5        | 2.5        | 40        | 20                   | 11       | 7      | 5                          | 13       | 7      | 5          | 10      | 5        | 2.5        |     |     |
| 120                                                                              | 150                | 9116-9120<br>312-314          | -7              | -6         | -4.5       | -3.5       | -2         | 12                    | 3       | 2        | 1          | 16        | 8                    | 4.5      | 3      | 2                          | 5        | 3      | 2          | 4       | 2        | 1          |     |     |
|                                                                                  |                    | 218-220<br>9323-9326          | -25             | -18        | -13        | -10        | -7         | 30                    | 8       | 5        | 2.5        | 45        | 23                   | 13       | 8      | 5                          | 14       | 8      | 5          | 10      | 5        | 2.5        |     |     |
| 150                                                                              | 180                | 9121-9326<br>315-317          | -10             | -7         | -5         | -4         | -3         | 12                    | 3       | 2        | 1          | 18        | 9                    | 5        | 3      | 2                          | 5.5      | 3      | 2          | 4       | 2        | 1          |     |     |
|                                                                                  |                    | 318-322<br>9126-9132          | -30             | -20        | -15        | -11        | -8         | 30                    | 10      | 7        | 4          | 50        | 25                   | 15       | 10     | 7                          | 15       | 10     | 7          | 11      | 7        | 4          |     |     |
| 180                                                                              | 250                | 220-228                       | -12             | -8         | -6         | -4.5       | -3         | 12                    | 4       | 3        | 1.5        | 20        | 10                   | 6        | 4      | 3                          | 6        | 4      | 3          | 4.5     | 3        | 1.5        |     |     |
|                                                                                  |                    | 324-328<br>9134-9140          | -35             | -25        | -18        | -13        | -8         | 35                    | 11      | 7        | 5          | 60        | 30                   | 18       | 11     | 7                          | 18       | 10     | 7          | 13      | 8        | 5          |     |     |
| 250                                                                              | 315                | 230-234                       | -14             | -10        | -7         | -5         | -3         | 14                    | 4.5     | 3        | 2          | 24        | 12                   | 7        | 4.5    | 3                          | 7        | 4      | 3          | 5       | 3        | 2          |     |     |
|                                                                                  |                    | 330-338<br>9144-9152          | -40             | -28        | -20        | -15        | -10        | 40                    | 13      | 8        | 7          | 70        | 35                   | 20       | 13     | 8                          | 20       | 13     | 8          | 13      | 10       | 7          |     |     |
| 315                                                                              | 400                | 236-244                       | -16             | -11        | -8         | -6         | -4         | 16                    | 5       | 3        | 3          | 28        | 14                   | 8        | 5      | 3                          | 8        | 5      | 3          | 5       | 4        | 3          |     |     |
|                                                                                  |                    | 340-348<br>9156-9164          | -45             | -33        | -23        | —          | —          | 45                    | 15      | —        | —          | 80        | 40                   | 23       | —      | —                          | 23       | —      | —          | 15      | —        | —          |     |     |
| 400                                                                              | 500                | 246-256                       | -18             | -13        | -9         | —          | —          | 18                    | 6       | —        | —          | 31        | 16                   | 9        | —      | —                          | 9        | —      | —          | 6       | —        | —          |     |     |
|                                                                                  |                    | 352-356<br>9180               | -50             | -38        | -28        | —          | —          | 50                    | 18      | —        | —          | 100       | 50                   | 25       | —      | —                          | 25       | —      | —          | 18      | —        | —          |     |     |
| 500                                                                              | 630                | 260-264                       | -20             | -15        | -11        | —          | —          | 20                    | 7       | —        | —          | 39        | 20                   | 10       | —      | —                          | 10       | —      | —          | 7       | —        | —          |     |     |
| 630                                                                              | 800                |                               | -75<br>-30      | -45<br>-18 | -35<br>-14 | —          | —          | —                     | 20<br>8 | —        | —          | 120<br>47 | 60<br>24             | 30<br>12 | —      | —                          | 30<br>12 | —      | —          | 20<br>8 | —        | —          |     |     |
| 800                                                                              | 1000               |                               | -100<br>-40     | -60<br>-24 | —          | —          | —          | —                     | —       | —        | —          | 140<br>55 | 75<br>30             | —        | —      | —                          | —        | —      | —          | —       | —        | —          |     |     |
| 1000                                                                             | 1250               |                               | -125<br>-50     | —          | —          | —          | —          | —                     | —       | —        | —          | 160<br>63 | —                    | —        | —      | —                          | —        | —      | —          | —       | —        | —          |     |     |

The tolerances in this table are in conformance with ANSI ABMA Standard 20 - 1987.

(1) D<sub>min</sub> (the smallest single diameter of an O.D.) and D<sub>max</sub> (the largest single diameter of an O.D.) may fall outside limits shown. D<sub>min</sub> + D<sub>max</sub> must be within outside diameter tabulated.



BEARING TOLERANCES, INCH & METRIC - continued

**TOLERANCES OF CYLINDRICAL ROLLER AND NEEDLE ROLLER BEARINGS**

The tolerances given in the following table apply to inner rings of metric series cylindrical roller and needle roller radial bearing types in which their rings are precision finished.

**Bore Diameter**  
 $V_{dsp}$  Difference between the largest and the smallest of the single bore diameters in a single radial plane.  
 $V_{dmp}$  Difference between the largest and smallest of the mean bore diameters in a single radial plane of an individual ring.

TABLE 5

| TOLERANCES OF CYLINDRICAL ROLLER AND NEEDLE ROLLER RADIAL BEARINGS – INNER RING – METRIC SERIES |     |                                         |    |       |                    |                                         |    |       |           |                                         |          |           |
|-------------------------------------------------------------------------------------------------|-----|-----------------------------------------|----|-------|--------------------|-----------------------------------------|----|-------|-----------|-----------------------------------------|----------|-----------|
| Tolerance in micrometers (0.001 mm)                                                             |     |                                         |    |       |                    |                                         |    |       |           |                                         |          |           |
| Tolerance class P0 (normal tolerance)                                                           |     |                                         |    |       | Tolerance class P6 |                                         |    |       |           | Tolerance class P5                      |          |           |
|                                                                                                 |     | Variation $V_{dsp}$<br>*diameter series |    |       | Variation          | Variation $V_{dsp}$<br>*diameter series |    |       | Variation | Variation $V_{dsp}$<br>*diameter series |          | Variation |
| >                                                                                               | ≤   | 9                                       | 0  | 2 & 3 | $V_{dmp}$          | 9                                       | 0  | 2 & 3 | $V_{dmp}$ | 9                                       | 0, 2 & 3 | $V_{dmp}$ |
| 2.5                                                                                             | 10  | 10                                      | 8  | 6     | 6                  | 9                                       | 7  | 5     | 5         | 5                                       | 4        | 3         |
| 10                                                                                              | 18  | 10                                      | 8  | 6     | 6                  | 9                                       | 7  | 5     | 5         | 5                                       | 4        | 3         |
| 18                                                                                              | 30  | 13                                      | 10 | 8     | 8                  | 10                                      | 8  | 6     | 6         | 6                                       | 5        | 3         |
| 30                                                                                              | 50  | 15                                      | 12 | 9     | 9                  | 13                                      | 10 | 8     | 8         | 8                                       | 6        | 4         |
| 50                                                                                              | 80  | 19                                      | 19 | 11    | 11                 | 15                                      | 15 | 9     | 9         | 9                                       | 7        | 5         |
| 80                                                                                              | 120 | 25                                      | 25 | 15    | 15                 | 19                                      | 19 | 11    | 11        | 10                                      | 8        | 5         |
| 120                                                                                             | 180 | 31                                      | 31 | 19    | 19                 | 23                                      | 23 | 14    | 14        | 13                                      | 10       | 7         |
| 180                                                                                             | 250 | 38                                      | 38 | 23    | 23                 | 28                                      | 28 | 17    | 17        | 15                                      | 12       | 8         |
| 250                                                                                             | 315 | 44                                      | 44 | 26    | 26                 | 31                                      | 31 | 19    | 19        | 18                                      | 14       | 9         |
| 315                                                                                             | 400 | 50                                      | 50 | 30    | 30                 | 38                                      | 38 | 23    | 23        | 23                                      | 18       | 12        |
| 400                                                                                             | 500 | 56                                      | 56 | 34    | 34                 | 44                                      | 44 | 26    | 26        |                                         |          |           |

\* No values have been established for diameter series 8.

**TOLERANCE TERMS, SYMBOLS AND DEFINITIONS**

**Axes, planes etc.**

**Inner ring (or shaft washer) axis:** Axis of the cylinder inscribed in a basically cylindrical bore. The inner ring (or shaft washer) axis is also the bearing axis.

**Outer ring (or housing washer) axis:** Axis of the cylinder circumscribed around a basically cylindrical outside surface.

**Radial plane:** Plane perpendicular to the bearing or ring axis. It is, however, acceptable to consider radial planes referred to in the definitions as being parallel with the plane tangential to the reference face of a ring or the back face of a thrust bearing washer.

**Radial direction:** Direction through the bearing or ring axis in a radial plane.

**Axial plane:** Plane containing the bearing or ring axis.

**Axial direction:** Direction parallel with the bearing or ring axis. It is, however, acceptable to consider axial directions referred to in the definitions as being perpendicular to the plane tangential to the reference face of a ring or back face of a thrust bearing washer.

**Reference face:** Face designated by the manufacturer of the bearings, and which may be the datum for measurements.

**NOTE:** The reference face for measurement is generally taken as the unmarked face. In case of symmetrical rings when it is not possible to identify the reference face, the tolerances are deemed to comply relative to either face, but not both. The reference face of a shaft and housing washer as a thrust bearing is that face intended to support axial load and is generally opposite the raceway face.

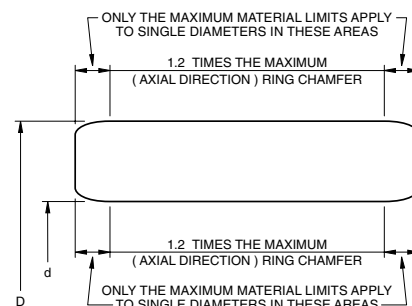
**Outer ring flange back face:** That side of an outer ring flange which is intended to support axial load.

**Middle of raceway:** Point or line on a raceway surface, halfway between the two edges of the raceway.

**Raceway contact diameter:** Diameter of the theoretical circle through the nominal points of contact between the rolling elements and raceway.

**NOTE:** For roller bearings, the nominal point of contact is generally at the middle of the roller.

**Diameter deviation near ring faces:** In radial planes, nearer the face of a ring than 1.2 times the maximum (axial direction) ring chamfer, only the maximum material limits apply.



**A** BEARING TOLERANCES, INCH & METRIC - *continued*

The tolerances given in the following table apply to outer rings of metric series cylindrical roller and needle roller radial bearing types in which their rings are precision finished.

TABLE 6

| TOLERANCES OF CYLINDRICAL ROLLER AND NEEDLE ROLLER RADIAL BEARINGS – OUTER RING – METRIC SERIES |     |                                         |    |       |                    |                                           |    |       |                    |                                         |          |           |
|-------------------------------------------------------------------------------------------------|-----|-----------------------------------------|----|-------|--------------------|-------------------------------------------|----|-------|--------------------|-----------------------------------------|----------|-----------|
| Tolerance in micrometers (0.001 mm)                                                             |     |                                         |    |       |                    |                                           |    |       |                    |                                         |          |           |
| Tolerance class P0 (normal tolerance)                                                           |     |                                         |    |       | Tolerance class P6 |                                           |    |       | Tolerance class P5 |                                         |          |           |
|                                                                                                 |     | Variation $V_{Dsp}$<br>*diameter series |    |       | Variation          | **Variation $V_{Dsp}$<br>*diameter series |    |       | Variation          | Variation $V_{Dsp}$<br>*diameter series |          | Variation |
| >                                                                                               | ≤   | 9                                       | 0  | 2 & 3 | $V_{Dmp}$          | 9                                         | 0  | 2 & 3 | $V_{Dmp}$          | 9                                       | 0, 2 & 3 | $V_{Dmp}$ |
| 6                                                                                               | 18  | 10                                      | 8  | 6     | 6                  | 9                                         | 7  | 5     | 6                  | 5                                       | 4        | 3         |
| 18                                                                                              | 30  | 12                                      | 9  | 7     | 7                  | 10                                        | 8  | 6     | 7                  | 6                                       | 5        | 3         |
| 30                                                                                              | 50  | 14                                      | 11 | 8     | 8                  | 11                                        | 9  | 7     | 8                  | 7                                       | 5        | 4         |
| 50                                                                                              | 80  | 16                                      | 13 | 10    | 10                 | 14                                        | 11 | 8     | 10                 | 9                                       | 7        | 5         |
| 80                                                                                              | 120 | 19                                      | 19 | 11    | 11                 | 16                                        | 16 | 10    | 11                 | 10                                      | 8        | 5         |
| 120                                                                                             | 150 | 23                                      | 23 | 14    | 14                 | 19                                        | 19 | 11    | 14                 | 11                                      | 8        | 6         |
| 150                                                                                             | 180 | 31                                      | 31 | 19    | 19                 | 23                                        | 23 | 14    | 15                 | 13                                      | 10       | 7         |
| 180                                                                                             | 250 | 38                                      | 38 | 23    | 23                 | 25                                        | 25 | 15    | 19                 | 15                                      | 11       | 8         |
| 250                                                                                             | 315 | 44                                      | 44 | 26    | 26                 | 31                                        | 31 | 19    | 21                 | 18                                      | 14       | 9         |
| 315                                                                                             | 400 | 50                                      | 50 | 30    | 30                 | 35                                        | 35 | 21    | 25                 | 20                                      | 15       | 10        |
| 400                                                                                             | 500 | 56                                      | 56 | 34    | 34                 | 41                                        | 41 | 25    |                    | 23                                      | 17       | 12        |

\* No values have been established for diameter series 8.  
 \*\* Applies before inserting and after removal of internal snap ring.

**Outside Diameter**  
 $V_{Dmp}$  Difference between the largest and the smallest of the mean outside diameters in a single radial plane of an individual ring.  
 $V_{Dsp}$  Difference between the largest and smallest of the single outside diameters in a single radial plane.

BEARING TOLERANCES, INCH & METRIC - continued

**TOLERANCES OF CYLINDRICAL ROLLER THRUST BEARINGS**

The tolerances given in the following tables apply to thrust washers used in metric series cylindrical roller thrust bearings of dimension series 811 and 812.

TABLE 7

| TOLERANCES OF CYLINDRICAL ROLLER THRUST BEARINGS – SHAFT PILOTED WASHER – METRIC SERIES |     |                                       |           |           |                          |                    |         |                |                          |                    |                |           |                          |
|-----------------------------------------------------------------------------------------|-----|---------------------------------------|-----------|-----------|--------------------------|--------------------|---------|----------------|--------------------------|--------------------|----------------|-----------|--------------------------|
| Dimensions in mm                                                                        |     | Dimensions in micrometers (0.001 mm)  |           |           |                          |                    |         |                |                          |                    |                |           |                          |
| Nominal bore diameter<br>>      ≤                                                       |     | Tolerance class P0 (normal tolerance) |           |           |                          | Tolerance class P6 |         |                |                          | Tolerance class P5 |                |           |                          |
|                                                                                         |     | Deviation                             |           | Variation | Wall thickness Variation | Deviation          |         | Variation      | Wall thickness Variation | Deviation          |                | Variation | Wall thickness Variation |
|                                                                                         |     | $\Delta_{dmp}$                        | $V_{dsp}$ | $S_i^*$   | $\Delta_{dmp}$           | $V_{dsp}$          | $S_i^*$ | $\Delta_{dmp}$ | $V_{dsp}$                | $S_i^*$            | $\Delta_{dmp}$ | $V_{dsp}$ | $S_i^*$                  |
| 18                                                                                      | 18  | 0                                     | -8        | 6         | 10                       | 0                  | -8      | 6              | 5                        | 0                  | -8             | 6         | 3                        |
| 18                                                                                      | 30  | 0                                     | -10       | 8         | 10                       | 0                  | -10     | 8              | 5                        | 0                  | -10            | 8         | 3                        |
| 30                                                                                      | 50  | 0                                     | -12       | 9         | 10                       | 0                  | -12     | 9              | 6                        | 0                  | -12            | 9         | 3                        |
| 50                                                                                      | 80  | 0                                     | -15       | 11        | 10                       | 0                  | -15     | 11             | 7                        | 0                  | -15            | 11        | 4                        |
| 80                                                                                      | 120 | 0                                     | -20       | 15        | 15                       | 0                  | -20     | 15             | 8                        | 0                  | -20            | 15        | 4                        |
| 120                                                                                     | 180 | 0                                     | -25       | 19        | 15                       | 0                  | -25     | 19             | 9                        | 0                  | -25            | 19        | 5                        |
| 180                                                                                     | 250 | 0                                     | -30       | 23        | 20                       | 0                  | -30     | 23             | 10                       | 0                  | -30            | 23        | 5                        |
| 250                                                                                     | 315 | 0                                     | -35       | 26        | 25                       | 0                  | -35     | 26             | 13                       | 0                  | -35            | 26        | 7                        |
| 315                                                                                     | 400 | 0                                     | -40       | 30        | 30                       | 0                  | -40     | 30             | 15                       | 0                  | -40            | 30        | 7                        |
| 400                                                                                     | 500 | 0                                     | -45       | 34        | 30                       | 0                  | -45     | 34             | 18                       | 0                  | -45            | 34        | 9                        |

\* The values of the wall thickness variation  $S_e$ , for the Housing Piloted washer are identical to  $S_i$  for the Shaft Piloted washers.

TABLE 8

| TOLERANCES OF CYLINDRICAL ROLLER THRUST BEARINGS – HOUSING PILOTED WASHER – METRIC SERIES |     |                                       |           |                |                    |                |           |                    |           |           |
|-------------------------------------------------------------------------------------------|-----|---------------------------------------|-----------|----------------|--------------------|----------------|-----------|--------------------|-----------|-----------|
| Dimensions in mm                                                                          |     | Tolerances in micrometers (0.001 mm)  |           |                |                    |                |           |                    |           |           |
| Nominal outside diameter<br>>      ≤                                                      |     | Tolerance class P0 (normal tolerance) |           |                | Tolerance class P6 |                |           | Tolerance class P5 |           |           |
|                                                                                           |     | Deviation                             |           | Variation      | Deviation          |                | Variation | Deviation          |           | Variation |
|                                                                                           |     | $\Delta_{Dmp}$                        | $V_{Dsp}$ | $\Delta_{Dmp}$ | $V_{Dsp}$          | $\Delta_{Dmp}$ | $V_{Dsp}$ | $\Delta_{Dmp}$     | $V_{Dsp}$ |           |
|                                                                                           | 30  | 0                                     | -13       | 10             | 0                  | -13            | 10        | 0                  | -13       | 10        |
| 30                                                                                        | 50  | 0                                     | -16       | 12             | 0                  | -16            | 12        | 0                  | -16       | 12        |
| 50                                                                                        | 80  | 0                                     | -19       | 14             | 0                  | -19            | 14        | 0                  | -19       | 14        |
| 80                                                                                        | 120 | 0                                     | -22       | 17             | 0                  | -22            | 17        | 0                  | -22       | 17        |
| 120                                                                                       | 180 | 0                                     | -25       | 19             | 0                  | -25            | 19        | 0                  | -25       | 19        |
| 180                                                                                       | 250 | 0                                     | -30       | 23             | 0                  | -30            | 23        | 0                  | -30       | 23        |
| 250                                                                                       | 315 | 0                                     | -35       | 26             | 0                  | -35            | 26        | 0                  | -35       | 26        |
| 315                                                                                       | 400 | 0                                     | -40       | 30             | 0                  | -40            | 30        | 0                  | -40       | 30        |
| 400                                                                                       | 500 | 0                                     | -45       | 34             | 0                  | -45            | 34        | 0                  | -45       | 34        |

**ABMA / ISO Symbols - Inner Ring**

- $\Delta_{dmp}$  Single plane mean bore diameter deviation from basic bore diameter, e.g., bore tolerance for a basically tapered bore,  $\Delta_{dmp}$  refers only to the theoretical small bore end of the bore.
- $V_{dsp}$  Difference between the largest and the smallest of the single bore diameters in a single radial plane.
- $V_{dmp}$  Difference between the largest and smallest of the mean bore diameters in a single radial plane of an individual ring.

**ABMA / ISO Symbols - Outer Ring**

- $\Delta_{Dmp}$  Single plane mean outside diameter deviation from basic outside diameter, e.g., O.D. tolerance.
- $V_{Dsp}$  Difference between the largest and smallest of the single outside diameters in a single radial plane.

**A** BEARING TOLERANCES, INCH & METRIC - continued

**TOLERANCES FOR NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES**

Tolerances for the bore diameters and outside diameters of inch thrust assemblies are given in Table 9.

**TABLE 9**

| TOLERANCES FOR BORE (D <sub>C1</sub> ) AND OUTSIDE (D <sub>C</sub> ) DIAMETERS OF NOMINAL INCH (NTA) NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES |                             |        |                                    |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------|------------------------------------|--------|
| Needle roller Bore Diameter (D <sub>w</sub> )<br>(nominal)                                                                                    | Deviations                  |        |                                    |        |
|                                                                                                                                               | Diameter (D <sub>C1</sub> ) |        | Outside Diameter (D <sub>C</sub> ) |        |
|                                                                                                                                               | inch                        |        | inch                               |        |
| inch                                                                                                                                          | low                         | high   | high                               | low    |
| 0.0781                                                                                                                                        | +0.002                      | +0.007 | -0.010                             | -0.020 |
| 0.1250                                                                                                                                        | +0.002                      | +0.010 | -0.010                             | -0.025 |

**Bore Inspection Procedure for Assembly**

The bore diameter (D<sub>C1</sub>) of the assembly should be checked with “go” and “no go” plug gages. The “go” plug gage size is the minimum bore diameter of the assembly. The “no go” plug gage size is the maximum bore diameter of the assembly.

The assembly, under its own free weight, must fall freely from the “go” plug gage. The “no go” plug gage must not enter the bore. Where the “no go” plug gage can be forced through the bore, the assembly must not fall from the gage under its own weight.

**THRUST BEARINGS**

The tolerances in this table conform to ANSI/ABMA Standard 21.2.

Certain applications for Timken cylindrical roller bearings may require special precision tolerances. Timken has for many years offered two high-precision tolerance standards which augment the ABMA tolerance system. If your application requires precision beyond ABMA tolerances, consult your Timken representative about extraprecision and ultraprecision tolerances.

**TOLERANCES FOR THRUST WASHERS**

Tolerances for the outside diameters and bore diameters of nominal inch thrust washers are given in Tables 10 and 11.

**TABLE 10**

| TOLERANCES FOR BORE DIAMETER (d) OF NOMINAL INCH (TRA, TRB, ETC.) THRUST WASHERS. |      |            |        |
|-----------------------------------------------------------------------------------|------|------------|--------|
| Nominal bore diameter                                                             |      | Deviations |        |
| inch                                                                              |      | inch       |        |
| >                                                                                 | ≤    | low        | high   |
| 0.24                                                                              | 2.25 | +0.002     | +0.012 |
| 2.25                                                                              | 5.25 | +0.002     | +0.017 |

**TABLE 11**

| TOLERANCES FOR OUTSIDE DIAMETER (d <sub>1</sub> ) OF NOMINAL INCH (TRA, TRB ETC.) THRUST WASHERS. |      |            |        |
|---------------------------------------------------------------------------------------------------|------|------------|--------|
| Nominal O.D.                                                                                      |      | Deviations |        |
| inch                                                                                              |      | inch       |        |
| >                                                                                                 | ≤    | high       | low    |
| 0.24                                                                                              | 5.25 | -0.010     | -0.030 |

**THRUST CYLINDRICAL ROLLER BEARINGS**

| TYPE TP      |            |                |              |            |              |              |            |                | TYPES TPS    |            |                |              |            |              |              |            |                |
|--------------|------------|----------------|--------------|------------|--------------|--------------|------------|----------------|--------------|------------|----------------|--------------|------------|--------------|--------------|------------|----------------|
| Bore         |            |                | O.D.         |            |              | Height       |            |                | Bore         |            |                | O.D.         |            |              | Height       |            |                |
| Bearing over | Bore incl. | Tolerance +0.0 | Bearing over | O.D. incl. | Tolerance -0 | Bearing over | Bore incl. | Tolerance +0.0 | Bearing over | Bore incl. | Tolerance +0.0 | Bearing over | O.D. incl. | Tolerance -0 | Bearing over | Bore incl. | Tolerance +0.0 |
| mm in.       | mm in.     | mm in.         | mm in.       | mm in.     | mm in.       | mm in.       | mm in.     | mm in.         | mm in.       | mm in.     | mm in.         | mm in.       | mm in.     | mm in.       | mm in.       | mm in.     | mm in.         |
| 50.800       | 76.200     | -0.025         | 127.000      | 254.000    | +0.038       | 0.000        | 50.800     | -0.152         | 50.800       | 76.200     | -0.025         | 127.000      | 266.700    | +0.048       | 0.000        | 50.800     | -0.203         |
| 2.0000       | 3.0000     | -0.0010        | 5.0000       | 10.0000    | +0.0015      | 0.0000       | 2.0000     | -0.0060        | 2.0000       | 3.0000     | -0.0010        | 5.0000       | 10.5000    | +0.0019      | 0.0000       | 2.0000     | -0.0080        |
| 76.200       | 88.900     | -0.030         | 254.000      | 457.200    | +0.051       | 50.800       | 76.200     | -0.203         | 76.200       | 88.900     | -0.030         | 266.700      | 323.850    | +0.053       | 50.800       | 76.200     | -0.254         |
| 3.0000       | 3.5000     | -0.0012        | 10.0000      | 18.0000    | +0.0020      | 2.0000       | 3.0000     | -0.0080        | 3.0000       | 3.5000     | -0.0012        | 10.5000      | 12.7500    | +0.0021      | 2.0000       | 3.0000     | -0.0100        |
| 88.900       | 228.600    | -0.038         | 457.200      | 660.400    | +0.640       | 76.200       | 152.400    | -0.254         | 88.900       | 228.600    | -0.038         | 323.850      | 431.800    | +0.058       | 76.200       | 152.400    | -0.381         |
| 3.5000       | 9.0000     | -0.0015        | 18.0000      | 26.0000    | +0.0025      | 3.0000       | 6.0000     | -0.0100        | 3.5000       | 9.0000     | -0.0015        | 12.7500      | 17.0000    | +0.0023      | 3.0000       | 6.0000     | -0.0150        |
| 228.600      | 304.800    | -0.046         | 660.400      | 863.600    | +0.076       | 152.400      | 254.000    | -0.381         | 228.600      | 304.800    | -0.046         | 431.800      | 685.800    | +0.064       | 152.400      | 254.000    | -0.508         |
| 9.0000       | 12.0000    | -0.0018        | 26.0000      | 34.0000    | +0.0030      | 6.0000       | 10.0000    | -0.0150        | 9.0000       | 12.0000    | -0.0018        | 17.0000      | 27.0000    | +0.0025      | 6.0000       | 10.0000    | -0.0200        |
| 304.800      | 457.200    | -0.051         | 863.600      | 1117.600   | +0.102       | 254.000      | 457.200    | -0.508         | 304.800      | 457.200    | -0.051         | 685.800      | 889.000    | +0.076       | 254.000      | 457.200    | -0.635         |
| 12.0000      | 18.0000    | -0.0020        | 34.0000      | 44.0000    | +0.0040      | 10.0000      | 18.0000    | -0.0200        | 12.0000      | 18.0000    | -0.0020        | 27.0000      | 35.0000    | +0.0030      | 10.0000      | 18.0000    | -0.0250        |
| 457.200      | 558.800    | -0.064         |              |            |              | 457.200      | 762.000    | -0.635         | 457.200      | 558.800    | -0.064         |              |            |              | 457.200      | 762.000    | -0.762         |
| 18.0000      | 22.0000    | -0.0025        |              |            |              | 18.0000      | 30.0000    | -0.0250        | 18.0000      | 22.0000    | -0.0025        |              |            |              | 18.0000      | 30.0000    | -0.0300        |
| 558.800      | 762.000    | -0.076         |              |            |              |              |            |                | 558.800      | 762.000    | -0.076         |              |            |              |              |            |                |
| 22.0000      | 30.0000    | -0.0030        |              |            |              |              |            |                | 22.0000      | 30.0000    | -0.0030        |              |            |              |              |            |                |

The tolerances in this table conform to ANSI/ABMA Standard 21.2.

BEARING TOLERANCES, INCH & METRIC - continued

| THRUST BALL BEARINGS |         |           |         |          |           |         |                  |           |         |      |         |          |           |         |          |           |           |           |        |
|----------------------|---------|-----------|---------|----------|-----------|---------|------------------|-----------|---------|------|---------|----------|-----------|---------|----------|-----------|-----------|-----------|--------|
| TYPE TVB             |         |           |         |          |           |         | TYPES TVL & DTVL |           |         |      |         |          |           |         |          |           |           |           |        |
| Bore                 |         |           | O.D.    |          |           | Height  |                  |           |         | Bore |         |          | O.D.      |         |          | Height    |           |           |        |
| Bearing              | Bore    | Tolerance | Bearing | O.D.     | Tolerance | Bearing | Bore             | Tolerance | Max.    | Min. | Bearing | Bore     | Tolerance | Bearing | O.D.     | Tolerance | Bearing   | Tolerance |        |
| over                 | incl.   | -0        | over    | incl.    | +0.0      | over    | incl.            |           |         |      | over    | incl.    | -0        | over    | incl.    | +0.0      | over      |           |        |
| mm                   | mm      | mm        | mm      | mm       | mm        | mm      | mm               | mm        | mm      | mm   | mm      | mm       | mm        | mm      | mm       | mm        | mm        | mm        | mm     |
| in.                  | in.     | in.       | in.     | in.      | in.       | in.     | in.              | in.       | in.     | in.  | in.     | in.      | in.       | in.     | in.      | in.       | in.       | in.       | in.    |
| 0.000                | 171.450 | +0.127    | 0.000   | 134.938  | -0.051    | 0.000   | 46.038           | +0.127    | -0.127  |      | 0.000   | 504.825  | -0.076    | 0.000   | 584.000  | -0.076    |           |           |        |
| 0.0000               | 6.7500  | +0.0050   | 0.0000  | 5.3125   | -0.0020   | 0.0000  | 1.8125           | +0.0050   | -0.0050 |      | 0.0000  | 19.8750  | -0.0030   | 0.0000  | 23.0000  | -0.0030   | All Sizes |           | ±.381  |
| 171.450              | 508.000 | +0.178    | 134.938 | 441.325  | -0.076    | 46.038  | 304.800          | +0.254    | -0.254  |      | 504.825 | 1524.000 | -0.127    | 584.000 | 1778.000 | -0.127    |           |           | ±.0150 |
| 6.7500               | 20.0000 | +0.0070   | 5.3125  | 17.3750  | -0.0030   | 1.8125  | 12.0000          | +0.0100   | -0.0100 |      | 19.8750 | 60.0000  | -0.0050   | 23.0000 | 70.0000  | -0.0050   |           |           |        |
|                      |         |           | 441.325 | 1000.000 | -0.102    | 304.800 | 508.000          | +0.381    | -0.381  |      |         |          |           |         |          |           |           |           |        |
|                      |         |           | 17.3750 | 39.3701  | -0.0040   | 12.0000 | 20.0000          | +0.0150   | -0.0150 |      |         |          |           |         |          |           |           |           |        |

The tolerances in this table conform to ANSI/ABMA Standard 2.

| THRUST SPHERICAL ROLLER BEARINGS |          |           |               |            |          |           |               |               |         |           |        |      |       |
|----------------------------------|----------|-----------|---------------|------------|----------|-----------|---------------|---------------|---------|-----------|--------|------|-------|
| Inner Ring                       |          |           |               | Outer Ring |          |           |               | Height        |         |           |        |      |       |
| Bore                             |          | Tolerance |               | O.D.       |          | Tolerance |               | Bore Diameter |         | Tolerance |        |      |       |
| over                             | incl.    | Bore      | Radial Runout | over       | incl.    | O.D.      | Radial Runout | over          | incl.   | plus      | minus  | plus | minus |
| mm                               | mm       | -0.000 mm | mm            | mm         | mm       | mm        | mm            | mm            | mm      | mm        | mm     | mm   | mm    |
| in.                              | in.      | +0.0000   | in.           | in.        | in.      | in.       | in.           | in.           | in.     | in.       | in.    | in.  | in.   |
| 80.000                           | 120.000  | -0.020    | 0.025         | 120.000    | 150.000  | -0.020    | 0.041         | 80.000        | 120.000 | 0.094     | 0.254  |      |       |
| 3.1496                           | 4.7244   | -0.0008   | 0.0010        | 4.7244     | 5.9055   | -0.0080   | 0.0016        | 3.1496        | 4.7244  | 0.0037    | 0.0100 |      |       |
| 120.000                          | 180.000  | -0.025    | 0.030         | 150.000    | 180.000  | -0.025    | 0.046         | 120.000       | 180.000 | 0.109     | 0.300  |      |       |
| 4.7244                           | 7.0866   | -0.0010   | 0.0012        | 5.9055     | 7.0866   | -0.0010   | 0.0018        | 4.7244        | 7.0866  | 0.0043    | 0.0118 |      |       |
| 180.000                          | 250.000  | -0.030    | 0.041         | 180.000    | 250.000  | -0.030    | 0.051         | 180.000       | 250.000 | 0.130     | 0.366  |      |       |
| 7.0866                           | 9.8425   | -0.0012   | 0.0016        | 7.0866     | 9.8425   | -0.0012   | 0.0020        | 7.0866        | 9.8425  | 0.0051    | 0.0144 |      |       |
| 250.000                          | 315.000  | -0.036    | 0.051         | 250.000    | 315.000  | -0.036    | 0.061         | 250.000       | 315.000 | 0.155     | 0.434  |      |       |
| 9.8425                           | 12.4016  | -0.0014   | 0.0020        | 9.8425     | 12.4016  | -0.0014   | 0.0024        | 9.8425        | 12.4016 | 0.0061    | 0.0171 |      |       |
| 315.000                          | 400.000  | -0.041    | 0.061         | 315.000    | 400.000  | -0.041    | 0.071         | 315.000       | 400.000 | 0.170     | 0.480  |      |       |
| 12.4016                          | 15.7480  | -0.0016   | 0.0024        | 12.4016    | 15.7480  | -0.0016   | 0.0028        | 12.4016       | 15.7480 | 0.0067    | 0.0189 |      |       |
| 400.000                          | 500.000  | -0.046    | 0.066         | 400.000    | 500.000  | -0.046    | 0.081         | 400.000       | 500.000 | 0.185     | 0.526  |      |       |
| 15.7480                          | 19.6850  | -0.0018   | 0.0026        | 15.7480    | 19.6850  | -0.0018   | 0.0032        | 15.7480       | 19.6850 | 0.0073    | 0.0207 |      |       |
| 500.000                          | 630.000  | -0.051    | 0.071         | 500.000    | 630.000  | -0.051    | 0.102         | 500.000       | 630.000 | 0.203     | 0.584  |      |       |
| 19.6850                          | 24.8031  | -0.0020   | 0.0028        | 19.6850    | 24.8031  | -0.0020   | 0.0040        | 19.6850       | and up  | 0.0080    | 0.0230 |      |       |
| 630.000                          | 800.000  | -0.076    | 0.081         | 630.000    | 800.000  | -0.076    | 0.119         |               |         |           |        |      |       |
| 24.8031                          | 31.4961  | -0.0030   | 0.0032        | 24.8031    | 31.4961  | -0.0030   | 0.0047        |               |         |           |        |      |       |
| 800.000                          | 1000.000 | -0.102    | 0.089         | 800.000    | 1000.000 | -0.102    | 0.140         |               |         |           |        |      |       |
| 31.4961                          | 39.3701  | -0.0040   | 0.0035        | 31.4961    | 39.3701  | -0.0040   | 0.0055        |               |         |           |        |      |       |
| 1000.000                         | 1250.000 | -0.127    | 0.102         | 1000.000   | 1250.000 | -0.127    | 0.163         |               |         |           |        |      |       |
| 39.3701                          | 49.2126  | -0.0050   | 0.0040        | 39.3701    | 49.2126  | -0.0050   | 0.0064        |               |         |           |        |      |       |
|                                  |          |           | 1250.000      | 1600.000   | -0.165   | 0.193     |               |               |         |           |        |      |       |
|                                  |          |           | 49.2126       | 62.9921    | -0.0065  | 0.0076    |               |               |         |           |        |      |       |
|                                  |          |           | 1600.000      | 2000.000   | -0.203   | 0.229     |               |               |         |           |        |      |       |
|                                  |          |           | 62.9921       | 78.7402    | -0.0080  | 0.009     |               |               |         |           |        |      |       |



**TOLERANCES FOR NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES**

Pages C234 to C237 list the nominal outside diameter, bore diameter and needle roller diameter for the FNT and AXK Series of needle roller and cage thrust assemblies and also the nominal outside diameter and bore diameter of the series AS, LS, WS and GS thrust washers. Thickness tolerances for the AS and LS thrust washers are also included.

Tolerances for the outside and bore diameters of series FNT and AXK needle roller and cage thrust assemblies are given in Table 12. The needle rollers in any one assembly have a group tolerance of 2 µm.

TABLE 12

| TOLERANCES FOR BORE DIAMETER (D <sub>C1</sub> ) AND OUTSIDE DIAMETER (D <sub>C</sub> ) OF SERIES FNT AND AXK NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES |     |                                    |      |                |     |                                       |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------|------|----------------|-----|---------------------------------------|------|
| D <sub>C1</sub>                                                                                                                                       |     | Deviations of min. bore dia. (E11) |      | D <sub>C</sub> |     | Deviations of max. outside dia. (c12) |      |
| mm                                                                                                                                                    |     | µm                                 |      | mm             |     | µm                                    |      |
| >                                                                                                                                                     | ≤   | low                                | high | >              | ≤   | high                                  | low  |
| 3                                                                                                                                                     | 6   | +20                                | +95  | 18             | 30  | -110                                  | -320 |
| 6                                                                                                                                                     | 10  | +25                                | +115 | 30             | 40  | -120                                  | -370 |
| 10                                                                                                                                                    | 18  | +32                                | +142 | 40             | 50  | -130                                  | -380 |
| 18                                                                                                                                                    | 30  | +40                                | +170 | 50             | 65  | -140                                  | -440 |
| 30                                                                                                                                                    | 50  | +50                                | +210 | 65             | 80  | -150                                  | -450 |
| 50                                                                                                                                                    | 80  | +60                                | +250 | 80             | 100 | -170                                  | -520 |
| 80                                                                                                                                                    | 120 | +72                                | +292 | 100            | 120 | -180                                  | -530 |
|                                                                                                                                                       |     |                                    |      | 120            | 140 | -200                                  | -600 |

**Bore inspection procedure for assembly**

If an inspection of the bore diameter is desired, the bore diameter (D<sub>C1</sub>) of the assembly should be checked with “go” and “no go” plug gages. The “go” plug gage size is the minimum bore diameter of the assembly. The “no go” plug gage size is the maximum bore diameter of the assembly.

The assembly, under its own weight, must fall freely from the “go” plug gage. The “no go” plug gage must not enter the bore. Where the “no go” plug gage can be forced through the bore, the assembly must not fall from the gage under its own weight.

**Tolerances for thrust washers**

Tolerances for the outside and bore diameters of series AS thrust washers are given in Table 13. Thickness tolerance for series AS thrust washers is +0.05 mm.

TABLE 13

| TOLERANCES FOR BORE DIAMETER (d) AND OUTSIDE DIAMETER (d <sub>1</sub> ) OF SERIES AS THRUST WASHERS. |     |                                    |      |                |     |                                       |      |
|------------------------------------------------------------------------------------------------------|-----|------------------------------------|------|----------------|-----|---------------------------------------|------|
| d                                                                                                    |     | Deviations of min. bore dia. (E12) |      | d <sub>1</sub> |     | Deviations of max. outside dia. (e13) |      |
| mm                                                                                                   |     | µm                                 |      | mm             |     | µm                                    |      |
| >                                                                                                    | ≤   | low                                | high | >              | ≤   | high                                  | low  |
| 3                                                                                                    | 6   | +20                                | +140 | 18             | 30  | -40                                   | -370 |
| 6                                                                                                    | 10  | +25                                | +175 | 30             | 50  | -50                                   | -440 |
| 10                                                                                                   | 18  | +32                                | +212 | 50             | 80  | -60                                   | -520 |
| 18                                                                                                   | 30  | +40                                | +250 | 80             | 120 | -72                                   | -612 |
| 30                                                                                                   | 50  | +50                                | +300 | 120            | 180 | -85                                   | -715 |
| 50                                                                                                   | 80  | +60                                | +360 | 180            | 250 | -100                                  | -820 |
| 80                                                                                                   | 120 | +72                                | +422 |                |     |                                       |      |
| 120                                                                                                  | 180 | +85                                | +485 |                |     |                                       |      |

Tolerances for the outside and bore diameters of series LS heavy thrust washers are given in Table 14. Thickness tolerances for series LS heavy thrust washers are given in tabular pages.

TABLE 14

| TOLERANCES FOR BORE DIAMETER (d) AND OUTSIDE DIAMETER (d <sub>1</sub> ) OF SERIES LS HEAVY THRUST WASHERS. |     |                                    |      |                |     |                                       |       |
|------------------------------------------------------------------------------------------------------------|-----|------------------------------------|------|----------------|-----|---------------------------------------|-------|
| d                                                                                                          |     | Deviations of min. bore dia. (E12) |      | d <sub>1</sub> |     | Deviations of max. outside dia. (a12) |       |
| mm                                                                                                         |     | µm                                 |      | mm             |     | µm                                    |       |
| >                                                                                                          | ≤   | low                                | high | >              | ≤   | high                                  | low   |
| 3                                                                                                          | 6   | +20                                | +140 | 18             | 30  | -300                                  | -510  |
| 6                                                                                                          | 10  | +25                                | +175 | 30             | 40  | -310                                  | -560  |
| 10                                                                                                         | 18  | +32                                | +212 | 40             | 50  | -320                                  | -570  |
| 18                                                                                                         | 30  | +40                                | +250 | 50             | 65  | -340                                  | -640  |
| 30                                                                                                         | 50  | +50                                | +300 | 65             | 80  | -360                                  | -660  |
| 50                                                                                                         | 80  | +60                                | +360 | 80             | 100 | -380                                  | -730  |
| 80                                                                                                         | 120 | +72                                | +422 | 100            | 120 | -410                                  | -760  |
| 120                                                                                                        | 180 | +85                                | +485 | 120            | 140 | -460                                  | -860  |
|                                                                                                            |     |                                    |      | 140            | 160 | -520                                  | -920  |
|                                                                                                            |     |                                    |      | 160            | 180 | -580                                  | -980  |
|                                                                                                            |     |                                    |      | 180            | 200 | -660                                  | -1120 |

**Bore inspection procedure for series AS and LS thrust washers**

If an inspection of the thrust washer bore diameter (d) is desired, it should be checked with “go” and “no go” plug gages. The “go” plug gage size is the minimum bore diameter of the thrust washer. The “no go” plug gage size is the maximum bore diameter of the thrust washer.

The thrust washer, under its own weight, must fall freely from the “go” plug gage. The “no go” plug gage must not enter the bore. Where the “no go” plug gage can be forced through the bore, the thrust washer must not fall from the gage under its own weight.

BEARING TOLERANCES, INCH & METRIC - continued

TAPERED ROLLER BEARINGS

Timken tapered roller bearings are manufactured to a number of specifications or “classes” that define tolerances on dimensions such as bore, O.D., width and runout. The Timken Company produces bearings to both inch and metric systems. The boundary dimension tolerances applicable to these two categories of bearings differ.

The major difference between the two tolerance systems is that inch bearings have historically been manufactured to positive bore and O.D. tolerances, whereas metric bearings have been manufactured to negative tolerances.

Metric system bearings (ISO and “J” prefix parts)

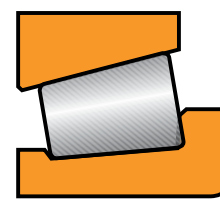
Timken manufactures metric system bearings to six tolerance classes. Classes K and N are often referred to as standard classes. Class N has more closely controlled bearing width tolerances than K. Classes C, B, A and AA are “precision” classes. These tolerances lie within those currently specified in ISO 492 with the exception of a small number of dimensions indicated in the tables. The differences normally have an insignificant effect on the mounting and performance of tapered roller bearings.

The following table illustrates the current ISO bearing class that corresponds approximately to each of The Timken Company metric bearing classes.

For the exact comparison, please consult your Timken representative.

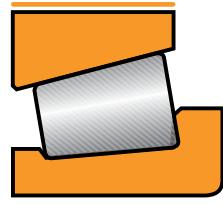
| BEARING CLASS |        |    |    |    |    |     |
|---------------|--------|----|----|----|----|-----|
| Metric        | K      | N  | C  | B  | A  | AA  |
| Inch          | 4      | 2  | 3  | 0  | 00 | 000 |
| ISO/DIN       | Normal | 6X | P5 | P4 | P2 | –   |

| METRIC BEARING TOLERANCES (µm) |               |                |      |      |      |           |      |      |      |      |      |      |      |      |
|--------------------------------|---------------|----------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CONE BORE                      |               | Bearing Class  |      |      |      |           |      |      |      |      |      |      |      |      |
|                                |               | Standard       |      |      |      | Precision |      |      |      |      |      |      |      |      |
|                                |               | K              |      | N    |      | C         |      | B    |      | A    |      | AA   |      |      |
| Bearing types                  | Bore, mm over | Bore, mm incl. | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                | 10            | 18             | 0    | -12  | 0    | -12       | 0    | -7   | 0    | -5   | 0    | -5   | 0    | -5   |
|                                | 18            | 30             | 0    | -12  | 0    | -12       | 0    | -8   | 0    | -6   | 0    | -6   | 0    | -6   |
|                                | 30            | 50             | 0    | -12  | 0    | -12       | 0    | -10  | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 50            | 80             | 0    | -15  | 0    | -15       | 0    | -12  | 0    | -9   | 0    | -8   | 0    | -8   |
|                                | 80            | 120            | 0    | -20  | 0    | -20       | 0    | -15  | 0    | -10  | 0    | -8   | 0    | -8   |
| TS                             | 120           | 180            | 0    | -25  | 0    | -25       | 0    | -18  | 0    | -13  | 0    | -8   | 0    | -8   |
|                                | 180           | 250            | 0    | -30  | 0    | -30       | 0    | -22  | 0    | -15  | 0    | -8   | 0    | -8   |
| TSF                            | 250           | 265            | 0    | -35  | 0    | -35       | 0    | -22  | 0    | -15  | 0    | -8   | 0    | -8   |
|                                | 265           | 315            | 0    | -35  | 0    | -35       | 0    | -22  | 0    | -15  | 0    | -8   | 0    | -8   |
| SR <sup>(1)</sup>              | 315           | 400            | 0    | -40  | 0    | -40       | 0    | -25  | –    | –    | –    | –    | –    | –    |
|                                | 400           | 500            | 0    | -45  | 0    | -45       | 0    | -25  | –    | –    | –    | –    | –    | –    |
|                                | 500           | 630            | 0    | -50  | –    | –         | 0    | -30  | –    | –    | –    | –    | –    | –    |
|                                | 630           | 800            | 0    | -80  | –    | –         | 0    | -40  | –    | –    | –    | –    | –    | –    |
|                                | 800           | 1000           | 0    | -100 | –    | –         | 0    | -50  | –    | –    | –    | –    | –    | –    |
|                                | 1000          | 1200           | 0    | -130 | –    | –         | 0    | -60  | –    | –    | –    | –    | –    | –    |
|                                | 1200          | 1600           | 0    | -150 | –    | –         | 0    | -80  | –    | –    | –    | –    | –    | –    |
|                                | 1600          | 2000           | 0    | -200 | –    | –         | –    | –    | –    | –    | –    | –    | –    | –    |
|                                | 2000          |                | 0    | -250 | –    | –         | –    | –    | –    | –    | –    | –    | –    | –    |



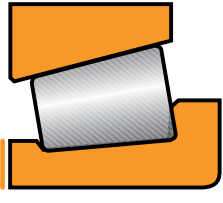
<sup>(1)</sup>SR assemblies are manufactured to tolerance class N only.

| METRIC BEARING TOLERANCES (µm) |                         |               |      |      |      |           |      |      |      |      |      |      |      |      |      |
|--------------------------------|-------------------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|------|
| CUP O.D.                       |                         | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |      |
|                                |                         | Standard      |      |      |      | Precision |      |      |      | AA   |      |      |      |      |      |
|                                |                         | K             |      | N    |      | C         |      | B    |      | A    |      | AA   |      |      |      |
| Bearing types                  | O. D., mm<br>over incl. | Max.          | Min. | Max. | Min. | Max.      | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| TS                             | 10 18                   | 0             | -8   | 0    | -8   | 0         | -8   | 0    | -8   | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 18 30                   | 0             | -12  | 0    | -12  | 0         | -8   | 0    | -6   | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 30 50                   | 0             | -14  | 0    | -14  | 0         | -9   | 0    | -7   | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 50 80                   | 0             | -16  | 0    | -16  | 0         | -11  | 0    | -9   | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 80 120                  | 0             | -18  | 0    | -18  | 0         | -13  | 0    | -10  | 0    | -8   | 0    | -8   | 0    | -8   |
| TSF                            | 120 150                 | 0             | -20  | 0    | -20  | 0         | -15  | 0    | -11  | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 150 180                 | 0             | -25  | 0    | -25  | 0         | -18  | 0    | -13  | 0    | -8   | 0    | -8   | 0    | -8   |
| SR <sup>(1)</sup>              | 180 250                 | 0             | -30  | 0    | -30  | 0         | -20  | 0    | -15  | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 250 265                 | 0             | -35  | 0    | -35  | 0         | -25  | 0    | -18  | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 265 315                 | 0             | -35  | 0    | -35  | 0         | -25  | 0    | -18  | 0    | -8   | 0    | -8   | 0    | -8   |
|                                | 315 400                 | 0             | -40  | 0    | -40  | 0         | -28  | 0    | -18  | -    | -    | -    | -    | -    | -    |
|                                | 400 500                 | 0             | -45  | 0    | -45  | 0         | -30  | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 500 630                 | 0             | -50  | 0    | -50  | 0         | -35  | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 630 800                 | 0             | -80  | -    | -    | 0         | -40  | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 800 1000                | 0             | -100 | -    | -    | 0         | -50  | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 1000 1200               | 0             | -130 | -    | -    | 0         | -60  | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 1200 1600               | 0             | -165 | -    | -    | 0         | -80  | -    | -    | -    | -    | -    | -    | -    | -    |
| 1600 2000                      | 0                       | -200          | -    | -    | -    | -         | -    | -    | -    | -    | -    | -    | -    | -    |      |
| 2000                           | 0                       | -250          | -    | -    | -    | -         | -    | -    | -    | -    | -    | -    | -    | -    |      |



<sup>(1)</sup>SR assemblies are manufactured to tolerance class N only.

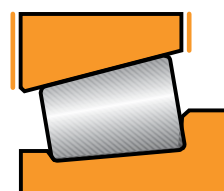
| METRIC BEARING TOLERANCES (µm) |                        |               |      |      |      |           |      |      |      |      |      |      |      |      |      |
|--------------------------------|------------------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|------|
| CONE WIDTH                     |                        | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |      |
|                                |                        | Standard      |      |      |      | Precision |      |      |      | AA   |      |      |      |      |      |
|                                |                        | K             |      | N    |      | C         |      | B    |      | A    |      | AA   |      |      |      |
| Bearing types                  | Bore, mm<br>over incl. | Max.          | Min. | Max. | Min. | Max.      | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| TS                             | 10 50                  | 0             | -100 | 0    | -50  | 0         | -200 | 0    | -200 | 0    | -200 | 0    | -200 | 0    | -200 |
|                                | 50 120                 | 0             | -150 | 0    | -50  | 0         | -300 | 0    | -300 | 0    | -300 | 0    | -300 | 0    | -300 |
|                                | 120 180                | 0             | -200 | 0    | -50  | 0         | -300 | 0    | -300 | 0    | -300 | 0    | -300 | 0    | -300 |
|                                | 180 250                | 0             | -200 | 0    | -50  | 0         | -350 | 0    | -350 | 0    | -350 | 0    | -350 | 0    | -350 |
|                                | 250 265                | 0             | -200 | 0    | -50  | 0         | -350 | 0    | -350 | 0    | -350 | 0    | -350 | 0    | -350 |
| TSF                            | 265 315                | 0             | -200 | 0    | -50  | 0         | -350 | 0    | -350 | 0    | -350 | 0    | -350 | 0    | -350 |
|                                | 315 500                | 0             | -250 | 0    | -50  | 0         | -350 | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 500 630                | 0             | -250 | -    | -    | 0         | -350 | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 630 1200               | 0             | -300 | -    | -    | 0         | -350 | -    | -    | -    | -    | -    | -    | -    | -    |
|                                | 1200 1600              | 0             | -350 | -    | -    | 0         | -350 | -    | -    | -    | -    | -    | -    | -    | -    |
| 1600                           | 0                      | -350          | -    | -    | -    | -         | -    | -    | -    | -    | -    | -    | -    | -    |      |



BEARING TOLERANCES, INCH & METRIC - continued

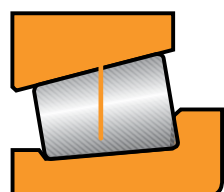
| METRIC BEARING TOLERANCES (µm) |           |               |      |        |      |           |      |      |      |      |      |      |      |      |
|--------------------------------|-----------|---------------|------|--------|------|-----------|------|------|------|------|------|------|------|------|
| CUP WIDTH                      |           | Bearing Class |      |        |      |           |      |      |      |      |      |      |      |      |
|                                |           | Standard      |      |        |      | Precision |      |      |      | AA   |      |      |      |      |
|                                |           | K             |      | N      |      | C         |      | B    |      | A    |      | AA   |      |      |
| Bearing types                  | O. D., mm |               | Max. | ▲ Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                | 10        | 80            | 0    | -150   | 0    | -100      | 0    | -150 | 0    | -150 | 0    | -150 | 0    | -150 |
|                                | 80        | 150           | 0    | -200   | 0    | -100      | 0    | -200 | 0    | -200 | 0    | -200 | 0    | -200 |
|                                | 150       | 180           | 0    | -200   | 0    | -100      | 0    | -250 | 0    | -250 | 0    | -250 | 0    | -250 |
|                                | 180       | 250           | 0    | -250   | 0    | -100      | 0    | -250 | 0    | -250 | 0    | -250 | 0    | -250 |
| TS                             | 250       | 265           | 0    | -250   | 0    | -100      | 0    | -300 | 0    | -300 | 0    | -300 | 0    | -300 |
|                                | 265       | 315           | 0    | -250   | 0    | -100      | 0    | -300 | 0    | -300 | 0    | -300 | 0    | -300 |
| TSF                            | 315       | 400           | 0    | -250   | 0    | -100      | 0    | -300 | 0    | -300 | -    | -    | -    | -    |
|                                | 400       | 500           | 0    | -300   | 0    | -100      | 0    | -350 | -    | -    | -    | -    | -    | -    |
|                                | 500       | 800           | 0    | -300   | 0    | -100      | 0    | -350 | -    | -    | -    | -    | -    | -    |
|                                | 800       | 1200          | 0    | -350   | -    | -         | 0    | -400 | -    | -    | -    | -    | -    | -    |
|                                | 1200      | 1600          | 0    | -400   | -    | -         | 0    | -400 | -    | -    | -    | -    | -    | -    |
|                                | 1600      |               | 0    | -400   | -    | -         | -    | -    | -    | -    | -    | -    | -    | -    |

▲These differ slightly from tolerances in ISO 492. These differences normally have an insignificant effect on the mounting and performance of tapered roller bearings. The 30000 series ISO bearings are also available with the above parameter according to ISO 492.



| METRIC BEARING TOLERANCES (µm) |          |               |      |      |      |           |      |      |      |      |      |      |      |      |
|--------------------------------|----------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CONE STAND                     |          | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                |          | Standard      |      |      |      | Precision |      |      |      | AA   |      |      |      |      |
|                                |          | K             |      | N    |      | C         |      | B    |      | A    |      | AA   |      |      |
| Bearing types                  | Bore, mm |               | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                | 10       | 80            | +100 | 0    | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
|                                | 80       | 120           | +100 | -100 | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
| TS                             | 120      | 180           | +150 | -150 | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
|                                | 180      | 250           | +150 | -150 | +50  | 0         | +100 | -150 | *    | *    | *    | *    | *    | *    |
| TSF                            | 250      | 265           | +150 | -150 | +100 | 0         | +100 | -150 | *    | *    | *    | *    | *    | *    |
|                                | 265      | 315           | +150 | -150 | +100 | 0         | +100 | -150 | *    | *    | -    | -    | -    | -    |
|                                | 315      | 400           | +200 | -200 | +100 | 0         | +150 | -150 | -    | -    | -    | -    | -    | -    |
|                                | 400      |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |

\* These sizes manufactured as matched assemblies only.

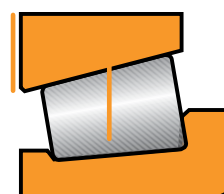


Cone Stand. Cone stand is a measure of the variation in cone raceway size and taper and roller diameter and taper which is checked by measuring the axial location of the reference surface of a master cup or other type gage with respect to the reference face of the cone.

| METRIC BEARING TOLERANCES (µm) |          |               |      |      |      |           |      |      |      |      |      |      |      |      |
|--------------------------------|----------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CUP STAND                      |          | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                |          | Standard      |      |      |      | Precision |      |      |      | AA   |      |      |      |      |
|                                |          | K             |      | N    |      | C         |      | B    |      | A    |      | AA   |      |      |
| Bearing types                  | Bore, mm |               | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                | 10       | 18            | +100 | 0    | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
|                                | 18       | 80            | +100 | 0    | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
| TS                             | 80       | 120           | +100 | -100 | +50  | 0         | +100 | -100 | *    | *    | *    | *    | *    | *    |
|                                | 120      | 265           | +200 | -100 | +100 | 0         | +100 | -150 | *    | *    | *    | *    | *    | *    |
| TSF <sup>(1)</sup>             | 265      | 315           | +200 | -100 | +100 | 0         | +100 | -150 | *    | *    | -    | -    | -    | -    |
|                                | 315      | 400           | +200 | -200 | +100 | 0         | +100 | -150 | -    | -    | -    | -    | -    | -    |
|                                | 400      |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |

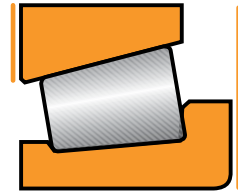
\* These sizes manufactured as matched assemblies only.

<sup>(1)</sup>Stand for flanged cup is measured from flange backface (seating face).



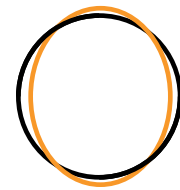
Cup Stand. Cup stand is a measure of the variation in cup I.D. size and taper which is checked by measuring the axial location of the reference surface of a master plug or other type gage with respect to the reference face of the cup.

| METRIC BEARING TOLERANCES (µm) |                        |               |      |      |      |           |      |      |      |           |      |      |      |      |
|--------------------------------|------------------------|---------------|------|------|------|-----------|------|------|------|-----------|------|------|------|------|
| OVERALL BEARING WIDTH          |                        | Bearing Class |      |      |      |           |      |      |      |           |      |      |      |      |
|                                |                        | Standard      |      |      |      | Precision |      |      |      | Precision |      |      |      |      |
|                                |                        | K             |      | N    |      | C         |      | B    |      | A         |      | AA   |      |      |
| Bearing types                  | Bore, mm<br>over incl. |               | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. |
| TS                             | 10                     | 80            | +200 | 0    | +100 | 0         | +200 | -200 | +200 | -200      | +200 | -200 | +200 | -200 |
|                                | 80                     | 120           | +200 | -200 | +100 | 0         | +200 | -200 | +200 | -200      | +200 | -200 | +200 | -200 |
|                                | 120                    | 180           | +350 | -250 | +150 | 0         | +350 | -250 | +200 | -250      | +200 | -250 | +200 | -250 |
|                                | 180                    | 250           | +350 | -250 | +150 | 0         | +350 | -250 | +200 | -300      | +200 | -300 | +200 | -300 |
|                                | 250                    | 265           | +350 | -250 | +200 | 0         | +350 | -300 | +200 | -300      | +200 | -300 | +200 | -300 |
|                                | 265                    | 315           | +350 | -250 | +200 | 0         | +350 | -300 | +200 | -300      | +200 | -300 | +200 | -300 |
|                                | 315                    | 500           | +400 | -400 | +200 | 0         | +350 | -300 | -    | -         | -    | -    | -    | -    |
|                                | 500                    | 800           | +400 | -400 | -    | -         | +350 | -400 | -    | -         | -    | -    | -    | -    |
|                                | 800                    | 1000          | +450 | -450 | -    | -         | +350 | -400 | -    | -         | -    | -    | -    | -    |
|                                | 1000                   | 1200          | +450 | -450 | -    | -         | +350 | -450 | -    | -         | -    | -    | -    | -    |
| TSF <sup>(2)</sup>             | 1200                   | 1600          | +450 | -450 | -    | -         | +350 | -500 | -    | -         | -    | -    | -    | -    |
|                                | 1600                   |               | +450 | -450 | -    | -         | -    | -    | -    | -         | -    | -    | -    | -    |
|                                | SR <sup>(3)</sup>      | 10            | 500  | -    | -    | 0         | -150 | -    | -    | -         | -    | -    | -    | -    |



<sup>(2)</sup> For bearing type TSF the tolerance applies to the dimension T<sub>1</sub>.  
<sup>(3)</sup> SR assemblies are manufactured to tolerance class N only.

| METRIC BEARING TOLERANCES (µm)          |                        |               |     |    |    |           |     |   |     |   |
|-----------------------------------------|------------------------|---------------|-----|----|----|-----------|-----|---|-----|---|
| ASSEMBLED BEARING MAXIMUM RADIAL RUNOUT |                        | Bearing Class |     |    |    |           |     |   |     |   |
|                                         |                        | Standard      |     |    |    | Precision |     |   |     |   |
|                                         |                        | K             |     | N  |    | C         |     | B |     | A |
| Bearing types                           | O.D., mm<br>over incl. |               |     |    |    |           |     |   |     |   |
| TS                                      | 10                     | 18            | -   | -  | -  | -         | -   | - | 1.9 | 1 |
|                                         | 18                     | 30            | 18  | 18 | 5  | 3         | 1.9 | 1 | 1   | 1 |
|                                         | 30                     | 50            | 20  | 20 | 6  | 3         | 1.9 | 1 | 1   | 1 |
|                                         | 50                     | 80            | 25  | 25 | 6  | 4         | 1.9 | 1 | 1   | 1 |
|                                         | 80                     | 120           | 35  | 35 | 6  | 4         | 1.9 | 1 | 1   | 1 |
|                                         | 120                    | 150           | 40  | 40 | 7  | 4         | 1.9 | 1 | 1   | 1 |
|                                         | 150                    | 180           | 45  | 45 | 8  | 4         | 1.9 | 1 | 1   | 1 |
|                                         | 180                    | 250           | 50  | 50 | 10 | 5         | 1.9 | 1 | 1   | 1 |
|                                         | 250                    | 265           | 60  | 60 | 11 | 5         | 1.9 | 1 | 1   | 1 |
|                                         | 265                    | 315           | 60  | 60 | 11 | 5         | 1.9 | 1 | 1   | 1 |
| TSF                                     | 315                    | 400           | 70  | 70 | 13 | 5         | -   | - | -   | - |
|                                         | 400                    | 500           | 80  | 80 | 18 | -         | -   | - | -   | - |
| SR <sup>(1)</sup>                       | 500                    | 630           | 100 | -  | 25 | -         | -   | - | -   | - |
|                                         | 630                    | 800           | 120 | -  | 35 | -         | -   | - | -   | - |
|                                         | 800                    | 1000          | 140 | -  | 50 | -         | -   | - | -   | - |
|                                         | 1000                   | 1200          | 160 | -  | 60 | -         | -   | - | -   | - |
|                                         | 1200                   | 1600          | 180 | -  | 80 | -         | -   | - | -   | - |
|                                         | 1600                   | 2000          | 200 | -  | -  | -         | -   | - | -   | - |
|                                         | 2000                   |               | 200 | -  | -  | -         | -   | - | -   | - |



<sup>(1)</sup> SR assemblies are manufactured to tolerance class N only.





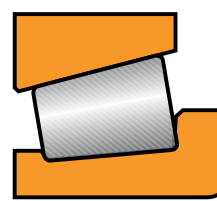
BEARING TOLERANCES, INCH & METRIC - continued

INCH SYSTEM BEARINGS

Inch system bearings are manufactured to a number of tolerance classes. Classes 4 and 2 are often referred to as “standard” classes.

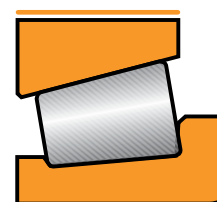
Class 2 has certain tolerances more closely controlled than class 4 and thus may be required for specific applications. Classes 3, 0, 00 and 000 are “precision” classes.

| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                              |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|------------------------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CONE BORE                                    |                              | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                              | Standard      |      |      |      | Precision |      |      |      |      |      |      |      |      |
|                                              |                              | 4             |      | 2    |      | 3         |      | 0    |      | 00   |      | 000  |      |      |
| Bearing types                                | Bore, mm (in.)<br>over incl. |               | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                              | 0                            | 76.200        | +13  | 0    | +13  | 0         | +13  | 0    | +13  | 0    | +8   | 0    | +8   | 0    |
|                                              | 0                            | 3.0000        | +5   | 0    | +5   | 0         | +5   | 0    | +5   | 0    | +3   | 0    | +3   | 0    |
| TS                                           | 76.200                       | 304.800       | +25  | 0    | +25  | 0         | +13  | 0    | +13  | 0    | +8   | 0    | +8   | 0    |
| TSF                                          | 3.0000                       | 12.0000       | +10  | 0    | +10  | 0         | +5   | 0    | +5   | 0    | +3   | 0    | +3   | 0    |
| TSL <sup>(1)</sup>                           | 304.800                      | 609.600       | –    | –    | +51  | 0         | +25  | 0    | –    | –    | –    | –    | –    | –    |
|                                              | 12.0000                      | 24.0000       | –    | –    | +20  | 0         | +10  | 0    | –    | –    | –    | –    | –    | –    |
| SS                                           | 609.600                      | 914.400       | +76  | 0    | –    | –         | +38  | 0    | –    | –    | –    | –    | –    | –    |
| TDI                                          | 24.0000                      | 36.0000       | +30  | 0    | –    | –         | +15  | 0    | –    | –    | –    | –    | –    | –    |
| TDIT                                         | 914.400                      | 1219.200      | +102 | 0    | –    | –         | +51  | 0    | –    | –    | –    | –    | –    | –    |
| TDO                                          | 36.0000                      | 48.0000       | +40  | 0    | –    | –         | +20  | 0    | –    | –    | –    | –    | –    | –    |
| TNA                                          | 1219.200                     | 48.0000       | +127 | 0    | –    | –         | +76  | 0    | –    | –    | –    | –    | –    | –    |
|                                              |                              |               | +50  | 0    | –    | –         | +30  | 0    | –    | –    | –    | –    | –    | –    |



<sup>(1)</sup> For TSL bearings these are the normal tolerances of cone bore. However, bore size can be slightly reduced at large end due to tight fit assembly of the seal on the rib. This should not have any effect on the performance of the bearing.

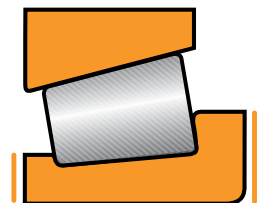
| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                              |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|------------------------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CUP O.D.                                     |                              | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                              | Standard      |      |      |      | Precision |      |      |      |      |      |      |      |      |
|                                              |                              | 4             |      | 2    |      | 3         |      | 0    |      | 00   |      | 000  |      |      |
| Bearing types                                | Bore, mm (in.)<br>over incl. |               | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| TS                                           | 0                            | 304.800       | +25  | 0    | +25  | 0         | +13  | 0    | +13  | 0    | +8   | 0    | +8   | 0    |
| TSF                                          | 0                            | 12.0000       | +10  | 0    | +10  | 0         | +5   | 0    | +5   | 0    | +3   | 0    | +3   | 0    |
| TSL                                          | 304.800                      | 609.600       | +51  | 0    | +51  | 0         | +25  | 0    | –    | –    | –    | –    | –    | –    |
| SS                                           | 12.0000                      | 24.0000       | +20  | 0    | +20  | 0         | +10  | 0    | –    | –    | –    | –    | –    | –    |
| TDI                                          | 609.600                      | 914.400       | +76  | 0    | +76  | 0         | +38  | 0    | –    | –    | –    | –    | –    | –    |
| TDIT                                         | 24.0000                      | 36.0000       | +30  | 0    | +30  | 0         | +15  | 0    | –    | –    | –    | –    | –    | –    |
| TDO                                          | 914.400                      | 1219.200      | +102 | 0    | –    | –         | +51  | 0    | –    | –    | –    | –    | –    | –    |
| TNA                                          | 36.0000                      | 48.0000       | +40  | 0    | –    | –         | +20  | 0    | –    | –    | –    | –    | –    | –    |
| TNASW                                        | 1219.200                     | 48.0000       | +127 | 0    | –    | –         | +76  | 0    | –    | –    | –    | –    | –    | –    |
| TNASWE                                       |                              |               | +50  | 0    | –    | –         | +30  | 0    | –    | –    | –    | –    | –    | –    |



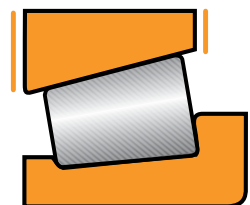
| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|----------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| OUTER RACE FLANGE O.D.                       |                | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                | Standard      |      |      |      | Precision |      |      |      |      |      |      |      |      |
| Bearing types                                | O.D., mm (in.) |               | 4    |      | 2    |           | 3    |      | 0    |      | 00   |      | 000  |      |
|                                              | over           | incl.         | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| TSF                                          | 304.800        | 609.600       | +51  | 0    | +52  | 0         | +51  | 0    | +51  | 0    | +51  | 0    | +51  | 0    |
|                                              | 12.0000        | 24.0000       | +20  | 0    | +20  | 0         | +20  | 0    | +20  | 0    | +20  | 0    | +20  | 0    |
|                                              | 609.600        | 914.400       | +76  | 0    | +76  | 0         | +76  | 0    | -    | -    | -    | -    | -    | -    |
|                                              | 24.0000        | 36.0000       | +30  | 0    | +30  | 0         | +30  | 0    | -    | -    | -    | -    | -    | -    |
|                                              | 914.400        | 36.0000       | +127 | 0    | -    | -         | +127 | 0    | -    | -    | -    | -    | -    | -    |
|                                              | 36.0000        |               | +40  | 0    | -    | -         | +50  | 0    | -    | -    | -    | -    | -    | -    |



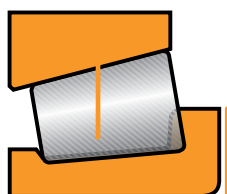
| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |
|----------------------------------------------|----------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|--|
| INNER RACE WIDTH                             |                | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |  |
|                                              |                | Standard      |      |      |      | Precision |      |      |      |      |      |      |      |      |  |
| Bearing types                                | O.D., mm (in.) |               | 4    |      | 2    |           | 3    |      | 0    |      | 00   |      | 000  |      |  |
|                                              | over           | incl.         | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |  |
| TS                                           | All Sizes      |               | +76  | -254 | +76  | -254      | +76  | -254 | +76  | -254 | +76  | -254 | +76  | -254 |  |
| TSF                                          |                |               | +30  | -100 | +30  | -100      | +30  | -100 | +30  | -100 | +30  | -100 | +30  | -100 |  |
| TSL                                          |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |
| SS                                           |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |
| TDI                                          |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |
| TDIT                                         |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |
| TDO                                          |                |               |      |      |      |           |      |      |      |      |      |      |      |      |  |



| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|----------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| OUTER RACE WIDTH                             |                | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                | Standard      |      |      |      | Precision |      |      |      |      |      |      |      |      |
| Bearing types                                | O.D., mm (in.) |               | 4    |      | 2    |           | 3    |      | 0    |      | 00   |      | 000  |      |
|                                              | over           | incl.         | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| All Types                                    | All Sizes      |               | +51  | -254 | +51  | -254      | +51  | -254 | +51  | -254 | +51  | -254 | +51  | -254 |
|                                              |                |               | +20  | -100 | +20  | -100      | +20  | -100 | +20  | -100 | +20  | -100 | +20  | -100 |



BEARING TOLERANCES, INCH & METRIC - continued

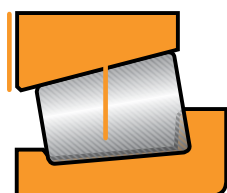


Cone Stand. Cone stand is a measure of the variation in cone raceway size and taper and roller diameter and taper which is checked by measuring the axial location of the reference surface of a master cup or other type gage with respect to the reference face of the cone.

| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|----------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CONE STAND                                   |                | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                | Standard      |      |      |      | Precision |      |      |      | 000  |      |      |      |      |
| Bearing types                                | O.D., mm (in.) |               | 4    |      | 2    |           | 3    |      | 0    |      | 00   |      | 000  |      |
|                                              | over           | incl.         | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                              | 0              | 101.600       | +102 | 0    | +102 | 0         | +102 | -102 | *    | *    | *    | *    | *    | *    |
|                                              | 0              | 4.0000        | +40  | 0    | +40  | 0         | +40  | -40  | *    | *    | *    | *    | *    | *    |
| TS                                           | 101.600        | 266.700       | +152 | -152 | +102 | 0         | +102 | -102 | *    | *    | *    | *    | *    | *    |
| TSL                                          | 4.0000         | 10.5000       | +60  | -60  | +40  | 0         | +40  | -40  | *    | *    | *    | *    | *    | *    |
| SS                                           | 266.700        | 304.800       | +152 | -152 | +102 | 0         | +102 | -102 | *    | *    | -    | -    | -    | -    |
| TDI <sup>(1)</sup>                           | 10.5000        | 12.0000       | +60  | -60  | +40  | 0         | +40  | -40  | *    | *    | -    | -    | -    | -    |
| TDIT <sup>(1)</sup>                          | 304.800        | 406.400       | -    | -    | +178 | -178      | +102 | -102 | -    | -    | -    | -    | -    | -    |
| TDO                                          | 12.0000        | 16.0000       | -    | -    | +70  | -70       | +40  | -40  | -    | -    | -    | -    | -    | -    |
|                                              | 406.400        |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |
|                                              | 16.0000        |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |

\* These sizes manufactured as matched assemblies only.

<sup>(1)</sup> For class 2, TDI and TDIT bearings with cone bore of 101.600 to 304.800 mm (4 in. to 12 in.), the cone stand is ±102 (±40).



Cup Stand. Cup stand is a measure of the variation in cup I.D. size and taper which is checked by measuring the axial location of the reference surface of a master plug or other type gage with respect to the reference face of the cup.

| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |               |      |      |      |           |      |      |      |      |      |      |      |      |
|----------------------------------------------|----------------|---------------|------|------|------|-----------|------|------|------|------|------|------|------|------|
| CUP STAND                                    |                | Bearing Class |      |      |      |           |      |      |      |      |      |      |      |      |
|                                              |                | Standard      |      |      |      | Precision |      |      |      | 000  |      |      |      |      |
| Bearing types                                | Bore, mm (in.) |               | 4    |      | 2    |           | 3    |      | 0    |      | 00   |      | 000  |      |
|                                              | over           | incl.         | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
|                                              | 0              | 101.600       | +102 | 0    | +102 | 0         | +102 | -102 | *    | *    | *    | *    | *    | *    |
|                                              | 0              | 4.0000        | +40  | 0    | +40  | 0         | +40  | -40  | *    | *    | *    | *    | *    | *    |
| TS                                           | 101.600        | 266.700       | +203 | -102 | +102 | 0         | +102 | -102 | *    | *    | *    | *    | *    | *    |
| TSF <sup>(1)</sup>                           | 4.0000         | 10.5000       | +80  | -40  | +40  | 0         | +40  | -40  | *    | *    | *    | *    | *    | *    |
| TSL                                          | 266.700        | 304.800       | +203 | -102 | +102 | 0         | +102 | -102 | *    | *    | -    | -    | -    | -    |
| SS                                           | 10.5000        | 12.0000       | +80  | -40  | +40  | 0         | +40  | -40  | *    | *    | -    | -    | -    | -    |
| TDI                                          | 304.800        | 406.400       | -    | -    | +203 | -203      | +102 | -102 | -    | -    | -    | -    | -    | -    |
| TDIT                                         | 12.0000        | 16.0000       | -    | -    | +80  | -80       | +40  | -40  | -    | -    | -    | -    | -    | -    |
|                                              | 406.400        |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |
|                                              | 16.0000        |               | *    | *    | *    | *         | *    | *    | -    | -    | -    | -    | -    | -    |

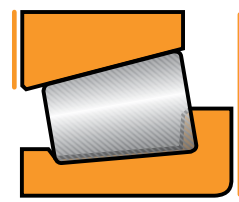
\* These sizes manufactured as matched assemblies only.

<sup>(1)</sup> Stand for flanged cup is measured from flange backface (seating face).

# ENGINEERING

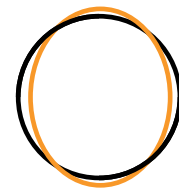
## A BEARING TOLERANCES, INCH & METRIC - continued

| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |         |                |               |      |      |      |      |      |      |      |           |      |      |      |      |
|----------------------------------------------|----------------|---------|----------------|---------------|------|------|------|------|------|------|------|-----------|------|------|------|------|
| OVERALL BEARING WIDTH                        |                |         |                | Bearing Class |      |      |      |      |      |      |      |           |      |      |      |      |
|                                              |                |         |                | Standard      |      |      |      | 3    |      |      |      | Precision |      |      |      |      |
| Bearing types                                | Bore, mm (in.) |         | O.D., mm (in.) |               | 4    |      | 2    |      | 3    |      | 0    |           | 00   |      | 000  |      |
|                                              | over           | incl.   | over           | incl.         | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min.      | Max. | Min. | Max. | Min. |
| TS                                           | 0              | 101.600 | -              | -             | +203 | 0    | +203 | 0    | +203 | -203 | +203 | -203      | +203 | -203 | +203 | -203 |
|                                              | 0              | 4.0000  | -              | -             | +80  | 0    | +80  | 0    | +80  | -80  | +80  | -80       | +80  | -80  | +80  | -80  |
|                                              | 101.600        | 304.800 | -              | -             | +356 | -254 | +203 | 0    | +203 | -203 | +203 | -203      | +203 | -203 | +203 | -203 |
|                                              | 4.0000         | 12.0000 | -              | -             | +140 | -100 | +80  | 0    | +80  | -80  | +80  | -80       | +80  | -80  | +80  | -80  |
|                                              | 304.800        | 609.600 | 0              | 508.000       | -    | -    | +381 | -381 | +203 | -203 | -    | -         | -    | -    | -    | -    |
| TSF <sup>(1)</sup>                           | 12.0000        | 24.0000 | 0              | 20.0000       | -    | -    | +150 | -150 | +80  | -80  | -    | -         | -    | -    | -    | -    |
|                                              | 304.800        | 609.600 | 508.000        | -             | -    | -    | -    | +381 | -381 | +381 | -381 | -         | -    | -    | -    | -    |
| TSL                                          | 12.0000        | 24.0000 | 0              | 20.0000       | -    | -    | +150 | -150 | +150 | -150 | -    | -         | -    | -    | -    | -    |
|                                              | 304.800        | 609.600 | 508.000        | -             | -    | -    | -    | +381 | -381 | +381 | -381 | -         | -    | -    | -    | -    |
| TNA                                          | 0              | 127.000 | -              | -             | -    | -    | +254 | 0    | +254 | 0    | -    | -         | -    | -    | -    | -    |
|                                              | 0              | 5.0000  | -              | -             | -    | -    | +100 | 0    | +100 | 0    | -    | -         | -    | -    | -    | -    |
| TNASW                                        | 127.000        | -       | -              | -             | -    | -    | +762 | 0    | +762 | 0    | -    | -         | -    | -    | -    | -    |
|                                              | 5.0000         | -       | -              | -             | -    | -    | +300 | 0    | +300 | 0    | -    | -         | -    | -    | -    | -    |
| TDI                                          | 0              | 101.600 | -              | -             | +406 | 0    | +406 | 0    | +406 | -406 | +406 | -406      | +406 | -406 | +406 | -406 |
|                                              | 0              | 4.0000  | -              | -             | +160 | 0    | +160 | 0    | +160 | -160 | +160 | -160      | +160 | -160 | +160 | -160 |
|                                              | 101.600        | 304.800 | -              | -             | +711 | -508 | +406 | -203 | +406 | -406 | +406 | -406      | +406 | -406 | +406 | -406 |
|                                              | 4.0000         | 12.0000 | -              | -             | +280 | -200 | +160 | -80  | +160 | -160 | +160 | -160      | +160 | -160 | +160 | -160 |
|                                              | 304.800        | 609.600 | 0              | 508.000       | -    | -    | +762 | -762 | +406 | -406 | -    | -         | -    | -    | -    | -    |
| TDIT                                         | 12.0000        | 24.0000 | 0              | 20.0000       | -    | -    | +300 | -300 | +160 | -160 | -    | -         | -    | -    | -    | -    |
|                                              | 304.800        | 609.600 | 508.000        | -             | -    | -    | -    | +762 | -762 | +762 | -762 | -         | -    | -    | -    | -    |
| TDO                                          | 12.0000        | 24.0000 | 0              | 20.0000       | -    | -    | +300 | -300 | +300 | -300 | -    | -         | -    | -    | -    | -    |
|                                              | 609.600        | 24.0000 | -              | -             | +762 | -762 | -    | -    | +762 | -762 | -    | -         | -    | -    | -    | -    |
| SS                                           | 0              | 101.600 | -              | -             | +457 | -51  | +457 | -51  | -    | -    | -    | -         | -    | -    | -    | -    |
|                                              | 0              | 4.0000  | -              | -             | +180 | -20  | +180 | -20  | -    | -    | -    | -         | -    | -    | -    | -    |



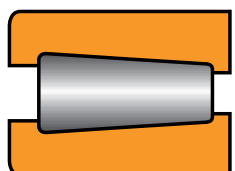
<sup>(1)</sup> For bearing type TSF the tolerance applies to the dimension T<sub>1</sub>.

| INCH BEARING TOLERANCES (µm AND 0.0001 INCH) |                |         |      |               |      |      |      |      |      |      |           |      |      |      |
|----------------------------------------------|----------------|---------|------|---------------|------|------|------|------|------|------|-----------|------|------|------|
| ASSEMBLED BEARING MAXIMUM RADIAL RUNOUT      |                |         |      | Bearing Class |      |      |      |      |      |      |           |      |      |      |
|                                              |                |         |      | Standard      |      |      |      | 3    |      |      | Precision |      |      |      |
| Bearing types                                | O.D., mm (in.) |         | 4    |               | 2    |      | 3    |      | 0    |      | 00        |      | 000  |      |
|                                              | over           | incl.   | Max. | Min.          | Max. | Min. | Max. | Min. | Max. | Min. | Max.      | Min. | Max. | Min. |
| TS                                           | 0              | -       | 51   | -             | 38   | -    | 8    | -    | 4    | -    | 2         | -    | 1    | -    |
| TSF                                          | 0              | -       | 20   | -             | 15   | -    | 3    | -    | 1.5  | -    | 0.75      | -    | 0.40 | -    |
| TSL                                          | 266.700        | 304.800 | 51   | -             | 38   | -    | 8    | -    | 4    | -    | 2         | -    | 1    | -    |
|                                              | 10.5000        | 12.0000 | 20   | -             | 15   | -    | 3    | -    | 1.5  | -    | 0.75      | -    | 0.40 | -    |
| SS                                           | 304.800        | 609.600 | 51   | -             | 38   | -    | 18   | -    | -    | -    | -         | -    | -    | -    |
|                                              | 12.0000        | 24.0000 | 20   | -             | 15   | -    | 7    | -    | -    | -    | -         | -    | -    | -    |
| TDI                                          | 609.600        | 914.400 | 76   | -             | 51   | -    | 51   | -    | -    | -    | -         | -    | -    | -    |
|                                              | 24.0000        | 36.0000 | 30   | -             | 20   | -    | 20   | -    | -    | -    | -         | -    | -    | -    |
| TNA                                          | 914.400        | -       | 76   | -             | -    | -    | 76   | -    | -    | -    | -         | -    | -    | -    |
|                                              | 36.0000        | -       | 30   | -             | -    | -    | 30   | -    | -    | -    | -         | -    | -    | -    |
| TNASW                                        | -              | -       | -    | -             | -    | -    | -    | -    | -    | -    | -         | -    | -    | -    |
| TNASWE                                       | -              | -       | -    | -             | -    | -    | -    | -    | -    | -    | -         | -    | -    | -    |

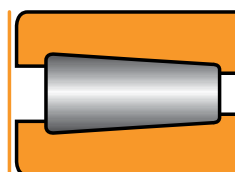


BEARING TOLERANCES, INCH & METRIC - *continued*

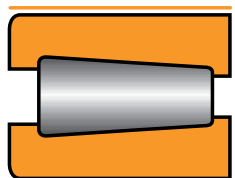
**THRUST TAPERED ROLLER BEARING (TTHD, TTVF, TTVS)  
TOLERANCES (µm AND 0.0001in.)**



| BORE            |          | BEARING CLASS |      |             |      |
|-----------------|----------|---------------|------|-------------|------|
|                 |          | Standard 2    |      | Precision 3 |      |
| Range, mm (in.) |          | Max.          | Min. | Max.        | Min. |
| over            | incl.    |               |      |             |      |
| 0               | 304.800  | +25           | 0    | +13         | 0    |
| 0               | 12.0000  | +10           | 0    | +5          | 0    |
| 304.800         | 609.600  | +51           | 0    | +25         | 0    |
| 12.0000         | 24.0000  | +20           | 0    | +10         | 0    |
| 609.600         | 914.400  | +76           | 0    | +38         | 0    |
| 24.0000         | 36.0000  | +30           | 0    | +15         | 0    |
| 914.400         | 1219.200 | +102          | 0    | +51         | 0    |
| 36.0000         | 48.0000  | +40           | 0    | +20         | 0    |
| 1219.200        |          | +127          | 0    | +76         | 0    |
| 48.0000         |          | +50           | 0    | +30         | 0    |



| OUTSIDE DIAMETER |          | BEARING CLASS |      |             |      |
|------------------|----------|---------------|------|-------------|------|
|                  |          | Standard 2    |      | Precision 3 |      |
| Range, mm (in.)  |          | Max.          | Min. | Max.        | Min. |
| over             | incl.    |               |      |             |      |
| 0                | 304.800  | +25           | 0    | +13         | 0    |
| 0                | 12.0000  | +10           | 0    | +5          | 0    |
| 304.800          | 609.600  | +51           | 0    | +25         | 0    |
| 12.0000          | 24.0000  | +20           | 0    | +10         | 0    |
| 609.600          | 914.400  | +76           | 0    | +38         | 0    |
| 24.0000          | 36.0000  | +30           | 0    | +15         | 0    |
| 914.400          | 1219.200 | +102          | 0    | +51         | 0    |
| 36.0000          | 48.0000  | +40           | 0    | +20         | 0    |
| 1219.200         |          | +127          | 0    | +76         | 0    |
| 48.0000          |          | +50           | 0    | +30         | 0    |



| WIDTH     | BEARING CLASS |              |             |             |
|-----------|---------------|--------------|-------------|-------------|
|           | Standard 2    |              | Precision 3 |             |
|           | Max.          | Min.         | Max.        | Min.        |
| All sizes | +381<br>+150  | -381<br>-150 | +203<br>+80 | -203<br>-80 |

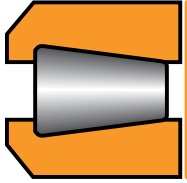


# ENGINEERING

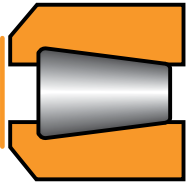
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## BEARING TOLERANCES, INCH & METRIC - continued

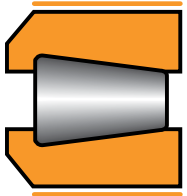
### THRUST TAPERED ROLLER BEARING (TTC, TTSP – CLASS 4) TOLERANCES (µm AND 0.0001 inch)



| BORE            |        | DEVIATION |      |
|-----------------|--------|-----------|------|
| Range, mm (in.) |        |           |      |
| over            | incl.  | Max.      | Min. |
| 0               | 25.400 | +76       | -76  |
| 0               | 1.0000 | +30       | -30  |
| 25.400          | 76.200 | +102      | -102 |
| 1.0000          | 3.0000 | +40       | -40  |
| 76.200          |        | +127      | -127 |
| 3.0000          |        | +50       | -50  |



| OUTSIDE DIAMETER |         | DEVIATION |      |
|------------------|---------|-----------|------|
| Range, mm (in.)  |         |           |      |
| over             | incl.   | Max.      | Min. |
| 0                | 127.000 | +254      | 0    |
| 0                | 5.0000  | +100      | 0    |
| 127.000          | 203.200 | +381      | 0    |
| 5.0000           | 8.0000  | +150      | 0    |
| 203.200          |         | +508      | 0    |
| 8.0000           |         | +200      | 0    |



| WIDTH           |         | DEVIATION |      |
|-----------------|---------|-----------|------|
| Range, mm (in.) |         |           |      |
| over            | incl.   | Max.      | Min. |
| 0               | 76.200  | +254      | -254 |
| 0               | 3.0000  | +100      | -100 |
| 76.200          | 127.000 | +381      | -381 |
| 3.0000          | 5.0000  | +150      | -150 |
| 127.000         |         | +508      | -508 |
| 5.0000          |         | +200      | -200 |

BEARING TOLERANCES, INCH & METRIC - continued

The following tables provide standard ISO tolerance information. They are provided for general use and are referenced throughout this catalog.

| ISO TOLERANCES FOR HOLES – METRIC |        |                             |      |       |      |       |      |                             |      |      |      |      |      |
|-----------------------------------|--------|-----------------------------|------|-------|------|-------|------|-----------------------------|------|------|------|------|------|
| Diameters<br>mm                   |        | Deviations in $\mu\text{m}$ |      |       |      |       |      | Deviations in $\mu\text{m}$ |      |      |      |      |      |
|                                   |        | B10                         |      | B11   |      | B12   |      | C9                          |      | C10  |      | C11  |      |
| >                                 | $\leq$ | high                        | low  | high  | low  | high  | low  | high                        | low  | high | low  | high | low  |
| 3                                 | 6      | +188                        | +140 | +215  | +140 | +260  | +140 | +100                        | +70  | +118 | +70  | +145 | +70  |
| 6                                 | 10     | +208                        | +150 | +240  | +150 | +300  | +150 | +116                        | +80  | +138 | +80  | +170 | +80  |
| 10                                | 18     | +220                        | +150 | +260  | +150 | +330  | +150 | +138                        | +95  | +165 | +95  | +205 | +95  |
| 18                                | 30     | +244                        | +160 | +290  | +160 | +370  | +160 | +162                        | +110 | +194 | +110 | +240 | +110 |
| 30                                | 40     | +270                        | +170 | +330  | +170 | +420  | +170 | +182                        | +120 | +220 | +120 | +280 | +120 |
| 40                                | 50     | +280                        | +180 | +340  | +180 | +430  | +180 | +192                        | +130 | +230 | +130 | +290 | +130 |
| 50                                | 65     | +310                        | +190 | +380  | +190 | +490  | +190 | +214                        | +140 | +260 | +140 | +330 | +140 |
| 65                                | 80     | +320                        | +200 | +390  | +200 | +500  | +200 | +224                        | +150 | +270 | +150 | +340 | +150 |
| 80                                | 100    | +360                        | +220 | +440  | +220 | +570  | +220 | +257                        | +170 | +310 | +170 | +390 | +170 |
| 100                               | 120    | +380                        | +240 | +460  | +240 | +590  | +240 | +267                        | +180 | +320 | +180 | +400 | +180 |
| 120                               | 140    | +420                        | +260 | +510  | +260 | +660  | +260 | +300                        | +200 | +360 | +200 | +450 | +200 |
| 140                               | 160    | +440                        | +280 | +530  | +280 | +680  | +280 | +310                        | +210 | +370 | +210 | +460 | +210 |
| 160                               | 180    | +470                        | +310 | +560  | +310 | +710  | +310 | +330                        | +230 | +390 | +230 | +480 | +230 |
| 180                               | 200    | +525                        | +340 | +630  | +340 | +800  | +340 | +355                        | +240 | +425 | +240 | +530 | +240 |
| 200                               | 225    | +565                        | +380 | +670  | +380 | +840  | +380 | +375                        | +260 | +445 | +260 | +550 | +260 |
| 225                               | 250    | +605                        | +420 | +710  | +420 | +880  | +420 | +395                        | +280 | +465 | +280 | +570 | +280 |
| 250                               | 280    | +690                        | +480 | +800  | +480 | +1000 | +480 | +430                        | +300 | +510 | +300 | +620 | +300 |
| 280                               | 315    | +750                        | +540 | +860  | +540 | +1060 | +540 | +460                        | +330 | +540 | +330 | +650 | +330 |
| 315                               | 355    | +830                        | +600 | +960  | +600 | +1170 | +600 | +500                        | +360 | +590 | +360 | +720 | +360 |
| 355                               | 400    | +910                        | +680 | +1040 | +680 | +1250 | +680 | +540                        | +400 | +630 | +400 | +760 | +400 |
| 400                               | 450    | +1010                       | +760 | +1160 | +760 | +1390 | +760 | +595                        | +440 | +690 | +440 | +840 | +440 |
| 450                               | 500    | +1090                       | +840 | +1240 | +840 | +1470 | +840 | +635                        | +480 | +730 | +480 | +880 | +480 |

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |      |      |      |      |      |      |      |       |      |
|-----------------|--------|-----------------------------|------|------|------|------|------|------|------|-------|------|
|                 |        | E9                          |      | E10  |      | E11  |      | E12  |      | E13   |      |
| >               | $\leq$ | high                        | low  | high | low  | high | low  | high | low  | high  | low  |
| 3               | 6      | +50                         | +20  | +68  | +20  | +95  | +20  | +140 | +20  | +200  | +20  |
| 6               | 10     | +61                         | +25  | +83  | +25  | +115 | +25  | +175 | +25  | +245  | +25  |
| 10              | 18     | +75                         | +32  | +102 | +32  | +142 | +32  | +212 | +32  | +302  | +32  |
| 18              | 30     | +92                         | +40  | +124 | +40  | +170 | +40  | +250 | +40  | +370  | +40  |
| 30              | 50     | +112                        | +50  | +150 | +50  | +210 | +50  | +300 | +50  | +440  | +50  |
| 50              | 80     | +134                        | +60  | +180 | +60  | +250 | +60  | +360 | +60  | +520  | +60  |
| 80              | 120    | +159                        | +72  | +212 | +72  | +292 | +72  | +422 | +72  | +612  | +72  |
| 120             | 180    | +185                        | +85  | +245 | +85  | +335 | +85  | +485 | +85  | +715  | +85  |
| 180             | 250    | +215                        | +100 | +285 | +100 | +390 | +100 | +560 | +100 | +820  | +100 |
| 250             | 315    | +240                        | +110 | +320 | +110 | +430 | +110 | +630 | +110 | +920  | +110 |
| 315             | 400    | +265                        | +125 | +355 | +125 | +485 | +125 | +695 | +125 | +1015 | +125 |
| 400             | 500    | +290                        | +135 | +385 | +135 | +535 | +135 | +765 | +135 | +1105 | +135 |

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |     |      |     |      |     |      |     |
|-----------------|--------|-----------------------------|-----|------|-----|------|-----|------|-----|
|                 |        | F5                          |     | F6   |     | F7   |     | F8   |     |
| >               | $\leq$ | high                        | low | high | low | high | low | high | low |
| 3               | 6      | +15                         | +10 | +18  | +10 | +22  | +10 | +28  | +10 |
| 6               | 10     | +19                         | +13 | +22  | +13 | +28  | +13 | +35  | +13 |
| 10              | 18     | +24                         | +16 | +27  | +16 | +34  | +16 | +43  | +16 |
| 18              | 30     | +29                         | +20 | +33  | +20 | +41  | +20 | +53  | +20 |
| 30              | 50     | +36                         | +25 | +41  | +25 | +50  | +25 | +64  | +25 |
| 50              | 80     | +43                         | +30 | +49  | +30 | +60  | +30 | +76  | +30 |
| 80              | 120    | +51                         | +36 | +58  | +36 | +71  | +36 | +90  | +36 |
| 120             | 180    | +61                         | +43 | +68  | +43 | +83  | +43 | +106 | +43 |
| 180             | 250    | +70                         | +50 | +79  | +50 | +96  | +50 | +122 | +50 |
| 250             | 315    | +79                         | +56 | +88  | +56 | +108 | +56 | +137 | +56 |
| 315             | 400    | +87                         | +62 | +98  | +62 | +119 | +62 | +151 | +62 |
| 400             | 500    | +95                         | +68 | +108 | +68 | +131 | +68 | +165 | +68 |

| ISO TOLERANCES FOR HOLES – METRIC |        |                             |     |      |     |      |     |      |     |
|-----------------------------------|--------|-----------------------------|-----|------|-----|------|-----|------|-----|
| Diameters mm                      |        | Deviations in $\mu\text{m}$ |     |      |     |      |     |      |     |
| >                                 | $\leq$ | G5                          |     | G6   |     | G7   |     |      |     |
|                                   |        | high                        | low | high | low | high | low | high | low |
| 3                                 | 6      | +9                          | +4  | +12  | +4  | +16  | +4  |      |     |
| 6                                 | 10     | +11                         | +5  | +14  | +5  | +20  | +5  |      |     |
| 10                                | 18     | +14                         | +6  | +17  | +6  | +24  | +6  |      |     |
| 18                                | 30     | +16                         | +7  | +20  | +7  | +28  | +7  |      |     |
| 30                                | 50     | +20                         | +9  | +25  | +9  | +34  | +9  |      |     |
| 50                                | 80     | +23                         | +10 | +29  | +10 | +40  | +10 |      |     |
| 80                                | 120    | +27                         | +12 | +34  | +12 | +47  | +12 |      |     |
| 120                               | 180    | +32                         | +14 | +39  | +14 | +54  | +14 |      |     |
| 180                               | 250    | +35                         | +15 | +44  | +15 | +61  | +15 |      |     |
| 250                               | 315    | +40                         | +17 | +49  | +17 | +69  | +17 |      |     |
| 315                               | 400    | +43                         | +18 | +54  | +18 | +75  | +18 |      |     |
| 400                               | 500    | +47                         | +20 | +60  | +20 | +83  | +20 |      |     |

| Deviations in $\mu\text{m}$ |        |      |     |      |     |      |     |      |     |      |     |
|-----------------------------|--------|------|-----|------|-----|------|-----|------|-----|------|-----|
| Diameters mm                |        | H4   |     | H5   |     | H6   |     | H7   |     | H8   |     |
| >                           | $\leq$ | high | low | high | low | high | low | high | low | high | low |
| 3                           | 6      | +4   | 0   | +5   | 0   | +8   | 0   | +12  | 0   | +18  | 0   |
| 6                           | 10     | +4   | 0   | +6   | 0   | +9   | 0   | +15  | 0   | +22  | 0   |
| 10                          | 18     | +5   | 0   | +8   | 0   | +11  | 0   | +18  | 0   | +27  | 0   |
| 18                          | 30     | +6   | 0   | +9   | 0   | +13  | 0   | +21  | 0   | +33  | 0   |
| 30                          | 50     | +7   | 0   | +11  | 0   | +16  | 0   | +25  | 0   | +39  | 0   |
| 50                          | 80     | +8   | 0   | +13  | 0   | +19  | 0   | +30  | 0   | +46  | 0   |
| 80                          | 120    | +10  | 0   | +15  | 0   | +22  | 0   | +35  | 0   | +54  | 0   |
| 120                         | 180    | +12  | 0   | +18  | 0   | +25  | 0   | +40  | 0   | +63  | 0   |
| 180                         | 250    | +14  | 0   | +20  | 0   | +29  | 0   | +46  | 0   | +72  | 0   |
| 250                         | 315    | +16  | 0   | +23  | 0   | +32  | 0   | +52  | 0   | +81  | 0   |
| 315                         | 400    | +18  | 0   | +25  | 0   | +36  | 0   | +57  | 0   | +89  | 0   |
| 400                         | 500    | +20  | 0   | +27  | 0   | +40  | 0   | +63  | 0   | +97  | 0   |

| Deviations in $\mu\text{m}$ |        |      |     |      |     |      |     |      |     |      |     |
|-----------------------------|--------|------|-----|------|-----|------|-----|------|-----|------|-----|
| Diameters mm                |        | H9   |     | H10  |     | H11  |     | H12  |     |      |     |
| >                           | $\leq$ | high | low | high | low | high | low | high | low | high | low |
| 3                           | 6      | +30  | 0   | +48  | 0   | +75  | 0   | +120 | 0   |      |     |
| 6                           | 10     | +36  | 0   | +58  | 0   | +90  | 0   | +150 | 0   |      |     |
| 10                          | 18     | +43  | 0   | +70  | 0   | +110 | 0   | +180 | 0   |      |     |
| 18                          | 30     | +52  | 0   | +84  | 0   | +130 | 0   | +210 | 0   |      |     |
| 30                          | 50     | +62  | 0   | +100 | 0   | +160 | 0   | +250 | 0   |      |     |
| 50                          | 80     | +74  | 0   | +120 | 0   | +190 | 0   | +300 | 0   |      |     |
| 80                          | 120    | +87  | 0   | +140 | 0   | +220 | 0   | +350 | 0   |      |     |
| 120                         | 180    | +100 | 0   | +160 | 0   | +250 | 0   | +400 | 0   |      |     |
| 180                         | 250    | +115 | 0   | +185 | 0   | +290 | 0   | +460 | 0   |      |     |
| 250                         | 315    | +130 | 0   | +210 | 0   | +320 | 0   | +520 | 0   |      |     |
| 315                         | 400    | +140 | 0   | +230 | 0   | +360 | 0   | +570 | 0   |      |     |
| 400                         | 500    | +155 | 0   | +250 | 0   | +400 | 0   | +630 | 0   |      |     |

BEARING TOLERANCES, INCH & METRIC - continued

| ISO TOLERANCES FOR HOLES – METRIC |     |                  |     |      |     |      |     |                  |     |      |     |      |     |
|-----------------------------------|-----|------------------|-----|------|-----|------|-----|------------------|-----|------|-----|------|-----|
| Diameters<br>mm                   |     | Deviations in µm |     |      |     |      |     | Deviations in µm |     |      |     |      |     |
|                                   |     | J6               |     | J7   |     | J8   |     | K6               |     | K7   |     | K8   |     |
| >                                 | ≤   | high             | low | high | low | high | low | high             | low | high | low | high | low |
| 3                                 | 6   | +5               | -3  | +6   | -6  | +10  | -8  | +2               | -6  | +3   | -9  | +5   | -13 |
| 6                                 | 10  | +5               | -4  | +8   | -7  | +12  | -10 | +2               | -7  | +5   | -10 | +6   | -16 |
| 10                                | 18  | +6               | -5  | +10  | -8  | +15  | -12 | +2               | -9  | +6   | -12 | +8   | -19 |
| 18                                | 30  | +8               | -5  | +12  | -9  | +20  | -13 | +2               | -11 | +6   | -15 | +10  | -23 |
| 30                                | 50  | +10              | -6  | +14  | -11 | +24  | -15 | +3               | -13 | +7   | -18 | +12  | -27 |
| 50                                | 80  | +13              | -6  | +18  | -12 | +28  | -18 | +4               | -15 | +9   | -21 | +14  | -32 |
| 80                                | 120 | +16              | -6  | +22  | -13 | +34  | -20 | +4               | -18 | +10  | -25 | +16  | -38 |
| 120                               | 180 | +18              | -7  | +26  | -14 | +41  | -22 | +4               | -21 | +12  | -28 | +20  | -43 |
| 180                               | 250 | +22              | -7  | +30  | -16 | +47  | -25 | +5               | -24 | +13  | -33 | +22  | -50 |
| 250                               | 315 | +25              | -7  | +36  | -16 | +55  | -26 | +5               | -27 | +16  | -36 | +25  | -56 |
| 315                               | 400 | +29              | -7  | +39  | -18 | +60  | -29 | +7               | -29 | +17  | -40 | +28  | -61 |
| 400                               | 500 | +33              | -7  | +43  | -20 | +66  | -31 | +8               | -32 | +18  | -45 | +29  | -68 |

| Diameters<br>mm |     | Deviations in µm |     |      |     |      |     | Deviations in µm |     |      |     |      |      |
|-----------------|-----|------------------|-----|------|-----|------|-----|------------------|-----|------|-----|------|------|
|                 |     | M5               |     | M6   |     | M7   |     | N6               |     | N7   |     | N8   |      |
| >               | ≤   | high             | low | high | low | high | low | high             | low | high | low | high | low  |
| 3               | 6   | -3               | -8  | -1   | -9  | 0    | -12 | -5               | -13 | -4   | -16 | -2   | -20  |
| 6               | 10  | -4               | -10 | -3   | -12 | 0    | -15 | -7               | -16 | -4   | -19 | -3   | -25  |
| 10              | 18  | -4               | -12 | -4   | -15 | 0    | -18 | -9               | -20 | -5   | -23 | -3   | -30  |
| 18              | 30  | -5               | -14 | -4   | -17 | 0    | -21 | -11              | -24 | -7   | -28 | -3   | -36  |
| 30              | 50  | -5               | -16 | -4   | -20 | 0    | -25 | -12              | -28 | -8   | -33 | -3   | -42  |
| 50              | 80  | -6               | -19 | -5   | -24 | 0    | -30 | -14              | -33 | -9   | -39 | -4   | -50  |
| 80              | 120 | -8               | -23 | -6   | -28 | 0    | -35 | -16              | -38 | -10  | -45 | -4   | -58  |
| 120             | 180 | -9               | -27 | -8   | -33 | 0    | -40 | -20              | -45 | -12  | -52 | -4   | -67  |
| 180             | 250 | -11              | -31 | -8   | -37 | 0    | -46 | -22              | -51 | -14  | -60 | -5   | -77  |
| 250             | 315 | -13              | -36 | -9   | -41 | 0    | -52 | -25              | -57 | -14  | -66 | -5   | -86  |
| 315             | 400 | -14              | -39 | -10  | -46 | 0    | -57 | -26              | -62 | -16  | -73 | -5   | -94  |
| 400             | 500 | -16              | -43 | -10  | -50 | 0    | -63 | -27              | -67 | -17  | -80 | -6   | -103 |

| Diameters<br>mm |     | Deviations in µm |     |      |      |      |      | Deviations in µm |      |      |      |  |  |
|-----------------|-----|------------------|-----|------|------|------|------|------------------|------|------|------|--|--|
|                 |     | P6               |     | P7   |      | R6   |      | R7               |      | R8   |      |  |  |
| >               | ≤   | high             | low | high | low  | high | low  | high             | low  | high | low  |  |  |
| 3               | 6   | -9               | -17 | -8   | -20  | -12  | -20  | -11              | -23  | -15  | -33  |  |  |
| 6               | 10  | -12              | -21 | -9   | -24  | -16  | -25  | -13              | -28  | -19  | -41  |  |  |
| 10              | 18  | -15              | -26 | -11  | -29  | -20  | -31  | -16              | -34  | -23  | -50  |  |  |
| 18              | 30  | -18              | -31 | -14  | -35  | -24  | -37  | -20              | -41  | -28  | -61  |  |  |
| 30              | 50  | -21              | -37 | -17  | -42  | -29  | -45  | -25              | -50  | -34  | -73  |  |  |
| 50              | 65  | -26              | -45 | -21  | -51  | -35  | -54  | -30              | -60  | -41  | -87  |  |  |
| 65              | 80  | -26              | -45 | -21  | -51  | -37  | -56  | -32              | -62  | -43  | -89  |  |  |
| 80              | 100 | -30              | -52 | -24  | -59  | -44  | -66  | -38              | -73  | -51  | -105 |  |  |
| 100             | 120 | -30              | -52 | -24  | -59  | -47  | -69  | -41              | -76  | -54  | -108 |  |  |
| 120             | 140 | -37              | -61 | -28  | -68  | -56  | -81  | -48              | -88  | -63  | -126 |  |  |
| 140             | 160 | -36              | -61 | -28  | -68  | -58  | -83  | -50              | -90  | -65  | -128 |  |  |
| 160             | 180 | -36              | -61 | -28  | -68  | -61  | -86  | -53              | -93  | -68  | -131 |  |  |
| 180             | 200 | -41              | -70 | -33  | -79  | -68  | -97  | -60              | -106 | -77  | -149 |  |  |
| 200             | 225 | -41              | -70 | -33  | -79  | -71  | -100 | -63              | -109 | -80  | -152 |  |  |
| 225             | 250 | -41              | -70 | -33  | -79  | -75  | -104 | -67              | -113 | -84  | -156 |  |  |
| 250             | 280 | -47              | -79 | -36  | -88  | -85  | -117 | -74              | -126 | -94  | -175 |  |  |
| 280             | 315 | -47              | -79 | -36  | -88  | -89  | -121 | -78              | -130 | -98  | -179 |  |  |
| 315             | 355 | -51              | -87 | -41  | -98  | -97  | -133 | -87              | -144 | -108 | -197 |  |  |
| 355             | 400 | -51              | -87 | -41  | -98  | -103 | -139 | -93              | -150 | -114 | -203 |  |  |
| 400             | 450 | -55              | -95 | -45  | -108 | -113 | -153 | -103             | -166 | -126 | -223 |  |  |
| 450             | 500 | -55              | -95 | -45  | -108 | -119 | -159 | -109             | -172 | -132 | -229 |  |  |

**ISO TOLERANCES FOR SHAFTS – METRIC**

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |       |       |       |       |       |       |       |  |  |
|-----------------|--------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|--|--|
|                 |        | a10                         |       | a11   |       | a12   |       | a13   |       |  |  |
| >               | $\leq$ | high                        | low   | high  | low   | high  | low   | high  | low   |  |  |
| —               | 3      | -270                        | -310  | -270  | -330  | -270  | -370  | -270  | -410  |  |  |
| 3               | 6      | -270                        | -318  | -270  | -345  | -270  | -390  | -270  | -450  |  |  |
| 6               | 10     | -280                        | -338  | -280  | -370  | -280  | -430  | -280  | -500  |  |  |
| 10              | 18     | -290                        | -360  | -290  | -400  | -290  | -470  | -290  | -560  |  |  |
| 18              | 30     | -300                        | -384  | -300  | -430  | -300  | -510  | -300  | -630  |  |  |
| 30              | 40     | -310                        | -410  | -310  | -470  | -310  | -560  | -310  | -700  |  |  |
| 40              | 50     | -320                        | -420  | -320  | -480  | -320  | -570  | -320  | -710  |  |  |
| 50              | 65     | -340                        | -460  | -340  | -530  | -340  | -640  | -340  | -800  |  |  |
| 65              | 80     | -360                        | -480  | -360  | -550  | -360  | -660  | -360  | -820  |  |  |
| 80              | 100    | -380                        | -520  | -380  | -600  | -380  | -730  | -380  | -920  |  |  |
| 100             | 120    | -410                        | -550  | -410  | -630  | -410  | -760  | -410  | -950  |  |  |
| 120             | 140    | -460                        | -620  | -460  | -710  | -460  | -860  | -460  | -1090 |  |  |
| 140             | 160    | -520                        | -680  | -520  | -770  | -520  | -920  | -520  | -1150 |  |  |
| 160             | 180    | -580                        | -740  | -580  | -830  | -580  | -980  | -580  | -1210 |  |  |
| 180             | 200    | -660                        | -845  | -660  | -950  | -660  | -1120 | -660  | -1380 |  |  |
| 200             | 225    | -740                        | -925  | -740  | -1030 | -740  | -1200 | -740  | -1460 |  |  |
| 225             | 250    | -820                        | -1005 | -820  | -1110 | -820  | -1280 | -820  | -1540 |  |  |
| 250             | 280    | -920                        | -1130 | -920  | -1240 | -920  | -1440 | -920  | -1730 |  |  |
| 280             | 315    | -1050                       | -1260 | -1050 | -1370 | -1050 | -1570 | -1050 | -1860 |  |  |
| 315             | 355    | -1200                       | -1430 | -1200 | -1560 | -1200 | -1770 | -1200 | -2090 |  |  |
| 355             | 400    | -1350                       | -1580 | -1350 | -1710 | -1350 | -1920 | -1350 | -2240 |  |  |

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |      |      |      |      |       | Deviations in $\mu\text{m}$ |      |      |      |      |       |
|-----------------|--------|-----------------------------|------|------|------|------|-------|-----------------------------|------|------|------|------|-------|
|                 |        | c11                         |      | c12  |      | c13  |       | e11                         |      | e12  |      | e13  |       |
| >               | $\leq$ | high                        | low  | high | low  | high | low   | high                        | low  | high | low  | high | low   |
| —               | 3      | -60                         | -120 | -60  | -160 | -60  | -200  | -14                         | -74  | -14  | -114 | -14  | -154  |
| 3               | 6      | -70                         | -145 | -70  | -190 | -70  | -250  | -20                         | -95  | -20  | -140 | -20  | -200  |
| 6               | 10     | -80                         | -170 | -80  | -230 | -80  | -300  | -25                         | -115 | -25  | -175 | -25  | -245  |
| 10              | 18     | -95                         | -205 | -95  | -275 | -95  | -365  | -32                         | -142 | -32  | -212 | -32  | -302  |
| 18              | 30     | -110                        | -240 | -110 | -320 | -110 | -440  | -40                         | -170 | -40  | -250 | -40  | -370  |
| 30              | 40     | -120                        | -280 | -120 | -370 | -120 | -510  | -50                         | -210 | -50  | -300 | -50  | -440  |
| 40              | 50     | -130                        | -290 | -130 | -380 | -130 | -520  | -50                         | -210 | -50  | -300 | -50  | -440  |
| 50              | 65     | -140                        | -330 | -140 | -440 | -140 | -600  | -60                         | -250 | -60  | -360 | -60  | -520  |
| 65              | 80     | -150                        | -340 | -150 | -450 | -150 | -610  | -60                         | -250 | -60  | -360 | -60  | -520  |
| 80              | 100    | -170                        | -390 | -170 | -520 | -170 | -710  | -72                         | -292 | -72  | -422 | -72  | -612  |
| 100             | 120    | -180                        | -400 | -180 | -530 | -180 | -720  | -72                         | -292 | -72  | -422 | -72  | -612  |
| 120             | 140    | -200                        | -450 | -200 | -600 | -200 | -830  | -85                         | -335 | -85  | -485 | -85  | -715  |
| 140             | 160    | -210                        | -460 | -210 | -610 | -210 | -840  | -85                         | -335 | -85  | -485 | -85  | -715  |
| 160             | 180    | -230                        | -480 | -230 | -630 | -230 | -860  | -85                         | -335 | -85  | -485 | -85  | -715  |
| 180             | 200    | -240                        | -530 | -240 | -700 | -240 | -960  | -100                        | -390 | -100 | -560 | -100 | -820  |
| 200             | 225    | -260                        | -550 | -260 | -720 | -260 | -980  | -100                        | -390 | -100 | -560 | -100 | -820  |
| 225             | 250    | -280                        | -570 | -280 | -740 | -280 | -1000 | -100                        | -390 | -100 | -560 | -100 | -820  |
| 250             | 280    | -300                        | -620 | -300 | -820 | -300 | -1110 | -110                        | -430 | -110 | -630 | -110 | -920  |
| 280             | 315    | -330                        | -650 | -330 | -850 | -330 | -1140 | -110                        | -430 | -110 | -630 | -110 | -920  |
| 315             | 355    | -360                        | -720 | -360 | -930 | -360 | -1250 | -125                        | -485 | -125 | -695 | -125 | -1015 |

BEARING TOLERANCES, INCH & METRIC - continued

| ISO TOLERANCES FOR SHAFTS – METRIC |        |                             |     |      |     |      |      |                             |     |      |     |      |     |
|------------------------------------|--------|-----------------------------|-----|------|-----|------|------|-----------------------------|-----|------|-----|------|-----|
| Diameters<br>mm                    |        | Deviations in $\mu\text{m}$ |     |      |     |      |      | Deviations in $\mu\text{m}$ |     |      |     |      |     |
|                                    |        | f5                          |     | f6   |     | f7   |      | g5                          |     | g6   |     | g7   |     |
| >                                  | $\leq$ | high                        | low | high | low | high | low  | high                        | low | high | low | high | low |
| —                                  | 3      | -6                          | -10 | -6   | -12 | -6   | -16  | -2                          | -6  | -2   | -8  | -2   | -12 |
| 3                                  | 6      | -10                         | -15 | -10  | -18 | -10  | -22  | -4                          | -9  | -4   | -12 | -4   | -16 |
| 6                                  | 10     | -13                         | -19 | -13  | -22 | -13  | -28  | -5                          | -11 | -5   | -14 | -5   | -20 |
| 10                                 | 18     | -16                         | -24 | -16  | -27 | -16  | -34  | -6                          | -14 | -6   | -17 | -6   | -24 |
| 18                                 | 30     | -20                         | -29 | -20  | -33 | -20  | -41  | -7                          | -16 | -7   | -20 | -7   | -28 |
| 30                                 | 50     | -25                         | -36 | -25  | -41 | -25  | -50  | -9                          | -20 | -9   | -25 | -9   | -34 |
| 50                                 | 80     | -30                         | -43 | -30  | -49 | -30  | -60  | -10                         | -23 | -10  | -29 | -10  | -40 |
| 80                                 | 120    | -36                         | -51 | -36  | -58 | -36  | -71  | -12                         | -27 | -12  | -34 | -12  | -47 |
| 120                                | 180    | -43                         | -61 | -43  | -68 | -43  | -83  | -14                         | -32 | -14  | -39 | -14  | -54 |
| 180                                | 250    | -50                         | -70 | -50  | -79 | -50  | -96  | -15                         | -35 | -15  | -44 | -15  | -61 |
| 250                                | 315    | -56                         | -79 | -56  | -88 | -56  | -108 | -17                         | -40 | -17  | -49 | -17  | -69 |
| 315                                | 400    | -62                         | -87 | -62  | -98 | -62  | -119 | -18                         | -43 | -18  | -54 | -18  | -75 |

| Deviations in $\mu\text{m}$ |     |      |     |      |     |      |     |      |     |      |     |  |  |
|-----------------------------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|--|--|
| Diameters<br>mm             |     | h4   |     | h5   |     | h6   |     | h7   |     | h8   |     |  |  |
|                             |     | high | low | high | low | high | low | high | low | high | low |  |  |
| —                           | 3   | 0    | -3  | 0    | -4  | 0    | -6  | 0    | -10 | 0    | -14 |  |  |
| 3                           | 6   | 0    | -4  | 0    | -5  | 0    | -8  | 0    | -12 | 0    | -18 |  |  |
| 6                           | 10  | 0    | -4  | 0    | -6  | 0    | -9  | 0    | -15 | 0    | -22 |  |  |
| 10                          | 18  | 0    | -5  | 0    | -8  | 0    | -11 | 0    | -18 | 0    | -27 |  |  |
| 18                          | 30  | 0    | -6  | 0    | -9  | 0    | -13 | 0    | -21 | 0    | -33 |  |  |
| 30                          | 50  | 0    | -7  | 0    | -11 | 0    | -16 | 0    | -25 | 0    | -39 |  |  |
| 50                          | 80  | 0    | -8  | 0    | -13 | 0    | -19 | 0    | -30 | 0    | -46 |  |  |
| 80                          | 120 | 0    | -10 | 0    | -15 | 0    | -22 | 0    | -35 | 0    | -54 |  |  |
| 120                         | 180 | 0    | -12 | 0    | -18 | 0    | -25 | 0    | -40 | 0    | -63 |  |  |
| 180                         | 250 | 0    | -14 | 0    | -20 | 0    | -29 | 0    | -46 | 0    | -72 |  |  |
| 250                         | 315 | 0    | -16 | 0    | -23 | 0    | -32 | 0    | -52 | 0    | -81 |  |  |
| 315                         | 400 | 0    | -18 | 0    | -25 | 0    | -36 | 0    | -57 | 0    | -89 |  |  |

| Deviations in $\mu\text{m}$ |     |      |      |      |      |      |      |      |      |      |      |  |  |
|-----------------------------|-----|------|------|------|------|------|------|------|------|------|------|--|--|
| Diameters<br>mm             |     | h9   |      | h10  |      | h11  |      | h12  |      | h13  |      |  |  |
|                             |     | high | low  | high | low  | high | low  | high | low  | high | low  |  |  |
| —                           | 3   | 0    | -25  | 0    | -40  | 0    | -60  | 0    | -100 | 0    | -140 |  |  |
| 3                           | 6   | 0    | -30  | 0    | -48  | 0    | -75  | 0    | -120 | 0    | -180 |  |  |
| 6                           | 10  | 0    | -36  | 0    | -58  | 0    | -90  | 0    | -150 | 0    | -220 |  |  |
| 10                          | 18  | 0    | -43  | 0    | -70  | 0    | -110 | 0    | -180 | 0    | -270 |  |  |
| 18                          | 30  | 0    | -52  | 0    | -84  | 0    | -130 | 0    | -210 | 0    | -330 |  |  |
| 30                          | 50  | 0    | -62  | 0    | -100 | 0    | -160 | 0    | -250 | 0    | -390 |  |  |
| 50                          | 80  | 0    | -74  | 0    | -120 | 0    | -190 | 0    | -300 | 0    | -460 |  |  |
| 80                          | 120 | 0    | -87  | 0    | -140 | 0    | -220 | 0    | -350 | 0    | -540 |  |  |
| 120                         | 180 | 0    | -100 | 0    | -160 | 0    | -250 | 0    | -400 | 0    | -630 |  |  |
| 180                         | 250 | 0    | -115 | 0    | -185 | 0    | -290 | 0    | -460 | 0    | -720 |  |  |
| 250                         | 315 | 0    | -130 | 0    | -210 | 0    | -320 | 0    | -520 | 0    | -810 |  |  |
| 315                         | 400 | 0    | -140 | 0    | -230 | 0    | -360 | 0    | -570 | 0    | -890 |  |  |



**ISO TOLERANCES FOR SHAFTS – METRIC**

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |     |      |     |      |     | Deviations in $\mu\text{m}$ |     |      |     |      |     |
|-----------------|--------|-----------------------------|-----|------|-----|------|-----|-----------------------------|-----|------|-----|------|-----|
|                 |        | j5                          |     | j6   |     | j7   |     | k5                          |     | k6   |     | k7   |     |
| >               | $\leq$ | high                        | low | high | low | high | low | high                        | low | high | low | high | low |
| —               | 3      | +2                          | -2  | +4   | -2  | +6   | -4  | +4                          | 0   | +6   | 0   | +10  | 0   |
| 3               | 6      | +3                          | -2  | +6   | -2  | +8   | -4  | +6                          | +1  | +9   | +1  | +13  | +1  |
| 6               | 10     | +4                          | -2  | +7   | -2  | +10  | -5  | +7                          | +1  | +10  | +1  | +16  | +1  |
| 10              | 18     | +5                          | -3  | +8   | -3  | +12  | -6  | +9                          | +1  | +12  | +1  | +19  | +1  |
| 18              | 30     | +5                          | -4  | +9   | -4  | +13  | -8  | +11                         | +2  | +15  | +2  | +23  | +2  |
| 30              | 50     | +6                          | -5  | +11  | -5  | +15  | -10 | +13                         | +2  | +18  | +2  | +27  | +2  |
| 50              | 80     | +6                          | -7  | +12  | -7  | +18  | -12 | +15                         | +2  | +21  | +2  | +32  | +2  |
| 80              | 120    | +6                          | -9  | +13  | -9  | +20  | -15 | +18                         | +3  | +25  | +3  | +38  | +3  |
| 120             | 180    | +7                          | -11 | +14  | -11 | +22  | -18 | +21                         | +3  | +28  | +3  | +43  | +3  |
| 180             | 250    | +7                          | -13 | +16  | -13 | +25  | -21 | +24                         | +4  | +33  | +4  | +50  | +4  |
| 250             | 315    | +7                          | -16 | +16  | -16 | +26  | -26 | +27                         | +4  | +36  | +4  | +56  | +4  |
| 315             | 400    | +7                          | -18 | +18  | -18 | +29  | -28 | +29                         | +4  | +40  | +4  | +61  | +4  |

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |     |      |     |      |     | Deviations in $\mu\text{m}$ |     |      |     |      |     |
|-----------------|--------|-----------------------------|-----|------|-----|------|-----|-----------------------------|-----|------|-----|------|-----|
|                 |        | m5                          |     | m6   |     | m7   |     | n5                          |     | n6   |     | n7   |     |
| >               | $\leq$ | high                        | low | high | low | high | low | high                        | low | high | low | high | low |
| —               | 3      | +6                          | +2  | +8   | +2  | +12  | +2  | +8                          | +4  | +10  | +4  | +14  | +4  |
| 3               | 6      | +9                          | +4  | +12  | +4  | +16  | +4  | +13                         | +8  | +16  | +8  | +20  | +8  |
| 6               | 10     | +12                         | +6  | +15  | +6  | +21  | +6  | +16                         | +10 | +19  | +10 | +25  | +10 |
| 10              | 18     | +15                         | +7  | +18  | +7  | +25  | +7  | +20                         | +12 | +23  | +12 | +30  | +12 |
| 18              | 30     | +17                         | +8  | +21  | +8  | +29  | +8  | +24                         | +15 | +28  | +15 | +36  | +15 |
| 30              | 50     | +20                         | +9  | +25  | +9  | +34  | +9  | +28                         | +17 | +33  | +17 | +42  | +17 |
| 50              | 80     | +24                         | +11 | +30  | +11 | +41  | +11 | +33                         | +20 | +39  | +20 | +50  | +20 |
| 80              | 120    | +28                         | +13 | +35  | +13 | +48  | +13 | +38                         | +23 | +45  | +23 | +58  | +23 |
| 120             | 180    | +33                         | +15 | +40  | +15 | +55  | +15 | +45                         | +27 | +52  | +27 | +67  | +27 |
| 180             | 250    | +37                         | +17 | +46  | +17 | +63  | +17 | +51                         | +31 | +60  | +31 | +77  | +31 |
| 250             | 315    | +43                         | +20 | +52  | +20 | +72  | +20 | +57                         | +34 | +66  | +34 | +86  | +34 |
| 315             | 400    | +46                         | +21 | +57  | +21 | +78  | +21 | +62                         | +37 | +73  | +37 | +94  | +37 |

| Diameters<br>mm |        | Deviations in $\mu\text{m}$ |     |      |      |      |      |
|-----------------|--------|-----------------------------|-----|------|------|------|------|
|                 |        | p6                          |     | r6   |      | r7   |      |
| >               | $\leq$ | high                        | low | high | low  | high | low  |
| 3               | 6      | -                           | -   | -    | -    | -    | -    |
| 6               | 10     | -                           | -   | -    | -    | -    | -    |
| 10              | 18     | -                           | -   | -    | -    | -    | -    |
| 18              | 30     | -                           | -   | -    | -    | -    | -    |
| 30              | 50     | -                           | -   | -    | -    | -    | -    |
| 50              | 65     | -                           | -   | -    | -    | -    | -    |
| 65              | 80     | -                           | -   | -    | -    | -    | -    |
| 80              | 100    | +59                         | +37 | -    | -    | -    | -    |
| 100             | 120    | +59                         | +37 | -    | -    | -    | -    |
| 120             | 140    | +68                         | +43 | +90  | +65  | -    | -    |
| 140             | 160    | +68                         | +43 | +90  | +65  | -    | -    |
| 160             | 180    | +68                         | +43 | +90  | +65  | -    | -    |
| 180             | 200    | +79                         | +50 | +106 | +77  | -    | -    |
| 200             | 225    | +79                         | +50 | +109 | +80  | +126 | +80  |
| 225             | 250    | +79                         | +50 | +113 | +84  | +130 | +84  |
| 250             | 280    | +88                         | +56 | +126 | +94  | +146 | +94  |
| 280             | 315    | +88                         | +56 | +130 | +98  | +150 | +98  |
| 315             | 355    | +98                         | +62 | +144 | +108 | +165 | +108 |
| 355             | 400    | +98                         | +62 | +150 | +114 | +171 | +114 |
| 400             | 450    | +108                        | +68 | +166 | +126 | +189 | +126 |
| 450             | 500    | +108                        | +68 | +172 | +132 | +195 | +132 |

BEARING TOLERANCES, INCH & METRIC - continued

A

| ISO TOLERANCES FOR HOLES – INCH |         |                      |         |         |         |         |         |                      |         |         |         |         |         |
|---------------------------------|---------|----------------------|---------|---------|---------|---------|---------|----------------------|---------|---------|---------|---------|---------|
| Diameters inches                |         | Deviations in inches |         |         |         |         |         | Deviations in inches |         |         |         |         |         |
|                                 |         | B10                  |         | B11     |         | B12     |         | C9                   |         | C10     |         | C11     |         |
| >                               | ≤       | high                 | low     | high    | low     | high    | low     | high                 | low     | high    | low     | high    | low     |
| 0.1181                          | 0.2362  | +0.0074              | +0.0055 | +0.0085 | +0.0055 | +0.0102 | +0.0055 | +0.0039              | +0.0028 | +0.0046 | +0.0028 | +0.0057 | +0.0028 |
| 0.2362                          | 0.3937  | +0.0082              | +0.0059 | +0.0094 | +0.0059 | +0.0118 | +0.0059 | +0.0046              | +0.0031 | +0.0054 | +0.0031 | +0.0067 | +0.0031 |
| 0.3937                          | 0.7087  | +0.0087              | +0.0059 | +0.0102 | +0.0059 | +0.0130 | +0.0059 | +0.0054              | +0.0037 | +0.0065 | +0.0037 | +0.0081 | +0.0037 |
| 0.7087                          | 1.1811  | +0.0096              | +0.0063 | +0.0114 | +0.0063 | +0.0146 | +0.0063 | +0.0064              | +0.0043 | +0.0076 | +0.0043 | +0.0094 | +0.0043 |
| 1.1811                          | 1.5748  | +0.0106              | +0.0067 | +0.0130 | +0.0067 | +0.0165 | +0.0067 | +0.0072              | +0.0047 | +0.0087 | +0.0047 | +0.0110 | +0.0047 |
| 1.5748                          | 1.9685  | +0.0110              | +0.0071 | +0.0134 | +0.0071 | +0.0169 | +0.0071 | +0.0076              | +0.0051 | +0.0091 | +0.0051 | +0.0114 | +0.0051 |
| 1.9685                          | 2.5591  | +0.0122              | +0.0075 | +0.0150 | +0.0075 | +0.0193 | +0.0075 | +0.0084              | +0.0055 | +0.0102 | +0.0055 | +0.0120 | +0.0055 |
| 2.5591                          | 3.1496  | +0.0126              | +0.0079 | +0.0154 | +0.0079 | +0.0197 | +0.0079 | +0.0088              | +0.0059 | +0.0106 | +0.0059 | +0.0134 | +0.0059 |
| 3.1496                          | 3.9370  | +0.0142              | +0.0087 | +0.0173 | +0.0087 | +0.0224 | +0.0087 | +0.0101              | +0.0067 | +0.0122 | +0.0067 | +0.0154 | +0.0067 |
| 3.9370                          | 4.7244  | +0.0150              | +0.0094 | +0.0181 | +0.0094 | +0.0232 | +0.0094 | +0.0105              | +0.0071 | +0.0126 | +0.0071 | +0.0157 | +0.0071 |
| 4.7244                          | 5.5118  | +0.0165              | +0.0102 | +0.0201 | +0.0102 | +0.0260 | +0.0102 | +0.0118              | +0.0079 | +0.0142 | +0.0079 | +0.0177 | +0.0079 |
| 5.5118                          | 6.2992  | +0.0173              | +0.0110 | +0.0209 | +0.0110 | +0.0268 | +0.0110 | +0.0122              | +0.0083 | +0.0146 | +0.0083 | +0.0181 | +0.0083 |
| 6.2992                          | 7.0866  | +0.0185              | +0.0122 | +0.0220 | +0.0122 | +0.0280 | +0.0122 | +0.0130              | +0.0091 | +0.0154 | +0.0091 | +0.0189 | +0.0091 |
| 7.0866                          | 7.8740  | +0.0207              | +0.0134 | +0.0248 | +0.0134 | +0.0315 | +0.0134 | +0.0140              | +0.0094 | +0.0167 | +0.0094 | +0.0209 | +0.0094 |
| 7.8740                          | 8.8583  | +0.0222              | +0.0150 | +0.0264 | +0.0150 | +0.0331 | +0.0150 | +0.0148              | +0.0102 | +0.0175 | +0.0102 | +0.0217 | +0.0102 |
| 8.8583                          | 9.8425  | +0.0238              | +0.0165 | +0.0280 | +0.0165 | +0.0346 | +0.0165 | +0.0156              | +0.0110 | +0.0183 | +0.0110 | +0.0224 | +0.0110 |
| 9.8425                          | 11.0236 | +0.0272              | +0.0189 | +0.0315 | +0.0189 | +0.0394 | +0.0189 | +0.0169              | +0.0118 | +0.0201 | +0.0118 | +0.0244 | +0.0118 |
| 11.0236                         | 12.4016 | +0.0295              | +0.0213 | +0.0339 | +0.0213 | +0.0417 | +0.0213 | +0.0181              | +0.0130 | +0.0213 | +0.0130 | +0.0256 | +0.0130 |
| 12.4016                         | 13.9764 | +0.0327              | +0.0236 | +0.0378 | +0.0236 | +0.0461 | +0.0236 | +0.0197              | +0.0142 | +0.0232 | +0.0142 | +0.0283 | +0.0142 |
| 13.9764                         | 15.7480 | +0.0358              | +0.0268 | +0.0409 | +0.0268 | +0.0492 | +0.0268 | +0.0213              | +0.0157 | +0.0248 | +0.0157 | +0.0299 | +0.0157 |
| 15.7480                         | 17.7165 | +0.0398              | +0.0299 | +0.0457 | +0.0299 | +0.0547 | +0.0299 | +0.0234              | +0.0173 | +0.0272 | +0.0173 | +0.0331 | +0.0173 |
| 17.71654                        | 19.6850 | +0.0429              | +0.0331 | +0.0488 | +0.0331 | +0.0579 | +0.0331 | +0.0250              | +0.0189 | +0.0287 | +0.0189 | +0.0346 | +0.0189 |

| Deviations in inches |         |         |         |         |         |         |         |         |         |         |         |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Diameters inches     |         | E9      |         | E10     |         | E11     |         | E12     |         | E13     |         |
|                      |         | high    | low     | high    | low     | high    | low     | high    | low     | high    | low     |
| 0.1181               | 0.2362  | +0.0020 | +0.0008 | +0.0027 | +0.0008 | +0.0037 | +0.0008 | +0.0055 | +0.0008 | +0.0079 | +0.0008 |
| 0.2362               | 0.3937  | +0.0024 | +0.0010 | +0.0033 | +0.0010 | +0.0045 | +0.0010 | +0.0069 | +0.0010 | +0.0096 | +0.0010 |
| 0.3937               | 0.7087  | +0.0030 | +0.0013 | +0.0040 | +0.0013 | +0.0056 | +0.0013 | +0.0083 | +0.0013 | +0.0119 | +0.0013 |
| 0.7087               | 1.1811  | +0.0036 | +0.0016 | +0.0049 | +0.0016 | +0.0067 | +0.0016 | +0.0098 | +0.0016 | +0.0146 | +0.0016 |
| 1.1811               | 1.9685  | +0.0044 | +0.0020 | +0.0059 | +0.0020 | +0.0083 | +0.0020 | +0.0118 | +0.0020 | +0.0173 | +0.0020 |
| 1.9685               | 3.1496  | +0.0053 | +0.0024 | +0.0071 | +0.0024 | +0.0098 | +0.0024 | +0.0142 | +0.0024 | +0.0205 | +0.0024 |
| 3.1496               | 4.7244  | +0.0063 | +0.0028 | +0.0083 | +0.0028 | +0.0115 | +0.0028 | +0.0166 | +0.0028 | +0.0241 | +0.0028 |
| 4.7244               | 7.0866  | +0.0073 | +0.0033 | +0.0096 | +0.0033 | +0.0132 | +0.0033 | +0.0191 | +0.0033 | +0.0281 | +0.0033 |
| 7.0866               | 9.8425  | +0.0085 | +0.0039 | +0.0112 | +0.0039 | +0.0154 | +0.0039 | +0.0220 | +0.0039 | +0.0323 | +0.0039 |
| 9.8425               | 12.4016 | +0.0094 | +0.0043 | +0.0126 | +0.0043 | +0.0169 | +0.0043 | +0.0248 | +0.0043 | +0.0362 | +0.0043 |
| 12.4016              | 15.7480 | +0.0104 | +0.0049 | +0.0140 | +0.0049 | +0.0191 | +0.0049 | +0.0274 | +0.0049 | +0.0400 | +0.0049 |
| 15.7480              | 19.6850 | +0.0114 | +0.0053 | +0.0152 | +0.0053 | +0.0211 | +0.0053 | +0.0301 | +0.0053 | +0.0435 | +0.0053 |

| Deviations in inches |         |         |         |         |         |         |         |         |         |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Diameters inches     |         | F5      |         | F6      |         | F7      |         | F8      |         |
|                      |         | high    | low     | high    | low     | high    | low     | high    | low     |
| 0.1181               | 0.2362  | +0.0006 | +0.0004 | +0.0007 | +0.0004 | +0.0009 | +0.0004 | +0.0011 | +0.0004 |
| 0.2362               | 0.3937  | +0.0007 | +0.0005 | +0.0009 | +0.0005 | +0.0011 | +0.0005 | +0.0014 | +0.0005 |
| 0.3937               | 0.7087  | +0.0009 | +0.0006 | +0.0011 | +0.0006 | +0.0013 | +0.0006 | +0.0017 | +0.0006 |
| 0.7087               | 1.1811  | +0.0011 | +0.0008 | +0.0013 | +0.0008 | +0.0016 | +0.0008 | +0.0021 | +0.0008 |
| 1.1811               | 1.9685  | +0.0014 | +0.0010 | +0.0016 | +0.0010 | +0.0020 | +0.0010 | +0.0025 | +0.0010 |
| 1.9685               | 3.1496  | +0.0017 | +0.0012 | +0.0019 | +0.0012 | +0.0024 | +0.0012 | +0.0030 | +0.0012 |
| 3.1496               | 4.7244  | +0.0020 | +0.0014 | +0.0023 | +0.0014 | +0.0028 | +0.0014 | +0.0035 | +0.0014 |
| 4.7244               | 7.0866  | +0.0024 | +0.0017 | +0.0027 | +0.0017 | +0.0033 | +0.0017 | +0.0042 | +0.0017 |
| 7.0866               | 9.8425  | +0.0028 | +0.0020 | +0.0031 | +0.0020 | +0.0038 | +0.0020 | +0.0048 | +0.0020 |
| 9.8425               | 12.4016 | +0.0031 | +0.0022 | +0.0035 | +0.0022 | +0.0043 | +0.0022 | +0.0054 | +0.0022 |
| 12.4016              | 15.7480 | +0.0034 | +0.0024 | +0.0039 | +0.0024 | +0.0047 | +0.0024 | +0.0059 | +0.0024 |
| 15.7480              | 19.6850 | +0.0037 | +0.0027 | +0.0043 | +0.0027 | +0.0052 | +0.0027 | +0.0065 | +0.0027 |

**ISO TOLERANCES FOR HOLES – INCH**

| Diameters inches |         | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|---------|---------|---------|---------|---------|
|                  |         | G5                   |         | G6      |         | G7      |         |
|                  |         | high                 | low     | high    | low     | high    | low     |
| >                | ≤       |                      |         |         |         |         |         |
| 0.1181           | 0.2362  | +0.0004              | +0.0002 | +0.0005 | +0.0002 | +0.0006 | +0.0002 |
| 0.2362           | 0.3937  | +0.0004              | +0.0002 | +0.0006 | +0.0002 | +0.0008 | +0.0002 |
| 0.3937           | 0.7087  | +0.0006              | +0.0002 | +0.0007 | +0.0002 | +0.0009 | +0.0002 |
| 0.7087           | 1.1811  | +0.0006              | +0.0003 | +0.0008 | +0.0003 | +0.0011 | +0.0003 |
| 1.1811           | 1.9685  | +0.0008              | +0.0004 | +0.0010 | +0.0004 | +0.0013 | +0.0004 |
| 1.9685           | 3.1496  | +0.0009              | +0.0004 | +0.0011 | +0.0004 | +0.0016 | +0.0004 |
| 3.1496           | 4.7244  | +0.0011              | +0.0005 | +0.0013 | +0.0005 | +0.0019 | +0.0005 |
| 4.7244           | 7.0866  | +0.0013              | +0.0006 | +0.0015 | +0.0006 | +0.0021 | +0.0006 |
| 7.0866           | 9.8425  | +0.0014              | +0.0006 | +0.0017 | +0.0006 | +0.0024 | +0.0006 |
| 9.8425           | 12.4016 | +0.0016              | +0.0007 | +0.0019 | +0.0007 | +0.0027 | +0.0007 |
| 12.4016          | 15.7480 | +0.0017              | +0.0007 | +0.0021 | +0.0007 | +0.0030 | +0.0007 |
| 15.7480          | 19.6850 | +0.0019              | +0.0008 | +0.0024 | +0.0008 | +0.0033 | +0.0008 |

| Diameters inches |         | Deviations in inches |     |         |     |         |     |         |     |         |     |
|------------------|---------|----------------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|
|                  |         | H4                   |     | H5      |     | H6      |     | H7      |     | H8      |     |
|                  |         | high                 | low | high    | low | high    | low | high    | low | high    | low |
| >                | ≤       |                      |     |         |     |         |     |         |     |         |     |
| 0.1181           | 0.2362  | +0.0002              | 0   | +0.0002 | 0   | +0.0003 | 0   | +0.0005 | 0   | +0.0007 | 0   |
| 0.2362           | 0.3937  | +0.0002              | 0   | +0.0002 | 0   | +0.0004 | 0   | +0.0006 | 0   | +0.0009 | 0   |
| 0.3937           | 0.7087  | +0.0002              | 0   | +0.0003 | 0   | +0.0004 | 0   | +0.0007 | 0   | +0.0011 | 0   |
| 0.7087           | 1.1811  | +0.0002              | 0   | +0.0004 | 0   | +0.0005 | 0   | +0.0008 | 0   | +0.0013 | 0   |
| 1.1811           | 1.9685  | +0.0003              | 0   | +0.0004 | 0   | +0.0006 | 0   | +0.0010 | 0   | +0.0015 | 0   |
| 1.9685           | 3.1496  | +0.0003              | 0   | +0.0005 | 0   | +0.0007 | 0   | +0.0012 | 0   | +0.0018 | 0   |
| 3.1496           | 4.7244  | +0.0004              | 0   | +0.0006 | 0   | +0.0009 | 0   | +0.0014 | 0   | +0.0021 | 0   |
| 4.7244           | 7.0866  | +0.0005              | 0   | +0.0007 | 0   | +0.0010 | 0   | +0.0016 | 0   | +0.0025 | 0   |
| 7.0866           | 9.8425  | +0.0006              | 0   | +0.0008 | 0   | +0.0011 | 0   | +0.0018 | 0   | +0.0028 | 0   |
| 9.8425           | 12.4016 | +0.0006              | 0   | +0.0009 | 0   | +0.0013 | 0   | +0.0020 | 0   | +0.0032 | 0   |
| 12.4016          | 15.7480 | +0.0007              | 0   | +0.0010 | 0   | +0.0014 | 0   | +0.0022 | 0   | +0.0035 | 0   |
| 15.7480          | 19.6850 | +0.0008              | 0   | +0.0011 | 0   | +0.0016 | 0   | +0.0025 | 0   | +0.0038 | 0   |

| Diameters inches |         | Deviations in inches |     |         |     |         |     |         |     |
|------------------|---------|----------------------|-----|---------|-----|---------|-----|---------|-----|
|                  |         | H9                   |     | H10     |     | H11     |     | H12     |     |
|                  |         | high                 | low | high    | low | high    | low | high    | low |
| >                | ≤       |                      |     |         |     |         |     |         |     |
| 0.1181           | 0.2362  | +0.0012              | 0   | +0.0019 | 0   | +0.0030 | 0   | +0.0047 | 0   |
| 0.2362           | 0.3937  | +0.0014              | 0   | +0.0023 | 0   | +0.0035 | 0   | +0.0059 | 0   |
| 0.3937           | 0.7087  | +0.0017              | 0   | +0.0028 | 0   | +0.0043 | 0   | +0.0071 | 0   |
| 0.7087           | 1.1811  | +0.0020              | 0   | +0.0033 | 0   | +0.0051 | 0   | +0.0083 | 0   |
| 1.1811           | 1.9685  | +0.0024              | 0   | +0.0039 | 0   | +0.0063 | 0   | +0.0098 | 0   |
| 1.9685           | 3.1496  | +0.0029              | 0   | +0.0047 | 0   | +0.0075 | 0   | +0.0118 | 0   |
| 3.1496           | 4.7244  | +0.0034              | 0   | +0.0055 | 0   | +0.0087 | 0   | +0.0138 | 0   |
| 4.7244           | 7.0866  | +0.0039              | 0   | +0.0063 | 0   | +0.0098 | 0   | +0.0157 | 0   |
| 7.0866           | 9.8425  | +0.0045              | 0   | +0.0073 | 0   | +0.0114 | 0   | +0.0181 | 0   |
| 9.8425           | 12.4016 | +0.0051              | 0   | +0.0083 | 0   | +0.0126 | 0   | +0.0205 | 0   |
| 12.4016          | 15.7480 | +0.0055              | 0   | +0.0091 | 0   | +0.0142 | 0   | +0.0224 | 0   |
| 15.7480          | 19.6850 | +0.0061              | 0   | +0.0098 | 0   | +0.0157 | 0   | +0.0248 | 0   |

BEARING TOLERANCES, INCH & METRIC - continued

A

ISO TOLERANCES FOR HOLES – INCH

| Diameters inches |         | Deviations in inches |          |          |          |          |          | Deviations in inches |          |          |          |          |          |
|------------------|---------|----------------------|----------|----------|----------|----------|----------|----------------------|----------|----------|----------|----------|----------|
|                  |         | J6                   |          | J7       |          | J8       |          | K6                   |          | K7       |          | K8       |          |
|                  |         | high                 | low      | high     | low      | high     | low      | high                 | low      | high     | low      | high     | low      |
| >                | ≤       |                      |          |          |          |          |          |                      |          |          |          |          |          |
| 0.1181           | 0.2362  | +0.00020             | -0.00012 | +0.00024 | -0.00024 | +0.00039 | -0.00031 | +0.00008             | -0.00024 | +0.00012 | -0.00035 | +0.00020 | -0.00051 |
| 0.2362           | 0.3937  | +0.00020             | -0.00016 | +0.00031 | -0.00028 | +0.00047 | -0.00039 | +0.00008             | -0.00028 | +0.00020 | -0.00039 | +0.00024 | -0.00063 |
| 0.3937           | 0.7087  | +0.00024             | -0.00020 | +0.00039 | -0.00031 | +0.00059 | -0.00047 | +0.00008             | -0.00035 | +0.00024 | -0.00047 | +0.00031 | -0.00075 |
| 0.7087           | 1.1811  | +0.00031             | -0.00020 | +0.00047 | -0.00035 | +0.00079 | -0.00051 | +0.00008             | -0.00043 | +0.00024 | -0.00059 | +0.00039 | -0.00091 |
| 1.1811           | 1.9685  | +0.00039             | -0.00024 | +0.00055 | -0.00043 | +0.00094 | -0.00059 | +0.00012             | -0.00051 | +0.00028 | -0.00071 | +0.00047 | -0.00106 |
| 1.9685           | 3.1496  | +0.00051             | -0.00024 | +0.00071 | -0.00047 | +0.00110 | -0.00071 | +0.00016             | -0.00059 | +0.00035 | -0.00083 | +0.00055 | -0.00126 |
| 3.1496           | 4.7244  | +0.00063             | -0.00024 | +0.00087 | -0.00051 | +0.00134 | -0.00079 | +0.00016             | -0.00071 | +0.00039 | -0.00098 | +0.00063 | -0.00150 |
| 4.7244           | 7.0866  | +0.00071             | -0.00028 | +0.00102 | -0.00055 | +0.00161 | -0.00087 | +0.00016             | -0.00083 | +0.00047 | -0.00110 | +0.00079 | -0.00169 |
| 7.0866           | 9.8425  | +0.00087             | -0.00028 | +0.00118 | -0.00063 | +0.00185 | -0.00098 | +0.00020             | -0.00094 | +0.00051 | -0.00130 | +0.00087 | -0.00197 |
| 9.8425           | 12.4016 | +0.00098             | -0.00028 | +0.00142 | -0.00063 | +0.00217 | -0.00102 | +0.00020             | -0.00106 | +0.00063 | -0.00142 | +0.00098 | -0.00220 |
| 12.4016          | 15.7480 | +0.00114             | -0.00028 | +0.00154 | -0.00071 | +0.00236 | -0.00114 | +0.00028             | -0.00114 | +0.00067 | -0.00157 | +0.00110 | -0.00240 |
| 15.7480          | 19.6850 | +0.00130             | -0.00028 | +0.00169 | -0.00079 | +0.00259 | -0.00122 | +0.00031             | -0.00126 | +0.00071 | -0.00177 | +0.00114 | -0.00268 |

| Diameters inches |         | Deviations in inches |          |          |          |      |          | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|----------|----------|----------|------|----------|----------------------|---------|---------|---------|---------|---------|
|                  |         | M5                   |          | M6       |          | M7   |          | N6                   |         | N7      |         | N8      |         |
|                  |         | high                 | low      | high     | low      | high | low      | high                 | low     | high    | low     | high    | low     |
| >                | ≤       |                      |          |          |          |      |          |                      |         |         |         |         |         |
| 0.1181           | 0.2362  | -0.00012             | -0.00031 | -0.00004 | -0.00035 | 0    | -0.00047 | -0.0002              | -0.0005 | -0.0002 | -0.0006 | -0.0001 | -0.0008 |
| 0.2362           | 0.3937  | -0.00016             | -0.00039 | -0.00012 | -0.00047 | 0    | -0.00059 | -0.0003              | -0.0006 | -0.0002 | -0.0007 | -0.0001 | -0.0010 |
| 0.3937           | 0.7087  | -0.00016             | -0.00047 | -0.00016 | -0.00059 | 0    | -0.00071 | -0.0004              | -0.0008 | -0.0002 | -0.0009 | -0.0001 | -0.0012 |
| 0.7087           | 1.1811  | -0.00020             | -0.00055 | -0.00016 | -0.00067 | 0    | -0.00083 | -0.0004              | -0.0009 | -0.0003 | -0.0011 | -0.0001 | -0.0014 |
| 1.1811           | 1.9685  | -0.00020             | -0.00063 | -0.00016 | -0.00079 | 0    | -0.00098 | -0.0005              | -0.0011 | -0.0003 | -0.0013 | -0.0001 | -0.0017 |
| 1.9685           | 3.1496  | -0.00024             | -0.00075 | -0.00020 | -0.00094 | 0    | -0.00118 | -0.0006              | -0.0013 | -0.0004 | -0.0015 | -0.0002 | -0.0020 |
| 3.1496           | 4.7244  | -0.00031             | -0.00091 | -0.00024 | -0.00110 | 0    | -0.00138 | -0.0006              | -0.0015 | -0.0004 | -0.0018 | -0.0002 | -0.0023 |
| 4.7244           | 7.0866  | -0.00035             | -0.00106 | -0.00031 | -0.00130 | 0    | -0.00157 | -0.0008              | -0.0018 | -0.0005 | -0.0020 | -0.0002 | -0.0026 |
| 7.0866           | 9.8425  | -0.00043             | -0.00122 | -0.00031 | -0.00146 | 0    | -0.00181 | -0.0009              | -0.0020 | -0.0006 | -0.0024 | -0.0002 | -0.0030 |
| 9.8425           | 12.4016 | -0.00051             | -0.00142 | -0.00035 | -0.00161 | 0    | -0.00205 | -0.0010              | -0.0022 | -0.0006 | -0.0026 | -0.0002 | -0.0034 |
| 12.4016          | 15.7480 | -0.00055             | -0.00154 | -0.00039 | -0.00181 | 0    | -0.00224 | -0.0010              | -0.0024 | -0.0006 | -0.0029 | -0.0002 | -0.0037 |
| 15.7480          | 19.6850 | -0.00063             | -0.00169 | -0.00039 | -0.00197 | 0    | -0.00248 | -0.0011              | -0.0026 | -0.0007 | -0.0031 | -0.0002 | -0.0041 |

| Diameters inches |         | Deviations in inches |         |         |         |         |         | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|---------|---------|---------|---------|---------|----------------------|---------|---------|---------|---------|---------|
|                  |         | P6                   |         | P7      |         | R6      |         | R7                   |         | R8      |         |         |         |
|                  |         | high                 | low     | high    | low     | high    | low     | high                 | low     | high    | low     |         |         |
| >                | ≤       |                      |         |         |         |         |         |                      |         |         |         |         |         |
| 0.1181           | 0.2362  | -0.0004              | -0.0007 | -0.0003 | -0.0008 | -0.0005 | -0.0008 | -0.0004              | -0.0009 | -0.0006 | -0.0013 | -0.0006 | -0.0013 |
| 0.2362           | 0.3937  | -0.0005              | -0.0008 | -0.0004 | -0.0009 | -0.0006 | -0.0010 | -0.0005              | -0.0011 | -0.0007 | -0.0016 | -0.0007 | -0.0016 |
| 0.3937           | 0.7087  | -0.0006              | -0.0010 | -0.0004 | -0.0011 | -0.0008 | -0.0012 | -0.0006              | -0.0013 | -0.0009 | -0.0020 | -0.0009 | -0.0020 |
| 0.7087           | 1.1811  | -0.0007              | -0.0012 | -0.0006 | -0.0014 | -0.0009 | -0.0015 | -0.0008              | -0.0016 | -0.0011 | -0.0024 | -0.0011 | -0.0024 |
| 1.1811           | 1.9685  | -0.0008              | -0.0015 | -0.0007 | -0.0017 | -0.0011 | -0.0018 | -0.0010              | -0.0020 | -0.0013 | -0.0029 | -0.0013 | -0.0029 |
| 1.9685           | 2.5591  | -0.0010              | -0.0018 | -0.0008 | -0.0020 | -0.0014 | -0.0021 | -0.0012              | -0.0024 | -0.0016 | -0.0034 | -0.0016 | -0.0034 |
| 2.5591           | 3.1496  | -0.0010              | -0.0018 | -0.0008 | -0.0020 | -0.0015 | -0.0022 | -0.0013              | -0.0024 | -0.0017 | -0.0035 | -0.0017 | -0.0035 |
| 3.1496           | 3.9370  | -0.0012              | -0.0020 | -0.0009 | -0.0023 | -0.0017 | -0.0026 | -0.0015              | -0.0029 | -0.0020 | -0.0041 | -0.0020 | -0.0041 |
| 3.9370           | 4.7244  | -0.0012              | -0.0020 | -0.0009 | -0.0023 | -0.0019 | -0.0027 | -0.0016              | -0.0030 | -0.0021 | -0.0043 | -0.0021 | -0.0043 |
| 4.7244           | 5.5118  | -0.0014              | -0.0024 | -0.0011 | -0.0027 | -0.0022 | -0.0032 | -0.0019              | -0.0035 | -0.0025 | -0.0050 | -0.0025 | -0.0050 |
| 5.5118           | 6.2992  | -0.0014              | -0.0024 | -0.0011 | -0.0027 | -0.0023 | -0.0033 | -0.0020              | -0.0035 | -0.0026 | -0.0050 | -0.0026 | -0.0050 |
| 6.2992           | 7.0866  | -0.0014              | -0.0024 | -0.0011 | -0.0027 | -0.0024 | -0.0034 | -0.0021              | -0.0037 | -0.0027 | -0.0052 | -0.0027 | -0.0052 |
| 7.0866           | 7.8740  | -0.0016              | -0.0028 | -0.0013 | -0.0031 | -0.0027 | -0.0038 | -0.0024              | -0.0042 | -0.0030 | -0.0059 | -0.0030 | -0.0059 |
| 7.8740           | 8.8583  | -0.0016              | -0.0028 | -0.0013 | -0.0031 | 0.0028  | -0.0039 | -0.0025              | -0.0043 | -0.0031 | -0.0060 | -0.0031 | -0.0060 |
| 8.8583           | 9.8425  | -0.0016              | -0.0028 | -0.0013 | -0.0031 | -0.0030 | -0.0041 | -0.0026              | -0.0044 | -0.0033 | -0.0061 | -0.0033 | -0.0061 |
| 9.8425           | 11.0236 | -0.0019              | -0.0031 | -0.0014 | -0.0035 | -0.0033 | -0.0046 | -0.0029              | -0.0050 | -0.0037 | -0.0069 | -0.0037 | -0.0069 |
| 11.0236          | 12.4016 | -0.0019              | -0.0031 | -0.0014 | -0.0035 | -0.0035 | -0.0048 | -0.0031              | -0.0051 | -0.0039 | -0.0070 | -0.0039 | -0.0070 |
| 12.4016          | 13.9764 | -0.0020              | -0.0034 | -0.0016 | -0.0039 | -0.0038 | -0.0052 | -0.0034              | -0.0057 | -0.0043 | -0.0078 | -0.0043 | -0.0078 |
| 13.9764          | 15.7480 | -0.0020              | -0.0034 | -0.0016 | -0.0039 | -0.0041 | -0.0055 | -0.0037              | -0.0059 | -0.0045 | -0.0080 | -0.0045 | -0.0080 |
| 15.7480          | 17.7165 | -0.0022              | -0.0037 | -0.0018 | -0.0043 | -0.0044 | -0.0060 | -0.0041              | -0.0065 | -0.0050 | -0.0088 | -0.0050 | -0.0088 |
| 17.7165          | 19.6850 | -0.0022              | -0.0037 | -0.0018 | -0.0043 | -0.0047 | -0.0063 | -0.0043              | -0.0068 | -0.0052 | -0.0090 | -0.0052 | -0.0090 |

| ISO TOLERANCES FOR SHAFTS – INCH |         |                      |         |         |         |         |         |         |         |  |
|----------------------------------|---------|----------------------|---------|---------|---------|---------|---------|---------|---------|--|
| Diameters inches                 |         | Deviations in inches |         |         |         |         |         |         |         |  |
|                                  |         | a10                  |         | a11     |         | a12     |         | a13     |         |  |
| >                                | ≤       | high                 | low     | high    | low     | high    | low     | high    | low     |  |
| —                                | 0.1181  | -0.0106              | -0.0122 | -0.0106 | -0.0130 | -0.0106 | -0.0146 | -0.0106 | -0.0161 |  |
| 0.1181                           | 0.2362  | -0.0106              | -0.0125 | -0.0106 | -0.0136 | -0.0106 | -0.0154 | -0.0106 | -0.0177 |  |
| 0.2362                           | 0.3937  | -0.0110              | -0.0133 | -0.0110 | -0.0146 | -0.0110 | -0.0169 | -0.0110 | -0.0197 |  |
| 0.3937                           | 0.7087  | -0.0114              | -0.0142 | -0.0114 | -0.0157 | -0.0114 | -0.0185 | -0.0114 | -0.0220 |  |
| 0.7087                           | 1.1811  | -0.0118              | -0.0151 | -0.0118 | -0.0169 | -0.0118 | -0.0201 | -0.0118 | -0.0248 |  |
| 1.1811                           | 1.5748  | -0.0122              | -0.0161 | -0.0122 | -0.0185 | -0.0122 | -0.0220 | -0.0122 | -0.0276 |  |
| 1.5748                           | 1.9685  | -0.0126              | -0.0165 | -0.0126 | -0.0189 | -0.0126 | -0.0224 | -0.0126 | -0.0280 |  |
| 1.9685                           | 2.5591  | -0.0134              | -0.0181 | -0.0134 | -0.0209 | -0.0134 | -0.0252 | -0.0134 | -0.0315 |  |
| 2.5591                           | 3.1496  | -0.0142              | -0.0189 | -0.0142 | -0.0217 | -0.0142 | -0.0260 | -0.0142 | -0.0323 |  |
| 3.1496                           | 3.9370  | -0.0150              | -0.0205 | -0.0150 | -0.0236 | -0.0150 | -0.0287 | -0.0150 | -0.0362 |  |
| 3.9370                           | 4.7244  | -0.0161              | -0.0217 | -0.0161 | -0.0248 | -0.0161 | -0.0299 | -0.0161 | -0.0374 |  |
| 4.7244                           | 5.5118  | -0.0181              | -0.0244 | -0.0181 | -0.0280 | -0.0181 | -0.0339 | -0.0181 | -0.0429 |  |
| 5.5118                           | 6.2992  | -0.0205              | -0.0268 | -0.0205 | -0.0303 | -0.0205 | -0.0362 | -0.0205 | -0.0453 |  |
| 6.2992                           | 7.0866  | -0.0228              | -0.0291 | -0.0228 | -0.0327 | -0.0228 | -0.0386 | -0.0228 | -0.0476 |  |
| 7.0866                           | 7.8740  | -0.0260              | -0.0333 | -0.0260 | -0.0374 | -0.0260 | -0.0441 | -0.0260 | -0.0543 |  |
| 7.8740                           | 8.8583  | -0.0291              | -0.0364 | -0.0291 | -0.0406 | -0.0291 | -0.0472 | -0.0291 | -0.0575 |  |
| 8.8583                           | 9.8425  | -0.0323              | -0.0396 | -0.0323 | -0.0437 | -0.0323 | -0.0504 | -0.0323 | -0.0606 |  |
| 9.8425                           | 11.0236 | -0.0362              | -0.0445 | -0.0362 | -0.0488 | -0.0362 | -0.0567 | -0.0362 | -0.0681 |  |
| 11.0236                          | 12.4016 | -0.0413              | -0.0496 | -0.0413 | -0.0539 | -0.0413 | -0.0618 | -0.0413 | -0.0732 |  |
| 12.4016                          | 13.9764 | -0.0472              | -0.0563 | -0.0472 | -0.0614 | -0.0472 | -0.0697 | -0.0472 | -0.0823 |  |
| 13.9764                          | 15.7480 | -0.0531              | -0.0622 | -0.0531 | -0.0673 | -0.0531 | -0.0756 | -0.0531 | -0.0882 |  |

| Diameters inches |         | Deviations in inches |         |         |         |         |         | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|---------|---------|---------|---------|---------|----------------------|---------|---------|---------|---------|---------|
|                  |         | c11                  |         | c12     |         | c13     |         | e11                  |         | e12     |         | e13     |         |
| >                | ≤       | high                 | low     | high    | low     | high    | low     | high                 | low     | high    | low     | high    | low     |
| —                | 0.1181  | -0.0024              | -0.0047 | -0.0024 | -0.0063 | -0.0024 | -0.0079 | -0.0006              | -0.0029 | -0.0006 | -0.0045 | -0.0006 | -0.0061 |
| 0.1181           | 0.2362  | -0.0028              | -0.0057 | -0.0028 | -0.0075 | -0.0028 | -0.0098 | -0.0008              | -0.0037 | -0.0008 | -0.0055 | -0.0008 | -0.0079 |
| 0.2362           | 0.3937  | -0.0031              | -0.0067 | -0.0031 | -0.0091 | -0.0031 | -0.0118 | -0.0010              | -0.0045 | -0.0010 | -0.0069 | -0.0010 | -0.0096 |
| 0.3937           | 0.7087  | -0.0037              | -0.0081 | -0.0037 | -0.0108 | -0.0037 | -0.0144 | -0.0013              | -0.0056 | -0.0013 | -0.0083 | -0.0013 | -0.0119 |
| 0.7087           | 1.1811  | -0.0043              | -0.0094 | -0.0043 | -0.0126 | -0.0043 | -0.0173 | -0.0016              | -0.0067 | -0.0016 | -0.0098 | -0.0016 | -0.0146 |
| 1.1811           | 1.5748  | -0.0047              | -0.0110 | -0.0047 | -0.0146 | -0.0047 | -0.0201 | -0.0020              | -0.0083 | -0.0020 | -0.0118 | -0.0020 | -0.0173 |
| 1.5748           | 1.9685  | -0.0051              | -0.0114 | -0.0051 | -0.0150 | -0.0051 | -0.0205 | -0.0020              | -0.0083 | -0.0020 | -0.0118 | -0.0020 | -0.0173 |
| 1.9685           | 2.5591  | -0.0055              | -0.0130 | -0.0055 | -0.0173 | -0.0055 | -0.0236 | -0.0024              | -0.0098 | -0.0024 | -0.0142 | -0.0024 | -0.0205 |
| 2.5591           | 3.1496  | -0.0059              | -0.0134 | -0.0059 | -0.0177 | -0.0059 | -0.0240 | -0.0024              | -0.0098 | -0.0024 | -0.0142 | -0.0024 | -0.0205 |
| 3.1496           | 3.9370  | -0.0067              | -0.0154 | -0.0067 | -0.0205 | -0.0067 | -0.0280 | -0.0028              | -0.0115 | -0.0028 | -0.0166 | -0.0028 | -0.0241 |
| 3.9370           | 4.7244  | -0.0071              | -0.0157 | -0.0071 | -0.0209 | -0.0071 | -0.0283 | -0.0028              | -0.0115 | -0.0028 | -0.0166 | -0.0028 | -0.0241 |
| 4.7244           | 5.5118  | -0.0079              | -0.0177 | -0.0079 | -0.0236 | -0.0079 | -0.0327 | -0.0033              | -0.0132 | -0.0033 | -0.0191 | -0.0033 | -0.0281 |
| 5.5118           | 6.2992  | -0.0083              | -0.0181 | -0.0083 | -0.0240 | -0.0083 | -0.0331 | -0.0033              | -0.0132 | -0.0033 | -0.0191 | -0.0033 | -0.0281 |
| 6.2992           | 7.0866  | -0.0091              | -0.0189 | -0.0091 | -0.0248 | -0.0091 | -0.0339 | -0.0033              | -0.0132 | -0.0033 | -0.0191 | -0.0033 | -0.0281 |
| 7.0866           | 7.8740  | -0.0094              | -0.0209 | -0.0094 | -0.0276 | -0.0094 | -0.0378 | -0.0039              | -0.0154 | -0.0039 | -0.0220 | -0.0039 | -0.0323 |
| 7.8740           | 8.8583  | -0.0102              | -0.0217 | -0.0102 | -0.0283 | -0.0102 | -0.0386 | -0.0039              | -0.0154 | -0.0039 | -0.0220 | -0.0039 | -0.0323 |
| 8.8583           | 9.8425  | -0.0110              | -0.0224 | -0.0110 | -0.0291 | -0.0110 | -0.0394 | -0.0039              | -0.0154 | -0.0039 | -0.0220 | -0.0039 | -0.0323 |
| 9.8425           | 11.0236 | -0.0118              | -0.0244 | -0.0118 | -0.0323 | -0.0118 | -0.0437 | -0.0043              | -0.0169 | -0.0043 | -0.0248 | -0.0043 | -0.0362 |
| 11.0236          | 12.4016 | -0.0130              | -0.0256 | -0.0130 | -0.0335 | -0.0130 | -0.0449 | -0.0043              | -0.0169 | -0.0043 | -0.0248 | -0.0043 | -0.0362 |
| 12.4016          | 13.9764 | -0.0142              | -0.0283 | -0.0142 | -0.0366 | -0.0142 | -0.0492 | -0.0049              | -0.0191 | -0.0049 | -0.0274 | -0.0049 | -0.0400 |
| 13.9764          | 15.7480 | -0.0157              | -0.0299 | -0.0157 | -0.0382 | -0.0157 | -0.0508 | -0.0049              | -0.0191 | -0.0049 | -0.0274 | -0.0049 | -0.0400 |

BEARING TOLERANCES, INCH & METRIC - continued

| ISO TOLERANCES FOR SHAFTS – INCH |         |                      |         |         |         |         |         |                      |         |         |         |         |         |
|----------------------------------|---------|----------------------|---------|---------|---------|---------|---------|----------------------|---------|---------|---------|---------|---------|
| Diameters inches                 |         | Deviations in inches |         |         |         |         |         | Deviations in inches |         |         |         |         |         |
|                                  |         | f5                   |         | f6      |         | f7      |         | g5                   |         | g6      |         | g7      |         |
| >                                | ≤       | high                 | low     | high    | low     | high    | low     | high                 | low     | high    | low     | high    | low     |
| —                                | 0.1181  | -0.0002              | -0.0004 | -0.0002 | -0.0005 | -0.0002 | -0.0006 | -0.0001              | -0.0002 | -0.0001 | -0.0003 | -0.0001 | -0.0005 |
| 0.1181                           | 0.2362  | -0.0004              | -0.0006 | -0.0004 | -0.0007 | -0.0004 | -0.0009 | -0.0002              | -0.0004 | -0.0002 | -0.0005 | -0.0002 | -0.0006 |
| 0.2362                           | 0.3937  | -0.0005              | -0.0007 | -0.0005 | -0.0009 | -0.0005 | -0.0011 | -0.0002              | -0.0004 | -0.0002 | -0.0006 | -0.0002 | -0.0008 |
| 0.3937                           | 0.7087  | -0.0006              | -0.0009 | -0.0006 | -0.0011 | -0.0006 | -0.0013 | -0.0002              | -0.0006 | -0.0002 | -0.0007 | -0.0002 | -0.0009 |
| 0.7087                           | 1.1811  | -0.0008              | -0.0011 | -0.0008 | -0.0013 | -0.0008 | -0.0016 | -0.0003              | -0.0006 | -0.0003 | -0.0008 | -0.0003 | -0.0011 |
| 1.1811                           | 1.9685  | -0.0010              | -0.0014 | -0.0010 | -0.0016 | -0.0010 | -0.0020 | -0.0004              | -0.0008 | -0.0004 | -0.0010 | -0.0004 | -0.0013 |
| 1.9685                           | 3.1496  | -0.0012              | -0.0017 | -0.0012 | -0.0019 | -0.0012 | -0.0024 | -0.0004              | -0.0009 | -0.0004 | -0.0011 | -0.0004 | -0.0016 |
| 3.1496                           | 4.7244  | -0.0014              | -0.0020 | -0.0014 | -0.0023 | -0.0014 | -0.0028 | -0.0005              | -0.0011 | -0.0005 | -0.0013 | -0.0005 | -0.0019 |
| 4.7244                           | 7.0866  | -0.0017              | -0.0024 | -0.0017 | -0.0027 | -0.0017 | -0.0033 | -0.0006              | -0.0013 | -0.0006 | -0.0015 | -0.0006 | -0.0021 |
| 7.0866                           | 9.8425  | -0.0020              | -0.0028 | -0.0020 | -0.0031 | -0.0020 | -0.0038 | -0.0006              | -0.0014 | -0.0006 | -0.0017 | -0.0006 | -0.0024 |
| 9.8425                           | 12.4016 | -0.0022              | -0.0031 | -0.0022 | -0.0035 | -0.0022 | -0.0043 | -0.0007              | -0.0016 | -0.0007 | -0.0019 | -0.0007 | -0.0027 |
| 12.4016                          | 15.7480 | -0.0024              | -0.0034 | -0.0024 | -0.0039 | -0.0024 | -0.0047 | -0.0007              | -0.0017 | -0.0007 | -0.0021 | -0.0007 | -0.0030 |

| Deviations in inches |         |      |          |      |          |      |          |      |         |      |         |
|----------------------|---------|------|----------|------|----------|------|----------|------|---------|------|---------|
| Diameters inches     |         | h4   |          | h5   |          | h6   |          | h7   |         | h8   |         |
|                      |         | high | low      | high | low      | high | low      | high | low     | high | low     |
| —                    | 0.1181  | 0    | -0.00012 | 0    | -0.00016 | 0    | -0.00024 | 0    | -0.0004 | 0    | -0.0006 |
| 0.1181               | 0.2362  | 0    | -0.00016 | 0    | -0.00020 | 0    | -0.00031 | 0    | -0.0005 | 0    | -0.0007 |
| 0.2362               | 0.3937  | 0    | -0.0002  | 0    | -0.00024 | 0    | -0.0004  | 0    | -0.0006 | 0    | -0.0009 |
| 0.3937               | 0.7087  | 0    | -0.0002  | 0    | -0.00031 | 0    | -0.0004  | 0    | -0.0007 | 0    | -0.0011 |
| 0.7087               | 1.1811  | 0    | -0.0002  | 0    | -0.0004  | 0    | -0.0005  | 0    | -0.0008 | 0    | -0.0013 |
| 1.1811               | 1.9685  | 0    | -0.0003  | 0    | -0.0004  | 0    | -0.0006  | 0    | -0.0010 | 0    | -0.0015 |
| 1.9685               | 3.1496  | 0    | -0.0003  | 0    | -0.0005  | 0    | -0.0007  | 0    | -0.0012 | 0    | -0.0018 |
| 3.1496               | 4.7244  | 0    | -0.0004  | 0    | -0.0006  | 0    | -0.0009  | 0    | -0.0014 | 0    | -0.0021 |
| 4.7244               | 7.0866  | 0    | -0.0005  | 0    | -0.0007  | 0    | -0.0010  | 0    | -0.0016 | 0    | -0.0025 |
| 7.0866               | 9.8425  | 0    | -0.0006  | 0    | -0.0008  | 0    | -0.0011  | 0    | -0.0018 | 0    | -0.0028 |
| 9.8425               | 12.4016 | 0    | -0.0006  | 0    | -0.0009  | 0    | -0.0013  | 0    | -0.0020 | 0    | -0.0032 |
| 12.4016              | 15.7480 | 0    | -0.0007  | 0    | -0.0010  | 0    | -0.0014  | 0    | -0.0022 | 0    | -0.0035 |

| Deviations in inches |         |      |         |      |         |      |         |      |         |      |         |
|----------------------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|
| Diameters inches     |         | h9   |         | h10  |         | h11  |         | h12  |         | h13  |         |
|                      |         | high | low     | high | low     | high | low     | high | low     | high | low     |
| —                    | 0.1181  | 0    | -0.0010 | 0    | -0.0016 | 0    | -0.0024 | 0    | -0.0039 | 0    | -0.0055 |
| 0.1181               | 0.2362  | 0    | -0.0012 | 0    | -0.0019 | 0    | -0.0030 | 0    | -0.0047 | 0    | -0.0071 |
| 0.2362               | 0.3937  | 0    | -0.0014 | 0    | -0.0023 | 0    | -0.0035 | 0    | -0.0059 | 0    | -0.0087 |
| 0.3937               | 0.7087  | 0    | -0.0017 | 0    | -0.0028 | 0    | -0.0043 | 0    | -0.0071 | 0    | -0.0106 |
| 0.7087               | 1.1811  | 0    | -0.0020 | 0    | -0.0033 | 0    | -0.0051 | 0    | -0.0083 | 0    | -0.0130 |
| 1.1811               | 1.9685  | 0    | -0.0024 | 0    | -0.0039 | 0    | -0.0063 | 0    | -0.0098 | 0    | -0.0154 |
| 1.9685               | 3.1496  | 0    | -0.0029 | 0    | -0.0047 | 0    | -0.0075 | 0    | -0.0118 | 0    | -0.0181 |
| 3.1496               | 4.7244  | 0    | -0.0034 | 0    | -0.0055 | 0    | -0.0087 | 0    | -0.0138 | 0    | -0.0213 |
| 4.7244               | 7.0866  | 0    | -0.0039 | 0    | -0.0063 | 0    | -0.0098 | 0    | -0.0157 | 0    | -0.0248 |
| 7.0866               | 9.8425  | 0    | -0.0045 | 0    | -0.0073 | 0    | -0.0114 | 0    | -0.0181 | 0    | -0.0283 |
| 9.8425               | 12.4016 | 0    | -0.0051 | 0    | -0.0083 | 0    | -0.0126 | 0    | -0.0205 | 0    | -0.0319 |
| 12.4016              | 15.7480 | 0    | -0.0055 | 0    | -0.0091 | 0    | -0.0142 | 0    | -0.0224 | 0    | -0.0350 |



**ISO TOLERANCES FOR SHAFTS – INCH**

| Diameters inches |         | Deviations in inches |          |          |          |          |          | Deviations in inches |          |          |          |          |          |
|------------------|---------|----------------------|----------|----------|----------|----------|----------|----------------------|----------|----------|----------|----------|----------|
|                  |         | j5                   |          | j6       |          | j7       |          | k5                   |          | k6       |          | k7       |          |
| >                | ≤       | high                 | low      | high     | low      | high     | low      | high                 | low      | high     | low      | high     | low      |
| —                | 0.1181  | +0.00008             | -0.00008 | +0.00016 | -0.00008 | +0.00024 | -0.00016 | +0.00016             | 0        | +0.00024 | 0        | +0.00039 | 0        |
| 0.1181           | 0.2362  | +0.00012             | -0.00008 | +0.00024 | -0.00008 | +0.00031 | -0.00016 | +0.00024             | +0.00004 | +0.00035 | +0.00004 | +0.00051 | +0.00004 |
| 0.2362           | 0.3937  | +0.00016             | -0.00008 | +0.00028 | -0.00008 | +0.00039 | -0.00020 | +0.00028             | +0.00004 | +0.00039 | +0.00004 | +0.00063 | +0.00004 |
| 0.3937           | 0.7087  | +0.00020             | -0.00012 | +0.00031 | -0.00012 | +0.00047 | -0.00024 | +0.00035             | +0.00004 | +0.00047 | +0.00004 | +0.00075 | +0.00004 |
| 0.7087           | 1.1811  | +0.00020             | -0.00016 | +0.00035 | -0.00016 | +0.00051 | -0.00031 | +0.00043             | +0.00008 | +0.00059 | +0.00008 | +0.00091 | +0.00008 |
| 1.1811           | 1.9685  | +0.00024             | -0.00020 | +0.00043 | -0.00020 | +0.00059 | -0.00039 | +0.00051             | +0.00008 | +0.00071 | +0.00008 | +0.00106 | +0.00008 |
| 1.9685           | 3.1496  | +0.00024             | -0.00028 | +0.00047 | -0.00028 | +0.00071 | -0.00047 | +0.00059             | +0.00008 | +0.00083 | +0.00008 | +0.00126 | +0.00008 |
| 3.1496           | 4.7244  | +0.00024             | -0.00035 | +0.00051 | -0.00035 | +0.00079 | -0.00059 | +0.00071             | +0.00012 | +0.00098 | +0.00012 | +0.00150 | +0.00012 |
| 4.7244           | 7.0866  | +0.00028             | -0.00043 | +0.00055 | -0.00043 | +0.00087 | -0.00071 | +0.00083             | +0.00012 | +0.00110 | +0.00012 | +0.00169 | +0.00012 |
| 7.0866           | 9.8425  | +0.00028             | -0.00051 | +0.00063 | -0.00051 | +0.00098 | -0.00083 | +0.00094             | +0.00016 | +0.00130 | +0.00016 | +0.00197 | +0.00016 |
| 9.8425           | 12.4016 | +0.00028             | -0.00063 | +0.00063 | -0.00063 | +0.00102 | -0.00102 | +0.00106             | +0.00016 | +0.00142 | +0.00016 | +0.00220 | +0.00016 |
| 12.4016          | 15.7480 | +0.00028             | -0.00071 | +0.00071 | -0.00071 | +0.00114 | -0.00110 | +0.00114             | +0.00016 | +0.00157 | +0.00016 | +0.00240 | +0.00016 |

| Diameters inches |         | Deviations in inches |          |          |          |          |          | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|----------|----------|----------|----------|----------|----------------------|---------|---------|---------|---------|---------|
|                  |         | m5                   |          | m6       |          | m7       |          | n5                   |         | n6      |         | n7      |         |
| >                | ≤       | high                 | low      | high     | low      | high     | low      | high                 | low     | high    | low     | high    | low     |
| —                | 0.1181  | +0.00024             | +0.00008 | +0.00031 | +0.00008 | +0.00047 | +0.00008 | +0.0003              | +0.0002 | +0.0004 | +0.0002 | +0.0006 | +0.0002 |
| 0.1181           | 0.2362  | +0.00035             | +0.00016 | +0.00047 | +0.00016 | +0.00063 | +0.00016 | +0.0005              | +0.0003 | +0.0006 | +0.0003 | +0.0008 | +0.0003 |
| 0.2362           | 0.3937  | +0.00047             | +0.00024 | +0.00059 | +0.00024 | +0.00083 | +0.00024 | +0.0006              | +0.0004 | +0.0007 | +0.0004 | +0.0010 | +0.0004 |
| 0.3937           | 0.7087  | +0.00059             | +0.00028 | +0.00071 | +0.00028 | +0.00098 | +0.00028 | +0.0008              | +0.0005 | +0.0009 | +0.0005 | +0.0012 | +0.0005 |
| 0.7087           | 1.1811  | +0.00067             | +0.00031 | +0.00083 | +0.00031 | +0.00114 | +0.00031 | +0.0009              | +0.0006 | +0.0011 | +0.0006 | +0.0014 | +0.0006 |
| 1.1811           | 1.9685  | +0.00079             | +0.00035 | +0.00098 | +0.00035 | +0.00134 | +0.00035 | +0.0011              | +0.0007 | +0.0013 | +0.0007 | +0.0017 | +0.0007 |
| 1.9685           | 3.1496  | +0.00094             | +0.00043 | +0.00118 | +0.00043 | +0.00161 | +0.00043 | +0.0013              | +0.0008 | +0.0015 | +0.0008 | +0.0020 | +0.0008 |
| 3.1496           | 4.7244  | +0.00110             | +0.00051 | +0.00138 | +0.00051 | +0.00189 | +0.00051 | +0.0015              | +0.0009 | +0.0018 | +0.0009 | +0.0023 | +0.0009 |
| 4.7244           | 7.0866  | +0.00130             | +0.00059 | +0.00157 | +0.00059 | +0.00217 | +0.00059 | +0.0018              | +0.0011 | +0.0020 | +0.0011 | +0.0026 | +0.0011 |
| 7.0866           | 9.8425  | +0.00146             | +0.00067 | +0.00181 | +0.00067 | +0.00248 | +0.00067 | +0.0020              | +0.0012 | +0.0024 | +0.0012 | +0.0030 | +0.0012 |
| 9.8425           | 12.4016 | +0.00169             | +0.00079 | +0.00205 | +0.00079 | +0.00283 | +0.00079 | +0.0022              | +0.0013 | +0.0026 | +0.0013 | +0.0034 | +0.0013 |
| 12.4016          | 15.7480 | +0.00181             | +0.00083 | +0.00224 | +0.00083 | +0.00307 | +0.00083 | +0.0024              | +0.0015 | +0.0029 | +0.0015 | +0.0037 | +0.0015 |

| Diameters inches |         | Deviations in inches |         |         |         |         |         |
|------------------|---------|----------------------|---------|---------|---------|---------|---------|
|                  |         | p6                   |         | r6      |         | r7      |         |
| >                | ≤       | high                 | low     | high    | low     | high    | low     |
| 0.1181           | 0.2362  | -                    | -       | -       | -       | -       | -       |
| 0.2362           | 0.3937  | -                    | -       | -       | -       | -       | -       |
| 0.3937           | 0.7087  | -                    | -       | -       | -       | -       | -       |
| 0.7087           | 1.1811  | -                    | -       | -       | -       | -       | -       |
| 1.1811           | 1.9685  | -                    | -       | -       | -       | -       | -       |
| 1.9685           | 2.5591  | -                    | -       | -       | -       | -       | -       |
| 2.5591           | 3.1496  | -                    | -       | -       | -       | -       | -       |
| 3.1496           | 3.9370  | +0.0023              | +0.0015 | -       | -       | -       | -       |
| 3.9370           | 4.7244  | +0.0023              | +0.0015 | -       | -       | -       | -       |
| 4.7244           | 5.5118  | +0.0027              | +0.0017 | +0.0035 | +0.0026 | -       | -       |
| 5.5118           | 6.2992  | +0.0027              | +0.0017 | +0.0035 | +0.0026 | -       | -       |
| 6.2992           | 7.0866  | +0.0027              | +0.0017 | +0.0035 | +0.0026 | -       | -       |
| 7.0866           | 7.8740  | +0.0031              | +0.0020 | +0.0042 | +0.0030 | -       | -       |
| 7.8740           | 8.8583  | +0.0031              | +0.0020 | +0.0043 | +0.0031 | +0.0050 | +0.0031 |
| 8.8583           | 9.8425  | +0.0031              | +0.0020 | +0.0044 | +0.0033 | +0.0051 | +0.0033 |
| 9.8425           | 11.0236 | +0.0035              | +0.0022 | +0.0050 | +0.0037 | +0.0057 | +0.0037 |
| 11.0236          | 12.4016 | +0.0035              | +0.0022 | +0.0051 | +0.0039 | +0.0059 | +0.0039 |
| 12.4016          | 13.9764 | +0.0039              | +0.0024 | +0.0057 | +0.0043 | +0.0065 | +0.0043 |
| 13.9764          | 15.7480 | +0.0039              | +0.0024 | +0.0059 | +0.0045 | +0.0067 | +0.0045 |
| 15.7480          | 17.7165 | +0.0043              | +0.0027 | +0.0065 | +0.0050 | +0.0074 | +0.0050 |
| 17.7165          | 19.6850 | +0.0043              | +0.0027 | +0.0068 | +0.0052 | +0.0077 | +0.0052 |

## MOUNTING DESIGNS

Correct bearing mounting and fitting practices are key components of proper bearing setting. Setting is the amount of clearance or interference within a mounted bearing. Bearing internal clearance is affected by the tightness of the fit to the inner and outer races. Proper bearing setting is crucial to bearing life and performance. Although clearance is required for most mounted bearings, application dependant factors include load, speed, bearing position, installation method, materials of construction, runout accuracy, thermal considerations, hoop stress, and shaft and housing design. This section provides tables and discussion to aid in selection of the proper bearing mounting and fitting procedures to optimize performance in general applications. For special applications, please consult your Timken representative for review.

### RADIAL BALL BEARINGS

In the manufacture of rolling element bearings, it is standard practice to assemble rings and rolling elements with a specified internal clearance. This characteristic is necessary to absorb the effect of press fitting the bearing rings at mounting.

Internal clearance is sometimes utilized to compensate for thermal expansion of bearings, shafts and housings or to provide a contact angle in the bearing after mounting.

Internal clearance can be measured either by gaging radially or axially.

Radial measurement is accepted as the more significant characteristic for most bearing types because it is more directly related to shaft and housing fits. It also is the method prescribed by the American Bearing Manufacturers Association (ABMA). However, tapered roller bearings and duplex sets of angular contact ball bearings are usually set axially.

The radial internal clearance (RIC) of a radial contact ball bearing can be defined as the average outer ring raceway diameter minus the average inner ring raceway diameter minus twice the ball diameter.

(RIC) can be measured mechanically by moving the outer ring, horizontally as pictured in Figure A-12. The total movement of the outer ring when the balls are properly seated in the raceways determines the (RIC). Several readings should be taken using different circumferential orientations of the rings in order to get a comprehensive average reading.

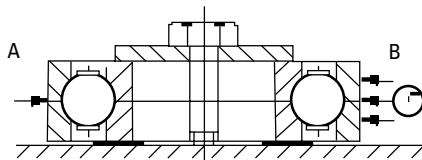


Fig. A-12

The Timken Company radial clearance designations correlate with ABMA symbols as follows:

| Bearing Number Prefix | ABMA Symbol | Description                                                                                                                                                                                |
|-----------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H                     | 2           | Snug; slight internal clearance; sometimes used to achieve a minimum of radial or axial play in an assembly, Example: H204K                                                                |
| R                     | 0           | Medium; internal clearance generally satisfactory with suggested shaft and housing fits. Example: RMM204K.                                                                                 |
| P                     | 3           | Loose; considerable internal clearance required for applications involving press fits on both inner and outer rings, extra interference fits or temperature differentials. Example: P204K. |
| J                     | 4           | Extra Loose; large amount of internal clearance for applications involving large interference fits or temperature differentials. Example: J204K.                                           |
| JJ                    | 5           | Extra-Extra Loose; extra large amount of internal clearance for applications with large temperature differential and interference fits on both rings.                                      |

### ENDPLAY

Endplay is an alternate method of measuring internal clearance and is rarely used except for certain special applications. Endplay is determined by mounting the bearing, as shown in Figure A-13, with one of its rings clamped to prevent axial movement. A reversing measuring load is applied to the unclamped ring so that the resultant movement of that ring is parallel to the bearing axis. Endplay is the total movement of the unclamped ring when the load is applied first in one direction and then in the other.

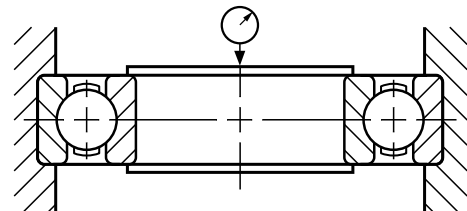


Fig. A-13

When the inner and outer ring raceway curvatures are accurately known, the free endplay can readily be calculated from the values of no load radial clearance by the following formula:

$$E = \sqrt{4dR_D(K_0 + K_i - 1) - R_D^2} \text{ or } \approx \sqrt{4dR_D(K_0 + K_i - 1)}$$

(Where  $R_D^2$  is generally a very small value and can be omitted for most calculations without introducing undue inaccuracy.)

E = Free endplay where

$K_0$  = outer race contour radius expressed as a decimal fraction of the ball diameter.

$K_i$  = inner race contour radius expressed as a decimal fraction of the ball diameter

$R_D$  = radial clearance (no load)

d = ball diameter

**RADIAL BALL BEARINGS**

| LIMITS FOR RADIAL INTERNAL CLEARANCE OF SINGLE-ROW, RADIAL CONTACT BALL BEARINGS UNDER NO LOAD<br>(APPLIES TO BEARINGS OF ABEC 1, ABEC 3, ABEC 5, ABEC 7, AND ABEC 9 TOLERANCES) |      |                             |           |                             |           |                             |           |                             |           |                             |           |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|-----------|
| All tolerances in number of micrometers (µm) and ten-thousandths inches (.0001")                                                                                                 |      |                             |           |                             |           |                             |           |                             |           |                             |           |           |
| Timken® Prefix (ABMA designation)                                                                                                                                                |      | H (C2)<br>Acceptance Limits |           | R (C0)<br>Acceptance Limits |           | P (C3)<br>Acceptance Limits |           | J (C4)<br>Acceptance Limits |           | JJ (C5)<br>Acceptance Limit |           |           |
| Basic Bore<br>Diameter<br>MM                                                                                                                                                     | over | incl.                       | low       | high                        | low       | high                        | low       | high                        | low       | high                        | low       | high      |
|                                                                                                                                                                                  |      |                             | mm<br>in. | mm<br>in.                   | mm<br>in. | mm<br>in.                   | mm<br>in. | mm<br>in.                   | mm<br>in. | mm<br>in.                   | mm<br>in. | mm<br>in. |
| 2.5                                                                                                                                                                              | 10   | 0                           | 7         | 2                           | 13        | 8                           | 23        | 14                          | 29        | 20                          | 37        |           |
|                                                                                                                                                                                  |      | 0                           | 3         | 1                           | 5         | 3                           | 9         | 6                           | 11        | 8                           | 15        |           |
| 10                                                                                                                                                                               | 18   | 0                           | 9         | 3                           | 18        | 11                          | 25        | 18                          | 33        | 25                          | 45        |           |
|                                                                                                                                                                                  |      | 0                           | 3.5       | 1                           | 7         | 4                           | 10        | 7                           | 13        | 10                          | 18        |           |
| 18                                                                                                                                                                               | 24   | 0                           | 10        | 5                           | 20        | 13                          | 28        | 20                          | 36        | 28                          | 48        |           |
|                                                                                                                                                                                  |      | 0                           | 4         | 2                           | 8         | 5                           | 11        | 8                           | 14        | 11                          | 19        |           |
| 24                                                                                                                                                                               | 30   | 1                           | 11        | 5                           | 20        | 13                          | 28        | 23                          | 41        | 30                          | 53        |           |
|                                                                                                                                                                                  |      | 0.5                         | 4.5       | 2                           | 8         | 5                           | 11        | 9                           | 16        | 12                          | 21        |           |
| 30                                                                                                                                                                               | 40   | 1                           | 11        | 6                           | 20        | 15                          | 33        | 28                          | 46        | 40                          | 64        |           |
|                                                                                                                                                                                  |      | 0.5                         | 4.5       | 2                           | 8         | 6                           | 13        | 11                          | 18        | 16                          | 25        |           |
| 40                                                                                                                                                                               | 50   | 1                           | 11        | 6                           | 23        | 18                          | 36        | 30                          | 51        | 45                          | 73        |           |
|                                                                                                                                                                                  |      | 0.5                         | 4.5       | 2.5                         | 9         | 7                           | 14        | 12                          | 20        | 18                          | 29        |           |
| 50                                                                                                                                                                               | 65   | 1                           | 15        | 8                           | 28        | 23                          | 43        | 38                          | 61        | 55                          | 90        |           |
|                                                                                                                                                                                  |      | 0.5                         | 6         | 3.5                         | 11        | 9                           | 17        | 15                          | 24        | 22                          | 35        |           |
| 65                                                                                                                                                                               | 80   | 1                           | 15        | 10                          | 30        | 25                          | 51        | 46                          | 71        | 65                          | 105       |           |
|                                                                                                                                                                                  |      | 0.5                         | 6         | 4                           | 12        | 10                          | 20        | 18                          | 28        | 26                          | 41        |           |
| 80                                                                                                                                                                               | 100  | 1                           | 18        | 12                          | 36        | 30                          | 58        | 53                          | 84        | 75                          | 120       |           |
|                                                                                                                                                                                  |      | 0.5                         | 7         | 4.5                         | 14        | 12                          | 23        | 21                          | 33        | 30                          | 47        |           |
| 100                                                                                                                                                                              | 120  | 2                           | 20        | 15                          | 41        | 36                          | 66        | 61                          | 97        | 90                          | 140       |           |
|                                                                                                                                                                                  |      | 1                           | 8         | 6                           | 16        | 14                          | 26        | 24                          | 38        | 35                          | 55        |           |
| 120                                                                                                                                                                              | 140  | 2                           | 23        | 18                          | 48        | 41                          | 81        | 71                          | 114       | 105                         | 160       |           |
|                                                                                                                                                                                  |      | 1                           | 9         | 7                           | 19        | 16                          | 32        | 28                          | 45        | 41                          | 63        |           |
| 140                                                                                                                                                                              | 160  | 2                           | 23        | 18                          | 53        | 46                          | 91        | 81                          | 130       | 120                         | 180       |           |
|                                                                                                                                                                                  |      | 1                           | 9         | 7                           | 21        | 18                          | 36        | 32                          | 51        | 47                          | 71        |           |
| 160                                                                                                                                                                              | 180  | 2                           | 25        | 20                          | 61        | 53                          | 102       | 91                          | 147       | 135                         | 200       |           |
|                                                                                                                                                                                  |      | 1                           | 10        | 8                           | 24        | 21                          | 40        | 36                          | 58        | 53                          | 79        |           |
| 180                                                                                                                                                                              | 200  | 2                           | 30        | 25                          | 71        | 63                          | 117       | 107                         | 163       | 150                         | 230       |           |
|                                                                                                                                                                                  |      | 1                           | 12        | 10                          | 28        | 25                          | 46        | 42                          | 64        | 59                          | 91        |           |
| 200                                                                                                                                                                              | 240  | 3                           | 36        | 30                          | 81        | 74                          | 137       | 127                         | 193       | 183                         | 267       |           |
|                                                                                                                                                                                  |      | 1                           | 14        | 12                          | 32        | 29                          | 54        | 50                          | 76        | 72                          | 105       |           |
| 240                                                                                                                                                                              | 280  | 3                           | 41        | 33                          | 97        | 86                          | 157       | 147                         | 224       | 213                         | 310       |           |
|                                                                                                                                                                                  |      | 1                           | 16        | 13                          | 38        | 34                          | 62        | 58                          | 88        | 84                          | 122       |           |
| 280                                                                                                                                                                              | 320  | 5                           | 48        | 41                          | 114       | 104                         | 180       | 170                         | 257       | 246                         | 353       |           |
|                                                                                                                                                                                  |      | 2                           | 19        | 16                          | 45        | 41                          | 71        | 67                          | 101       | 97                          | 139       |           |
| 320                                                                                                                                                                              | 370  | 5                           | 53        | 46                          | 127       | 117                         | 208       | 198                         | 295       | 284                         | 409       |           |
|                                                                                                                                                                                  |      | 2                           | 21        | 18                          | 50        | 46                          | 82        | 78                          | 116       | 112                         | 161       |           |
| 370                                                                                                                                                                              | 430  | 8                           | 64        | 56                          | 147       | 137                         | 241       | 231                         | 340       | 330                         | 475       |           |
|                                                                                                                                                                                  |      | 3                           | 25        | 22                          | 58        | 54                          | 95        | 91                          | 134       | 130                         | 187       |           |
| 430                                                                                                                                                                              | 500  | 10                          | 74        | 66                          | 170       | 160                         | 279       | 269                         | 396       | 386                         | 551       |           |
|                                                                                                                                                                                  |      | 4                           | 29        | 26                          | 67        | 63                          | 110       | 106                         | 156       | 152                         | 217       |           |
| 500                                                                                                                                                                              | 570  | 10                          | 81        | 74                          | 193       | 183                         | 318       | 307                         | 450       | 439                         | 630       |           |
|                                                                                                                                                                                  |      | 4                           | 32        | 29                          | 76        | 72                          | 125       | 121                         | 177       | 173                         | 248       |           |
| 570                                                                                                                                                                              | 640  | 13                          | 91        | 85                          | 216       | 206                         | 356       | 345                         | 505       | 495                         | 706       |           |
|                                                                                                                                                                                  |      | 5                           | 36        | 33                          | 85        | 81                          | 140       | 136                         | 199       | 195                         | 278       |           |
| 640                                                                                                                                                                              | 710  | 20                          | 114       | 107                         | 239       | 229                         | 394       | 384                         | 564       | 554                         | 780       |           |
|                                                                                                                                                                                  |      | 8                           | 45        | 42                          | 94        | 90                          | 155       | 151                         | 222       | 218                         | 307       |           |
| 710                                                                                                                                                                              | 800  | 20                          | 140       | 130                         | 269       | 259                         | 445       | 434                         | 630       | 620                         | 879       |           |
|                                                                                                                                                                                  |      | 8                           | 55        | 51                          | 106       | 102                         | 175       | 171                         | 248       | 244                         | 346       |           |
| 800                                                                                                                                                                              | 1060 | 28                          | 211       | 201                         | 353       | 345                         | 587       | 577                         | 833       | 823                         | 1148      |           |
|                                                                                                                                                                                  |      | 11                          | 83        | 79                          | 139       | 136                         | 231       | 227                         | 328       | 324                         | 452       |           |

Standard fits for Timken radial ball bearings. P(C3) for bearing O.D. greater than 52 mm.

**MOUNTING DESIGNS - continued****CONTACT ANGLE**

The contact angle ( $\alpha$ ) is related to internal clearance as follows:

$$\alpha = \sin^{-1} \left( \frac{E}{2(K_o + K_i - 1)d} \right)$$

The contact angle ( $\alpha$ ) may also be accurately determined in a production bearing from its pitch diameter (P.D.) and by measuring the number of revolutions ( $N_c$ ) of the ball and cage assembly relative to rotation ( $N_i$ ) of the inner ring under a light thrust load.

$$(N_c) = 0.5N_i \left( 1 - \frac{d}{d_m} \cos \alpha \right)$$

$$\cos \alpha = \frac{d_m}{d} \left( 1 - \frac{N_c}{0.5N_i} \right)$$

The accuracy of this method of measurement depends greatly upon the care taken in set up. Balanced weight for thrust loading, vertical turning, slow turning, many turns, minimum lubricant of low viscosity and pre-rotation are all essential for instance. The races should not be radially restrained during the contact angle measurement.

**MOUNTING DESIGNS - continued**

**RADIAL SPHERICAL ROLLER BEARINGS**

Timken bearing RIC allows a tight fit, with sufficient internal clearance after installation for normal operating conditions.

Spherical roller bearings with tapered bore (K) require a slightly greater interference fit on the shaft than would a cylindrical bore bearing. The effect of this greater interference fit is a reduction of RIC. For tapered bore bearings, it is critical to select the RIC that allows for this reduction.

For example, bearing number 22328K C3 (140 mm bore with C3 clearance) is to be mounted on a tapered shaft. By feeler gaging, RIC is found to be 0.178 mm (0.007 in.). The chart indicates that the proper fit will be obtained when RIC is reduced by 0.064 to 0.089 mm (0.0025 in. to 0.0035 in.). Clearance after mounting is computed:  $0.178 - 0.076 = 0.102$  mm (0.007 in. - 0.003 in. = 0.004 in.). The locknut should be tightened until RIC reaches 0.102 mm (0.004 in.).

Several factors influence RIC reduction. Inner rings pressed into solid steel shafts expand approximately 80 percent of the interference fit. Outer rings pressed into steel or cast iron housings reduce RIC by about 60 percent of the interference fit. For RIC reduction on hollow shafts or non-steel materials, consult your local Timken representative.

Timken bearings are supplied with NORMAL RIC, unless otherwise specified. The desired RIC code must be added to the bearing number, FOLLOWING ALL OTHER SUFFIXES.

Min./max. values for each RIC are shown in the two adjacent columns directly beneath the selected RIC. Each single column represents a boundary between adjacent RICs. For example, the minimum values shown for C5 are also the maximum values for C4; minimum values for C4 are also the maximum values for C3; etc.

**SPHERICAL ROLLER BEARING ENDPLAY**

In certain applications such as vane pumps, rubber mill rotor shafts or where it is necessary to take up axial expansion within the bearing, knowledge of the bearing endplay relationship to mounted radial internal clearance may be required. The following table showing the ratio of approximate endplay to radial internal clearance in spherical roller bearings can be used to calculate approximate endplay in the bearing.

Example: 22320CJW33C3 bearing has a radial internal clearance after installation of .002. The total endplay would be approximately .0086 in. ( $\pm .0043$  from center)

| Series | E.P.<br>RIC |
|--------|-------------|
| 39     | 8.7         |
| 30     | 7.0         |
| 22     | 5.5         |
| 31     | 5.0         |
| 40     | 4.8         |
| 32     | 4.4         |
| 23     | 4.3         |
| 41     | 4.2         |
| 33     | 3.9         |

MOUNTING DESIGNS - continued

RADIAL INTERNAL CLEARANCE LIMITS – RADIAL SPHERICAL ROLLER BEARINGS

All data on this page, except Bore I.D., are in millimeters/inches

| Bore (nominal) |      | Cylindrical Bore |        |        |        |        |        | Tapered Bore |        |        |        |        |        | Suggested Reduction of RIC Due to Installation |        | Suggested RIC after Installation <sup>(1)</sup> |        |
|----------------|------|------------------|--------|--------|--------|--------|--------|--------------|--------|--------|--------|--------|--------|------------------------------------------------|--------|-------------------------------------------------|--------|
|                |      | Normal C0        |        |        | C4     |        |        | Normal C0    |        |        | C4     |        |        |                                                |        |                                                 |        |
|                |      | Min.             |        | Max.   | Min.   |        | Max.   | Min.         |        | Max.   | Min.   |        | Max.   |                                                |        |                                                 |        |
|                |      | C2               |        | C3     | C5     |        | C2     |              | C3     | C5     |        |        |        |                                                |        |                                                 |        |
| mm             | Min. | Max.             | Min.   | Max.   | Min.   | Max.   | Min.   | Max.         | Mmin.  | Max.   | Min.   | Max.   | Min.   | Max.                                           | Min.   |                                                 |        |
| over           | mm   | mm               | mm     | mm     | mm     | mm     | mm     | mm           | mm     | mm     | mm     | mm     | mm     | mm                                             | mm     | mm                                              |        |
| incl.          | inch | inch             | inch   | inch   | inch   | inch   | inch   | inch         | inch   | inch   | inch   | inch   | inch   | inch                                           | inch   | inch                                            |        |
| 24             | 30   | 0.015            | 0.006  | 0.025  | 0.010  | 0.040  | 0.016  | 0.055        | 0.022  | 0.075  | 0.030  | 0.095  | 0.008  | 0.008                                          | 0.030  | 0.008                                           | 0.015  |
|                |      | 0.0006           | 0.0012 | 0.0018 | 0.0024 | 0.0031 | 0.0039 | 0.0049       | 0.0059 | 0.0071 | 0.0089 | 0.0110 | 0.0140 | 0.0180                                         | 0.0230 | 0.0300                                          | 0.0400 |
| 30             | 40   | 0.015            | 0.006  | 0.030  | 0.012  | 0.045  | 0.018  | 0.060        | 0.024  | 0.080  | 0.100  | 0.100  | 0.025  | 0.035                                          | 0.050  | 0.065                                           | 0.085  |
|                |      | 0.0006           | 0.0012 | 0.0018 | 0.0024 | 0.0031 | 0.0039 | 0.0049       | 0.0059 | 0.0071 | 0.0089 | 0.0110 | 0.0140 | 0.0180                                         | 0.0230 | 0.0300                                          | 0.0400 |
| 40             | 50   | 0.020            | 0.008  | 0.035  | 0.014  | 0.055  | 0.022  | 0.075        | 0.030  | 0.100  | 0.125  | 0.125  | 0.030  | 0.045                                          | 0.060  | 0.080                                           | 0.100  |
|                |      | 0.0008           | 0.0014 | 0.0022 | 0.0030 | 0.0039 | 0.0049 | 0.0059       | 0.0071 | 0.0089 | 0.0110 | 0.0140 | 0.0180 | 0.0230                                         | 0.0300 | 0.0400                                          | 0.0500 |
| 50             | 65   | 0.020            | 0.008  | 0.040  | 0.016  | 0.065  | 0.026  | 0.090        | 0.035  | 0.120  | 0.150  | 0.150  | 0.040  | 0.055                                          | 0.075  | 0.095                                           | 0.120  |
|                |      | 0.0008           | 0.0016 | 0.0026 | 0.0035 | 0.0047 | 0.0059 | 0.0071       | 0.0089 | 0.0110 | 0.0140 | 0.0180 | 0.0230 | 0.0300                                         | 0.0400 | 0.0500                                          | 0.0650 |
| 65             | 80   | 0.030            | 0.012  | 0.050  | 0.020  | 0.080  | 0.031  | 0.110        | 0.043  | 0.145  | 0.180  | 0.180  | 0.050  | 0.070                                          | 0.095  | 0.120                                           | 0.150  |
|                |      | 0.0012           | 0.0020 | 0.0031 | 0.0043 | 0.0057 | 0.0071 | 0.0089       | 0.0110 | 0.0138 | 0.0170 | 0.0210 | 0.0260 | 0.0330                                         | 0.0430 | 0.0550                                          | 0.0700 |
| 80             | 100  | 0.035            | 0.014  | 0.060  | 0.024  | 0.100  | 0.039  | 0.135        | 0.053  | 0.180  | 0.225  | 0.225  | 0.055  | 0.080                                          | 0.110  | 0.140                                           | 0.180  |
|                |      | 0.0014           | 0.0024 | 0.0039 | 0.0053 | 0.0071 | 0.0089 | 0.0110       | 0.0138 | 0.0170 | 0.0210 | 0.0260 | 0.0330 | 0.0430                                         | 0.0550 | 0.0700                                          | 0.0850 |
| 100            | 120  | 0.040            | 0.016  | 0.075  | 0.030  | 0.120  | 0.047  | 0.160        | 0.063  | 0.210  | 0.260  | 0.260  | 0.065  | 0.100                                          | 0.135  | 0.170                                           | 0.220  |
|                |      | 0.0016           | 0.0030 | 0.0047 | 0.0063 | 0.0083 | 0.0102 | 0.0120       | 0.0150 | 0.0190 | 0.0240 | 0.0300 | 0.0360 | 0.0450                                         | 0.0550 | 0.0700                                          | 0.0850 |
| 120            | 140  | 0.050            | 0.020  | 0.095  | 0.037  | 0.145  | 0.057  | 0.190        | 0.075  | 0.240  | 0.300  | 0.300  | 0.080  | 0.120                                          | 0.160  | 0.200                                           | 0.260  |
|                |      | 0.0020           | 0.0037 | 0.0057 | 0.0075 | 0.0094 | 0.0118 | 0.0140       | 0.0170 | 0.0210 | 0.0260 | 0.0330 | 0.0430 | 0.0550                                         | 0.0700 | 0.0850                                          | 0.1000 |
| 140            | 160  | 0.060            | 0.024  | 0.110  | 0.043  | 0.170  | 0.067  | 0.220        | 0.087  | 0.280  | 0.350  | 0.350  | 0.090  | 0.130                                          | 0.180  | 0.230                                           | 0.300  |
|                |      | 0.0024           | 0.0043 | 0.0067 | 0.0087 | 0.0110 | 0.0138 | 0.0160       | 0.0200 | 0.0250 | 0.0300 | 0.0360 | 0.0450 | 0.0550                                         | 0.0700 | 0.0850                                          | 0.1000 |
| 160            | 180  | 0.065            | 0.026  | 0.120  | 0.047  | 0.180  | 0.071  | 0.240        | 0.094  | 0.310  | 0.390  | 0.390  | 0.100  | 0.140                                          | 0.200  | 0.260                                           | 0.340  |
|                |      | 0.0026           | 0.0047 | 0.0071 | 0.0094 | 0.0122 | 0.0154 | 0.0190       | 0.0240 | 0.0300 | 0.0390 | 0.0490 | 0.0600 | 0.0750                                         | 0.1000 | 0.1200                                          | 0.1500 |
| 180            | 200  | 0.070            | 0.028  | 0.130  | 0.051  | 0.200  | 0.079  | 0.260        | 0.102  | 0.340  | 0.430  | 0.430  | 0.110  | 0.160                                          | 0.220  | 0.290                                           | 0.370  |
|                |      | 0.0028           | 0.0051 | 0.0079 | 0.0102 | 0.0134 | 0.0169 | 0.0210       | 0.0260 | 0.0330 | 0.0430 | 0.0550 | 0.0700 | 0.0850                                         | 0.1100 | 0.1300                                          | 0.1600 |
| 200            | 225  | 0.080            | 0.031  | 0.140  | 0.055  | 0.220  | 0.087  | 0.290        | 0.114  | 0.380  | 0.470  | 0.470  | 0.120  | 0.180                                          | 0.250  | 0.320                                           | 0.410  |
|                |      | 0.0031           | 0.0055 | 0.0087 | 0.0114 | 0.0150 | 0.0185 | 0.0230       | 0.0280 | 0.0360 | 0.0470 | 0.0600 | 0.0750 | 0.1000                                         | 0.1200 | 0.1500                                          | 0.1900 |
| 225            | 250  | 0.090            | 0.035  | 0.150  | 0.059  | 0.240  | 0.094  | 0.320        | 0.126  | 0.420  | 0.520  | 0.520  | 0.140  | 0.200                                          | 0.270  | 0.350                                           | 0.450  |
|                |      | 0.0035           | 0.0059 | 0.0094 | 0.0126 | 0.0165 | 0.0205 | 0.0250       | 0.0300 | 0.0390 | 0.0500 | 0.0630 | 0.0780 | 0.1000                                         | 0.1200 | 0.1500                                          | 0.1900 |
| 250            | 280  | 0.100            | 0.039  | 0.170  | 0.067  | 0.260  | 0.102  | 0.350        | 0.138  | 0.460  | 0.570  | 0.570  | 0.150  | 0.220                                          | 0.300  | 0.390                                           | 0.490  |
|                |      | 0.0039           | 0.0067 | 0.0102 | 0.0138 | 0.0181 | 0.0224 | 0.0270       | 0.0330 | 0.0430 | 0.0550 | 0.0700 | 0.0850 | 0.1100                                         | 0.1300 | 0.1600                                          | 0.2000 |
| 280            | 315  | 0.110            | 0.043  | 0.190  | 0.075  | 0.280  | 0.110  | 0.370        | 0.146  | 0.500  | 0.630  | 0.630  | 0.170  | 0.240                                          | 0.330  | 0.430                                           | 0.540  |
|                |      | 0.0043           | 0.0075 | 0.0110 | 0.0146 | 0.0197 | 0.0248 | 0.0300       | 0.0360 | 0.0470 | 0.0600 | 0.0750 | 0.0900 | 0.1100                                         | 0.1300 | 0.1600                                          | 0.2000 |
| 315            | 355  | 0.120            | 0.047  | 0.200  | 0.079  | 0.310  | 0.122  | 0.410        | 0.161  | 0.550  | 0.690  | 0.690  | 0.190  | 0.270                                          | 0.360  | 0.470                                           | 0.590  |
|                |      | 0.0047           | 0.0079 | 0.0122 | 0.0161 | 0.0217 | 0.0272 | 0.0330       | 0.0400 | 0.0520 | 0.0660 | 0.0820 | 0.1000 | 0.1200                                         | 0.1500 | 0.1900                                          | 0.2400 |
| 355            | 400  | 0.130            | 0.051  | 0.220  | 0.087  | 0.340  | 0.134  | 0.450        | 0.177  | 0.600  | 0.750  | 0.750  | 0.210  | 0.300                                          | 0.400  | 0.520                                           | 0.650  |
|                |      | 0.0051           | 0.0087 | 0.0134 | 0.0177 | 0.0236 | 0.0295 | 0.0360       | 0.0430 | 0.0560 | 0.0710 | 0.0880 | 0.1080 | 0.1300                                         | 0.1600 | 0.2000                                          | 0.2500 |
| 400            | 450  | 0.140            | 0.055  | 0.240  | 0.094  | 0.370  | 0.146  | 0.500        | 0.197  | 0.660  | 0.820  | 0.820  | 0.230  | 0.330                                          | 0.440  | 0.570                                           | 0.720  |
|                |      | 0.0055           | 0.0094 | 0.0146 | 0.0197 | 0.0260 | 0.0323 | 0.0390       | 0.0470 | 0.0600 | 0.0750 | 0.0920 | 0.1100 | 0.1300                                         | 0.1600 | 0.2000                                          | 0.2500 |
| 450            | 500  | 0.140            | 0.055  | 0.260  | 0.102  | 0.410  | 0.161  | 0.550        | 0.217  | 0.720  | 0.900  | 0.900  | 0.260  | 0.370                                          | 0.490  | 0.630                                           | 0.790  |
|                |      | 0.0055           | 0.0102 | 0.0161 | 0.0217 | 0.0283 | 0.0354 | 0.0430       | 0.0520 | 0.0660 | 0.0820 | 0.1000 | 0.1200 | 0.1500                                         | 0.1900 | 0.2400                                          | 0.3000 |
| 500            | 560  | 0.150            | 0.059  | 0.280  | 0.110  | 0.440  | 0.173  | 0.600        | 0.236  | 0.780  | 1.000  | 1.000  | 0.290  | 0.410                                          | 0.540  | 0.680                                           | 0.870  |
|                |      | 0.0059           | 0.0110 | 0.0173 | 0.0236 | 0.0307 | 0.0394 | 0.0490       | 0.0600 | 0.0750 | 0.0920 | 0.1100 | 0.1300 | 0.1600                                         | 0.2000 | 0.2500                                          | 0.3000 |
| 560            | 630  | 0.170            | 0.067  | 0.310  | 0.122  | 0.480  | 0.189  | 0.650        | 0.256  | 0.850  | 1.100  | 1.100  | 0.320  | 0.460                                          | 0.600  | 0.760                                           | 0.980  |
|                |      | 0.0067           | 0.0122 | 0.0189 | 0.0256 | 0.0335 | 0.0433 | 0.0540       | 0.0660 | 0.0820 | 0.1000 | 0.1200 | 0.1500 | 0.1900                                         | 0.2400 | 0.3000                                          | 0.3600 |
| 630            | 710  | 0.190            | 0.075  | 0.350  | 0.138  | 0.530  | 0.209  | 0.700        | 0.276  | 0.920  | 1.190  | 1.190  | 0.350  | 0.510                                          | 0.670  | 0.850                                           | 1.090  |
|                |      | 0.0075           | 0.0138 | 0.0209 | 0.0276 | 0.0362 | 0.0469 | 0.0580       | 0.0710 | 0.0880 | 0.1080 | 0.1300 | 0.1600 | 0.2000                                         | 0.2500 | 0.3000                                          | 0.3600 |
| 710            | 800  | 0.210            | 0.083  | 0.390  | 0.154  | 0.580  | 0.228  | 0.770        | 0.303  | 1.010  | 1.300  | 1.300  | 0.390  | 0.570                                          | 0.750  | 0.960                                           | 1.220  |
|                |      | 0.0083           | 0.0154 | 0.0228 | 0.0303 | 0.0398 | 0.0512 | 0.0630       | 0.0770 | 0.0920 | 0.1080 | 0.1260 | 0.1460 | 0.1700                                         | 0.2000 | 0.2400                                          | 0.2900 |
| 800            | 900  | 0.230            | 0.091  | 0.430  | 0.169  | 0.650  | 0.256  | 0.860        | 0.339  | 1.120  | 1.440  | 1.440  | 0.440  | 0.640                                          | 0.840  | 1.070                                           | 1.370  |
|                |      | 0.0091           | 0.0169 | 0.0256 | 0.0339 | 0.0441 | 0.0567 | 0.0690       | 0.0830 | 0.1000 | 0.1200 | 0.1440 | 0.1700 | 0.2000                                         | 0.2400 | 0.2900                                          | 0.3500 |
| 900            | 1000 | 0.260            | 0.102  | 0.480  | 0.189  | 0.710  | 0.280  | 0.930        | 0.366  | 1.220  | 1.57   | 1.57   | 0.490  | 0.710                                          | 0.930  | 1.190                                           | 1.520  |
|                |      | 0.0102           | 0.0189 | 0.0280 | 0.0366 | 0.0480 | 0.0618 | 0.0760       | 0.0920 | 0.1100 | 0.1300 | 0.1500 | 0.1700 | 0.2000                                         | 0.2400 | 0.2900                                          | 0.3500 |

<sup>(1)</sup>For bearings with normal initial clearance.

For bearings with normal initial clearance.

Min./Max. values for each RIC are shown in the two adjacent columns directly beneath the selected RIC. Each single column represents a boundary between adjacent RICs. For example, the minimum values shown for C5 are also the maximum values for C4; minimum values for C4 are also the maximum values for C3, etc.

\* Special clearances can be provided (C6, C7, etc.)



**MOUNTING DESIGNS - continued**

**CYLINDRICAL ROLLER BEARINGS**

Cylindrical roller bearings are available with Radial Internal Clearance designations per either of the following tables: “Timken ‘R’ Clearance” or “ISO/ABMA ‘C’ Clearance.” Non-standard values are also available by special request. Standard radial internal clearance values are listed in the following tables based on bore size. The clearance required for a given application depends on

the desired operating precision, rotational speed of the bearing, and the fitting practice used. Most applications use a normal or C0 clearance. Typically, larger clearance reduces the operating zone of the bearing, increases the maximum roller load and reduces the bearing’s expected life.

| <b>CYLINDRICAL ROLLER BEARING RADIAL INTERNAL CLEARANCE LIMITS</b> |              |                                    |             |             |             |             |             |             |             |             |             |
|--------------------------------------------------------------------|--------------|------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Bore, mm</b>                                                    |              | <b>R.I.C. (0.0001 inch and µm)</b> |             |             |             |             |             |             |             |             |             |
| <b>over</b>                                                        | <b>incl.</b> | <b>C2</b>                          |             | <b>C0</b>   |             | <b>C3</b>   |             | <b>C4</b>   |             | <b>C5</b>   |             |
|                                                                    |              | <b>Min.</b>                        | <b>Max.</b> | <b>Min.</b> | <b>Max.</b> | <b>Min.</b> | <b>Max.</b> | <b>Min.</b> | <b>Max.</b> | <b>Min.</b> | <b>Max.</b> |
|                                                                    |              | <b>mm</b>                          | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   | <b>mm</b>   |
|                                                                    |              | <b>in.</b>                         | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  | <b>in.</b>  |
| -                                                                  | 10           | 0                                  | 25          | 20          | 45          | 35          | 60          | 50          | 75          | -           | -           |
|                                                                    |              | 0                                  | 10          | 8           | 18          | 14          | 24          | 20          | 30          | -           | -           |
| 10                                                                 | 24           | 0                                  | 25          | 20          | 45          | 35          | 60          | 50          | 75          | 65          | 90          |
|                                                                    |              | 0                                  | 10          | 8           | 18          | 14          | 24          | 20          | 30          | 26          | 35          |
| 24                                                                 | 30           | 0                                  | 25          | 20          | 45          | 35          | 60          | 50          | 75          | 70          | 95          |
|                                                                    |              | 0                                  | 10          | 8           | 18          | 14          | 24          | 20          | 30          | 28          | 37          |
| 30                                                                 | 40           | 5                                  | 30          | 25          | 50          | 45          | 70          | 60          | 85          | 80          | 105         |
|                                                                    |              | 2                                  | 12          | 10          | 20          | 18          | 28          | 24          | 33          | 31          | 41          |
| 40                                                                 | 50           | 5                                  | 35          | 30          | 60          | 50          | 80          | 70          | 100         | 95          | 125         |
|                                                                    |              | 2                                  | 14          | 12          | 24          | 20          | 31          | 28          | 39          | 37          | 49          |
| 50                                                                 | 65           | 10                                 | 40          | 40          | 70          | 60          | 90          | 80          | 110         | 110         | 140         |
|                                                                    |              | 4                                  | 16          | 16          | 28          | 24          | 35          | 31          | 43          | 43          | 55          |
| 65                                                                 | 80           | 10                                 | 45          | 40          | 75          | 65          | 100         | 90          | 125         | 130         | 165         |
|                                                                    |              | 4                                  | 18          | 16          | 30          | 26          | 39          | 35          | 49          | 51          | 65          |
| 80                                                                 | 100          | 15                                 | 50          | 50          | 85          | 75          | 110         | 105         | 140         | 155         | 190         |
|                                                                    |              | 6                                  | 20          | 20          | 33          | 30          | 43          | 41          | 55          | 61          | 75          |
| 100                                                                | 120          | 15                                 | 55          | 50          | 90          | 85          | 125         | 125         | 165         | 180         | 220         |
|                                                                    |              | 6                                  | 22          | 20          | 35          | 33          | 49          | 49          | 65          | 71          | 87          |
| 120                                                                | 140          | 15                                 | 60          | 60          | 105         | 100         | 145         | 145         | 190         | 200         | 245         |
|                                                                    |              | 6                                  | 24          | 24          | 41          | 39          | 57          | 57          | 75          | 79          | 96          |
| 140                                                                | 160          | 20                                 | 70          | 70          | 120         | 115         | 165         | 165         | 215         | 225         | 275         |
|                                                                    |              | 8                                  | 28          | 28          | 47          | 45          | 65          | 65          | 85          | 89          | 108         |
| 160                                                                | 180          | 25                                 | 75          | 75          | 125         | 120         | 170         | 170         | 220         | 250         | 300         |
|                                                                    |              | 10                                 | 30          | 30          | 49          | 47          | 67          | 67          | 87          | 98          | 118         |
| 180                                                                | 200          | 35                                 | 90          | 90          | 145         | 140         | 195         | 195         | 250         | 275         | 330         |
|                                                                    |              | 14                                 | 35          | 35          | 57          | 55          | 77          | 77          | 98          | 108         | 130         |
| 200                                                                | 225          | 45                                 | 105         | 105         | 165         | 160         | 220         | 220         | 280         | 305         | 365         |
|                                                                    |              | 18                                 | 41          | 41          | 65          | 63          | 87          | 87          | 110         | 120         | 144         |
| 225                                                                | 250          | 45                                 | 110         | 110         | 175         | 170         | 235         | 235         | 300         | 330         | 395         |
|                                                                    |              | 18                                 | 43          | 43          | 69          | 67          | 93          | 93          | 118         | 130         | 156         |
| 250                                                                | 280          | 55                                 | 125         | 125         | 195         | 190         | 260         | 260         | 330         | 370         | 440         |
|                                                                    |              | 22                                 | 49          | 49          | 77          | 75          | 102         | 102         | 130         | 146         | 173         |
| 280                                                                | 315          | 55                                 | 130         | 130         | 205         | 200         | 275         | 275         | 350         | 410         | 485         |
|                                                                    |              | 22                                 | 51          | 51          | 81          | 79          | 108         | 108         | 138         | 161         | 191         |
| 315                                                                | 355          | 65                                 | 145         | 145         | 225         | 225         | 305         | 305         | 385         | 455         | 535         |
|                                                                    |              | 26                                 | 57          | 57          | 89          | 89          | 120         | 120         | 152         | 179         | 211         |
| 355                                                                | 400          | 100                                | 190         | 190         | 280         | 280         | 370         | 370         | 460         | 510         | 600         |
|                                                                    |              | 39                                 | 75          | 75          | 110         | 110         | 146         | 146         | 181         | 201         | 236         |
| 400                                                                | 450          | 110                                | 210         | 210         | 310         | 310         | 410         | 410         | 510         | 565         | 665         |
|                                                                    |              | 43                                 | 83          | 83          | 122         | 122         | 161         | 161         | 201         | 222         | 262         |
| 450                                                                | 500          | 110                                | 220         | 220         | 330         | 330         | 440         | 440         | 550         | 625         | 735         |
|                                                                    |              | 43                                 | 87          | 87          | 130         | 130         | 173         | 173         | 217         | 246         | 289         |
| 500                                                                | 560          | 120                                | 240         | 240         | 360         | 360         | 480         | 480         | 600         | 690         | 810         |
|                                                                    |              | 47.2                               | 94.5        | 94.5        | 141.7       | 141.7       | 189.0       | 189.0       | 236.2       | 271.7       | 318.9       |
| 560                                                                | 630          | 140                                | 260         | 260         | 380         | 380         | 500         | 500         | 620         | 780         | 900         |
|                                                                    |              | 55.1                               | 102.4       | 102.4       | 149.6       | 149.6       | 196.9       | 196.9       | 244.1       | 307.1       | 354.3       |
| 630                                                                | 710          | 145                                | 285         | 285         | 425         | 425         | 565         | 565         | 705         | 865         | 1005        |
|                                                                    |              | 57.1                               | 112.2       | 112.2       | 167.3       | 167.3       | 222.4       | 222.4       | 277.6       | 340.6       | 395.7       |
| 710                                                                | 800          | 150                                | 310         | 310         | 470         | 470         | 630         | 630         | 790         | 975         | 1135        |
|                                                                    |              | 59.1                               | 122.0       | 122.0       | 185.0       | 185.0       | 248.0       | 248.0       | 311.0       | 383.9       | 446.9       |
| 800                                                                | 900          | 180                                | 350         | 350         | 520         | 520         | 690         | 690         | 860         | 1095        | 1265        |
|                                                                    |              | 70.9                               | 137.8       | 137.8       | 204.7       | 204.7       | 271.7       | 271.7       | 338.6       | 431.1       | 498.0       |
| 900                                                                | 1000         | 200                                | 390         | 390         | 580         | 580         | 770         | 770         | 960         | 1215        | 1405        |
|                                                                    |              | 78.7                               | 153.5       | 153.5       | 228.3       | 228.3       | 303.1       | 303.1       | 378.0       | 478.3       | 553.1       |

These values indicate the expected range of mounted RIC following suggested push up values. Timken suggests that customers consult with our engineers to evaluate unique applications or requirements for special operating conditions.

MOUNTING DESIGNS - *continued*

**RADIAL CYLINDRICAL ROLLER BEARINGS**

Min./Max. values for each RIC are shown in the two adjacent columns directly beneath the selected RIC. Each single column represents a boundary between adjacent RICs. For example, the minimum values shown for R5 are also the maximum values for R4; minimum values for R4 are also the maximum values for R3, etc. The desired RIC code (R1, R2, etc.) must be added to the bearing number, FOLLOWING ALL OTHER SUFFIXES.

**RADIAL INTERNAL CLEARANCE LIMITS**

All data on this chart are in millimeters/inches.

| Bore (nominal) |         | R2     |        | R4     |        |        |        |
|----------------|---------|--------|--------|--------|--------|--------|--------|
|                |         | Min.   | Max.   | Min.   | Max.   |        |        |
|                |         | R1     |        | R3     |        | R5     |        |
| Over           | Incl.   | Min.   | Max.   | Min.   | Max.   | Min.   | Max.   |
| mm             | mm      | mm     | mm     | mm     | mm     | mm     | mm     |
| in.            | in.     | in.    | in.    | in.    | in.    | in.    | in.    |
| 80             | 100     | 0.013  | 0.041  | 0.081  | 0.130  | 0.196  | 0.272  |
| 3.1496         | 3.9370  | 0.0005 | 0.0016 | 0.0032 | 0.0051 | 0.0077 | 0.0107 |
| 100            | 120     | 0.013  | 0.046  | 0.091  | 0.152  | 0.226  | 0.310  |
| 3.9370         | 4.7244  | 0.0005 | 0.0018 | 0.0036 | 0.0060 | 0.0089 | 0.0122 |
| 120            | 140     | 0.023  | 0.056  | 0.104  | 0.170  | 0.256  | 0.353  |
| 4.7244         | 5.5118  | 0.0009 | 0.0022 | 0.0041 | 0.0067 | 0.0101 | 0.0139 |
| 140            | 160     | 0.025  | 0.066  | 0.124  | 0.196  | 0.284  | 0.384  |
| 5.5118         | 6.2992  | 0.0010 | 0.0026 | 0.0049 | 0.0077 | 0.0112 | 0.0151 |
| 160            | 180     | 0.028  | 0.069  | 0.132  | 0.208  | 0.300  | 0.401  |
| 6.2992         | 7.0866  | 0.0011 | 0.0027 | 0.0052 | 0.0082 | 0.0118 | 0.0158 |
| 180            | 200     | 0.036  | 0.081  | 0.152  | 0.234  | 0.330  | 0.437  |
| 7.0866         | 7.8740  | 0.0014 | 0.0032 | 0.0060 | 0.0092 | 0.0130 | 0.0172 |
| 200            | 220     | 0.041  | 0.086  | 0.157  | 0.239  | 0.335  | 0.4421 |
| 7.8740         | 8.6614  | 0.0016 | 0.0034 | 0.0062 | 0.0094 | 0.0132 | 0.0174 |
| 220            | 260     | 0.056  | 0.102  | 0.173  | 0.254  | 0.351  | 0.455  |
| 8.6614         | 10.2362 | 0.0022 | 0.0040 | 0.0068 | 0.0100 | 0.0138 | 0.0180 |
| 260            | 300     | 0.061  | 0.107  | 0.178  | 0.259  | 0.356  | 0.462  |
| 10.2362        | 11.8110 | 0.0024 | 0.0042 | 0.0070 | 0.0102 | 0.0140 | 0.0182 |

| Bore (nominal) |         | R2     |        | R4     |        |        |        |
|----------------|---------|--------|--------|--------|--------|--------|--------|
|                |         | Min.   | Max.   | Min.   | Max.   |        |        |
|                |         | R1     |        | R3     |        | R5     |        |
| Over           | Incl.   | Min.   | Max.   | Min.   | Max.   | Min.   | Max.   |
| mm             | mm      | mm     | mm     | mm     | mm     | mm     | mm     |
| in.            | in.     | in.    | in.    | in.    | in.    | in.    | in.    |
| 300            | 350     | 0.081  | 0.127  | 0.198  | 0.279  | 0.376  | 0.483  |
| 11.8110        | 13.7795 | 0.0032 | 0.0050 | 0.0078 | 0.0110 | 0.0148 | 0.0190 |
| 350            | 400     | 0.107  | 0.165  | 0.236  | 0.318  | 0.414  | 0.521  |
| 13.7795        | 15.7480 | 0.0042 | 0.0065 | 0.0093 | 0.0125 | 0.0163 | 0.0205 |
| 400            | 450     | 0.14   | 0.203  | 0.279  | 0.361  | 0.457  | 0.564  |
| 15.7480        | 17.7165 | 0.0055 | 0.0080 | 0.0110 | 0.0142 | 0.0180 | 0.0222 |
| 450            | 500     | 0.152  | 0.216  | 0.292  | 0.381  | 0.508  | 0.645  |
| 17.7165        | 19.6850 | 0.0060 | 0.0085 | 0.0115 | 0.0150 | 0.0200 | 0.0254 |
| 500            | 560     | 0.165  | 0.229  | 0.305  | 0.406  | 0.533  | 0.671  |
| 19.6850        | 22.0472 | 0.0065 | 0.0090 | 0.0120 | 0.0160 | 0.0210 | 0.0264 |
| 560            | 630     | 0.178  | 0.254  | 0.356  | 0.483  | 0.610  | 0.747  |
| 22.0472        | 24.8031 | 0.0070 | 0.0100 | 0.0140 | 0.0190 | 0.0240 | 0.0294 |
| 630            | 710     | 0.190  | 0.279  | 0.381  | 0.508  | 0.635  | 0.772  |
| 24.8031        | 27.9528 | 0.0075 | 0.0110 | 0.0150 | 0.0200 | 0.0250 | 0.0304 |
| 710            | 800     | 0.216  | 0.330  | 0.457  | 0.584  | 0.711  | 0.848  |
| 27.9528        | 31.4961 | 0.0085 | 0.0130 | 0.0180 | 0.2300 | 0.0280 | 0.0334 |

## MOUNTING DESIGNS - *continued*

### NEEDLE ROLLER BEARINGS

#### INSPECTION OF DRAWN CUP NEEDLE ROLLER BEARINGS

Although the bearing cup is accurately drawn from strip steel because of its fairly thin section, it may go out of round during heat treatment. When the bearing is pressed into a true round housing or ring gage, of correct size and wall thickness, it becomes round and is sized properly. **For this reason, it is incorrect to inspect an unmounted drawn cup bearing by measuring the outside diameter.** The correct method for inspecting the bearing size is to:

1. Press the bearing into a ring gage of proper size.
2. Plug the bearing bore with the appropriate "go" and "no go" gages or measure it with a tapered arbor (lathe mandrel).

Table 15 lists the "go" gage size for metric bearings which is the minimum needle roller complement bore diameter. The "no go" gage size is larger than the maximum needle roller complement bore diameter by 0.002 mm.

TABLE 15

| HK METRIC SERIES BEARINGS |                 |                                                          |        |
|---------------------------|-----------------|----------------------------------------------------------|--------|
| Nominal bore diameter     | Dimensions – mm |                                                          |        |
|                           | Ring gage       | Needle roller complement bore diameter ( $F_{ws \min}$ ) |        |
|                           |                 | *                                                        | Min.   |
| 3                         | 6.484           | 3.006                                                    | 3.024  |
| 4                         | 7.984           | 4.010                                                    | 4.028  |
| 5                         | 8.984           | 5.010                                                    | 5.028  |
| 6                         | 9.984           | 6.010                                                    | 6.028  |
| 7                         | 10.980          | 7.013                                                    | 7.031  |
| 8                         | 11.980          | 8.013                                                    | 8.031  |
| 9                         | 12.980          | 9.013                                                    | 9.031  |
| 10                        | 13.980          | 10.013                                                   | 10.031 |
| 12                        | 15.980          | 12.016                                                   | 12.034 |
| 12                        | 17.980          | 12.016                                                   | 12.034 |
| 13                        | 18.976          | 13.016                                                   | 13.034 |
| 14                        | 19.976          | 14.016                                                   | 14.034 |
| 15                        | 20.976          | 15.016                                                   | 15.034 |
| 16                        | 21.976          | 16.016                                                   | 16.034 |
| 17                        | 22.976          | 17.016                                                   | 17.034 |
| 18                        | 23.976          | 18.016                                                   | 18.034 |
| 20                        | 25.976          | 20.020                                                   | 20.041 |
| 22                        | 27.976          | 22.020                                                   | 22.041 |
| 25                        | 31.972          | 25.020                                                   | 25.041 |
| 28                        | 34.972          | 28.020                                                   | 28.041 |
| 30                        | 36.972          | 30.020                                                   | 30.041 |
| 35                        | 41.972          | 35.025                                                   | 35.050 |
| 40                        | 46.972          | 40.025                                                   | 40.050 |
| 45                        | 51.967          | 45.025                                                   | 45.050 |
| 50                        | 57.967          | 50.025                                                   | 50.050 |
| 60                        | 67.967          | 60.030                                                   | 60.060 |

\* The ring gage sizes are in accordance with ISO N6 lower limit.

#### Inspection procedures

Table 15-B provides the correct ring and plug gage diameters for inspecting inch drawn cup needle roller bearings. When the letter H appears in the columns headed "Bearing Bore Designation" and "Nominal Shaft Diameter", the gage sizes listed are for the larger cross section bearings which include H in their bearing designation prefix.

#### Example

Find the ring gage and plug gage dimensions for a BH-68 bearing. The nominal bore diameter ( $F_w$ ) for this bearing, as shown in the table of dimensions is .3750 inch. Since the letter H appears in the bearing designation, the following information will be found opposite H6 .3750 in Table 15-B.

|                                     | INCH  |
|-------------------------------------|-------|
| ring gage                           | .6255 |
| diameter under needle rollers, min. | .3765 |
| diameter under needle rollers, max. | .3774 |

The "go" plug gage is the same size as the minimum needle roller complement bore diameter and the "no go" plug gage size is .00001 inch larger than the maximum bore diameter. Therefore the correct ring and plug gage dimensions are:

|                    | INCH  |
|--------------------|-------|
| ring gage          | .6255 |
| plug gage, "go"    | .3765 |
| plug gage, "no go" | .3775 |

These same gage dimensions also apply to JH-68.

MOUNTING DESIGNS - *continued*

TABLE 15-B

| INCH SERIES EXTRA-PRECISION BEARINGS |                        |                       |                   |                                        |        |
|--------------------------------------|------------------------|-----------------------|-------------------|----------------------------------------|--------|
| Bearing bore designation             | Nominal shaft diameter | Nominal bore diameter | Dimensions – inch |                                        |        |
|                                      |                        |                       | Ring gage         | Needle roller complement bore diameter |        |
|                                      |                        |                       |                   | Min.                                   | Max.   |
| inch                                 |                        |                       |                   |                                        |        |
| 2                                    | 1/8                    | .1250                 | .2505             | .1258                                  | .1267  |
| 2 1/2                                | 5/32                   | .1562                 | .2817             | .1571                                  | .1580  |
| 3                                    | 3/16                   | .1875                 | .3437             | .1883                                  | .1892  |
| 4                                    | 1/4                    | .2500                 | .4380             | .2515                                  | .2524  |
| 5                                    | 5/16                   | .3125                 | .5005             | .3140                                  | .3149  |
| H 5                                  | H 5/16                 | .3125                 | .5630             | .3140                                  | .3149  |
| 6                                    | 3/8                    | .3750                 | .5630             | .3765                                  | .3774  |
| H 6                                  | H 3/8                  | .3750                 | .6255             | .3765                                  | .3774  |
| 7                                    | 7/16                   | .4375                 | .6255             | .4390                                  | .4399  |
| H 7                                  | H 7/16                 | .4375                 | .6880             | .4390                                  | .4399  |
| 8                                    | 1/2                    | .5000                 | .6880             | .5015                                  | .5024  |
| H 8                                  | H 1/2                  | .5000                 | .7505             | .5015                                  | .5024  |
| 9                                    | 9/16                   | .5625                 | .7505             | .5640                                  | .5649  |
| H 9                                  | H 9/16                 | .5625                 | .8130             | .5640                                  | .5649  |
| 10                                   | 5/8                    | .6250                 | .8130             | .6265                                  | .6274  |
| H 10                                 | H 5/8                  | .6250                 | .8755             | .6265                                  | .6274  |
| 11                                   | 11/16                  | .6875                 | .8755             | .6890                                  | .6899  |
| H 11                                 | H 11/16                | .6875                 | .9380             | .6890                                  | .6899  |
| 12                                   | 3/4                    | .7500                 | .9995             | .7505                                  | .7514  |
| H 12                                 | H 3/4                  | .7500                 | 1.0620            | .7505                                  | .7514  |
| 13                                   | 13/16                  | .8125                 | 1.0620            | .8130                                  | .8139  |
| H 13                                 | H 13/16                | .8125                 | 1.1245            | .8130                                  | .8139  |
| 14                                   | 7/8                    | .8750                 | 1.1245            | .8755                                  | .8764  |
| H 14                                 | H 7/8                  | .8750                 | 1.1870            | .8755                                  | .8764  |
| 15                                   | 15/16                  | .9375                 | 1.1870            | .9380                                  | .9389  |
| 16                                   | 1                      | 1.0000                | 1.2495            | 1.0005                                 | 1.0014 |
| H 16                                 | H 1                    | 1.0000                | 1.3120            | 1.0005                                 | 1.0014 |
| 17                                   | 1 1/16                 | 1.0625                | 1.3120            | 1.0630                                 | 1.0639 |
| 18                                   | 1 1/8                  | 1.1250                | 1.3745            | 1.1255                                 | 1.1264 |
| H 18                                 | H 1 1/8                | 1.1250                | 1.4995            | 1.1255                                 | 1.1264 |
| 19                                   | 1 3/16                 | 1.1875                | 1.4995            | 1.1880                                 | 1.1889 |
| 20                                   | 1 1/4                  | 1.2500                | 1.4995            | 1.2505                                 | 1.2514 |
| H 20                                 | H 1 1/4                | 1.2500                | 1.6245            | 1.2505                                 | 1.2514 |
| 21                                   | 1 5/16                 | 1.3125                | 1.6245            | 1.3130                                 | 1.3140 |
| 22                                   | 1 3/8                  | 1.3750                | 1.6245            | 1.3755                                 | 1.3765 |
| H 22                                 | H 1 3/8                | 1.3750                | 1.7495            | 1.3755                                 | 1.3765 |
| 24                                   | 1 1/2                  | 1.5000                | 1.8745            | 1.5005                                 | 1.5016 |
| 26                                   | 1 5/8                  | 1.6250                | 1.9995            | 1.6255                                 | 1.6266 |
| 28                                   | 1 3/4                  | 1.7500                | 2.1245            | 1.7505                                 | 1.7517 |
| 30                                   | 1 7/8                  | 1.8750                | 2.2495            | 1.8755                                 | 1.8767 |
| 32                                   | 2                      | 2.0000                | 2.3745            | 2.0006                                 | 2.0018 |
| H 33                                 | H 2 1/16               | 2.0625                | 2.5307            | 2.0635                                 | 2.0649 |
| 34                                   | 2 1/8                  | 2.1250                | 2.4995            | 2.1256                                 | 2.1270 |
| 36                                   | 2 1/4                  | 2.2500                | 2.6245            | 2.2506                                 | 2.2520 |
| 42                                   | 2 5/8                  | 2.6250                | 2.9995            | 2.6260                                 | 2.6274 |
| 44                                   | 2 3/4                  | 2.7500                | 3.1245            | 2.7510                                 | 2.7524 |
| 56                                   | 3 1/2                  | 3.5000                | 3.9995            | 3.5010                                 | 3.5024 |
| 88                                   | 5 1/2                  | 5.5000                | 5.9990            | 5.5010                                 | 5.5029 |

Bearing bore should be checked with “go” and “no go” plug gages. The “go” gage size is the minimum needle roller complement bore diameter. The “no go” gage size is larger than the maximum needle roller complement bore diameter by 0.0001 inch.

Inspection dimensions for the extra-precision bearings are given in the table below. Note that these bearings must be inspected while mounted in the specified ring gage. Bearing bores are checked with “go” and “no go” plug gages. The “go” gage size is the minimum diameter inside the needle rollers. The “no go” gage size is 0.0001 in. larger than the maximum diameter inside the needle rollers.

Procedures for selecting ring and plug gage dimensions are the same as for those involving precision needle bearings, except that the ring gage diameters and diameters inside the needle rollers must be drawn from the table on this page.

| GAGING                      |           |                                                       |        |
|-----------------------------|-----------|-------------------------------------------------------|--------|
| Nominal shaft diameter inch | Ring gage | Diameter inside needle rollers (F <sub>ws min</sub> ) |        |
|                             |           | Min.                                                  | Max.   |
|                             |           | inch                                                  |        |
| H                           | 1/8       | 0.2473                                                | 0.1256 |
|                             | 5/32      | 0.2785                                                | 0.1569 |
|                             | 3/16      | 0.3390                                                | 0.1881 |
|                             | 1/4       | 0.4328                                                | 0.2506 |
|                             | 5/16      | 0.4953                                                | 0.3131 |
|                             | 3/8       | 0.5578                                                | 0.3756 |
|                             | 7/16      | 0.6203                                                | 0.4381 |
|                             | 1/2       | 0.6828                                                | 0.5006 |
|                             | 5/8       | 0.7453                                                | 0.5631 |
|                             | 3/4       | 0.8078                                                | 0.6256 |
| H                           | 7/8       | 0.8703                                                | 0.6881 |
|                             | 1         | 0.9328                                                | 0.7506 |
|                             | 1 1/16    | 1.0575                                                | 0.8131 |
|                             | 1 1/8     | 1.0575                                                | 0.8128 |
|                             | 1 3/16    | 1.1200                                                | 0.8128 |
|                             | 1 1/4     | 1.1200                                                | 0.8753 |
|                             | 1 3/8     | 1.1825                                                | 0.8753 |
|                             | 1 1/2     | 1.1825                                                | 0.9378 |
|                             | 1 5/8     | 1.2450                                                | 1.0003 |
|                             | 1 3/4     | 1.3075                                                | 1.0003 |
| H                           | 1 7/8     | 1.3075                                                | 1.0628 |
|                             | 2         | 1.3700                                                | 1.1253 |
|                             | 2 1/16    | 1.4950                                                | 1.1253 |
|                             | 2 1/8     | 1.4950                                                | 1.1878 |
|                             | 2 1/4     | 1.4950                                                | 1.2503 |
|                             | 2 3/8     | 1.6200                                                | 1.2503 |
|                             | 2 1/2     | 1.6200                                                | 1.3128 |
|                             | 2 5/8     | 1.6200                                                | 1.3753 |
|                             | 2 3/4     | 1.7450                                                | 1.3753 |
|                             | 3         | 1.8700                                                | 1.5003 |
| H                           | 3 1/8     | 1.9950                                                | 1.6253 |
|                             | 3 1/4     | 2.1200                                                | 1.7503 |
|                             | 3 1/2     | 2.2450                                                | 1.8753 |
|                             | 3 3/4     | 2.2450                                                | 1.8753 |
|                             | 4         | 2.3700                                                | 2.0003 |
|                             | 4 1/16    | 2.5262                                                | 2.0628 |
|                             | 4 1/8     | 2.4950                                                | 2.1253 |
|                             | 4 1/4     | 2.6200                                                | 2.2503 |
|                             | 4 3/8     | 2.9950                                                | 2.6254 |
|                             | 4 1/2     | 3.1200                                                | 2.7504 |
| 4 5/8                       | 3.9950    | 3.5004                                                |        |

## MOUNTING DESIGNS - *continued*

### NEEDLE ROLLER CAGE ASSEMBLIES

Metric series needle roller and cage radial assemblies are supplied with needle roller complements subdivided into groups (gages) shown in Table 16. The groups are at Timken's option if nothing to the contrary is agreed upon at the time of ordering. This is in accordance with Grade G2 specified in ISO 3096 standard. The group limits of the needle rollers are indicated on the package. Labels of identifying colors show the group limits of the needle rollers. The needle roller and cage assemblies of one shipment usually contain needle rollers with group limits of between 0 to -2, and -5 to -7  $\mu\text{m}$  (colors red, blue and white). Information on needle roller and cage assemblies with needle rollers of different group limits will be supplied on request.

TABLE 16

| NEEDLE ROLLER GROUP LIMITS (GRADE G2) |         |                                          |              |
|---------------------------------------|---------|------------------------------------------|--------------|
| Group Tolerance $\mu\text{m}$         | Marking | Identifying color of label or on package |              |
| 0                                     | -2      | P0M2                                     |              |
| -1                                    | -3      | M1M3                                     | red          |
| -2                                    | -4      | M2M4                                     |              |
| -3                                    | -5      | M3M5                                     | blue         |
| -4                                    | -6      | M4M6                                     |              |
| -5                                    | -7      | M5M7                                     | white (gray) |
| -6                                    | -8      | M6M8                                     |              |
| -7                                    | -9      | M7M9                                     | green        |
| -8                                    | -10     | M8M10                                    |              |
| -9                                    | -11     | M9M11                                    | yellow       |

In the marking of the gages, P identifies zero (0) or plus (+), M identifies minus (-).

The nominal inch assemblies, WJ and WJC, contain needle rollers manufactured to only one diameter grade. Within any one assembly, the needle rollers have a total diameter tolerance of .0001 inch.

The limit to precision of the radial clearance of mounted needle roller and cage assemblies is the capability of the user to hold close tolerances on the inner and outer raceways.

The tolerance of the overall width of these assemblies is given on the tabular pages of this section.

It may be impractical to finish the shaft to meet desired raceway design requirements. In this case, standard needle roller bearings with inner rings (forming complete bearings) will have to be used. Such bearings meet the quality requirements in accordance with ISO standards.

- For inner and outer ring tolerances the metric series bearings follow the normal tolerance class in ISO Standard 492 covering radial bearings. Bearings to more precise tolerance classes P6 and P5 may be obtained upon request.
- The metric series bearings may be obtained with radial internal clearance in accordance with ISO Standard 5753 also specified for cylindrical roller bearings. Mostly, they follow the normal (C0) radial clearance group although bearings to clearance groups C2, C3, and C4 may be made available on request.
- Inner ring and outer ring chamfer dimensions meet the requirements of ISO Standard 582.

Whenever the shaft can be used as the inner raceway, needle roller bearings without inner rings provide advantages of economy and close control of radial internal clearance in operation. Tolerance class F6 is the normal specification for the metric series needle roller complement bore diameter of an unmounted bearing as shown in the following table. In the case of needle roller bearings of series RNAO, without flanges and without inner rings, the outer rings and needle roller and cage assemblies are not interchangeable.

METRIC SERIES NEEDLE ROLLER COMPLEMENT BORE DIAMETER FOR BEARINGS WITHOUT INNER RINGS

| $F_w$ mm |        | $\Delta F_{ws \text{ min}}$ $\mu\text{m}$ |      |
|----------|--------|-------------------------------------------|------|
| >        | $\leq$ | low                                       | high |
| 3        | 6      | +10                                       | +18  |
| 6        | 10     | +13                                       | +22  |
| 10       | 18     | +16                                       | +27  |
| 18       | 30     | +20                                       | +33  |
| 30       | 50     | +25                                       | +41  |
| 50       | 80     | +30                                       | +49  |
| 80       | 120    | +36                                       | +58  |
| 120      | 180    | +43                                       | +68  |
| 180      | 250    | +50                                       | +79  |
| 250      | 315    | +56                                       | +88  |
| 315      | 400    | +62                                       | +98  |

MOUNTING DESIGNS - *continued*

Alternatively, for inch designs the tolerances for the HJ bearings are given in Tables 17 and 18 and tolerances for the IR inner rings are given in Table 19 and 20.

TABLE 17

| OUTSIDE DIAMETER AND WIDTH TOLERANCES, HJ BEARINGS |         |                                                 |         |      |             |        |
|----------------------------------------------------|---------|-------------------------------------------------|---------|------|-------------|--------|
| D<br>Nominal Outside Diameter                      |         | Deviations from Nominal                         |         |      |             |        |
|                                                    |         | of Single Mean Outside Diameter, $D_{mp}^{(1)}$ |         |      | of Width, C |        |
| inch                                               | inch    | inch                                            |         |      | inch        |        |
| >                                                  | ≤       | high                                            | low     | high | low         | low    |
| 0.7500                                             | 2.0000  | 0                                               | -0.0005 | 0    |             | -0.005 |
| 2.0000                                             | 3.2500  | 0                                               | -0.0006 | 0    |             | -0.005 |
| 3.2500                                             | 4.7500  | 0                                               | -0.0008 | 0    |             | -0.005 |
| 4.7500                                             | 7.2500  | 0                                               | -0.001  | 0    |             | -0.005 |
| 7.2500                                             | 10.2500 | 0                                               | -0.0012 | 0    |             | -0.005 |
| 10.2500                                            | 12.5000 | 0                                               | -0.0014 | 0    |             | -0.005 |

<sup>(1)</sup>“Single mean diameter” is defined as the mean diameter in a single radial plane.

TABLE 18

| ROLLER COMPLEMENT BORE TOLERANCE, HJ BEARINGS    |        |                                                                                                                        |      |         |
|--------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------|------|---------|
| $F_w$<br>Nominal Roller Complement Bore Diameter |        | Deviations from Nominal of the Smallest Single Diameter <sup>(1)</sup><br>of the Roller Complement Bore, $F_{ws\ min}$ |      |         |
| inch                                             |        | inch                                                                                                                   |      |         |
| >                                                | ≤      | low                                                                                                                    | high | high    |
| 0.5000                                           | 0.6250 | +0.0008                                                                                                                |      | +0.0017 |
| 0.6250                                           | 1.1250 | +0.0009                                                                                                                |      | +0.0018 |
| 1.1250                                           | 1.6250 | +0.0010                                                                                                                |      | +0.0019 |
| 1.6250                                           | 1.8750 | +0.0010                                                                                                                |      | +0.0020 |
| 1.8750                                           | 2.7500 | +0.0011                                                                                                                |      | +0.0021 |
| 2.7500                                           | 3.0000 | +0.0011                                                                                                                |      | +0.0023 |
| 3.0000                                           | 4.0000 | +0.0012                                                                                                                |      | +0.0024 |
| 4.0000                                           | 4.5000 | +0.0012                                                                                                                |      | +0.0026 |
| 4.5000                                           | 6.0000 | +0.0013                                                                                                                |      | +0.0027 |
| 6.0000                                           | 6.5000 | +0.0013                                                                                                                |      | +0.0029 |
| 6.5000                                           | 7.7500 | +0.0014                                                                                                                |      | +0.0030 |
| 7.7500                                           | 9.2500 | +0.0014                                                                                                                |      | +0.0032 |

<sup>(1)</sup> “The smallest single diameter of the roller complement bore” is defined as the diameter of the cylinder which, when used as a bearing inner ring, results in zero radial internal clearance in the bearing on at least one diameter.



**TABLE 19**

| <b>BORE AND WIDTH TOLERANCES, IR INNER RINGS</b> |        |                                                                   |         |        |                    |        |     |
|--------------------------------------------------|--------|-------------------------------------------------------------------|---------|--------|--------------------|--------|-----|
| <b>d</b>                                         |        | <b>Deviations from Nominal</b>                                    |         |        |                    |        |     |
| <b>Nominal Outside Diameter</b>                  |        | <b>of Single Mean Outside Diameter, <math>d_{mp}^{(1)}</math></b> |         |        | <b>of Width, B</b> |        |     |
| inch                                             | inch   | inch                                                              |         |        | inch               |        |     |
| >                                                | ≤      | high                                                              | low     | high   | low                | high   | low |
| 0.3125                                           | 0.7500 | 0                                                                 | -0.0004 | +0.010 |                    | +0.005 |     |
| 0.7500                                           | 2.0000 | 0                                                                 | -0.0005 | +0.010 |                    | +0.005 |     |
| 2.0000                                           | 3.2500 | 0                                                                 | -0.0006 | +0.010 |                    | +0.005 |     |
| 3.2500                                           | 4.2500 | 0                                                                 | -0.0008 | +0.015 |                    | +0.005 |     |
| 4.2500                                           | 4.7500 | 0                                                                 | -0.0008 | +0.015 |                    | +0.010 |     |
| 4.7500                                           | 7.0000 | 0                                                                 | -0.001  | +0.015 |                    | +0.010 |     |
| 7.0000                                           | 8.0000 | 0                                                                 | -0.0012 | +0.015 |                    | +0.010 |     |

<sup>(1)</sup>“Single mean diameter” is defined as the mean diameter in a single radial plane.

**TABLE 20**

| <b>OUTSIDE DIAMETER TOLERANCE, IR INNER RINGS</b> |        |                                                                   |     |         |
|---------------------------------------------------|--------|-------------------------------------------------------------------|-----|---------|
| <b>F</b>                                          |        | <b>Deviations from Nominal</b>                                    |     |         |
| <b>Nominal Outside Diameter</b>                   |        | <b>of Single Mean Outside Diameter, <math>F_{mp}^{(1)}</math></b> |     |         |
| inch                                              |        | inch                                                              |     |         |
| >                                                 | ≤      | high                                                              | low | low     |
| 0.5000                                            | 0.6250 | -0.0005                                                           |     | -0.0009 |
| 0.6250                                            | 1.0000 | -0.0007                                                           |     | -0.0012 |
| 1.0000                                            | 1.1250 | -0.0009                                                           |     | -0.0014 |
| 1.1250                                            | 1.3750 | -0.0009                                                           |     | -0.0015 |
| 1.3750                                            | 1.8750 | -0.0010                                                           |     | -0.0016 |
| 1.8750                                            | 3.0000 | -0.0011                                                           |     | -0.0018 |
| 3.0000                                            | 3.7500 | -0.0013                                                           |     | -0.0022 |
| 3.7500                                            | 4.5000 | -0.0015                                                           |     | -0.0024 |
| 4.5000                                            | 5.5000 | -0.0015                                                           |     | -0.0025 |
| 5.5000                                            | 6.5000 | -0.0017                                                           |     | -0.0027 |
| 6.5000                                            | 8.2500 | -0.0019                                                           |     | -0.0031 |
| 8.2500                                            | 9.2500 | -0.0020                                                           |     | -0.0032 |

<sup>(1)</sup>“Single mean diameter” is defined as the mean diameter in a single radial plane.

MOUNTING DESIGNS - *continued*

## NEEDLE ROLLER BEARINGS

## BEARINGS WITHOUT INNER RINGS

When the shaft is used as the inner raceway for needle roller bearings it must have a hardness between 58 and 64 HRC and a wave-free finish in order to realize the full load-carrying capability of the bearing.

- 1. Metallurgy** – either case hardening or through hardening grades of good bearing quality steel are satisfactory for raceways. Steels which are modified for free machining, such as those high in sulfur content and particularly those containing lead, are seldom satisfactory for raceways. To realize full bearing capacity, the raceway area must be at least surface hard with a reasonable core strength. It is preferred that the case depth be not less than 0.42 mm (0.015 inches). The preferred surface hardness is equivalent to 58 HRC. If the raceway is of lesser hardness, see the modification factors shown on pages A39 and A34. The minimum effective case depth of hardened and ground raceways, for use with all types of needle roller bearings, depends on the applied load, the diameter of the rolling elements and the core strength of the steel used. To calculate the approximate case depth the following formula may be used:

$$\text{Min case depth} = (0.07 \text{ to } 0.12) \cdot D_w$$

$D_w$  is the diameter of the rolling element.

The high value should apply to a low core strength material and/or heavy loads.

Note – The effective case is defined as the distance from the surface, after final grind, to the 50 HRC hardness level.

- 2. Strength** – the shaft must be of sufficient size to keep the operating deflections within the limits outlined.
- 3. Tolerance** – the suggested shaft diameter tolerances for each type of needle roller bearing are indicated in the appropriate section of this catalog.
- 4. Variation of mean shaft diameter** – within the length of the bearing raceway should not exceed 0.008 mm (0.0003 inches), or one-half the diameter tolerance, whichever is smaller.

## BEARINGS WITH INNER RINGS

When it is undesirable or impractical to prepare the shaft to be used as a raceway, inner rings are available as listed in the tabular pages. If the shaft is not used directly as a raceway, the following design specifications must be met:

- 1. Strength** – the shaft must be of sufficient size to keep the operating deflections within the limits outlined.
- 2. Tolerance** – the suggested shaft diameter tolerances for each type of needle roller bearing are indicated in the appropriate section of the catalog.

- 5. Deviation from circular form** – the radial deviation from true circular form of the raceway should not exceed 0.0025 mm (0.0001 inches) for diameters up to and including 25 mm (1.0 inches). For raceways greater than 25 mm (1.0 inches) the allowable radial deviation should not exceed 0.0025 mm (0.0001 inch) multiplied by a factor of the raceway diameter divided by 25 for mm (1.0 for inches).
- 6. High frequency lobing** – the lobing which occurs 10 or more times around the circumference of a shaft and exceeds 0.4  $\mu\text{m}$  (15 microinches) peak-to-valley is defined as chatter. Chatter usually causes undesirable noise and reduces fatigue life.
- 7. Surface finish** – In addition to a wave-free finish the raceway surface roughness of  $R_a \leq 0.2 \mu\text{m}$  (8.0 microinches) must be maintained for the bearing to utilize its full load rating. The raceway area must also be free of nicks, burrs, scratches and dents. Oil holes are permissible in the raceway area but care must be taken to blend the edges gently into the raceway, and if possible, the hole should be located in the unloaded zone of the raceway. Care must also be taken to prevent grind reliefs, fillets, etc., from extending into the raceway area. If the rollers overhang a grind relief or step on the shaft, there will be high stress concentration with resultant early damage.
- 8. End chamfer** – for the most effective assembly of the shaft into a bearing, the end of the shaft should have a large chamfer or rounding. This should help in preventing damage to the roller complement, scratching of the raceway surface and nicking of the shaft end.
- 9. Sealing surface** – in some instances bearings have integral or immediately adjacent seals that operate on the surface ground for the bearing raceway. Here, particular attention should be paid to the pattern of the shaft finish. In no instance should there be a “lead” or spiral effect, as often occurs with through feed centerless grinding. Such a “lead” may pump lubricant past the seal.

- 3. Variation of mean shaft raceway diameter and deviation from circular form of the raceway** – should not exceed one-half the shaft diameter tolerance.
- 4. Surface finish** – the surface finish should not exceed  $R_a 1.6 \mu\text{m}$  (63 microinches).
- 5. Locating shoulders or steps** – locating shoulders or steps in the shaft must be held to close concentricity with the bearing seat to prevent imbalance and resultant vibrations.

MOUNTING DESIGNS - *continued***NEEDLE ROLLER BEARINGS  
BEARINGS WITH OUTER RINGS**

For bearings with outer rings, the function of the housing is to locate and support the outer ring. The following specifications must be met:

- 1. Strength** – housings should be designed so that the radial loads, which will be placed on the bearings, will cause a minimum of deflection or distortion of the housing.
- 2. Variation of mean housing diameter** – within the length of the outer ring should not exceed 0.013 mm (0.0005 inches).
- 3. Deviation from circular form** – the housing bore should be round within one-half the housing bore tolerance.
- 4. Parallelism** – when possible, line bore housings which are common to one shaft to obtain parallelism of the housing bores and the shaft axis.
- 5. Surface finish** – The surface finish should not exceed  $R_a$  1.6  $\mu$ m (63 microinches).
- 6. End chamfer** – to permit easy introduction of the bearing into the housing, the end of the housing should have a generous chamfer.

**Needle roller bearings** can be installed into housings with a transition fit or a clearance fit. The outer ring should be a transition fit in the housing when it rotates relative to the load. The outer ring may be a clearance fit in the housing when it is stationary relative to the load in either case, locate the bearings by shoulders, or other locating devices, to prevent axial movement.

Since the needle roller bearing does not require an interference fit in the housing to round and size it properly, a split housing may be used if desired. Dowels should be used to maintain proper register of the housing sections.

**Drawn cup bearings** have a thin case-hardened outer ring which is out-of-round from the hardening operation. For proper mounting it must **always** be pressed into the housing. Split housings will not round and size a drawn cup bearing. When split housings must be used, the bearing should first be mounted in a cylindrical sleeve.

The housing should be of sufficient tensile strength and section to round and size the bearing. It must be designed for minimum distortion under load. Steel or cast iron housings are preferred. Housing bores in low tensile strength materials such as aluminum, magnesium, phenolics, etc., should be reduced to provide more interference fit. Thin section cast iron and steel housings may also require reduced bores. Consult your Timken representative for suggestions when working with these lower strength housings.

The housing should be through-bored if possible. When shouldered housing bores are unavoidable, the bearing should be located far enough from the shoulder to avoid the danger of crushing the end of the drawn cup during installation.

When the drawn cup bearing is mounted close to the housing face, care should be taken to mount the bearing at least 0.25 mm (0.010 inches) within the housing face to protect the bearing lip.

**BEARINGS WITHOUT OUTER RINGS**

In many cases, such as with gear bores, it is desirable to have the housing bore serve as the outer raceway for radial needle roller and cage assemblies or loose needle roller complements. In those instances, as for shafts used as a raceway, the housing bore must have a hardness between 58 and 64 HRC and a roughness  $R_a \leq 0.2$   $\mu$ m (8.0 microinches), so that the full load carrying capacity of the bearing is realized.

- 1. Strength** – the housing must be of sufficient cross section to maintain proper roundness and running clearance under maximum load.
- 2. Metallurgical** – material selection, hardness and case depth should be consistent with the requirements for inner raceways given in the shaft design.

- 3. Variation of mean housing raceway diameter and deviation from circular form of the raceway** – the raceway out-of-roundness and taper should not exceed 0.008 mm (0.0003 inches) or one-half the bore tolerance, whichever is smaller. In addition, the bore diameter must never be smaller at both ends than in the center [sway-back].

- 4. Surface finish** – In addition to a wave-free finish, the raceway surface roughness of  $R_a \leq 0.2$   $\mu$ m (8.0 microinches) must be maintained for the bearing to utilize its full load rating. The raceway area must also be free of nicks, burrs, scratches and dents.

- 5. Grind reliefs** – care must be exercised to ensure that grind reliefs, fillets, etc. do not extend to the raceway. Oil holes in the raceway area are permissible, but the edges must be blended smoothly with the raceway, and if possible, the hole should be located in the unloaded zone of the raceway.

MOUNTING DESIGNS - *continued***ADDITIONAL DETAILS ABOUT DRAWN CUP NEEDLE BEARINGS**

Drawn cup bearings are manufactured to a degree of precision that will satisfy the radial clearance requirements of most applications. The total radial clearance for an installed drawn cup bearing results from the build up of manufacturing tolerances of the housing bore, the inner raceway diameter and the bearing, as well as the minimum radial clearance required for the application.

For metric series drawn cup bearings requiring close control of radial internal clearance the suggested housing bore tolerance is N6 and h5 tolerance for the inner raceway diameter. When such exacting close control of radial internal clearance is not required, the user may select N7 housing bore and h6 inner raceway diameter tolerances.

For metric series drawn cup bearings used in housings made from materials of low rigidity or steel housings of small section the suggested housing bore tolerance is R6 (R7). To maintain normal radial internal clearance the inner raceway diameter tolerance should be h5 (h6).

For metric series drawn cup bearing applications where the outer ring rotates with respect to the load, it is suggested that both the housing bore and the inner raceway diameter be reduced using R6 (R7) and f5 (f6) tolerance practice respectively.

Metric series drawn cup bearing applications involving oscillating motion may require reduced radial internal clearances. This reduction may be accomplished by increasing the inner raceway diameter using j6 tolerance.

When it becomes impractical to meet the shaft raceway design requirements (hardness, case depth, surface finish etc.) outlined in this section, standard inner rings may be used with metric series drawn cup bearings. It is suggested that when metric series inner rings are used with metric series drawn cup bearings, they should be mounted with a loose transition fit on the shaft using g6 (g5) shaft diameter tolerance. The inner ring should be endclamped against a shoulder. If a tight transition fit must be used, [shaft diameter tolerance h6 (h5)], to keep the inner ring from rotating relative to the shaft, the inner ring outside diameter, as mounted, must not exceed the raceway diameter required by the drawn cup bearing for the particular application. In case the outside diameter of the inner ring, when mounted on the shaft, exceeds the required raceway diameter for the matching drawn cup bearing, it should be ground to proper diameter while mounted on the shaft.

Inch drawn cup needle roller bearings utilize the standard tolerance scheme outlined in the following figure.

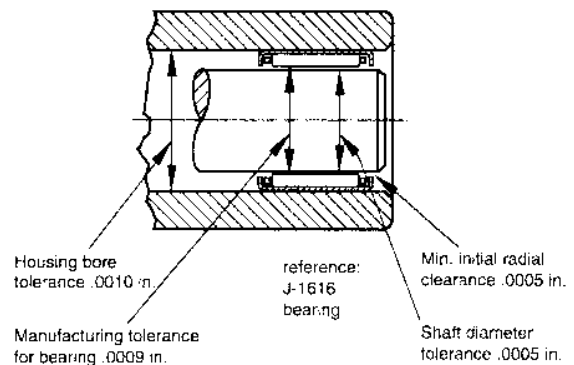


Fig. A-14

## MOUNTING DESIGNS - *continued*

For housing materials of low rigidity or steel housings of small section, it is suggested that for initial trial the housing bore diameters given in the tabular pages be reduced by the amounts shown in Table 21. To maintain normal radial internal clearance, the inner raceway diameter tolerance given in the tabular pages should be used.

**TABLE 21**

| LOW RIGIDITY HOUSING BORE |       |               |
|---------------------------|-------|---------------|
| Nom. Housing Bore Inch    |       | Subtract Inch |
| over                      | incl. |               |
| 0                         | .38   | .0004         |
| .38                       | 1.00  | .0006         |
| 1.00                      | 2.00  | .0010         |
| 2.00                      | 3.00  | .0012         |
| 3.00                      | 6.00  | .0014         |

For applications where the outer ring rotates with respect to the load, it is suggested that both the housing bore and inner raceway diameter be reduced. Bearings of nominal inch dimensions should have the housing bore and inner raceway diameters reduced by .0005".

Applications involving oscillating motion often require reduced radial clearances. This reduction is accomplished by increasing the shaft raceway diameters as shown in Table 22.

**TABLE 22**

| NOMINAL INCH BEARING OSCILLATING SHAFT SIZE |       |
|---------------------------------------------|-------|
| Shaft Size                                  | Add   |
| inch                                        | inch  |
| .094 to .188                                | .0003 |
| .25 to 1.875                                | .0005 |
| 2 to 5.5                                    | .0006 |

Where it becomes impractical to meet the shaft raceway design requirements (hardness, case depth, surface finish, etc.) standard inner rings for inch drawn cup bearings are available.

Inner rings for inch drawn cup bearings are designed to be a loose transition fit on the shaft and should be clamped against a shoulder. If a tight transition fit must be used to keep the inner ring from rotating relative to the shaft, the inner ring O.D., as mounted, must not exceed the raceway diameters required by the drawn cup bearing for the particular application. See the previous discussion on internal clearances and fits for further details on inner raceway diameter choice.

## EXTRA-PRECISION INCH DRAWN CUP NEEDLE ROLLER BEARINGS

| Basic Bore Designation | Nominal Bore Inch | Nominal O.D. | MOUNTING               |        | Housing Bore |        |
|------------------------|-------------------|--------------|------------------------|--------|--------------|--------|
|                        |                   |              | Shaft Raceway Diameter |        | Min.         | Max.   |
|                        |                   |              | Max.                   | Min.   |              |        |
| GB-2                   | .1250             | .2500        | 0.1251                 | 0.1248 | 0.2470       | 0.2473 |
| GB-2 1/2               | .1562             | .2812        | 0.1564                 | 0.1561 | 0.2782       | 0.2785 |
| GB-3                   | .1875             | .3438        | 0.1876                 | 0.1873 | 0.3387       | 0.3390 |
| GB-4                   | .2500             | .4375        | 0.2501                 | 0.2498 | 0.4325       | 0.4328 |
| GB-5                   | .3125             | .5000        | 0.3126                 | 0.3123 | 0.4950       | 0.4953 |
| GBH-5                  | .3125             | .5625        | 0.3126                 | 0.3123 | 0.5575       | 0.5578 |
| GB-6                   | .3750             | .5625        | 0.3751                 | 0.3748 | 0.5575       | 0.5578 |
| GBH-6                  | .3750             | .6250        | 0.3751                 | 0.3748 | 0.6200       | 0.6203 |
| GB-7                   | .4375             | .6250        | 0.4376                 | 0.4373 | 0.6200       | 0.6203 |
| GBH-7                  | .4375             | .6875        | 0.4376                 | 0.4373 | 0.6825       | 0.6828 |
| GB-8                   | .5000             | .6875        | 0.5001                 | 0.4998 | 0.6825       | 0.6828 |
| GBH-8                  | .5000             | .7500        | 0.5001                 | 0.4998 | 0.7450       | 0.7453 |
| GB-9                   | .5625             | .7500        | 0.5626                 | 0.5623 | 0.7450       | 0.7453 |
| GBH-9                  | .5625             | .8125        | 0.5626                 | 0.5623 | 0.8075       | 0.8078 |
| GB-10                  | .6250             | .8125        | 0.6251                 | 0.6248 | 0.8075       | 0.8078 |
| GBH-10                 | .6250             | .8750        | 0.6251                 | 0.6248 | 0.8700       | 0.8703 |
| GB-11                  | .6875             | .8750        | 0.6876                 | 0.6873 | 0.8700       | 0.8703 |
| GBH-11                 | .6875             | .9375        | 0.6876                 | 0.6873 | 0.9325       | 0.9328 |
| GB-12                  | .7500             | 1.0000       | 0.7501                 | 0.7498 | 0.9950       | 0.9953 |
| GBH-12                 | .7500             | 1.0625       | 0.7501                 | 0.7498 | 1.0575       | 1.0578 |
| GB-13                  | .8125             | 1.0625       | 0.8126                 | 0.8123 | 1.0575       | 1.0578 |
| GBH-13                 | .8125             | 1.1250       | 0.8126                 | 0.8123 | 1.1200       | 1.1203 |
| GB-14                  | .8750             | 1.1250       | 0.8751                 | 0.8748 | 1.1200       | 1.1203 |
| GBH-14                 | .8750             | 1.1875       | 0.8751                 | 0.8748 | 1.1825       | 1.1829 |
| GB-15                  | .9375             | 1.1875       | 0.9376                 | 0.9373 | 1.1825       | 1.1829 |
| GB-16                  | 1.0000            | 1.2500       | 1.0001                 | 0.9998 | 1.2450       | 1.2454 |
| GBH-16                 | 1.0000            | 1.3125       | 1.0001                 | 0.9998 | 1.3075       | 1.3079 |
| GB-17                  | 1.0625            | 1.3125       | 1.0626                 | 1.0623 | 1.3075       | 1.3079 |
| GB-18                  | 1.1250            | 1.3750       | 1.1251                 | 1.1248 | 1.3700       | 1.3704 |
| GBH-18                 | 1.1250            | 1.5000       | 1.1251                 | 1.1248 | 1.4950       | 1.4955 |
| GB-19                  | 1.1875            | 1.5000       | 1.1876                 | 1.1873 | 1.4950       | 1.4955 |
| GB-20                  | 1.2500            | 1.5000       | 1.2501                 | 1.2498 | 1.4950       | 1.4955 |
| GBH-20                 | 1.2500            | 1.6250       | 1.2501                 | 1.2498 | 1.6200       | 1.6205 |
| GB-21                  | 1.3125            | 1.6250       | 1.3126                 | 1.3123 | 1.6200       | 1.6205 |
| GB-22                  | 1.3750            | 1.6250       | 1.3750                 | 1.3747 | 1.6200       | 1.6205 |
| GBH-22                 | 1.3750            | 1.7500       | 1.3750                 | 1.3747 | 1.7450       | 1.7455 |
| GB-24                  | 1.5000            | 1.8750       | 1.5000                 | 1.4997 | 1.8700       | 1.8705 |
| GB-26                  | 1.6250            | 2.0000       | 1.6250                 | 1.6247 | 1.9950       | 1.9955 |
| GB-28                  | 1.7500            | 2.1250       | 1.7500                 | 1.7497 | 2.1200       | 2.1205 |
| GB-30                  | 1.8750            | 2.2500       | 1.8750                 | 1.8747 | 2.2450       | 2.2455 |
| GB-32                  | 2.0000            | 2.3750       | 2.0000                 | 1.9997 | 2.3700       | 2.3705 |
| GBH-33                 | 2.0625            | 2.5312       | 2.0624                 | 2.0621 | 2.5262       | 2.5267 |
| GB-34                  | 2.1250            | 2.5000       | 2.1249                 | 2.1246 | 2.4950       | 2.4955 |
| GB-36                  | 2.2500            | 2.6250       | 2.2499                 | 2.2496 | 2.6200       | 2.6205 |
| GB-42                  | 2.6250            | 3.0000       | 2.6248                 | 2.6245 | 2.9950       | 2.9956 |
| GB-44                  | 2.7500            | 3.1250       | 2.7498                 | 2.7495 | 3.1200       | 3.1206 |
| GB-56                  | 3.5000            | 4.0000       | 3.4998                 | 3.4995 | 3.9950       | 3.9956 |

\* Check for availability – not every size may be in production.

## MOUNTING DESIGNS - continued

## INSTALLATION OF DRAWN CUP BEARINGS

## General installation requirements

- A drawn cup bearing must be pressed into its housing.
- An installation tool, similar to the ones shown, must be used in conjunction with a standard press.
- The bearing must not be hammered into its housing, even in conjunction with the proper assembly mandrel.
- The bearing must not be pressed tightly against a shoulder in the housing.
- If it is necessary to use a shouldered housing, the depth of the housing bore must be sufficient to ensure the housing shoulder fillet, as well as the shoulder face, clears the bearing.
- The installation tool must be co-axial with the housing bore.

## INSTALLATION OF OPEN END BEARINGS

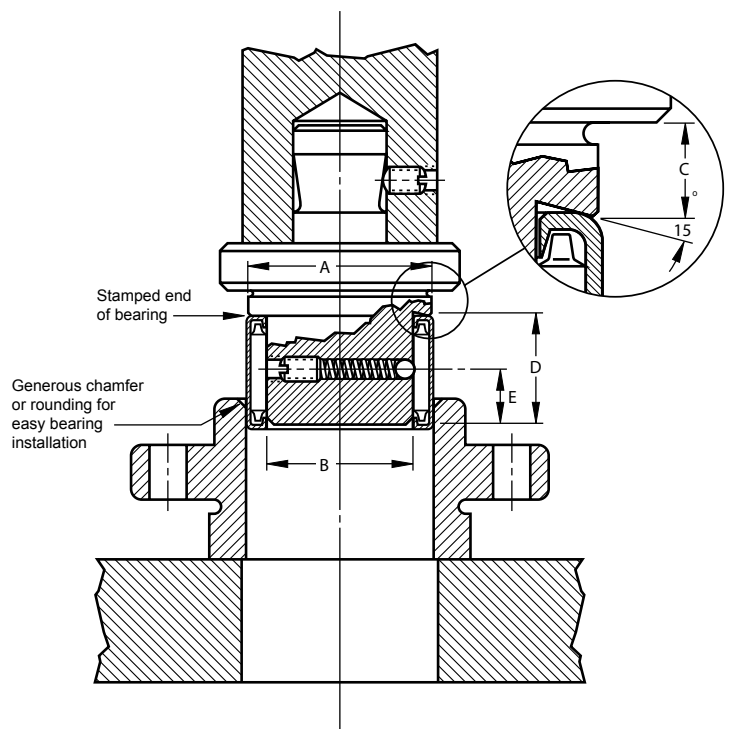
It is advisable to utilize a positive stop on the press tool to locate the bearing properly in the housing. The assembly tool should have a leader or a pilot, as shown, to aid in starting the bearing true in the housing. The ball detent shown on the drawing is used to assist in aligning the rollers of a full complement bearing during installation and to hold the bearing on the installation tool. A caged type drawn cup bearing does not require a ball detent to align its rollers. The ball detent may still be used to hold the bearing on the installation tool or an "O" ring may be used. The bearing should be installed with the stamped end (the end with identification markings) against the angled shoulder of the pressing tool.

## INCH BEARINGS

- A** –  $\frac{1}{64}$  in. less than housing bore  
**B** – .003 in. less than shaft diameter  
**C** – distance bearing will be inset into housing, minimum of .008 in.  
**D** – pilot length should be length of bearing less  $\frac{1}{32}$  in.  
**E** – approximately  $\frac{1}{2}$  D

## METRIC BEARINGS

- A** – 0.4 mm less than housing bore  
**B** – 0.08 mm less than shaft diameter  
**C** – distance bearing will be inset into housing, minimum of 0.2 mm  
**D** – pilot length should be length of bearing less 0.8 mm  
**E** – approximately  $\frac{1}{2}$  D



### MOUNTING DESIGNS - *continued*

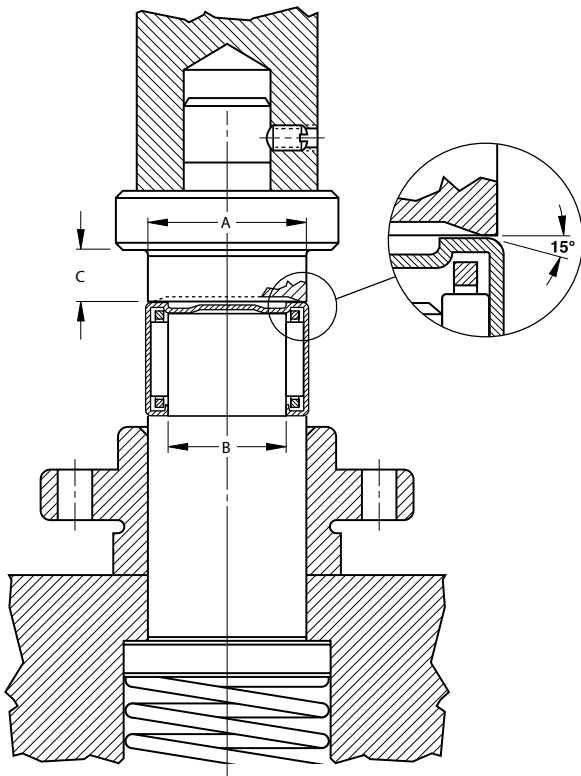
#### DRAWN CUP NEEDLE ROLLER BEARINGS – INCH

##### Installation of closed end bearings

The installation tool combines all the features of the tool used to install open end bearings, but the pilot is spring-loaded and is part of the press bed.

The angled shoulder of the pressing tool should bear against the closed end with the bearing held on the pilot to aid in starting the bearing true in the housing.

- A –  $\frac{1}{64}$  in. less than housing bore
- B – .003 in. less than shaft diameter
- C – distance bearing will be inset into housing, minimum of .008 in.

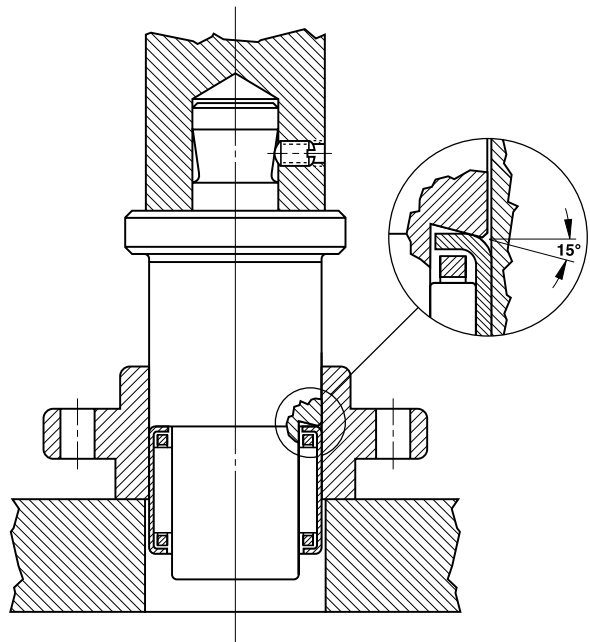


##### Extraction of drawn cup bearings

The need to extract a drawn cup bearing does not arise often. Standard extractor tools may be purchased from a reputable manufacturer. Customers may produce the special extraction tools at their own facilities. After extraction, the drawn cup bearing should not be reused.

##### Extraction from a straight housing

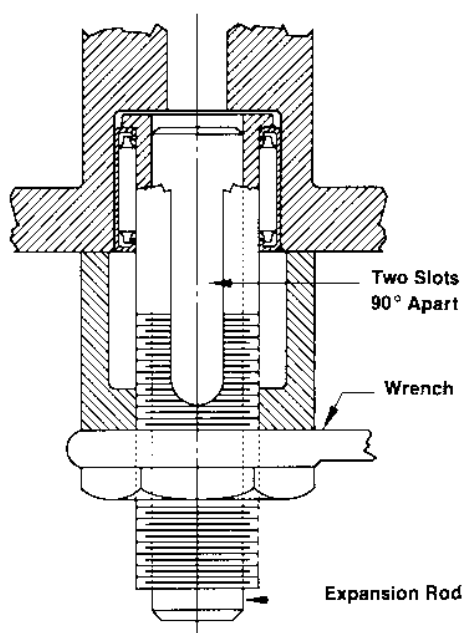
When it is necessary to extract a drawn cup bearing from a straight housing, a similar tool to the installation tool, but without the stop, may be used. To avoid damage to the bearing, pressure should be applied against the stamped end of the bearing, just as it is done at installation.





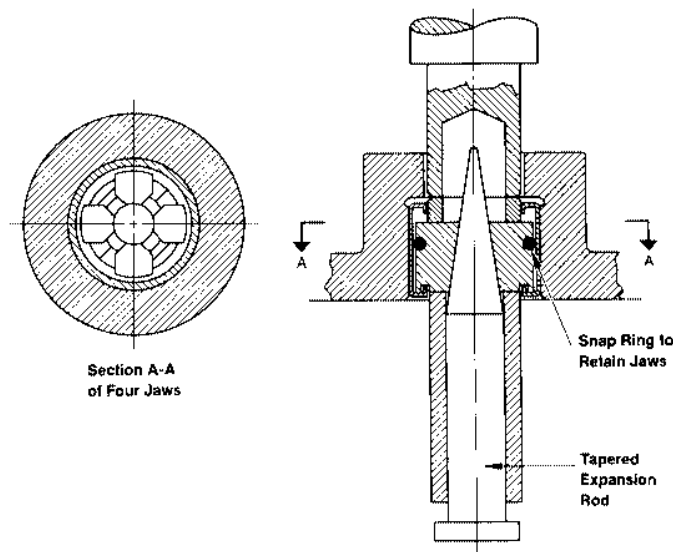
**MOUNTING DESIGNS - continued****DRAWN CUP NEEDLE ROLLER BEARINGS**  
**Extraction from a shouldered or dead-end housing (with space between the bearing and the housing shoulder)**

Bearings may be extracted from shouldered or dead-end housings with a common bearing puller tool as shown. This type of tool is slotted in two places at right angles to form four prongs. The four puller prongs are pressed together and inserted into the space between the end of the bearing and the shoulder. The prongs are forced outward by inserting the expansion rod, and then the bearing is extracted. Do not reuse the bearing after extraction.

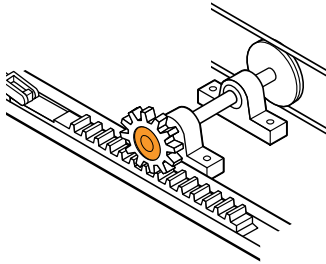
**Extraction from a shouldered housing (with bearing pressed up close to the shoulder)**

The tool to be used, as shown, is of a similar type described for a shouldered or dead-end housing, but the rollers must first be removed from the bearing.

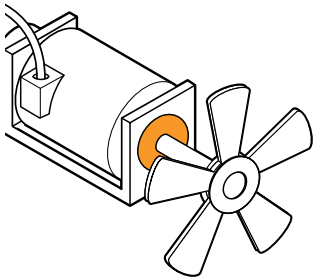
The four segment puller jaws are collapsed and slipped into the empty cup. The jaws are then forced outward into the cup bore by means of the tapered expansion rod. The jaws should bear on the lip as near as possible to the cup bore. The cup is then pressed out from the top.



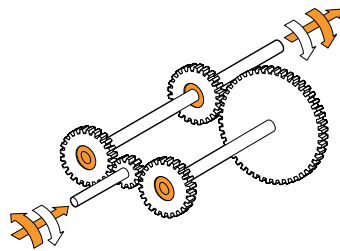
## MOUNTING DESIGNS - *continued*



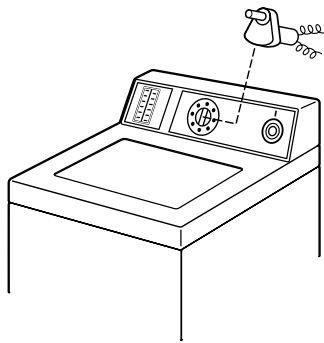
Rack Indexing Drive



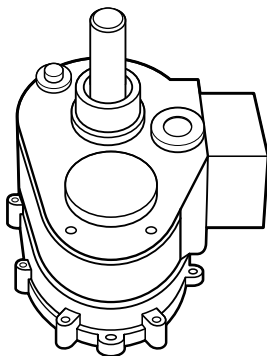
Motor Backstops



2-Speed Gearbox  
with Reversing Input



Timing Motor  
Freewheels



Washing Machine  
Transmission

## DRAWN CUP ROLLER CLUTCHES

### Housing design

Drawn cup clutches and clutch and bearing assemblies are mounted with a simple press fit in their housings. Through bored and chamfered housings are preferred. Provisions for axial location, such as shoulders or snap rings, are not required. The case hardened cups must be properly supported. Steel housings are preferred and must be used for applications involving high torque loads to prevent radial expansion of the clutch cups. The suggested minimum housing outside diameters in the tables of dimensions are for steel.

The housing bore should be round within one-half of the diameter tolerance. The taper within the length of the outer ring should not exceed 0.013 mm or 0.0005 inch.

The surface finish of the housing bore should not exceed 63 microinches, a.a. (arithmetic average) or 1.6  $\mu\text{m}$  (on the Ra scale).

Low strength housings (non-steel, sintered metals and some plastics) may be entirely satisfactory in lightly loaded applications. When using non-steel housings, thoroughly test designs.

Adhesive compounds can be used to prevent creeping rotation of the clutch in plastic housings with low friction properties. Adhesives will not provide proper support in oversized metallic housings. When using adhesives, care must be taken to keep the adhesive out of the clutches and bearings.

### Shaft design

The clutch or bearing assembly operates directly on the shaft whose specifications of dimensions, hardness and surface finish are well within standard manufacturing limits.

Either case hardening or through hardening grades of good bearing quality steel are satisfactory for raceways. Steels which are modified for free machining, such as those high in sulfur content and particularly those containing lead, are seldom satisfactory for raceways.

For long fatigue life, the shaft raceway, must have a hardness equivalent to 58 HRC (ref, ASTM E-18), and ground to the suggested diameter shown in the tables of dimensions. It may be through hardened, or it may be case hardened, with an effective case depth of 0. mm (0.015 inch) (Effective case depth is defined as the distance from the surface inward to the equivalent of 50 HRC hardness level after grinding.)

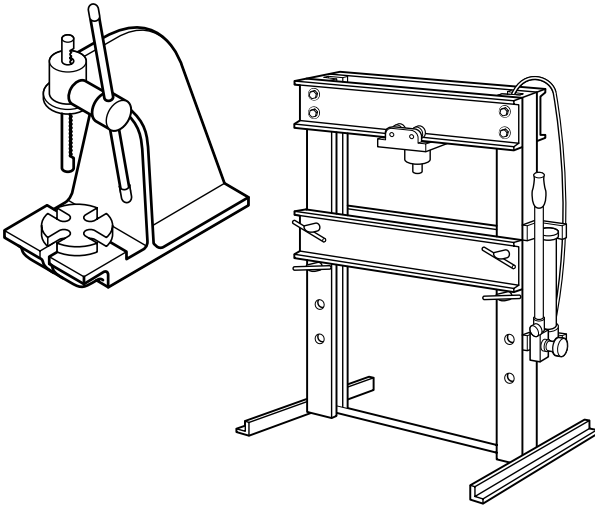
Taper within the length of the raceway should not exceed 0.008 mm (0.0003 inch), or one-half the diameter tolerance, whichever is smaller. The radial deviation from true circular form of the raceway should not exceed 0.0025 mm (.0001 inch) for diameters up to and including 25.4 mm (1 inch). For raceways greater than 25 mm or 1.0 inch the allowable radial deviation may be greater than 0.0025 mm (.0001 inch) by a factor of raceway diameter (in inches) divided by 1.0 or a factor of raceway diameter (in mm) divided by 25.4. Surface finish on the raceway should not exceed 16 microinches a.a. (arithmetic average) or 0.4  $\mu\text{m}$  (on the Ra scale). Deviations will reduce the load capacity and fatigue life of the shaft.

MOUNTING DESIGNS - *continued*

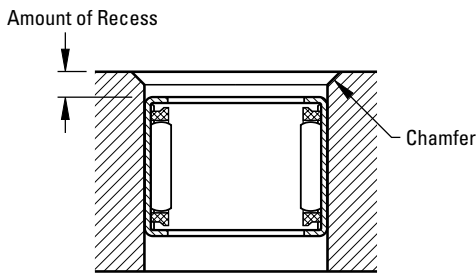
**Installation**

Simplicity of installation promotes additional cost savings. The drawn cup roller clutch or the clutch and bearing assembly must be pressed into its housing. The unit is pressed into the bore of a gear hub or pulley hub or housing of the proper size and no shoulders, splines, keys, screws or snap rings are required.

Installation procedures are summarized in the following sketches:



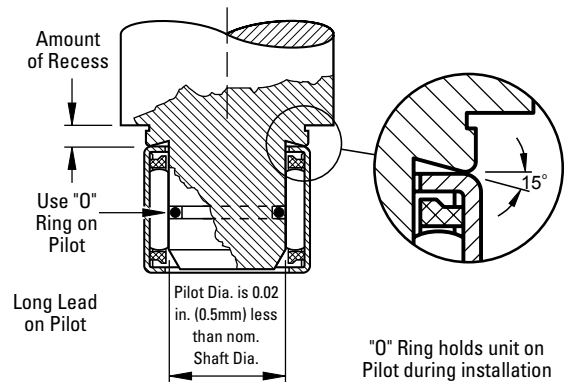
Use an arbor press or hydraulic ram press which will exert steady pressure. Never use a hammer or other tool requiring pounding to drive the clutch into its housing.



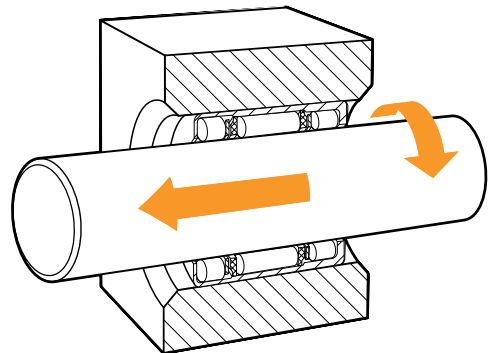
Make sure that the housing bore is chamfered to permit easy introduction of the clutch and bearing or the clutch unit. Press unit slightly beyond the chamfer in the housing bore to assure full seating. Through bored housings are always preferred. If the housing has a shoulder, never seat the clutch against the shoulder.



**IMPORTANT:** The mounted clutch or clutch and bearing assembly engages when the housing is rotated relative to the shaft in the direction of the arrow and LOCK marking (+LOCK) stamped on the cup. Make sure that the unit is oriented properly before pressing it into its housing.



Use an installation tool as shown in the diagram above. If clutch is straddled by needle roller bearings, press units into position in proper sequence and preferably leave a small clearance between units.



When assembling the shaft, it should be rotated during insertion. The end of the shaft should have a large chamfer or rounding.

MOUNTING DESIGNS - continued

**RADIAL NEEDLE ROLLER AND CAGE ASSEMBLIES – METRIC**

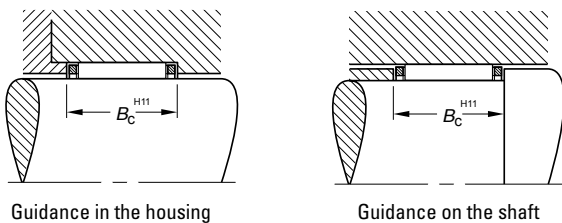
Radial needle roller and cage radial assemblies use the housing bore as the outer raceway and the shaft as the inner raceway. In order to realize full bearing load rating, the housing bore and the shaft raceways must have the correct geometric and metallurgical characteristics. The housing should be of sufficient cross section to maintain adequate roundness and running clearance under load. The only limit to precision of the radial clearance of a mounted assembly is the capability of the user to hold close tolerances on the inner and outer raceways. The suggested shaft tolerances listed in Table 23 are based on housing bore tolerance G6 and apply to metric series needle roller and cage radial assemblies with needle rollers of group limits between P0M2 and M5M7. Inch cage and roller assemblies list shaft tolerances in the bearing data tables based on h5 tolerances and housings to G6 tolerances.

TABLE 23

| SUGGESTED SHAFT TOLERANCES FOR METRIC BEARINGS<br>USING HOUSING BORES MACHINED TO G6 AS OUTER RACEWAYS |                 |      |
|--------------------------------------------------------------------------------------------------------|-----------------|------|
| Nominal shaft diameter in mm                                                                           | ≤ 80            | > 80 |
| Radial clearance                                                                                       | Shaft tolerance |      |
| Smaller than normal                                                                                    | j5              | h5   |
| Normal                                                                                                 | h5              | g5   |
| Larger than normal                                                                                     | g6              | f6   |

Needle roller and cage radial assembly must be axially guided by shoulders or other suitable means. The end guiding surfaces should be hardened to minimize wear and must provide sufficient axial clearance to prevent end locking of the assembly. Metric length tolerance H11 is suggested. Inch bearings are designed for minimum 0.008 inch axial clearance.

If end guidance is provided by a housing shoulder at one end and by a shaft shoulder at the other end the shaft must be axially positioned to prevent end locking of needle roller and cage assembly. The housing and shaft shoulder heights should be 70 to 90 percent of the needle roller diameter to provide proper axial guidance.



Needle roller and cage radial assemblies which are mounted side by side must have needle rollers of the same group limits to ensure uniform load distribution.

**Connecting rod guidance arrangements**

End guidance of a connecting rod can be provided either at the crank pin or at the wrist pin end. Connecting rod guidance is achieved at the crank pin end using a small clearance between the crank webs. Guidance at the wrist pin end is controlled by a small clearance between the piston bosses.

**Crank pin end guidance**

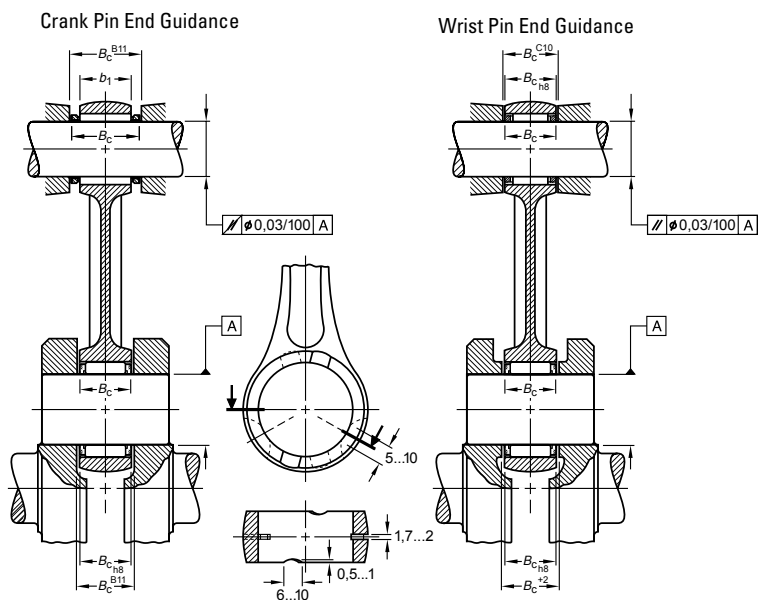
With crank pin end guidance, care must be taken to ensure that an adequate amount of lubricant is supplied to the crank pin bearing and the surfaces which guide the connecting rod. For this purpose, grooves in the connecting rod end faces or slots in the connecting rod bore aligned with the incoming lubrication path should be provided. Occasionally, brass or hardened steel washers may be used for end guidance of the connecting rod.

At the wrist pin end, the needle roller and cage radial assembly is located axially between the piston bosses. It may be both economical and effective to machine the connecting rod at the wrist pin end and at the crank pin end to the same width. It is suggested that at the wrist pin end, the needle roller length does not overhang the connecting rod width. Otherwise the load rating of the needle roller and cage assembly will be reduced.

**Wrist pin end guidance**

Wrist pin end will get the most effective axial guidance between the piston bosses. Grooves in the bottom of the piston bosses and a chamfer of small angle on each side of the upper portion of the connecting rod small end, can improve the oil flow to the needle roller and cage radial assembly and its guiding surfaces.

The length of the needle roller and cage radial assembly and the connecting rod width at the crank pin end should be identical to ensure best possible radial piloting of cage in the bore of the connecting rod. The crank webs are recessed to allow proper axial alignment of the connecting rod. As a rule it is not necessary to have additional supply of lubricant. Only in engines with sparse lubrication should consideration be given to provide lubricating slots in the connecting rod bores as with crank pin end guidance.



MOUNTING DESIGNS - continued

NEEDLE ROLLER BEARINGS

Heavy-duty needle roller bearings

It is suggested that needle roller bearings are mounted in their housings with a clearance fit if the load is stationary relative to the housing or with a tight transition fit if the load rotates relative to the housing. Table 24 lists the suggested tolerances for the housing bore and the shaft raceway for metric series bearings without inner rings. Table 25 lists the suggested shaft tolerances for the above two mounting conditions when the metric series bearings are used with inner rings. The suggested housing bore tolerances for metric series bearings with inner rings are the same as the housing bore tolerance listed in Table 24 for metric series bearings without inner rings.

The tables of dimensions for inch bearings list the suggested ISO H7 tolerances for the housing bore and the suggested ISO h6 tolerances for the shaft raceway when the outer ring is to be mounted with a clearance fit. They also list the suggested ISO N7 tolerances for the housing bore and the suggested ISO f6 tolerances for the shaft raceway when the outer ring is to be mounted with a tight transition fit.

Other mounting dimensions may be required for special operating conditions such as:

1. Extremely heavy radial loads
2. Shock loads
3. Temperature gradient across bearing
4. Housing material with heat expansion coefficient different than that of the bearing

If these conditions are expected, please consult your Timken representative.

TABLE 24

| MOUNTING TOLERANCES FOR METRIC SERIES BEARINGS WITHOUT INNER RING |                                       |                                |      |                                |                              |      |
|-------------------------------------------------------------------|---------------------------------------|--------------------------------|------|--------------------------------|------------------------------|------|
| Rotation conditions                                               | Nominal housing bore diameter D<br>mm | ISO tolerance zone for housing |      | Nominal shaft diameter F<br>mm | ISO tolerance zone for shaft |      |
|                                                                   |                                       | caged                          | full |                                | caged                        | full |
| Load stationary relative to housing                               | all diameters                         | H7                             | J6   | all diameters                  | h6                           | h5   |
| General work with larger clearance                                | all diameters                         | K7                             | —    | all diameters                  | g6                           | —    |
| Load rotates relative to housing                                  | all diameters                         | N7                             | M6   | all diameters                  | f6                           | g5   |

NOTE: Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions.

TABLE 25

| SHAFT TOLERANCES FOR METRIC SERIES BEARINGS WITH INNER RINGS (USE HOUSING TOLERANCE SHOWN IN TABLE 24) |                              |     |                              |
|--------------------------------------------------------------------------------------------------------|------------------------------|-----|------------------------------|
| Rotation Conditions                                                                                    | Nominal Shaft Diameter d, mm |     | ISO Tolerance Zone for Shaft |
| load rotates relative to housing                                                                       | all diameters                |     | g6                           |
| load stationary relative to housing                                                                    | >                            | ≤   |                              |
|                                                                                                        | 40                           | 40  | k6                           |
|                                                                                                        | 100                          | 100 | m6                           |
|                                                                                                        | 140                          | 140 | n6                           |

NOTE: Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions.

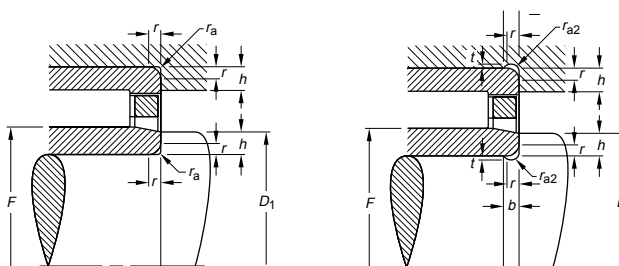


TABLE 26

| FILLETS, UNDERCUTS, AND SHOULDER HEIGHTS FOR METRIC SERIES BEARINGS |               |     |                |     |        |
|---------------------------------------------------------------------|---------------|-----|----------------|-----|--------|
| $r_s$ Min. mm                                                       | $r_{as}$ Max. | t   | $r_{a2s}$ Min. | b   | h Min. |
| 0.15                                                                | 0.15          |     |                |     | 0.6    |
| 0.3                                                                 | 0.3           |     |                |     | 1      |
| 0.6                                                                 | 0.6           |     |                |     | 2      |
| 1                                                                   | 1             | 0.2 | 1.3            | 2   | 2.5    |
| 1.1                                                                 | 1             | 0.3 | 2              | 3   | 3.25   |
| 1.5                                                                 | 1.5           | 0.4 | 2              | 3.2 | 4      |
| 2                                                                   | 2             | 0.5 | 2.5            | 4   | 5      |
| 2.1                                                                 | 2.1           | 0.5 | 3              | 4.7 | 5.5    |
| 3                                                                   | 2.5           | 0.5 | 3.5            | 5   | 3.6    |

Regardless of the fit of the bearing outer ring in the housing, the outer ring should be axially located by housing shoulders or other positive means. The bearing rings should closely fit against the shaft and housing shoulders and must not contact the fillet radius. In fact, the maximum shaft or housing fillet  $r_{as\ max}$  should be no greater than the minimum bearing chamfer  $r_{s\ min}$  as shown in Table 26.

In order to permit mounting and dismounting of the shaft, the maximum diameter  $D_1$  in Table 27 must not be exceeded.  $F_w$  is shown in the bearing tables.

For inch bearings, the unmarked end of the outer ring should be assembled against the housing shoulder to assure clearing the maximum housing fillet. Similarly, the unmarked end of the inner ring should be assembled against the shaft shoulder to assure clearing the maximum shaft fillet.

## MOUNTING DESIGNS - *continued*

TABLE 27

| SHOULDER DIAMETER $D_1$ MAX FOR METRIC SERIES BEARINGS |            |             |             |             |           |             |
|--------------------------------------------------------|------------|-------------|-------------|-------------|-----------|-------------|
| Dimensions in mm                                       |            |             |             |             |           |             |
| Needle roller complement bore diameter $F_w$           | >          | 20          | 55          | 100         | 250       |             |
|                                                        | ≤          | 20          | 55          | 100         | 250       |             |
| Diameter                                               | $D_{1max}$ | $F_w - 0.3$ | $F_w - 0.5$ | $F_w - 0.7$ | $F_w - 1$ | $F_w - 1.5$ |

Needle roller bearings without flanges of series RNAO and NAO must have the needle roller and cage radial assembly properly end guided by shoulders or other suitable means such as the spring steel washers (SNSH). These end guiding surfaces should be hardened and precision turned or ground to minimize wear and should properly fit against the outer rings and the inner rings to provide the desired end clearance for the needle roller and cage radial assembly.

### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

On NTA inch type needle roller and cage thrust assemblies the cage bore has a larger contact area and a closer tolerance than the outside diameter. Therefore, bore piloting is preferred for these assemblies. To reduce wear, it is suggested that the piloting surface for the cage be hardened to an equivalent of at least 55 HRC. Where design requirements prevent bore piloting, the NTA needle roller and cage thrust assemblies may be piloted on the outside diameters. It should be noted that the "diameter to clear washer O.D." given in the tabular data is not suitable for outside diameter piloting. For such cases, suitable O.D. piloting dimensions should be determined in consultation with your Timken representative.

On FNT and AXK Series needle roller and cage thrust assemblies, the cage bore has a closer tolerance than the outside diameter, therefore bore piloting is preferred for these assemblies. To reduce wear, it is suggested that the piloting surface for the cage be hardened to an equivalent of at least 55 HRC. Where design requirements prevent bore piloting, the FNT or AXK Series needle roller and cage thrust assemblies may be piloted on the outside diameters. For such cases, suitable O.D. piloting dimensions should be determined. Mounting tolerances are given in the table to the right.

Ideally, a thrust washer should be stationary with respect to, and piloted by, its supporting or backing member, whether or not this is an integral part of the shaft or housing. There should be no rubbing action between the thrust washer and any other machine member. The economics of design, however, often preclude these ideal conditions and thrust washers must be employed in another manner. In such cases, design details should be determined in consultation with your Timken representative.

The mounting tolerances for series AS, LS, WS and GS thrust washers for use with needle roller and cage thrust assemblies are given in the table to the right.

As for the FNT and AXK Series thrust assemblies, to reduce wear, the piloting surface for the thrust washers should also be hardened to an equivalent of at least 55 HRC.

Out of Square Surface

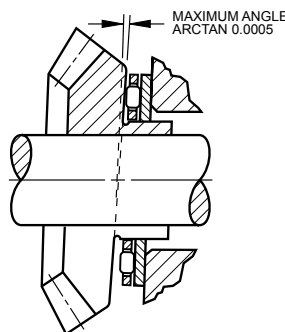


Fig. A-15

Dished or Coned Surface

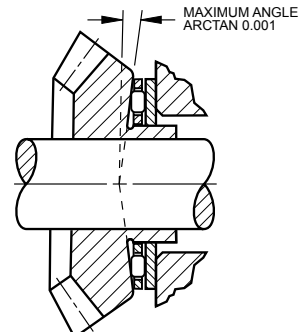


Fig. A-16

MOUNTING TOLERANCES FOR SHAFTS AND HOUSINGS FOR METRIC SERIES COMPONENTS

| Bearing components                                      | shaft tolerance | housing tolerance (shaft piloting) | piloting member (housing piloting) |
|---------------------------------------------------------|-----------------|------------------------------------|------------------------------------|
| Cylindrical roller & needle roller cage thrust assembly | h8              | H10                                | shaft                              |
| Thin thrust washer AS                                   | h10             | H11                                | shaft                              |
| Heavy thrust washer LS                                  | h10             | H11                                | shaft                              |
| Shaft piloted thrust washer WS.811                      | h6 (j6)         | clearance                          | shaft                              |
| Housing piloted thrust washer GS.811                    | Clearance       | H7 (K7)                            | housing                            |

In some applications, it is desirable to use the backup surfaces as raceways for the needle rollers of the needle roller and cage thrust assemblies. In such designs, these surfaces must be hardened to at least 58 HRC. If this hardness cannot be achieved and thrust washers cannot be used, the load ratings must be reduced, as explained in the Fatigue Life section.

Thrust raceway surfaces must be ground to a surface finish of  $0.2 \mu\text{m}$  ( $0.8 \mu\text{m}$ )  $R_a$ . When this requirement cannot be met, thrust washers must be used.

The raceways against which the needle rollers operate or the surface against which the thrust washers bear must be square with the axis of the shaft. Equally important, the raceway or surface backing the thrust washer, must not be dished or coned. The permissible limits of out-of-squareness and dishing or coning are shown in Figures A-15 and A-16.

Metric raceway contact dimensions  $E_a$  and  $E_b$  are given in the tabular pages. For the thin series AS thrust washers, full backup between the dimensions  $E_a$  and  $E_b$  should be provided.



**MOUNTING DESIGNS** - *continued***CONSTRUCTION****Basic designs**

Cylindrical roller thrust bearings dimension series 811 and 812 comprise a cylindrical roller and cage thrust assembly (K), a shaft washer (WS) and a housing washer (GS). Providing the backup surfaces can be hardened and ground they can be used as raceways for the cylindrical rollers of the cylindrical roller and cage thrust assembly, resulting in a compact bearing arrangement.

**Cage designs**

Metric series cylindrical roller thrust bearings use molded cages of glass fiber reinforced nylon 6/6 (suffix TVP) or machined cages of light metal (suffix LPB). The cages are designed to be piloted on the shaft. The reinforced nylon cages can be used at temperatures up to 120° C continuously for extended periods. When lubricating these bearings with oil it should be ensured that the oil does not contain additives detrimental to the cage over extended life at operating temperatures higher than 100° C. Also, care should be exercised that oil change intervals are observed as old oil may reduce cage life at such temperatures.

**BEARING THRUST WASHERS****Shaft washers and housing washers**

Shaft washers of types WS.811 and WS.812 as well as housing washers of types GS.811 and GS.812 are components of the metric series cylindrical roller thrust bearings of series 811 and 812. They are made of bearing quality steel, with hardened and precision ground and lapped flat raceway surfaces. The tolerances of the thrust bearing bore and outside diameter shown in Table 7 and Table 8 (on page A47) apply to shaft and housing piloted metric series washers.

**Heavy thrust washers (LS), thin thrust washers (AS)**

These thrust washers, more frequently used with needle roller and cage thrust assemblies of metric series FNT or AXK, are also suitable for use with the cylindrical roller and cage thrust assemblies K.811. The heavy thrust washer of series LS are made of bearing quality steel, hardened and precision ground on the flat raceway surfaces. The bore and outside diameters of the heavy thrust washers are not ground. Therefore, when used with K.811 type assemblies they are only suggested where accurate centering is not required. The thin thrust washers of series AS may be used in applications where the loads are light. Both types of these washers are listed in the tabular part of the metric series needle roller and cage thrust assemblies section.



### MOUNTING DESIGNS - *continued*

#### DIMENSIONAL ACCURACY

The tolerances for the metric series cylindrical roller thrust bearing bore and outside diameter shown in Tables 7 and 8 (on page A47) apply to shaft piloted washers of series WS.811 and WS.812 as well as housing piloted washers of series GS.811 and GS.812.

The tolerances for the bore and outside diameter of series AS thrust washers are shown in Table 13. The tolerances for the bore and outside diameter of series LS thrust washers are given in Table 14. Bore inspection procedures for thin thrust washers (AS) and heavy thrust washers (LS) are given on page A50.

#### MOUNTING TOLERANCES

Shaft and housing tolerances for mounting metric series cylindrical roller and cage thrust assemblies are given on page A96. If the cylindrical rollers of the cylindrical roller and cage thrust assemblies are to run directly on the adjacent support surfaces, these must be hardened to at least 58 HRC. Raceway contact dimensions  $E_a$  and  $E_b$  must be observed.

The backup surfaces for the shaft washers WS.811 and WS.812 as well as the housing washers GS.811 and GS.812 of cylindrical roller thrust bearings must be square with the axis of the shaft. Equally important, the raceway or the surface backing the thrust washer must not be dished or coned. The permissible limits of the squareness and dishing or coning are shown in Figures A-15 and A-16. When using the thin (AS) thrust washers the cylindrical rollers of the thrust cage assembly must be supported over their entire length.

Bearing thrust washers should make close contact with the shaft or housing shoulder and must not touch the fillet radius. Therefore, the maximum fillet radius  $r_{as\ max}$  must be no greater than the minimum chamfer  $r_{s\ min}$  of the shaft washer (WS) and the housing washer (GS).

#### THRUST BEARINGS

Tapered Roller thrust bearings are generally mounted with a fit range on the inside diameter of 127  $\mu\text{m}$  (0.0050 in.) loose to 400  $\mu\text{m}$  (0.0150 in.) loose. Sufficient clearance should be provided on the outside diameter to permit free centering of the bearing without interference.

When Type TTHD or TTHDFL thrust bearings are subjected to continuous rotation, the rotating race should be applied with a minimum interference fit of 25  $\mu\text{m}$  (0.0010 in.). Sufficient clearance should be provided on the outside diameter of the stationary race to permit free centering of the bearing without interference.

MOUNTING DESIGNS - *continued*

## TAPERED ROLLER BEARING MOUNTING PROCEDURE

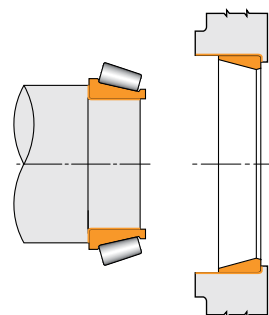
Bearing performances can be adversely affected by improper mounting procedure or lack of care during the assembly phase.

## Environment

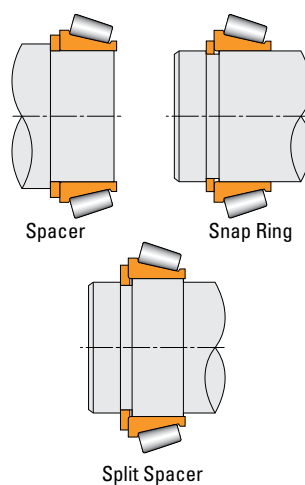
Cleanliness during the bearing mounting operation is essential for a rolling bearing to operate for maximum service life. Bearings in their shipping containers or wrapping have been coated for rust protection. While this coating is not sufficient to properly lubricate the bearing, it is compatible with most lubricants and therefore does not have to be removed when mounting the bearing in the majority of applications. Burrs, foreign matter and damaged bearing seats cause misalignment. Care should be taken to avoid shearing or damaging bearing seats during assembly which may introduce misalignment or result in a change of bearing setting during operation.

## Fitting

Adequate tools must be provided to properly fit the inner and outer races on shafts or in housings to avoid damage. Direct shock on the races must be avoided. Often, bearing races have to be heated or cooled to ease assembly. Do not heat standard bearings above 150° C (300° F) or freeze outer races below -55° C (-65° F). For precision bearings, do not heat above 65° C (150° F) or freeze below -30° C (-20° F). Note: For more information on this subject, please contact your Timken representative.



**Fig. A-17**  
Shaft and housing shoulders.



**Fig. A-18**  
Separate member used to provide adequate shaft shoulder diameter.

## MOUNTING DESIGNS

The primary function of either the cone or cup backing shoulders is to positively establish the axial location and alignment of the bearing and its adjacent parts under all loading and operating conditions.

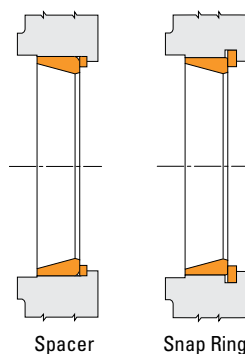
For a tapered roller bearing to operate for maximum service life, it is essential that a shoulder, square with the bearing axis and of sufficient diameter, is provided for each race. It must be of sufficient section and design to resist axial movement due to loading or distortion and must be wear-resistant at the interface with the bearing.

The conventional and most widely accepted method used to provide bearing backing is to machine a shoulder on a shaft or in the housing (Fig. A-17).

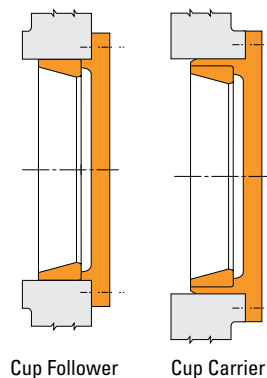
In some applications a spacer is used between a cone and shaft shoulder or a snap ring. As a further alternative, a split spacer can be used (Fig. A-18).

A spacer or snap ring can also be used for cup backing (Fig. A-19). If a snap ring is used for bearing backing it is suggested that an interference cup fit be used.

The cup used for bearing setting in a direct mounting (roller small ends pointing outwards) is usually set in position by a cup follower or by mounting in a carrier (Fig. A-20).



**Fig. A-19**  
Separate member used to provide adequate housing backing diameter.



**Fig. A-20**  
Bearing setting devices  
- direct mounting.

## MOUNTING DESIGNS - *continued*

With an indirect mounting (roller small ends pointing inwards), bearing setting can be achieved by a wide variety of devices (Fig. A-21).

In applications requiring precision class bearings, a special precision nut can be used. This has a soft metal shoe that is clamped against the threads with a locking screw. Other solutions can use split nut and/or ground spacers where setting cannot be altered (Fig. A-22).

### Snap rings

In instances where snap rings are used to locate bearing components, it is important that they are of sufficient section to provide positive location. Care must be taken during installation or removal of the snap ring to prevent damage to the bearing cage.

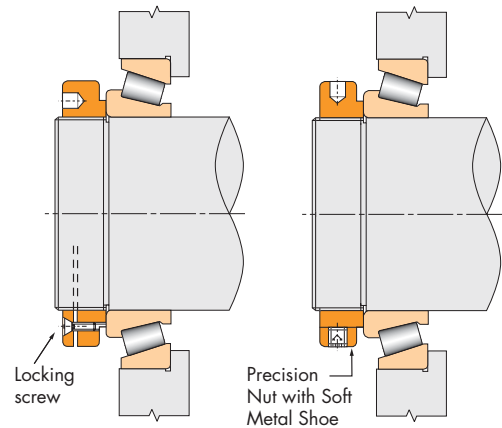
### Removal

Suitable means must be provided on adjacent bearing parts for easy bearing removal. Knockout slots, puller grooves and axial holes can be designed into the backing surfaces to ease removal of the cup or cone for servicing (Fig. A-23). In specific cases, hydraulic devices can also be used.

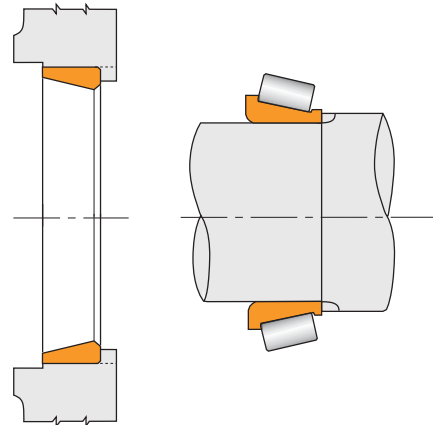
### Backing diameters

Backing diameters, fillet clearances and cage clearances are listed for each individual part number in the bearing tables. Backing shoulder diameters shown should be considered as minimum values for shafts and maximum values for housings.

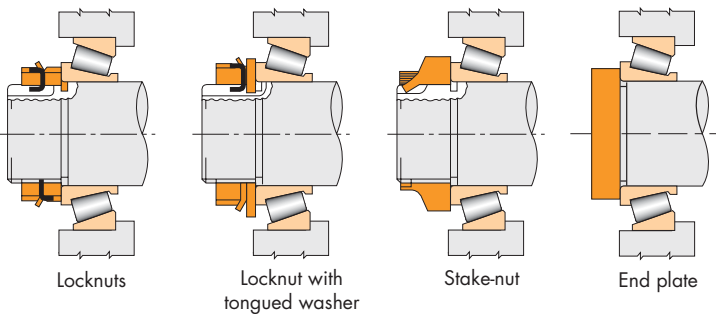
NOTE: Do not use a backing diameter that provides less backing surface than suggested.



**Fig. A-22**  
Setting devices using split nut and precision nut with soft metal shoe.



**Fig. A-23**  
Removal slots or puller grooves to ease removal.



**Fig. A-21**  
Bearing setting devices - indirect mounting.

**MOUNTING DESIGNS - continued**

**SEATING**

**Geometry**

Two major causes of misalignment occur when the seats of cones and/or cups are machined out of square with the bearing axis or when the seats are parallel but out of alignment.

**Surface finishes – standard bearings**

For industrial applications, please refer to the following guidelines:

**GROUND SHAFTS**

All roller bearing shaft seats should be ground to a surface finish of 1.6 µm (65 µin)  $R_a$  maximum wherever possible. Ball bearing seats should be 0.8 µm (32 µin) for shafts under 2 inches and 1.6 µm (65 µin) for all other sizes.

**TURNED SHAFTS**

When shaft seats are turned, a tighter heavy-duty fit should be used. In this case the shaft diameter should be turned to a finish of 3.2 µm (125 µin)  $R_a$  maximum.

**HOUSING BORES**

Housing bores should be finished to 3.2 µm (125 µin)  $R_a$  maximum.

**Surface finishes - precision bearings**

Precision class bearings should be mounted on shafts and in housings that are finished to at least the same precision limits as the bearing bore or outside diameter.

Furthermore, high quality surface finishes together with close machining tolerances of bearing seats must also be provided. The following tabulations give some guidelines for all these criteria:

| TAPERED ROLLER BEARINGS<br>SURFACE FINISH – $R_a$ (µm - µin)<br>BEARING CLASS |           |           |           |           |
|-------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| ALL SIZES                                                                     | C         | B         | A         | AA        |
|                                                                               | 3         | 0         | 00        | 000       |
| Shaft                                                                         | 0.8<br>32 | 0.6<br>24 | 0.4<br>15 | 0.2<br>7  |
| Housing                                                                       | 1.6<br>65 | 0.8<br>32 | 0.6<br>24 | 0.4<br>15 |

Correct fitting practice and precise bearing setting both affect bearing life, rigidity and, in the case of precision bearings, accuracy.

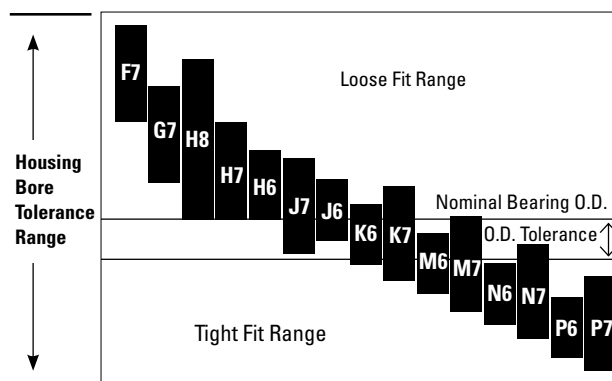
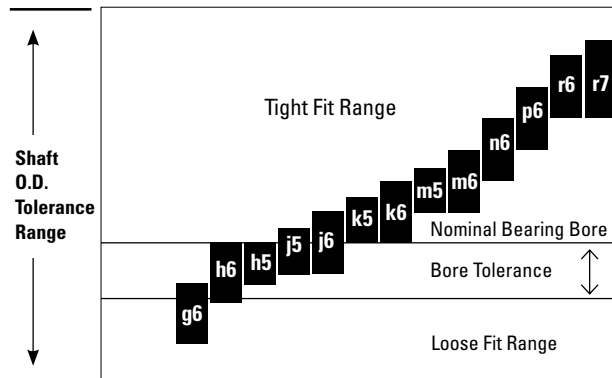
Improper fits will lead to problems such as poor machine performance including creeping of the cone on the spindle or the cup in the housing and lack of spindle stiffness.

The choice of fitting practices will mainly depend upon the following parameters:

- Precision class of the bearing.
- Rotating or stationary race.
- Type of layout (single/double-row bearings).
- Type and direction of load (continuous/alternate rotating).
- Particular running conditions like shocks, vibrations, overloading or high speed.
- Capability for machining the seats (grinding, turning or boring).
- Shaft and housing section and material.
- Mounting and setting conditions.
- Preadjusted tapered roller bearings must be mounted with the suggested fit.

**SHAFT AND HOUSING FITS**

Below is a graphical representation of shaft and housing fit selection for these bearings conforming to ANSI/ABMA Standard 7. The bars designated by g6, h6 etc., represent shaft/housing diameter and tolerance ranges to achieve various loose and interference fits required for various load and ring rotation conditions.



## FITTING PRACTICES

## TAPERED ROLLER BEARINGS

The design of a Timken tapered roller bearing allows the setting of bearing internal clearance during installation to optimize bearing operation.

General industrial application fitting practice standards for cones and cups are shown in the following tables. These tables apply to solid or heavy-sectioned steel shafts, heavy-sectioned ferrous housings and normal operating conditions. To use the tables, it is necessary to determine if the member is rotating or stationary, the magnitude, direction, and type of loading and the shaft finish.

Certain table fits may not be adequate for light shaft and housing sections, shafts other than steel, nonferrous housings, critical operation conditions such as high speed, unusual thermal or loading conditions or a combination thereof. Also assembly procedures and the means and ease of obtaining the bearing setting may require special fits. In these cases, experience should be used as a guideline or your Timken representative should be consulted for review and suggestions.

Rotating cones generally should be applied with an interference fit. In special cases loose fits may be considered if it has been determined by test or experience they will perform satisfactorily. The term "rotating cone" describes a condition in which the cone rotates relative to the load. This may occur with a rotating cone under a stationary load or a stationary cone with a rotating load. Loose fits will permit the cones to creep and wear the shaft and the backing shoulder. This will result in excessive bearing looseness and possible bearing and shaft damage.

Stationary cone fitting practice depends on the application. Under conditions of high speed, heavy loads or shock, interference fits using heavy-duty fitting practice should be used. With cones mounted on unground shafts subjected to moderate loads (no shock) and moderate speeds, a metal-to-metal or near zero average fit is used. In sheave and wheel applications using unground shafts, or in cases using ground shafts with moderate loads (no shock), a minimum fit near zero to a maximum looseness which varies with the cone bore size is suggested. In stationary cone applications requiring hardened and ground spindles, a slightly looser fit may be satisfactory. Special fits may also be necessary on installations such as multiple sheave crane blocks.

Rotating cup applications where the cup rotates relative to the load should always use an interference fit.

Stationary, nonadjustable and fixed single-row cup applications should be applied with a tight fit wherever practical. Generally, adjustable fits may be used where the bearing setup is obtained by sliding the cup axially in the housing bore. However, in certain heavy-duty, high-load applications, tight fits are necessary to prevent pounding and plastic deformation of the housing. Tightly fitted cups mounted in carriers can be used. Tight fits should always be used when the load rotates relative to the cup.

To permit through-boring when the outside diameters of single-row bearings mounted at each end of a shaft are equal and one is adjustable and the other fixed, it is suggested that the same adjustable fit be used at both ends. However, tight fits should be used if cups are backed against snap rings, to prevent excessive dishing of snap rings, groove wear and possible loss of ring retention. Only cups with a maximum housing fillet radius requirement of 1.3 mm (0.05 in.) or less should be considered for a snap ring backing.

Two-row stationary double cups are generally mounted with loose fits to permit assembly and disassembly. The loose fit also permits float when a floating bearing is mounted in conjunction with an axially fixed bearing on the other end of the shaft.

The fitting practice tables that follow have been prepared for both metric and inch dimensions.

For the inch system bearings, classes 4 and 2 (standard) and classes 3, 0, and 00 (precision) have been included.

The metric system bearings that have been included are: Classes K and N (metric system standard bearings) and classes C, B, and A (metric system precision bearings).

Precision class bearings should be mounted on shafts and in housings which are similarly finished to at least the same precision limits as the bearing bore and O.D. High quality surface finishes should also be provided.

Two-row and four-row bearings, which are provided with spacers and shipped as matched assemblies, have been preset to a specific bench endplay. The specific endplay setting is determined from a study of the bearing mounting and expected environment. It is dependent on the fitting practice and the required mounted bearing settings.

## FITTING PRACTICES - continued

For rolling mill neck fitting practice, consult your Timken representative. For all other equipment associated with the rolling mill industry, the fitting practice suggestions in the tables that follow should be used.

In addition to all other axial tolerances and the overall bearing width tolerance, the width increase due to tight fits of the cone or cup, or both, must be considered when axial tolerance summation calculations are made. By knowing the fit range, the minimum and maximum bearing width increase can be determined to establish the initial design dimensions. For instance, all tolerances plus the bearing width increase range due to tight fits must be known in order to calculate the shim gap range that would occur on a cup adjusted, direct mounting design.

In a factory preset bearing or a SET-RIGHT™ mounting, where the bearing overall width is fixed and clamped, tight fits will cause cup expansion or cone contraction which will reduce the internal clearance (endplay) within the bearing.

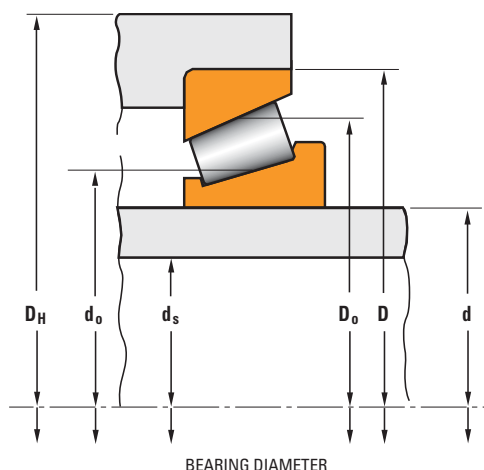
**Endplay Removed for Single Cone**

$$= 0.5 \left( \frac{K}{0.39} \right) \left( \frac{d}{d_o} \right) \delta_S$$

The following equations under Normal Sections and Thin Wall Sections can be used to calculate endplay removed in a similar manner.

where:

- K = Tapered Roller Bearing Radial-to-Axial Dynamic Load Rating Factor
- d = Bearing Bore Diameter
- d<sub>o</sub> = Mean Inner Race Diameter
- D<sub>o</sub> = Mean Outer Race Diameter
- d<sub>s</sub> = Shaft Inside Diameter
- D = Bearing Outside Diameter
- D<sub>H</sub> = Housing Outside Diameter
- δ<sub>S</sub> = Interference Fit of Inner Race on Shaft
- δ<sub>H</sub> = Interference Fit of Outer Race in Housing

**EFFECT OF TIGHT FITS ON BEARING WIDTH****Normal Sections**

The interference fit of either the cone or the cup increases the overall bearing width. For solid steel shafts and heavy sectioned steel housings, the increased bearing width for a single-row bearing is as follows. (Refer to diagram to the left.)

**Bearing Width Increase for Single Cone**

$$= 0.5 \left( \frac{K}{0.39} \right) \left( \frac{d}{d_o} \right) \delta_S$$

**Bearing Width Increase for Single Cup**

$$= 0.5 \left( \frac{K}{0.39} \right) \left( \frac{D_o}{D} \right) \delta_H$$

If the shaft or housing material is other than steel, consult your Timken representative.

**Thin Wall Sections**

Interference fits on thin-walled steel shafts and light-sectioned steel housings have a tendency to collapse the cone seat and stretch the cup seat, causing less change in bearing width than when used with solid shafts and heavy housings. The bearing width change due to tight fits on thin bearing seat sections is as follows. (Refer to diagram to the left.)

**Bearing Width Increase for Single Cone**

$$= 0.5 \left( \frac{K}{0.39} \right) \left\{ \frac{\left( \frac{d}{d_o} \right) \left[ 1 - \left( \frac{d_s}{d} \right)^2 \right]}{1 - \left( \frac{d_s}{d_o} \right)^2} \right\} \delta_S$$

**Bearing Width Increase for Single Cup**

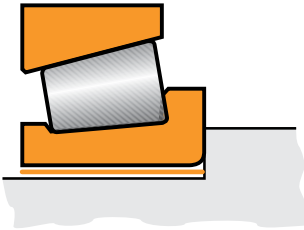
$$= 0.5 \left( \frac{K}{0.39} \right) \left\{ \frac{\left( \frac{D_o}{D} \right) \left[ 1 - \left( \frac{D}{D_H} \right)^2 \right]}{1 - \left( \frac{D_o}{D_H} \right)^2} \right\} \delta_H$$

These equations apply only to steel shafts and housings.

### FITTING PRACTICES - continued

#### FITTING GUIDELINES FOR METRIC BEARINGS (ISO AND J PREFIX) INDUSTRIAL EQUIPMENT BEARING CLASSES K AND N

| SHAFT O.D. (µm)                                                      |       |           | BEARING BORE |              | ROTATING SHAFT                               |                      |               | ROTATING OR STATIONARY SHAFT                             |                      |               |      |
|----------------------------------------------------------------------|-------|-----------|--------------|--------------|----------------------------------------------|----------------------|---------------|----------------------------------------------------------|----------------------|---------------|------|
| Deviation from nominal (maximum) bearing bore and resultant fit (µm) |       |           | Range mm     | Tolerance µm | Ground<br>Constant loads with moderate shock |                      |               | Unground or Ground<br>Heavy Loads or High Speed or Shock |                      |               |      |
| over                                                                 | incl. |           |              |              | Symbol                                       | Shaft O.D. Deviation | Resultant Fit | Symbol                                                   | Shaft O.D. Deviation | Resultant Fit |      |
| 10                                                                   | 18    | -12<br>0  | 10           | 18           | -12<br>0                                     | m6                   | +18           | 30T                                                      | n6                   | +23           | 35T  |
|                                                                      |       |           |              |              |                                              |                      | +7            | 7T                                                       |                      | +12           | 12T  |
| 18                                                                   | 30    | -12<br>0  | 18           | 30           | -12<br>0                                     | m6                   | +21           | 33T                                                      | n6                   | +28           | 40T  |
|                                                                      |       |           |              |              |                                              |                      | +8            | 8T                                                       |                      | +15           | 15T  |
| 30                                                                   | 50    | -12<br>0  | 30           | 50           | -12<br>0                                     | m6                   | +25           | 37T                                                      | n6                   | +33           | 45T  |
|                                                                      |       |           |              |              |                                              |                      | +9            | 9T                                                       |                      | +17           | 17T  |
| 50                                                                   | 80    | -15<br>0  | 50           | 80           | -15<br>0                                     | m6                   | +30           | 45T                                                      | n6                   | +39           | 54T  |
|                                                                      |       |           |              |              |                                              |                      | +11           | 11T                                                      |                      | +20           | 20T  |
| 80                                                                   | 120   | -20<br>0  | 80           | 120          | -20<br>0                                     | m6                   | +35           | 55T                                                      | n6                   | +45           | 65T  |
|                                                                      |       |           |              |              |                                              |                      | +13           | 13T                                                      |                      | +23           | 23T  |
| 120                                                                  | 180   | -25<br>0  | 120          | 180          | -25<br>0                                     | m6                   | +40           | 65T                                                      | p6                   | +68           | 93T  |
|                                                                      |       |           |              |              |                                              |                      | +15           | 15T                                                      |                      | +43           | 43T  |
| 180                                                                  | 200   | -30<br>0  | 180          | 200          | -30<br>0                                     | m6                   | +46<br>+17    | 76T<br>17T                                               | r6                   | +106          | 136T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +77           | 77T  |
| 200                                                                  | 225   |           |              |              |                                              |                      |               |                                                          |                      |               |      |
|                                                                      |       |           |              |              | +80                                          | 80T                  |               |                                                          |                      |               |      |
| 225                                                                  | 250   |           |              |              |                                              |                      |               |                                                          |                      | +113          | 143T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +84           | 84T  |
| 250                                                                  | 280   | -35<br>0  | 250          | 280          | -35<br>0                                     | m6                   | +52<br>+20    | 87T<br>20T                                               | r6                   | +126          | 161T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 280                                                                  | 315   |           |              |              |                                              |                      |               |                                                          |                      | +130          | 165T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +98           | 98T  |
| 315                                                                  | 355   | -40<br>0  | 315          | 355          | -40<br>0                                     | n6                   | +73<br>+37    | 113T<br>37T                                              | r6                   | +144          | 184T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 355                                                                  | 400   |           |              |              |                                              |                      |               |                                                          |                      | +150          | 190T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +114          | 114T |
| 400                                                                  | 450   | -45<br>0  | 400          | 450          | -45<br>0                                     | n6                   | +80<br>+40    | 125T<br>40T                                              | r6                   | +166          | 211T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 450                                                                  | 500   |           |              |              |                                              |                      |               |                                                          |                      | +172          | 217T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +132          | 132T |
| 500                                                                  | 560   | -50<br>0  | 500          | 560          | -50<br>0                                     | n6                   | +88<br>+44    | 138T<br>44T                                              | r6                   | +194          | 244T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 560                                                                  | 630   |           |              |              |                                              |                      |               |                                                          |                      | +199          | 249T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +155          | 155T |
| 630                                                                  | 710   | -80<br>0  | 630          | 710          | -80<br>0                                     | n7                   | +130<br>+50   | 210T<br>50T                                              | r7                   | +255          | 335T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 710                                                                  | 800   |           |              |              |                                              |                      |               |                                                          |                      | +265          | 345T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +185          | 185T |
| 800                                                                  | 900   | -100<br>0 | 800          | 900          | -100<br>0                                    | n7                   | +146<br>+56   | 246T<br>56T                                              | r7                   | +300          | 400T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      |               |      |
| 900                                                                  | 1000  |           |              |              |                                              |                      |               |                                                          |                      | +310          | 410T |
|                                                                      |       |           |              |              |                                              |                      |               |                                                          |                      | +220          | 220T |





| STATIONARY SHAFT                        |                         |                  |                                       |                         |                  |                                        |                         |                  |                                       |                         |                  |
|-----------------------------------------|-------------------------|------------------|---------------------------------------|-------------------------|------------------|----------------------------------------|-------------------------|------------------|---------------------------------------|-------------------------|------------------|
| Unground<br>Moderate Loads,<br>No Shock |                         |                  | Ground<br>Moderate Loads,<br>No Shock |                         |                  | Unground<br>Sheaves, Wheels,<br>Idlers |                         |                  | Hardened and Ground<br>Wheel Spindles |                         |                  |
| Symbol                                  | Shaft O.D.<br>Deviation | Resultant<br>Fit | Symbol                                | Shaft O.D.<br>Deviation | Resultant<br>Fit | Symbol                                 | Shaft O.D.<br>Deviation | Resultant<br>Fit | Symbol                                | Shaft O.D.<br>Deviation | Resultant<br>Fit |
| h6                                      | 0<br>-11                | 12T<br>11L       | g6                                    | -6<br>-17               | 6T<br>17L        | g6                                     | -6<br>-17               | 6T<br>17L        | f6                                    | -16<br>-27              | 4L<br>27L        |
| h6                                      | 0<br>-13                | 12T<br>13L       | g6                                    | -7<br>-20               | 5T<br>20L        | g6                                     | -7<br>-20               | 5T<br>20L        | f6                                    | -20<br>-33              | 8L<br>33L        |
| h6                                      | 0<br>-16                | 12T<br>16L       | g6                                    | -9<br>-25               | 3T<br>25L        | g6                                     | -9<br>-25               | 3T<br>25L        | f6                                    | -25<br>-41              | 13L<br>41L       |
| h6                                      | 0<br>-19                | 15T<br>19L       | g6                                    | -10<br>-29              | 5T<br>29L        | g6                                     | -10<br>-29              | 5T<br>29L        | f6                                    | -30<br>-49              | 15L<br>49L       |
| h6                                      | 0<br>-22                | 20T<br>22L       | g6                                    | -12<br>-34              | 8T<br>34L        | g6                                     | -12<br>-34              | 8T<br>34L        | f6                                    | -36<br>-58              | 16L<br>58L       |
| h6                                      | 0<br>-25                | 25T<br>25L       | g6                                    | -14<br>-39              | 11T<br>39L       | g6                                     | -14<br>-39              | 11T<br>39L       | f6                                    | -43<br>-68              | 18L<br>68L       |
| h6                                      | 0<br>-29                | 30T<br>29L       | g6                                    | -15<br>-44              | 15T<br>44L       | g6                                     | -15<br>-44              | 15T<br>44L       | f6                                    | -50<br>-79              | 20L<br>79L       |
| h6                                      | 0<br>-32                | 35T<br>32L       | g6                                    | -17<br>-49              | 18T<br>49L       | g6                                     | -17<br>-49              | 18T<br>49L       | f6                                    | -56<br>-88              | 21L<br>88L       |
| h6                                      | 0<br>-36                | 40T<br>36L       | g6                                    | -18<br>-54              | 22T<br>54L       | g6                                     | -18<br>-54              | 22T<br>54L       | -                                     | -<br>-                  | -<br>-           |
| h6                                      | 0<br>-40                | 45T<br>40L       | g6                                    | -20<br>-60              | 25T<br>60L       | g6                                     | -20<br>-60              | 25T<br>60L       | -                                     | -<br>-                  | -<br>-           |
| h6                                      | 0<br>-44                | 50T<br>44L       | g6                                    | -22<br>-66              | 28T<br>66L       | g6                                     | -22<br>-66              | 28T<br>66L       | -                                     | -<br>-                  | -<br>-           |
| h7                                      | 0<br>-80                | 80T<br>80L       | g7                                    | -24<br>-104             | 56T<br>104L      | g7                                     | -24<br>-104             | 56T<br>104L      | -                                     | -<br>-                  | -<br>-           |
| h7                                      | 0<br>-90                | 100T<br>90L      | g7                                    | -26<br>-116             | 74T<br>116L      | g7                                     | -26<br>-116             | 74T<br>116L      | -                                     | -<br>-                  | -<br>-           |

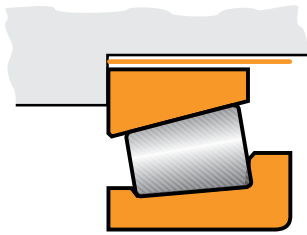
# ENGINEERING

A

## FITTING PRACTICES - continued

### FITTING GUIDELINES FOR METRIC BEARINGS (ISO AND J PREFIX) INDUSTRIAL EQUIPMENT BEARING CLASSES K AND N

| HOUSING BORE(μm)                                                                                 | BEARING O.D. |           | STATIONARY HOUSING       |                        |               |
|--------------------------------------------------------------------------------------------------|--------------|-----------|--------------------------|------------------------|---------------|
|                                                                                                  | Range mm     |           | Floating or Clamped Race |                        |               |
|                                                                                                  | over         | incl.     | Symbol                   | Housing Bore Deviation | Resultant fit |
| Deviation from nominal (maximum) bearing bore and resultant fit (μm)<br><br>T= Tight<br>L= Loose | 18           | 30        | 0<br>-12                 | G7<br>+7<br>+28        | 7L<br>40L     |
|                                                                                                  | 30           | 50        | 0<br>-14                 | G7<br>+9<br>+34        | 9L<br>48L     |
|                                                                                                  | 50           | 65        | 0<br>-16                 | G7<br>+10<br>+40       | 10L<br>56L    |
|                                                                                                  | 65           | 80        |                          |                        |               |
|                                                                                                  | 80           | 100       | 0<br>-18                 | G7<br>+12<br>+47       | 12L<br>65L    |
|                                                                                                  | 100          | 120       |                          |                        |               |
|                                                                                                  | 120          | 140       | 0<br>-20                 | G7<br>+14<br>+54       | 14L<br>74L    |
|                                                                                                  | 140          | 150       |                          |                        |               |
|                                                                                                  | 150          | 160       | 0<br>-25                 | G7<br>+14<br>+54       | 14L<br>79L    |
|                                                                                                  | 160          | 180       |                          |                        |               |
|                                                                                                  | 180          | 200       | 0<br>-30                 | G7<br>+15<br>+61       | 15L<br>91L    |
|                                                                                                  | 200          | 225       |                          |                        |               |
|                                                                                                  | 225          | 250       |                          |                        |               |
|                                                                                                  | 250          | 280       | 0<br>-35                 | G7<br>+17<br>+69       | 17L<br>104L   |
|                                                                                                  | 280          | 315       |                          |                        |               |
|                                                                                                  | 315          | 355       | 0<br>-40                 | F7<br>+62<br>+119      | 62L<br>159L   |
|                                                                                                  | 355          | 400       |                          |                        |               |
|                                                                                                  | 400          | 450       | 0<br>-45                 | F7<br>+68<br>+131      | 68L<br>176L   |
|                                                                                                  | 450          | 500       |                          |                        |               |
|                                                                                                  | 500          | 560       | 0<br>-50                 | F7<br>+76<br>+146      | 76L<br>196L   |
| 560                                                                                              | 630          |           |                          |                        |               |
| 630                                                                                              | 710          | 0<br>-80  | F7<br>+80<br>+160        | 80L<br>240L            |               |
| 710                                                                                              | 800          |           |                          |                        |               |
| 800                                                                                              | 900          | 0<br>-100 | F7<br>+86<br>+176        | 86L<br>276L            |               |
| 900                                                                                              | 1000         |           |                          |                        |               |

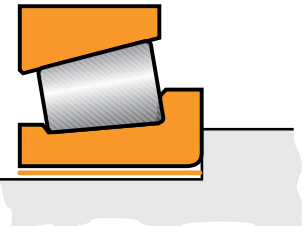




| STATIONARY HOUSING |                        |               |                                   |                        |               | ROTATING HOUSING                                           |                        |               |
|--------------------|------------------------|---------------|-----------------------------------|------------------------|---------------|------------------------------------------------------------|------------------------|---------------|
| Adjustable Race    |                        |               | Non-adjustable Race or in Carrier |                        |               | Non-adjustable Race or in Carrier or Sheave - Clamped Race |                        |               |
| Symbol             | Housing Bore Deviation | Resultant Fit | Symbol                            | Housing Bore Deviation | Resultant Fit | Symbol                                                     | Housing Bore Deviation | Resultant Fit |
| J7                 | -9                     | 9T            | P7                                | -35                    | 35T           | R7                                                         | -41                    | 41T           |
|                    | +12                    | 24L           |                                   | -14                    | 2T            |                                                            | -20                    | 8T            |
| J7                 | -11                    | 11T           | P7                                | -42                    | 42T           | R7                                                         | -50                    | 50T           |
|                    | +14                    | 28L           |                                   | -17                    | 3T            |                                                            | -25                    | 11T           |
| J7                 | -12                    | 12T           | P7                                | -51                    | 51T           | R7                                                         | -60                    | 60T           |
|                    | +18                    | 34L           |                                   | -21                    | 5T            |                                                            | -30                    | 14T           |
| J7                 | -13                    | 13T           | P7                                | -59                    | 59T           | R7                                                         | -62                    | 62T           |
|                    | +22                    | 40L           |                                   | -24                    | 6T            |                                                            | -32                    | 16T           |
| J7                 | -14                    | 14T           | P7                                | -68                    | 68T           | R7                                                         | -73                    | 73T           |
|                    | +26                    | 46L           |                                   | -28                    | 8T            |                                                            | -38                    | 20T           |
| J7                 | -14                    | 14T           | P7                                | -68                    | 68T           | R7                                                         | -76                    | 76T           |
|                    | +26                    | 51L           |                                   | -28                    | 3T            |                                                            | -41                    | 23T           |
| J7                 | -16                    | 16T           | P7                                | -79                    | 79T           | R7                                                         | -88                    | 88T           |
|                    | +30                    | 60L           |                                   | -33                    | 3T            |                                                            | -48                    | 28T           |
| J7                 | -16                    | 16T           | P7                                | -88                    | 88T           | R7                                                         | -90                    | 90T           |
|                    | +36                    | 71L           |                                   | -36                    | 1T            |                                                            | -50                    | 25T           |
| J7                 | -18                    | 18T           | P7                                | -98                    | 98T           | R7                                                         | -93                    | 93T           |
|                    | +39                    | 79L           |                                   | -41                    | 1T            |                                                            | -53                    | 28T           |
| J7                 | -20                    | 20T           | P7                                | -108                   | 108T          | R7                                                         | -106                   | 106T          |
|                    | +43                    | 88L           |                                   | -45                    | 0             |                                                            | -60                    | 30T           |
| JS7                | -35                    | 35T           | P7                                | -148                   | 148T          | R7                                                         | -109                   | 109T          |
|                    | +35                    | 85L           |                                   | -78                    | 28T           |                                                            | -63                    | 33T           |
| JS7                | -40                    | 40T           | P7                                | -168                   | 168T          | R7                                                         | -113                   | 113T          |
|                    | +40                    | 120L          |                                   | -88                    | 8T            |                                                            | -67                    | 37T           |
| JS7                | -45                    | 45T           | P7                                | -190                   | 190T          | R7                                                         | -126                   | 126T          |
|                    | +45                    | 145L          |                                   | -100                   | 0             |                                                            | -74                    | 39T           |
|                    |                        |               |                                   |                        |               | -130                                                       | 130T                   |               |
|                    |                        |               |                                   |                        |               | -78                                                        | 43T                    |               |
|                    |                        |               |                                   |                        |               | -144                                                       | 144T                   |               |
|                    |                        |               |                                   |                        |               | -87                                                        | 47T                    |               |
|                    |                        |               |                                   |                        |               | -150                                                       | 150T                   |               |
|                    |                        |               |                                   |                        |               | -93                                                        | 53T                    |               |
|                    |                        |               |                                   |                        |               | -166                                                       | 166T                   |               |
|                    |                        |               |                                   |                        |               | -103                                                       | 58T                    |               |
|                    |                        |               |                                   |                        |               | -172                                                       | 172T                   |               |
|                    |                        |               |                                   |                        |               | -109                                                       | 64T                    |               |
|                    |                        |               |                                   |                        |               | -220                                                       | 220T                   |               |
|                    |                        |               |                                   |                        |               | -150                                                       | 100T                   |               |
|                    |                        |               |                                   |                        |               | -225                                                       | 225T                   |               |
|                    |                        |               |                                   |                        |               | -155                                                       | 105T                   |               |
|                    |                        |               |                                   |                        |               | -255                                                       | 255T                   |               |
|                    |                        |               |                                   |                        |               | -175                                                       | 95T                    |               |
|                    |                        |               |                                   |                        |               | -245                                                       | 265T                   |               |
|                    |                        |               |                                   |                        |               | -185                                                       | 105T                   |               |
|                    |                        |               |                                   |                        |               | -300                                                       | 300T                   |               |
|                    |                        |               |                                   |                        |               | -210                                                       | 110T                   |               |
|                    |                        |               |                                   |                        |               | -310                                                       | 310T                   |               |
|                    |                        |               |                                   |                        |               | -220                                                       | 120T                   |               |

**FITTING PRACTICES - continued**

**FITTING GUIDELINES FOR INCH BEARINGS  
INDUSTRIAL EQUIPMENT BEARING CLASSES 4 AND 2**

| SHAFT O.D. (µm - INCHES)                                                                                                                                                                                | BEARING BORE |        | ROTATING SHAFT       |               |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------|----------------------|---------------|-----|
|                                                                                                                                                                                                         | over         | incl.  | Shaft O.D. Deviation | Resultant Fit |     |
| Deviation from nominal (minimum) bearing bore and resultant fit (µm - 0.0001 inch)<br><br>T= Tight<br>L= Loose<br><br> | 0            | 76.2   | 0                    | +38           | 38T |
|                                                                                                                                                                                                         | 0            | 3.0000 | +13                  | +25           | 12T |
|                                                                                                                                                                                                         |              |        | 0                    | +15           | 15T |
|                                                                                                                                                                                                         |              |        | +5                   | +10           | 5T  |
|                                                                                                                                                                                                         | 76.2         | 88.9   |                      |               |     |
|                                                                                                                                                                                                         | 3.0000       | 3.5000 |                      |               |     |
|                                                                                                                                                                                                         | 88.9         | 114.3  |                      |               |     |
|                                                                                                                                                                                                         | 3.5000       | 4.5000 |                      |               |     |
|                                                                                                                                                                                                         | 114.3        | 139.7  |                      |               |     |
|                                                                                                                                                                                                         | 4.5000       | 5.5000 |                      |               |     |
|                                                                                                                                                                                                         | 139.7        | 165.1  |                      |               |     |
|                                                                                                                                                                                                         | 5.5000       | 6.5000 |                      |               |     |
| 165.1                                                                                                                                                                                                   | 190.5        | 0      | +64                  | 64T           |     |
| 6.5000                                                                                                                                                                                                  | 7.5000       | +25    | +38                  | 13T           |     |
|                                                                                                                                                                                                         |              | 0      | +25                  | 25T           |     |
|                                                                                                                                                                                                         |              | +10    | +15                  | 5T            |     |
| 190.5                                                                                                                                                                                                   | 215.9        |        |                      |               |     |
| 7.5000                                                                                                                                                                                                  | 8.5000       |        |                      |               |     |
| 215.9                                                                                                                                                                                                   | 241.3        |        |                      |               |     |
| 8.5000                                                                                                                                                                                                  | 9.5000       |        |                      |               |     |
| 241.3                                                                                                                                                                                                   | 266.7        |        |                      |               |     |
| 9.5000                                                                                                                                                                                                  | 10.5000      |        |                      |               |     |
| 266.7                                                                                                                                                                                                   | 292.1        |        |                      |               |     |
| 10.5000                                                                                                                                                                                                 | 11.5000      |        |                      |               |     |
| 292.1                                                                                                                                                                                                   | 304.8        |        |                      |               |     |
| 11.5000                                                                                                                                                                                                 | 12.0000      |        |                      |               |     |
| 304.8                                                                                                                                                                                                   | 317.5        |        |                      |               |     |
| 12.0000                                                                                                                                                                                                 | 12.5000      | 0      | +127                 | 127T          |     |
|                                                                                                                                                                                                         |              | +51    | +76                  | 25T           |     |
| 317.5                                                                                                                                                                                                   | 342.9        | 0      | +50                  | 50T           |     |
| 12.5000                                                                                                                                                                                                 | 13.5000      | +20    | +30                  | 10T           |     |

\* Suggested heavy-duty fitting practices shown above are applicable for case carburized bearings. Consult your Timken representative for the suggested heavy-duty fitting practices that are specified for through hardened bearings.

| ROTATING OR STATIONARY SHAFT                         |               | STATIONARY SHAFT                  |               |                                 |               |                                  |               |                                    |               |
|------------------------------------------------------|---------------|-----------------------------------|---------------|---------------------------------|---------------|----------------------------------|---------------|------------------------------------|---------------|
| Unground or Ground Heavy Loads, High Speed or Shock* |               | Unground Moderate Loads, No Shock |               | Ground Moderate Loads, No Shock |               | Unground Sheaves, Wheels, Idlers |               | Hardened and Ground Wheel Spindles |               |
| Shaft O.D. Deviation                                 | Resultant Fit | Shaft O.D. Deviation              | Resultant Fit | Shaft O.D. Deviation            | Resultant Fit | Shaft O.D. Deviation             | Resultant Fit | Shaft O.D. Deviation               | Resultant Fit |
| +64                                                  | 64T           | +13                               | 13T           | 0                               | 0             | 0                                | 0             | -5                                 | 5L            |
| +38                                                  | 25T           | 0                                 | 13L           | -13                             | 26L           | -13                              | 26L           | -18                                | 31L           |
| +25                                                  | 25T           | +5                                | 5T            | 0                               | 0             | 0                                | 0             | -2                                 | 2L            |
| +15                                                  | 10T           | 0                                 | 5L            | -5                              | 10L           | -5                               | 10L           | -7                                 | 12L           |
| +76                                                  | 76T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +51                                                  | 25T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +30                                                  | 30T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +20                                                  | 10T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +76                                                  | 76T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +51                                                  | 25T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +30                                                  | 30T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +20                                                  | 10T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +89                                                  | 89T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +64                                                  | 38T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +35                                                  | 35T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +25                                                  | 15T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +102                                                 | 102T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +76                                                  | 51T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +40                                                  | 40T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +30                                                  | 20T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +114                                                 | 114T          | +25                               | 25T           | 0                               | 0             | 0                                | 0             | -5                                 | 5L            |
| +89                                                  | 64T           | 0                                 | 25L           | -25                             | 50L           | -25                              | 50L           | -30                                | 55L           |
| +45                                                  | 45T           | +10                               | 10T           | 0                               | 0             | 0                                | 0             | -2                                 | 2L            |
| +35                                                  | 25T           | 0                                 | 10L           | -10                             | 20L           | -10                              | 20L           | -12                                | 22L           |
| +127                                                 | 127T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +102                                                 | 76T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +50                                                  | 50T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +40                                                  | 30T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +140                                                 | 140T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +114                                                 | 89T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +55                                                  | 55T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +45                                                  | 35T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +152                                                 | 152T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +127                                                 | 102T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +60                                                  | 60T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +50                                                  | 40T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +165                                                 | 165T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +140                                                 | 114T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +65                                                  | 65T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +55                                                  | 45T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +178                                                 | 178T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +152                                                 | 127T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +70                                                  | 70T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +60                                                  | 50T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +203                                                 | 203T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +152                                                 | 101T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +80                                                  | 80T           | +51                               | 51T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +60                                                  | 40T           | 0                                 | 51L           | -51                             | 102L          | -51                              | 102L          | -                                  | -             |
| +216                                                 | 216T          | +20                               | 20T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +165                                                 | 114T          | 0                                 | 20L           | -20                             | 40L           | -20                              | 40L           | -                                  | -             |
| +85                                                  | 85T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +65                                                  | 45T           |                                   |               |                                 |               |                                  |               |                                    |               |

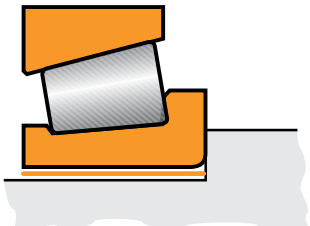
# ENGINEERING

A

## FITTING PRACTICES - continued

### FITTING GUIDELINES FOR INCH BEARINGS INDUSTRIAL EQUIPMENT BEARING CLASSES 4 AND 2

| SHAFT O.D. (µm - INCHES)                                                                                       | BEARING BORE  |              | ROTATING SHAFT       |               |
|----------------------------------------------------------------------------------------------------------------|---------------|--------------|----------------------|---------------|
|                                                                                                                | over          | incl.        | Shaft O.D. Deviation | Resultant Fit |
| Deviation from nominal (minimum) bearing bore and resultant fit (µm - 0.0001 inch)<br><br>T= Tight<br>L= Loose | <b>342.9</b>  | <b>368.3</b> |                      |               |
|                                                                                                                | 13.5000       | 14.5000      |                      |               |
|                                                                                                                | <b>368.3</b>  | <b>393.7</b> |                      |               |
|                                                                                                                | 14.5000       | 15.5000      |                      |               |
|                                                                                                                | <b>393.7</b>  | <b>419.1</b> |                      |               |
|                                                                                                                | 15.5000       | 16.5000      |                      |               |
|                                                                                                                | <b>419.1</b>  | <b>444.5</b> |                      |               |
|                                                                                                                | 16.5000       | 17.5000      |                      |               |
|                                                                                                                | <b>444.5</b>  | <b>469.9</b> |                      |               |
|                                                                                                                | 17.5000       | 18.5000      |                      |               |
| <b>469.9</b>                                                                                                   | <b>495.3</b>  | <b>0</b>     | <b>+127</b>          | <b>127T</b>   |
| 18.5000                                                                                                        | 19.5000       | <b>+51</b>   | <b>+76</b>           | <b>25T</b>    |
|                                                                                                                |               | <b>0</b>     | <b>+50</b>           | <b>50T</b>    |
|                                                                                                                |               | <b>+20</b>   | <b>+30</b>           | <b>10T</b>    |
| <b>495.3</b>                                                                                                   | <b>520.7</b>  |              |                      |               |
| 19.5000                                                                                                        | 20.5000       |              |                      |               |
| <b>520.7</b>                                                                                                   | <b>546.1</b>  |              |                      |               |
| 20.5000                                                                                                        | 21.5000       |              |                      |               |
| <b>546.1</b>                                                                                                   | <b>571.5</b>  |              |                      |               |
| 21.5000                                                                                                        | 22.5000       |              |                      |               |
| <b>571.5</b>                                                                                                   | <b>596.9</b>  |              |                      |               |
| 22.5000                                                                                                        | 23.5000       |              |                      |               |
| <b>596.9</b>                                                                                                   | <b>609.6</b>  |              |                      |               |
| 23.5000                                                                                                        | 24.0000       |              |                      |               |
| <b>609.6</b>                                                                                                   | <b>914.4</b>  | <b>0</b>     | <b>+190</b>          | <b>190T</b>   |
| 24.0000                                                                                                        | 36.0000       | <b>+76</b>   | <b>+114</b>          | <b>38T</b>    |
|                                                                                                                |               | <b>0</b>     | <b>+75</b>           | <b>75T</b>    |
|                                                                                                                |               | <b>+30</b>   | <b>+45</b>           | <b>15T</b>    |
| <b>914.4</b>                                                                                                   | <b>1219.2</b> | <b>0</b>     | <b>+252</b>          | <b>252T</b>   |
| 36.0000                                                                                                        | 48.0000       | <b>+102</b>  | <b>+150</b>          | <b>48T</b>    |
|                                                                                                                |               | <b>0</b>     | <b>+100</b>          | <b>100T</b>   |
|                                                                                                                |               | <b>+40</b>   | <b>+60</b>           | <b>20T</b>    |
| <b>1219.2</b>                                                                                                  | —             | <b>0</b>     | <b>+305</b>          | <b>305T</b>   |
| 48.0000                                                                                                        | —             | <b>+127</b>  | <b>+178</b>          | <b>51T</b>    |
|                                                                                                                |               | <b>0</b>     | <b>+120</b>          | <b>120T</b>   |
|                                                                                                                |               | <b>+50</b>   | <b>+70</b>           | <b>20T</b>    |



\* Suggested heavy-duty fitting practices shown above are applicable for case carburized bearings. Consult your Timken representative for the suggested heavy-duty fitting practices that are specified for through hardened bearings.

| ROTATION OR STATIONARY SHAFT                         |               | STATIONARY SHAFT                  |               |                                 |               |                                  |               |                                    |               |
|------------------------------------------------------|---------------|-----------------------------------|---------------|---------------------------------|---------------|----------------------------------|---------------|------------------------------------|---------------|
| Unground or Ground Heavy Loads, High Speed or Shock* |               | Unground Moderate Loads, No Shock |               | Ground Moderate Loads, No Shock |               | Unground Sheaves, Wheels, Idlers |               | Hardened and Ground Wheel Spindles |               |
| Shaft O.D. Deviation                                 | Resultant Fit | Shaft O.D. Deviation              | Resultant Fit | Shaft O.D. Deviation            | Resultant Fit | Shaft O.D. Deviation             | Resultant Fit | Shaft O.D. Deviation               | Resultant Fit |
| +229                                                 | 229T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +178                                                 | 127T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +90                                                  | 90T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +70                                                  | 50T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +241                                                 | 241T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +190                                                 | 139T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +95                                                  | 95T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +75                                                  | 55T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +254                                                 | 254T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +203                                                 | 152T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +100                                                 | 100T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +80                                                  | 60T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +267                                                 | 267T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +216                                                 | 165T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +105                                                 | 105T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +85                                                  | 65T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +279                                                 | 279T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +229                                                 | 178T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +110                                                 | 110T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +90                                                  | 70T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +292                                                 | 292T          | +51                               | 51T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +241                                                 | 190T          | 0                                 | 51L           | -51                             | 102L          | -51                              | 102L          | -                                  | -             |
| +115                                                 | 115T          | +20                               | 20T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +95                                                  | 75T           | 0                                 | 20L           | -20                             | 40L           | -20                              | 40L           | -                                  | -             |
| +305                                                 | 305T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +254                                                 | 203T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +120                                                 | 120T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +100                                                 | 80T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +318                                                 | 318T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +267                                                 | 216T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +125                                                 | 125T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +105                                                 | 85T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +330                                                 | 330T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +279                                                 | 228T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +130                                                 | 130T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +110                                                 | 90T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +343                                                 | 343T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +292                                                 | 241T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +135                                                 | 135T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +115                                                 | 95T           |                                   |               |                                 |               |                                  |               |                                    |               |
| +356                                                 | 356T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +305                                                 | 254T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +140                                                 | 140T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +120                                                 | 100T          |                                   |               |                                 |               |                                  |               |                                    |               |
| +457                                                 | 457T          | +76                               | 76T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +331                                                 | 305T          | 0                                 | 76L           | -76                             | 152L          | -76                              | 152L          | -                                  | -             |
| +180                                                 | 180T          | +30                               | 30T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +150                                                 | 120T          | 0                                 | 30L           | -30                             | 60L           | -30                              | 60L           | -                                  | -             |
| +625                                                 | 625T          | +102                              | 102T          | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +534                                                 | 432T          | 0                                 | 102L          | -102                            | 204L          | -102                             | 204L          | -                                  | -             |
| +250                                                 | 250T          | +40                               | 40T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +210                                                 | 170T          | 0                                 | 40L           | -40                             | 80L           | -40                              | 80L           | -                                  | -             |
| +813                                                 | 813T          | +127                              | 127T          | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +686                                                 | 599T          | 0                                 | 127L          | -127                            | 254L          | -127                             | 254L          | -                                  | -             |
| +320                                                 | 320T          | +50                               | 50T           | 0                               | 0             | 0                                | 0             | -                                  | -             |
| +270                                                 | 220T          | 0                                 | 50L           | -50                             | 100L          | -50                              | 100L          | -                                  | -             |



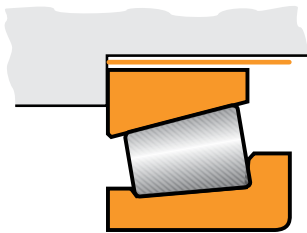
# ENGINEERING

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## FITTING PRACTICES - continued

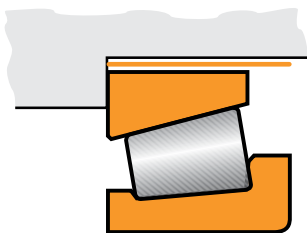
### FITTING GUIDELINES FOR INCH BEARINGS INDUSTRIAL EQUIPMENT BEARING CLASSES 4 AND 2

| HOUSING BORE ( $\mu\text{m}$ )                                                                                | BEARING O.D. |        | STATIONARY HOUSING      |                          |               |
|---------------------------------------------------------------------------------------------------------------|--------------|--------|-------------------------|--------------------------|---------------|
|                                                                                                               | Range mm     |        | Tolerance $\mu\text{m}$ | Floating or Clamped Race |               |
|                                                                                                               | over         | incl.  |                         | Housing Bore Deviation   | Resultant Fit |
| Deviation from nominal (minimum) bearing bore and resultant fit ( $\mu\text{m}$ )<br><br>T= Tight<br>L= Loose | 0            | 76.2   | +25<br>0                | +51<br>+76               | 26L<br>76L    |
|                                                                                                               | 76.2         | 127    | +25<br>0                | +51<br>+76               | 26L<br>76L    |
|                                                                                                               | 127          | 304.8  | +25<br>0                | +51<br>+76               | 26L<br>76L    |
|                                                                                                               | 304.8        | 609.6  | +51<br>0                | +102<br>+152             | 51L<br>152L   |
|                                                                                                               | 609.6        | 914.4  | +76<br>0                | +152<br>+229             | 76L<br>229L   |
|                                                                                                               | 914.4        | 1219.2 | +102<br>0               | +204<br>+305             | 102L<br>305L  |
|                                                                                                               | 1219.2       | —      | +127<br>0               | +254<br>+381             | 127L<br>381L  |



\* Unclamped race design is applicable only to sheaves with negligible fleet angle.

| HOUSING BORE (INCHES)                                                                                     | BEARING O.D. |         | STATIONARY HOUSING   |                          |               |
|-----------------------------------------------------------------------------------------------------------|--------------|---------|----------------------|--------------------------|---------------|
|                                                                                                           | Range inches |         | Tolerance 0.0001 in. | Floating or Clamped Race |               |
|                                                                                                           | over         | incl.   |                      | Housing Bore Deviation   | Resultant Fit |
| Deviation from nominal (minimum) bearing bore and resultant fit (0.0001 inch)<br><br>T= Tight<br>L= Loose | 0            | 3.0000  | +10<br>0             | +20<br>+30               | 10L<br>30L    |
|                                                                                                           | 3.0000       | 5.0000  | +10<br>0             | +20<br>+30               | 10L<br>30L    |
|                                                                                                           | 5.0000       | 12.0000 | +10<br>0             | +20<br>+30               | 10L<br>30L    |
|                                                                                                           | 12.0000      | 24.0000 | +20<br>0             | +40<br>+60               | 20L<br>60L    |
|                                                                                                           | 24.0000      | 36.0000 | +30<br>0             | +60<br>+90               | 30L<br>90L    |
|                                                                                                           | 36.0000      | 48.0000 | +40<br>0             | +80<br>+120              | 40L<br>120L   |
|                                                                                                           | 48.0000      | —       | +50<br>0             | +100<br>+150             | 50L<br>150L   |



\* Unclamped race design is applicable only to sheaves with negligible fleet angle.

| STATIONARY HOUSING     |               | STATIONARY OR ROTATION HOUSING                             |               | ROTATING HOUSING       |               |
|------------------------|---------------|------------------------------------------------------------|---------------|------------------------|---------------|
| Adjustable Race        |               | Non-adjustable Race or In Carrier or Sheave - Clamped Race |               | Sheave-unclamped Race* |               |
| Housing bore Deviation | Resultant Fit | Housing Bore Deviation                                     | Resultant Fit | Housing Bore Deviation | Resultant Fit |
| 0                      | 25T           | -38                                                        | 63T           | -76                    | 101T          |
| +25                    | 25L           | -13                                                        | 13T           | -51                    | 51T           |
| 0                      | 25T           | -51                                                        | 76T           | -76                    | 101T          |
| +25                    | 25L           | -25                                                        | 25T           | -51                    | 51T           |
| 0                      | 25T           | -51                                                        | 76T           | -76                    | 101T          |
| +51                    | 51L           | -25                                                        | 25T           | -51                    | 51T           |
| +26                    | 25T           | -76                                                        | 127T          | -102                   | 153T          |
| +76                    | 76L           | -25                                                        | 25T           | -51                    | 51T           |
| +51                    | 25T           | -102                                                       | 178T          | –                      | –             |
| +127                   | 127L          | -25                                                        | 25T           | –                      | –             |
| +76                    | 25T           | -127                                                       | 229T          | –                      | –             |
| +178                   | 178L          | -25                                                        | 25T           | –                      | –             |
| +102                   | 25T           | -152                                                       | 279T          | –                      | –             |
| +229                   | 229L          | -25                                                        | 25T           | –                      | –             |

| STATIONARY HOUSING     |               | STATIONARY OR ROTATION HOUSING                             |               | ROTATING HOUSING       |               |
|------------------------|---------------|------------------------------------------------------------|---------------|------------------------|---------------|
| Adjustable Race        |               | Non-adjustable Race or In Carrier or Sheave - Clamped Race |               | Sheave-unclamped Race* |               |
| Housing bore Deviation | Resultant Fit | Housing Bore Deviation                                     | Resultant Fit | Housing Bore Deviation | Resultant Fit |
| 0                      | 10T           | -15                                                        | 25T           | -30                    | 40T           |
| +10                    | 10L           | -5                                                         | 5T            | -20                    | 20T           |
| 0                      | 10T           | -20                                                        | 30T           | -30                    | 40T           |
| +10                    | 10L           | -10                                                        | 10T           | -20                    | 20T           |
| 0                      | 10T           | -20                                                        | 30T           | -30                    | 40T           |
| +20                    | 20L           | -10                                                        | 10T           | -20                    | 20T           |
| +10                    | 10T           | -30                                                        | 50T           | -40                    | 60T           |
| +30                    | 30L           | -10                                                        | 10T           | -20                    | 20T           |
| +20                    | 10T           | -40                                                        | 70T           | –                      | –             |
| +50                    | 50L           | -10                                                        | 10T           | –                      | –             |
| +30                    | 10T           | -50                                                        | 90T           | –                      | –             |
| +70                    | 70L           | -10                                                        | 10T           | –                      | –             |
| +40                    | 10T           | -60                                                        | 110T          | –                      | –             |
| +90                    | 90L           | -10                                                        | 10T           | –                      | –             |

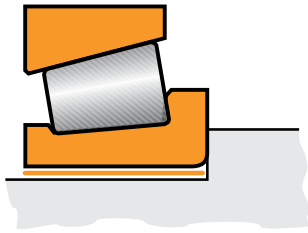
### FITTING PRACTICES - continued

#### FITTING GUIDELINES FOR PRECISION BEARINGS

##### SHAFT O.D. METRIC BEARINGS (ISO & J Prefix)

Deviation from nominal (maximum) bearing bore and resultant fit (µm)

T= Tight  
L = Loose



| BEARING BORE |       | CLASS C                   |        |                      |               |
|--------------|-------|---------------------------|--------|----------------------|---------------|
| Range        |       | Bearing Bore Tolerance µm | Symbol | Shaft O.D. Deviation | Resultant Fit |
| over         | incl. |                           |        |                      |               |
| 10           | 18    | -7<br>0                   | k5     | +9<br>+1             | 16T<br>1T     |
| 18           | 30    | -8<br>0                   | k5     | +11<br>+2            | 19T<br>2T     |
| 30           | 50    | -10<br>0                  | k5     | +13<br>+2            | 23T<br>2T     |
| 50           | 80    | -12<br>0                  | k5     | +15<br>+2            | 27T<br>2T     |
| 80           | 120   | -15<br>0                  | k5     | +18<br>+3            | 33T<br>3T     |
| 120          | 180   | -18<br>0                  | k5     | +21<br>+3            | 39T<br>3T     |
| 180          | 250   | -22<br>0                  | k5     | +24<br>+4            | 46T<br>4T     |
| 250          | 315   | -22<br>0                  | k5     | +27<br>+4            | 49T<br>4T     |

##### SHAFT O.D. INCH BEARINGS

Deviation from nominal (minimum) bearing bore and resultant fit (µm - 0.0001 inch)

T= Tight  
L = Loose

| BEARING BORE      |       | CLASS 3 AND 0 <sup>(1)</sup>           |                      |               | CLASS 00 AND 000       |                      |               |
|-------------------|-------|----------------------------------------|----------------------|---------------|------------------------|----------------------|---------------|
| Range mm (inches) |       | Bearing Bore Tolerance µm (0.0001 in.) | Shaft O.D. Deviation | Resultant Fit | Bearing Bore Tolerance | Shaft O.D. Deviation | Resultant Fit |
| over              | incl. |                                        |                      |               |                        |                      |               |
| -                 | 304.8 | 0                                      | +30                  | 30T           | 0                      | +20                  | 20T           |
|                   |       | +13                                    | +18                  | 5T            |                        |                      |               |
|                   |       | 0                                      | +12                  | 12T           |                        |                      |               |
| -                 | 12    | +5                                     | +7                   | 2T            | +3                     | +8                   | 8T            |
|                   |       | 0                                      | +5                   | 5T            |                        |                      |               |
|                   |       | 0                                      | +3                   | 3T            |                        |                      |               |
| 304.8             | 609.6 | 0                                      | +64                  | 64T           | -                      | -                    | -             |
|                   |       | +25                                    | +38                  | 13T           |                        |                      |               |
|                   |       | 0                                      | +25                  | 25T           |                        |                      |               |
| 12                | 24    | +10                                    | +15                  | 5T            | -                      | -                    | -             |
|                   |       | 0                                      | +10                  | 10T           |                        |                      |               |
|                   |       | 0                                      | +5                   | 5T            |                        |                      |               |
| 609.6             | 914.4 | 0                                      | +102                 | 102T          | -                      | -                    | -             |
|                   |       | +38                                    | +64                  | 26T           |                        |                      |               |
|                   |       | 0                                      | +40                  | 40T           |                        |                      |               |
| 24                | 36    | +15                                    | +25                  | 10T           | -                      | -                    | -             |
|                   |       | 0                                      | +15                  | 15T           |                        |                      |               |

<sup>(1)</sup>Class 0 made only to 304.8 mm (12 inch) O.D.

FITTING PRACTICES - continued

| CLASS B                |        |                      |               | BEARING BORE |       | CLASS A AND AA         |        |                      |               |
|------------------------|--------|----------------------|---------------|--------------|-------|------------------------|--------|----------------------|---------------|
| Bearing Bore Tolerance | Symbol | Shaft O.D. Deviation | Resultant Fit | Range mm     |       | Bearing Bore Tolerance | Symbol | Shaft O.D. Deviation | Resultant Fit |
|                        |        |                      |               | over         | incl. |                        |        |                      |               |
| -5<br>0                | k5     | +9<br>+1             | 14T<br>1T     | 10           | 18    | -5<br>0                | k4     | +6<br>+1             | 11T<br>1T     |
| -6<br>0                | k5     | +11<br>+2            | 17T<br>2T     | 18           | 30    | -6<br>0                | k4     | +8<br>+2             | 14T<br>2T     |
| -8<br>0                | k5     | +13<br>+2            | 21T<br>2T     | 30           | 315   | -8<br>0                |        | +13<br>+5            | 21T<br>5T     |
| -9<br>0                | k5     | +15<br>+2            | 24T<br>2T     |              |       |                        |        |                      |               |
| -10<br>0               | k5     | +18<br>+3            | 28T<br>3T     |              |       |                        |        |                      |               |
| -13<br>0               | k5     | +21<br>+3            | 34T<br>3T     |              |       |                        |        |                      |               |
| -15<br>0               | k5     | +24<br>+4            | 39T<br>4T     |              |       |                        |        |                      |               |
| -15<br>0               | k5     | +27<br>+4            | 42T<br>4T     |              |       |                        |        |                      |               |

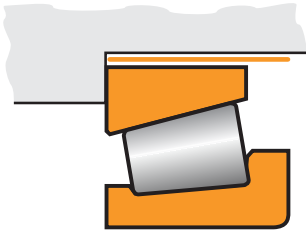
## FITTING PRACTICES - continued

### FITTING GUIDELINES FOR PRECISION BEARINGS

#### HOUSING BORE METRIC BEARINGS

Deviation from nominal (maximum) bearing O.D. and resultant fit (µm)

T= Tight  
L = Loose



| BEARING O.D.       |                 |                                 | CLASS C                      |                  |          |                              |                  |            |                              |                  |  |
|--------------------|-----------------|---------------------------------|------------------------------|------------------|----------|------------------------------|------------------|------------|------------------------------|------------------|--|
| Range<br>mm        | Tolerance<br>µm | Non-adjustable<br>or In Carrier |                              |                  | Floating |                              |                  | Adjustable |                              |                  |  |
|                    |                 | Symbol                          | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol   | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol     | Housing<br>Bore<br>Deviation | Resultant<br>Fit |  |
| 18 over 30 incl.   | 0<br>-8         | N5                              | -21<br>-12                   | 21T<br>4T        | G5       | +7<br>+16                    | 7L<br>24L        | K5         | -8<br>+1                     | 8T<br>9L         |  |
| 30 over 50 incl.   | 0<br>-9         | N5                              | -24<br>-13                   | 24T<br>4T        | G5       | +9<br>+20                    | 9L<br>29L        | K5         | -9<br>+2                     | 9T<br>11L        |  |
| 50 over 80 incl.   | 0<br>-11        | N5                              | -28<br>-15                   | 28T<br>4T        | G5       | +10<br>+23                   | 10L<br>34L       | K5         | -10<br>+3                    | 10T<br>14L       |  |
| 80 over 120 incl.  | 0<br>-13        | N5                              | -33<br>-18                   | 33T<br>5T        | G5       | +12<br>+27                   | 12L<br>40L       | K5         | -13<br>+2                    | 13T<br>15L       |  |
| 120 over 150 incl. | 0<br>-15        | N5                              | -39<br>-21                   | 39T<br>6T        | G5       | +14<br>+32                   | 14L<br>47L       | K5         | -15<br>+3                    | 15T<br>18L       |  |
| 150 over 180 incl. | 0<br>-18        | N5                              | -39<br>-21                   | 39T<br>3T        | G5       | +14<br>+32                   | 14L<br>50L       | K5         | -15<br>+3                    | 15T<br>21L       |  |
| 180 over 250 incl. | 0<br>-20        | N5                              | -45<br>-25                   | 45T<br>5T        | G5       | +15<br>+35                   | 15L<br>55L       | K5         | -18<br>+2                    | 18T<br>27L       |  |
| 250 over 315 incl. | 0<br>-25        | N5                              | -50<br>-27                   | 50T<br>2T        | G5       | +17<br>+40                   | 17L<br>65L       | K5         | -20<br>+3                    | 20T<br>28L       |  |

#### HOUSING BORE INCH BEARINGS

Deviation from nominal (minimum) bearing O.D. and resultant fit (µm - 0.0001 inch)

T= Tight  
L = Loose

| BEARING O.D.           |                                 |                                 | CLASS 3 AND 0 <sup>1</sup>   |                  |            |                              |                  |            |
|------------------------|---------------------------------|---------------------------------|------------------------------|------------------|------------|------------------------------|------------------|------------|
| Range<br>mm (inches)   | Tolerance<br>µm<br>(0.0001 in.) | Non-adjustable<br>or In Carrier |                              |                  | Floating   |                              | Adjustable       |            |
|                        |                                 | Symbol                          | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol     | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol     |
| — over 152.4 incl.     | +13<br>0                        |                                 | -13<br>0                     | 26T<br>0         | +25<br>+38 | 12L<br>38L                   | 0<br>+13         | 13T<br>13L |
| — over 6 incl.         | +5<br>0                         |                                 | -5<br>0                      | 10T<br>0         | +10<br>+15 | 5L<br>15L                    | 0<br>+5          | 5T<br>5L   |
| 152.4 over 304.8 incl. | +13<br>0                        |                                 | -25<br>0                     | 38T<br>0         | +25<br>+38 | 12L<br>38L                   | 0<br>+25         | 13T<br>25L |
| 6 over 12 incl.        | +5<br>0                         |                                 | -10<br>0                     | 15T<br>0         | +10<br>+15 | 5L<br>15L                    | 0<br>+10         | 5T<br>10L  |
| 304.8 over 609.6 incl. | +25<br>0                        |                                 | -25<br>0                     | 50T<br>0         | +38<br>+64 | 13L<br>64L                   | 0<br>+25         | 25T<br>25L |
| 12 over 24 incl.       | +10<br>0                        |                                 | -10<br>0                     | 20T<br>0         | +15<br>+25 | 5L<br>25L                    | 0<br>+10         | 10T<br>10L |
| 609.6 over 914.4 incl. | +38<br>0                        |                                 | -38<br>0                     | 76T<br>0         | +51<br>+89 | 13L<br>89L                   | 0<br>+38         | 38T<br>38L |
| 24 over 36 incl.       | +15<br>0                        |                                 | -15<br>0                     | 30T<br>0         | +20<br>+35 | 5L<br>35L                    | 0<br>+15         | 15T<br>15L |

<sup>(1)</sup>Class 0 made only to 304.8 mm (12 inch) O.D.

| BEARING O.D.         |                 | CLASS B                         |                              |                  |           |                              |                  |            |                              |                  |            |
|----------------------|-----------------|---------------------------------|------------------------------|------------------|-----------|------------------------------|------------------|------------|------------------------------|------------------|------------|
| Range<br>mm (inches) | Tolerance<br>µm | Non-adjustable<br>or In Carrier |                              |                  | Floating  |                              |                  | Adjustable |                              |                  |            |
|                      |                 | Symbol                          | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol    | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Symbol     | Housing<br>Bore<br>Deviation | Resultant<br>Fit |            |
| over                 | incl.           |                                 |                              |                  |           |                              |                  |            |                              |                  |            |
| 18                   | 30              | 0<br>-6                         | M5                           | -14<br>-5        | 14T<br>1L | G5                           | +7<br>+16        | 7L<br>22L  | K5                           | -8<br>+1         | 8T<br>7L   |
| 30                   | 50              | 0<br>-7                         | M5                           | -16<br>-5        | 16T<br>2L | G5                           | +9<br>+20        | 9L<br>27L  | K5                           | -9<br>+2         | 9T<br>9L   |
| 50                   | 80              | 0<br>-9                         | M5                           | -19<br>-6        | 19T<br>3L | G5                           | +10<br>+23       | 10L<br>32L | K5                           | -10<br>+3        | 10T<br>12L |
| 80                   | 120             | 0<br>-10                        | M5                           | -23<br>-8        | 23T<br>2L | G5                           | +12<br>+27       | 12L<br>37L | K5                           | -13<br>+2        | 13T<br>12L |
| 120                  | 150             | 0<br>-11                        | M5                           | -27<br>-9        | 27T<br>2L | G5                           | +14<br>+32       | 14L<br>43L | K5                           | -15<br>+3        | 15T<br>12L |
| 150                  | 180             | 0<br>-13                        | M5                           | -27<br>-9        | 27T<br>4L | G5                           | +14<br>+32       | 14L<br>45L | K5                           | -15<br>+3        | 15T<br>16L |
| 180                  | 250             | 0<br>-15                        | M5                           | -31<br>-11       | 31T<br>4L | G5                           | +15<br>+35       | 15L<br>50L | K5                           | -18<br>+2        | 18T<br>17L |
| 250                  | 315             | 0<br>-18                        | M5                           | -36<br>-13       | 36T<br>5L | G5                           | +17<br>+40       | 17L<br>58L | K5                           | -20<br>+3        | 20T<br>21L |

| BEARING O.D. |                                 | CLASS A AND AA                  |                  |                              |                  |                              |                  |          |
|--------------|---------------------------------|---------------------------------|------------------|------------------------------|------------------|------------------------------|------------------|----------|
| Range<br>mm  | Tolerance<br>µm<br>(0.0001 in.) | Non-adjustable<br>or In Carrier |                  | Floating                     |                  | Adjustable                   |                  |          |
|              |                                 | Housing<br>Bore<br>Deviation    | Resultant<br>Fit | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Housing<br>Bore<br>Deviation | Resultant<br>Fit |          |
| over         | incl.                           |                                 |                  |                              |                  |                              |                  |          |
| 0            | 315                             | -0<br>-8                        | -16<br>-8        | 16T<br>0                     | +8<br>+16        | 8L<br>24L                    | -8<br>-0         | 8T<br>8L |

| BEARING O.D.         |                                 | CLASS 00 AND 000                |                  |                              |                  |                              |                  |          |
|----------------------|---------------------------------|---------------------------------|------------------|------------------------------|------------------|------------------------------|------------------|----------|
| Range<br>mm (inches) | Tolerance<br>µm<br>(0.0001 in.) | Non-adjustable<br>or In Carrier |                  | Floating                     |                  | Adjustable                   |                  |          |
|                      |                                 | Housing<br>Bore<br>Deviation    | Resultant<br>Fit | Housing<br>Bore<br>Deviation | Resultant<br>Fit | Housing<br>Bore<br>Deviation | Resultant<br>Fit |          |
| over                 | incl.                           |                                 |                  |                              |                  |                              |                  |          |
| 0                    | 304.8                           | +8<br>0                         | -8<br>0          | 16T<br>0                     | +15<br>+23       | 7L<br>23L                    | 0<br>+8          | 8T<br>8L |
| 0                    | 12                              | +3<br>0                         | -3<br>0          | 6T<br>0                      | +6<br>+9         | 3L<br>9L                     | 0<br>+3          | 3T<br>3L |

FITTING PRACTICES - continued

**FITTING GUIDELINES FOR INCH BEARINGS  
AUTOMOTIVE EQUIPMENT  
BEARING CLASSES 4 AND 2**

| SHAFT O.D. (µm - INCHES)                                                           |         |             | CONE BORE        |                  | STATIONARY CONE |           |               |
|------------------------------------------------------------------------------------|---------|-------------|------------------|------------------|-----------------|-----------|---------------|
| Deviation from nominal (minimum) bearing bore and resultant fit (µm - 0.0001 inch) |         |             | over             | incl.            | Tolerance       | Deviation | Resultant Fit |
|                                                                                    |         |             |                  |                  |                 |           |               |
| 0                                                                                  | 76.200  | 0<br>+13    | -5<br>-18        | 5L<br>31L        |                 |           |               |
| 76.200                                                                             | 304.800 | 0<br>+25    | -13<br>-38       | 13L<br>63L       |                 |           |               |
| in.                                                                                | in.     | in.         | in.              | in.              |                 |           |               |
| 0                                                                                  | 3.0000  | 0<br>+.0005 | -.0002<br>-.0007 | .0002L<br>.0012L |                 |           |               |
| 3.0000                                                                             | 12.0000 | 0<br>+.0010 | -.0005<br>-.0015 | .0005L<br>.0025L |                 |           |               |

T= Tight  
L = Loose

Heavy-duty min. fit of .0005 inch per inch of cone bore

**FITTING GUIDELINES FOR METRIC BEARINGS  
AUTOMOTIVE EQUIPMENT  
BEARING CLASSES K AND N**

| SHAFT O.D. (µm - INCHES)                                                           |        |             | CONE BORE           |                  | STATIONARY CONE |           |               |
|------------------------------------------------------------------------------------|--------|-------------|---------------------|------------------|-----------------|-----------|---------------|
| Deviation from nominal (maximum) bearing bore and resultant fit (µm - 0.0001 inch) |        |             | over                | incl.            | Tolerance       | Deviation | Resultant Fit |
|                                                                                    |        |             |                     |                  |                 |           |               |
| 18                                                                                 | 30     | -12<br>0    | f6 -20<br>-33       | 8L<br>33L        |                 |           |               |
| 30                                                                                 | 50     | -12<br>0    | f6 -25<br>-41       | 13L<br>41L       |                 |           |               |
| 50                                                                                 | 80     | -15<br>0    | f6 -30<br>-49       | 15L<br>49L       |                 |           |               |
| 80                                                                                 | 120    | -20<br>0    | f6 -36<br>-58       | 16L<br>58L       |                 |           |               |
| 120                                                                                | 180    | -25<br>0    | f6 -43<br>-68       | 18L<br>68L       |                 |           |               |
| in.                                                                                | in.    | in.         | in.                 | in.              |                 |           |               |
| .7087                                                                              | 1.1811 | -.0005<br>0 | f6 -.0008<br>-.0013 | .0003L<br>.0013L |                 |           |               |
| 1.1811                                                                             | 1.9865 | -.0005<br>0 | f6 -.0010<br>-.0016 | .0005L<br>.0016L |                 |           |               |
| 1.9685                                                                             | 3.1496 | -.0006<br>0 | f6 -.0012<br>-.0019 | .0006L<br>.0019L |                 |           |               |
| 3.1496                                                                             | 4.7244 | -.0008<br>0 | f6 -.0014<br>-.0023 | .0006L<br>.0023L |                 |           |               |
| 4.7244                                                                             | 7.0866 | -.0010<br>0 | f6 -.0016<br>-.0026 | .0006L<br>.0026L |                 |           |               |

T= Tight  
L = Loose



| ROTATING CONE                        |                  |                                                        |                    |                         |                  |                         |                  |                         |                  |                         |                   |                                                                                 |                  |
|--------------------------------------|------------------|--------------------------------------------------------|--------------------|-------------------------|------------------|-------------------------|------------------|-------------------------|------------------|-------------------------|-------------------|---------------------------------------------------------------------------------|------------------|
| Rear Wheels<br>(Semi-floating Axles) |                  | Rear Wheels<br>(UNIT-BEARING)<br>(Semi-floating Axles) |                    | Pinion                  |                  |                         |                  |                         |                  | Differential            |                   | Transaxles<br>Transmissions<br>Transfer Cases<br>Cross Shafts<br>Non-adjustable |                  |
| Non-adjustable                       |                  | Non-adjustable                                         |                    | Clamped                 |                  | Collapsible Spacer      |                  | Non-adjustable          |                  | Non-adjustable          |                   | Non-adjustable                                                                  |                  |
| Shaft O.D.<br>Deviation              | Resultant<br>Fit | Shaft O.D.<br>Deviation                                | Resultant<br>Fit   | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit  | Shaft O.D.<br>Deviation                                                         | Resultant<br>Fit |
| µm                                   | µm               | µm                                                     | µm                 | µm                      | µm               | µm                      | µm               | µm                      | µm               | µm                      | µm                | µm                                                                              | µm               |
| +51<br>+38                           | 51T<br>25T       | +56<br>+38                                             | 56T<br>25T         | +38<br>+25              | 38T<br>13T       | +30<br>+18              | 30T<br>5T        | +51<br>+38              | 51T<br>25T       | +102<br>+64             | 102T<br>51T       | +38<br>+25                                                                      | 38T<br>12T       |
| +76<br>+51                           | 76T<br>26T       |                                                        |                    | +63<br>+38              | 63T<br>13T       |                         |                  | +76<br>+51              | 76T<br>26T       | +102<br>+76             | 102T<br>51T       | +64<br>+38                                                                      | 64T<br>13T       |
| in.                                  | in.              | in.                                                    | in.                | in.                     | in.              | in.                     | in.              | in.                     | in.              | in.                     | in.               | in.                                                                             | in.              |
| +0.020<br>+0.015                     | .0020T<br>.0010T | +0.022<br>+0.015                                       | .0022 T<br>.0010 T | +0.015<br>+0.010        | .0015T<br>.0005T | +0.012<br>+0.007        | .0012T<br>.0002T | +0.020<br>+0.015        | .0020T<br>.0010T | +0.040<br>+0.025        | +0.040T<br>.0020T | +0.015<br>+0.010                                                                | .0015T<br>.0005T |
| +0.030<br>+0.020                     | .0030T<br>.0010T |                                                        |                    | .0025<br>.0015          | .0025T<br>.0005T |                         |                  | +0.030<br>+0.020        | .0030T<br>.0010T | +0.040<br>+0.025        | .0040T<br>.0020T  | +0.025<br>+0.015                                                                | .0025T<br>.0005T |

| ROTATING CONE                        |                  |                                                        |                  |                         |                  |                         |                  |                         |                  |                         |                  |                                                                                 |                   |
|--------------------------------------|------------------|--------------------------------------------------------|------------------|-------------------------|------------------|-------------------------|------------------|-------------------------|------------------|-------------------------|------------------|---------------------------------------------------------------------------------|-------------------|
| Rear Wheels<br>(Semi-floating Axles) |                  | Rear Wheels<br>(UNIT-BEARING)<br>(Semi-floating Axles) |                  | Pinion                  |                  |                         |                  |                         |                  | Differential            |                  | Transaxles<br>Transmissions<br>Transfer Cases<br>Cross Shafts<br>Non-adjustable |                   |
| Non-adjustable                       |                  | Non-adjustable                                         |                  | Clamped                 |                  | Collapsible Spacer      |                  | Non-adjustable          |                  | Non-adjustable          |                  | Non-adjustable                                                                  |                   |
| Shaft O.D.<br>Deviation              | Resultant<br>Fit | Shaft O.D.<br>Deviation                                | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation | Resultant<br>Fit | Shaft O.D.<br>Deviation                                                         | Resultant<br>Fit  |
| µm                                   | µm               | µm                                                     | µm               | µm                      | µm               | µm                      | µm               | µm                      | µm               | µm                      | µm               | µm                                                                              | µm                |
| p6 +35<br>+22                        | 47T<br>22T       | p6 +35<br>+22                                          | 47T<br>22T       | k6 +15<br>+2            | 27T<br>2T        | k6 +15<br>+2            | 27T<br>2T        | p6 +35<br>+22           | 47T<br>22T       | +56<br>22T              | 68T<br>+35       | m6 +21<br>35T +8                                                                | 33T<br>8T         |
| p6 +42<br>+26                        | 54T<br>26T       | p6 +42<br>+26                                          | 54T<br>26T       | k6 +18<br>+2            | 30T<br>2T        | k6 +18<br>+2            | 30T<br>2T        | p6 +42<br>+26           | 54T<br>26T       | +68<br>+43              | 80T<br>43T       | m6 +25<br>+9                                                                    | 37T<br>9T         |
| p6 +51<br>+32                        | 66T<br>32T       |                                                        |                  | k6 +21<br>+2            | 36T<br>2T        | k6 +21<br>+2            | 36T<br>2T        | p6 +51<br>+32           | 66T<br>32T       | +89<br>+59              | 104T<br>59T      | m6 +30<br>+11                                                                   | 45T<br>11T        |
| n6 +45<br>+23                        | 65T<br>23T       |                                                        |                  | j6 +13<br>-9            | 33T<br>9L        |                         |                  | n6 +45<br>+23           | 65T<br>23T       | +114<br>+79             | 134T<br>79T      | m6 +35<br>+13                                                                   | 55T<br>13T        |
| n6 +52<br>+27                        | 77T<br>29T       |                                                        |                  | j6 +14<br>-11           | 39T<br>11L       |                         |                  | n6 +52<br>+27           | 77T<br>29T       | +140<br>+100            | 165T<br>100T     | m6 +40<br>+15                                                                   | 66T<br>15T        |
| in.                                  | in.              | in.                                                    | in.              | in.                     | in.              | in.                     | in.              | in.                     | in.              | in.                     | in.              | in.                                                                             | in.               |
| p6 +0.013<br>+0.008                  | .0018T<br>.0008T | p6 +0.013<br>+0.008                                    | .0018T<br>.0008T | k6 +0.006<br>+0.001     | .0011T<br>.0001T | k6 +0.006<br>+0.001     | .0011T<br>.0001T | p6 +0.013<br>+0.008     | .0018T<br>.0008T | +0.022<br>+0.014        | .0027T<br>.0014T | m6 +0.008<br>+0.003                                                             | .0013T<br>.0003 T |
| p6 +0.016<br>+0.010                  | .0021T<br>.0010T | p6 +0.016<br>+0.010                                    | .0021T<br>.0010T | k6 +0.007<br>+0.001     | .0012T<br>.0001T | k6 +0.007<br>+0.001     | .0012T<br>.0001T | p6 +0.016<br>+0.010     | .0021T<br>.0010T | +0.028<br>+0.018        | .0033T<br>.0018T | m6 +0.010<br>+0.004                                                             | .0015T<br>.0004T  |
| p6 +0.021<br>+0.014                  | .0027T<br>.0014T |                                                        |                  | k6 +0.008<br>-0.001     | .0014T<br>.0001L | k6 +0.008<br>+0.001     | .0014T<br>.0001L | p6 +0.021<br>+0.014     | .0027T<br>.0014T | +0.034<br>+0.022        | .0040T<br>.0022T | m6 +0.012<br>+0.005                                                             | .0018T<br>.0005T  |
| n6 +0.019<br>+0.010                  | .0027T<br>.0010T |                                                        |                  | j6 +0.005<br>-0.004     | .0013T<br>.0004L |                         |                  | n6 +0.019<br>+0.010     | .0027T<br>.0010T | +0.044<br>+0.030        | .0052T<br>.0030T | m6 +0.014<br>+0.005                                                             | .0022T<br>.0005T  |
| n6 +0.022<br>+0.012                  | .0032T<br>.0012T |                                                        |                  | j6 +0.006<br>-0.004     | .0016T<br>.0004L |                         |                  | n6 +0.022<br>+0.012     | .0032T<br>.0012T | +0.056<br>+0.040        | .0066T<br>.0040T | m6 +0.016<br>+0.006                                                             | .0026T<br>.0006T  |

FITTING PRACTICES - continued

**FITTING GUIDELINES FOR INCH BEARINGS  
AUTOMOTIVE EQUIPMENT BEARING CLASSES 4 AND 2**

Deviation from nominal (minimum) bearing bore and resultant fit (µm - 0.001 inch)

| HOUSING BORE (µm - INCHES)           |                        |               |                        |                                |                        |                  |                       |                  |                  |                |                  |                  |                  |
|--------------------------------------|------------------------|---------------|------------------------|--------------------------------|------------------------|------------------|-----------------------|------------------|------------------|----------------|------------------|------------------|------------------|
|                                      | CUP O.D.               |               |                        | ROTATING CUP                   |                        |                  |                       | STATIONARY CUP   |                  |                |                  |                  |                  |
|                                      | over                   | incl.         | Tolerance              | Front Wheels                   | Rear Wheels            | Rear Wheels      | (Semi-Floating Axles) | Differential     | (Split Seat)     | Trans-missions | Transfer Cases   | Pinion           | Differential     |
|                                      |                        |               |                        | (Full Floating Trailer Wheels) |                        | Adjustable (TS)  | Clamped (TSU)         | Adjustable       | Adjustable       | Adjustable     | Non-Adjustable   | Non-Adjustable   |                  |
|                                      | Housing Bore Deviation | Resultant Fit | Housing Bore Deviation | Resultant Fit                  | Housing Bore Deviation |                  |                       |                  |                  |                |                  |                  | Resultant Fit    |
| mm                                   | mm                     | µm            | µm                     | µm                             | µm                     | µm               | µm                    | µm               | µm               | µm             | µm               | µm               | µm               |
| Inch System Bearings Classes 4 and 2 | 0                      | 76.200        | +25<br>0               | -51<br>-13                     | 76T<br>13T             | +38<br>+76       | 13L<br>76L            | +25<br>+51       | 0<br>51L         | 0<br>+25       | 25T<br>25L       | -38<br>-13       | 63T<br>13T       |
|                                      | 76.200                 | 127.00        | +25<br>0               | -77<br>-25                     | 102T<br>25T            | +38<br>+76       | 13L<br>76L            | +25<br>+51       | 0<br>51L         | 0<br>+25       | 25T<br>25L       | -51<br>-25       | 76T<br>25T       |
|                                      | 127.00                 | 304.800       | +25<br>0               | -77<br>-25                     | 102T<br>25T            |                  |                       | 0<br>+51         | 25T<br>51L       | 0<br>+51       | 25T<br>51L       | -77<br>-25       | 102T<br>25T      |
|                                      | in.                    | in.           | in.                    | in.                            | in.                    | in.              | in.                   | in.              | in.              | in.            | in.              | in.              | in.              |
|                                      | 0                      | 3.0000        | +0.010<br>0            | -0.020<br>-0.005               | .0030T<br>.0005T       | +0.015<br>+0.030 | .0005L<br>.0030L      | +0.010<br>+0.020 | 0<br>.0020L      | 0<br>+0.010    | .0010T<br>.0010L | -0.015<br>-0.005 | .0025T<br>.0005T |
|                                      | 3.0000                 | 5.0000        | +0.010<br>0            | -0.030<br>-0.010               | .0040T<br>.0010T       | +0.015<br>+0.030 | .0005L<br>.0030L      | +0.010<br>+0.020 | 0<br>.0020L      | 0<br>+0.010    | .0010T<br>.0010L | -0.020<br>-0.010 | .0030T<br>.0010T |
|                                      | 5.0000                 | 12.0000       | +0.010<br>0            | -0.030<br>-0.010               | .0040T<br>.0010T       |                  |                       | 0<br>+0.020      | .0010T<br>.0020L | 0<br>+0.020    | .0010T<br>.0020L | -0.030<br>-0.010 | .0040T<br>.0010T |

Aluminum housings min. fit of .001 inch per inch of cup O.D.  
Magnesium housings min. fit of .0015 inch per inch of cup O.D.

FITTING PRACTICES - continued

**FITTING GUIDELINES FOR METRIC BEARINGS  
AUTOMOTIVE EQUIPMENT BEARING CLASSES K AND N**

Deviation from nominal (minimum) bearing bore and resultant fit (µm - inches)

| HOUSING BORE (µm - INCHES) |         |             |                                                      |                  |                 |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  |     |                  |                 |
|----------------------------|---------|-------------|------------------------------------------------------|------------------|-----------------|--------------------------------------|------------------|------------------------------|--------------|----------------------------------------------|------------------|----------------------------------------------------------------------------------|------------------|------------------|-----|------------------|-----------------|
| CUP O.D.                   |         |             | ROTATING CUP                                         |                  |                 | STATIONARY CUP                       |                  |                              |              |                                              |                  |                                                                                  |                  |                  |     |                  |                 |
|                            |         |             | Front Wheels<br>Rear Wheels<br>(Full Floating Axles) |                  |                 | Rear Wheels<br>(Semi-floating Axles) |                  | Differential<br>(Split Seat) |              | Transmissions<br>Transfer Cases Cross Shafts |                  | Pinion Differential<br>(Solid Seat) Transaxles<br>Transmission<br>Transfer Cases |                  |                  |     |                  |                 |
|                            |         |             | Non-adjustable                                       |                  |                 | Adjustable (TS)<br>Clamped (TSU)     |                  | Adjustable                   |              | Adjustable                                   |                  | Non-Adjustable                                                                   |                  |                  |     |                  |                 |
| over                       | incl.   | Tolerance   | Housing Bore                                         | Resultant        | Housing Bore    | Resultant                            | Housing Bore     | Resultant                    | Housing Bore | Resultant                                    | Housing Bore     | Resultant                                                                        | Housing Bore     | Resultant        |     |                  |                 |
| µm                         | µm      | µm          | Deviation                                            | Fit              | Deviation       | Fit                                  | Deviation        | Fit                          | Deviation    | Fit                                          | Deviation        | Fit                                                                              | Deviation        | Fit              |     |                  |                 |
| 30                         | 50      | 0<br>-14    | R7                                                   | -50<br>-25       | 50T<br>11T      | G7                                   | +9<br>+34        | 9L<br>48L                    | H7           | 0<br>+25                                     | 0<br>39L         | K6                                                                               | -13<br>+3        | 13T<br>17L       | R7  | -50<br>-25       | 50T<br>11T      |
| 50                         | 65      | 0<br>-16    | R7                                                   | -60<br>-30       | 60T<br>14T      | G7                                   | +10<br>+40       | 10L<br>56L                   | H7           | 0<br>+30                                     | 0<br>46L         | K6                                                                               | -15<br>+4        | 15T<br>20L       | R7  | -60<br>-30       | 60T<br>14T      |
| 65                         | 80      | 0<br>-16    | R7                                                   | -62<br>-32       | 62T<br>16T      |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -62<br>-32       | 62T<br>16T      |
| 80                         | 100     | 0<br>-18    | R7                                                   | -73<br>-38       | 73T<br>20T      | G7                                   | +12<br>+47       | 12L<br>65L                   | H7           | 0<br>+35                                     | 0<br>53L         | K6                                                                               | -18<br>+4        | 18T<br>22L       | R7  | -73<br>-38       | 73T<br>20T      |
| 100                        | 120     | 0<br>-18    | R7                                                   | -76<br>-41       | 76T<br>23T      |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -76<br>-41       | 76T<br>23T      |
| 120                        | 140     | 0<br>-20    | R7                                                   | -88<br>-48       | 88T<br>28T      | G7                                   | +14<br>+54       | 14L<br>74L                   | J7           | -14<br>+26                                   | 14T<br>46L       | K6                                                                               | -21<br>+4        | 21T<br>24L       | R7  | -88<br>-48       | 88T<br>28T      |
| 140                        | 150     | 0<br>-20    | R7                                                   | -90<br>-50       | 90T<br>30T      |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -90<br>-50       | 90T<br>30T      |
| 150                        | 160     | 0<br>-25    | R7                                                   | -90<br>-50       | 90T<br>25T      | G7                                   | +14<br>+54       | 14L<br>79L                   | J7           | -14<br>+26                                   | 14T<br>51L       | K6                                                                               | -21<br>+4        | 21T<br>29L       | R7  | -90<br>-50       | 90T<br>25T      |
| 160                        | 180     | 0<br>-25    | R7                                                   | -93<br>-53       | 93T<br>28T      |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -93<br>-53       | 93T<br>28T      |
| 180                        | 200     | 0<br>-30    | R7                                                   | -106<br>-60      | 106T<br>30T     |                                      |                  |                              | J7           | -16<br>+30                                   | 16T<br>60L       | J7                                                                               | -16<br>+30       | 16T<br>60L       | R7  | -106<br>-60      | 106T<br>30T     |
| 200                        | 225     | 0<br>-30    | R7                                                   | -109<br>-63      | 109T<br>33T     |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -109<br>-63      | 109T<br>33T     |
| 225                        | 250     | 0<br>-30    | R7                                                   | -113<br>-67      | 113T<br>37T     |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -113<br>-67      | 113T<br>37T     |
| 250                        | 280     | 0<br>-35    | R7                                                   | -126<br>-74      | 126T<br>39T     |                                      |                  |                              | J7           | -16<br>+36                                   | 16T<br>71L       | J7                                                                               | -16<br>+36       | 16T<br>71L       | R7  | -126<br>-74      | 126T<br>39T     |
| 280                        | 315     | 0<br>-35    | R7                                                   | -130<br>-78      | 130T<br>43T     |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -130<br>-78      | 130T<br>43T     |
| in.                        | in.     | in.         | in.                                                  | in.              | in.             | in.                                  | in.              | in.                          | in.          | in.                                          | in.              | in.                                                                              | in.              | in.              | in. | in.              | in.             |
| 1.1811                     | 1.9685  | 0<br>-0.006 | R7                                                   | -0.020<br>-0.010 | .0020T<br>.004T | G7                                   | +0.004<br>+0.014 | .0004L<br>.0020L             | H7           | 0<br>+0.010                                  | 0<br>.0016L      | K6                                                                               | -0.005<br>+0.001 | .0005T<br>.0007L | R7  | -0.020<br>-0.010 | .0020T<br>.004T |
| 1.9685                     | 2.5591  | 0<br>-0.006 | R7                                                   | -0.023<br>-0.011 | .0023T<br>.005T | G7                                   | +0.004<br>+0.016 | .0004L<br>.0022L             | H7           | 0<br>+0.012                                  | 0<br>.0018L      | K6                                                                               | -0.006<br>+0.001 | .0006T<br>.0007L | R7  | -0.023<br>-0.011 | .0023T<br>.005T |
| 2.5591                     | 3.1496  | 0<br>-0.006 | R7                                                   | -0.023<br>-0.011 | .0023T<br>.005T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.023<br>-0.011 | .0023T<br>.005T |
| 3.1496                     | 3.9370  | 0<br>-0.007 | R7                                                   | -0.029<br>-0.015 | .0029T<br>.008T | G7                                   | +0.005<br>+0.019 | .0005L<br>.0026L             | H7           | 0<br>+0.014                                  | 0<br>.0021L      | K6                                                                               | -0.007<br>+0.002 | .0007T<br>.0009L | R7  | -0.029<br>-0.015 | .0029T<br>.008T |
| 3.9370                     | 4.7244  | 0<br>-0.007 | R7                                                   | -0.029<br>-0.015 | .0029T<br>.008T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.029<br>-0.015 | .0029T<br>.008T |
| 4.7244                     | 5.5118  | 0<br>-0.008 | R7                                                   | -0.035<br>-0.019 | .0035T<br>.011T | G7                                   | +0.006<br>+0.022 | .0006L<br>.0030L             | J7           | -0.006<br>+0.010                             | .0006T<br>.0018L | K6                                                                               | -0.008<br>+0.002 | .0008T<br>.0010L | R7  | -0.035<br>-0.019 | .0035T<br>.011T |
| 5.5118                     | 5.9055  | 0<br>-0.008 | R7                                                   | -0.035<br>-0.019 | .0035T<br>.011T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.035<br>-0.019 | .0035T<br>.011T |
| 5.9055                     | 6.2992  | 0<br>-0.010 | R7                                                   | -0.035<br>-0.019 | .0035T<br>.009T | G7                                   | +0.006<br>+0.022 | .0006L<br>.0032L             | J7           | -0.006<br>+0.010                             | .0006T<br>.0020L | K6                                                                               | -0.008<br>+0.002 | .0008T<br>.0012L | R7  | -0.035<br>-0.019 | .0035T<br>.009T |
| 6.2992                     | 7.0866  | 0<br>-0.010 | R7                                                   | -0.035<br>-0.019 | .0035T<br>.009T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.035<br>-0.019 | .0035T<br>.009T |
| 7.0866                     | 7.8740  | 0<br>-0.012 | R7                                                   | -0.042<br>-0.024 | .0042T<br>.012T |                                      |                  |                              | J7           | -0.007<br>+0.011                             | .0007T<br>.0023L | J7                                                                               | -0.007<br>+0.011 | .0007T<br>.0023L | R7  | -0.042<br>-0.024 | .0042T<br>.012T |
| 7.8740                     | 8.8583  | 0<br>-0.012 | R7                                                   | -0.042<br>-0.024 | .0042T<br>.012T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.042<br>-0.024 | .0042T<br>.012T |
| 8.8583                     | 9.8425  | 0<br>-0.012 | R7                                                   | -0.042<br>-0.024 | .0042T<br>.012T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.042<br>-0.024 | .0042T<br>.012T |
| 9.8425                     | 11.0236 | 0<br>-0.014 | R7                                                   | -0.047<br>-0.027 | .0047T<br>.013T |                                      |                  |                              | J7           | -0.007<br>+0.013                             | .0007T<br>.0027L | J7                                                                               | -0.007<br>+0.013 | .0007T<br>.0027L | R7  | -0.047<br>-0.027 | .0047T<br>.013T |
| 11.0236                    | 12.4016 | 0<br>-0.014 | R7                                                   | -0.047<br>-0.027 | .0047T<br>.013T |                                      |                  |                              |              |                                              |                  |                                                                                  |                  |                  | R7  | -0.047<br>-0.027 | .0047T<br>.013T |

Aluminum housings min. fit of .001 inch per inch of cup O.D.  
Magnesium housings min. fit of .0015 inch per inch of cup O.D.

## FITTING PRACTICES - continued

### Non-ferrous housings

Care should be taken when pressing cups into aluminum or magnesium housings to avoid metal pick up. This may result in unsatisfactory fits, backing, and alignment from debris trapped between the cup and backing shoulder. Preferably, the cup should be frozen or the housing heated, or both, during assembly. Also, a special lubricant may be used to ease assembly. In some cases, cups are mounted in steel inserts which are attached to the aluminum or magnesium housings. Table fits may then be used. Where the cup is fitted directly into an aluminum housing, it is suggested that a minimum tight fit of 1.0  $\mu\text{m}$  per mm (0.0010 in. per in.) of cup outside diameter be used. For a magnesium housing, a minimum tight fit of 1.5  $\mu\text{m}$  per mm (0.0015 in. per in.) of cup outside diameter is suggested.

### Hollow shafts

In case of a thin section hollow shaft, the fits mentioned in the tables for industrial applications should be increased to avoid possible cone creeping under some load conditions.

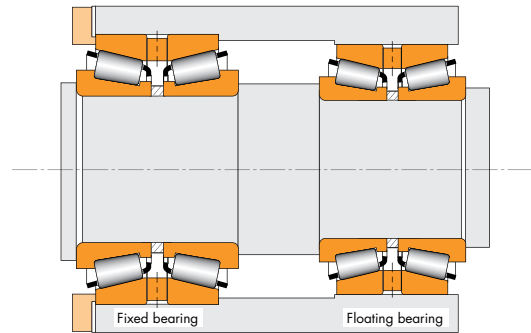
### Heavy-duty fitting practice

Where heavy-duty loads, shock loads or high speeds are involved, the heavy-duty fitting practice should be used, regardless of whether the cone seats are ground or unground. Where it is impractical to grind the shaft O.D. for the cone seats, the tighter heavy-duty fitting practice should be followed. In this case the turned shaft O.D. should not exceed a maximum surface finish of 3.2  $\mu\text{m}$  (125  $\mu\text{in}$ ) arithmetic average.

The average interference cone fit for inch bearings above 76.2 mm (3 in.) bore should be 0.5  $\mu\text{m}$  per mm (0.0005 in. per in.) of bearing bore. See inch fitting practice tables for cones with smaller bores. The minimum fit should not be less than 25  $\mu\text{m}$  (0.0010 in.) tight. If the shaft diameter is held to the same tolerance as the bearing bore, use the average interference fit. For example, average interference fit between a 609.6 mm (24 in.) bore cone and shaft will be 305  $\mu\text{m}$  (0.0120 in.). The fit range will be 305  $\mu\text{m}$  (0.0120 in.) tight plus or minus the bearing bore tolerance. See metric fitting practice tables for heavy-duty metric cone fitting practice.

### Double-row assemblies with double cups

Non-rotating double outer races of types TDO and TNA bearings are generally mounted with loose fits to permit assembly and disassembly (Fig. A-24). The loose fit also permits axial floating when the bearing is mounted in conjunction with an axially fixed (locating) bearing on the other end of the shaft. Double outer races types CD and DC can be pinned to prevent rotation in the housing. Fitting values can be taken from general industrial guidelines.



**Fig. A-24**  
Double-row bearing arrangement assembled with loose fit.

### Bearing assemblies

#### SR, TNA, TNASW, TNASWE types

The tolerance and fits for bearing types SR, TNA, TNASW, and TNASWE are tabulated along with the other dimensions in the bearing tables.

**CAUTION:** Failure to use the specified fits may result in improper bearing setting. Reduced bearing performance or malfunction may occur. This may cause damage to machinery in which the bearing is a component. If interference fits are either greater or less than those specified, the mounted bearing setting will be other than intended.

FITTING PRACTICES - continued

SHAFT AND HOUSING FITS

RADIAL BALL AND CYLINDRICAL ROLLER BEARINGS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions.

| SHAFT                                        |                               |                        |                                                 |                                                                                            |                                                     |                  |                                                    |       |                                       |                     |       |
|----------------------------------------------|-------------------------------|------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------|----------------------------------------------------|-------|---------------------------------------|---------------------|-------|
| Ball Bearings<br>(For all nominal diameters) |                               |                        | Operating Conditions                            | Examples                                                                                   | Cylindrical Roller Bearings<br>(Except 5200 Series) |                  |                                                    |       |                                       |                     |       |
| Loads                                        |                               | Shaft Tolerance Symbol |                                                 |                                                                                            | Loads                                               |                  | Shaft Diameter mm                                  |       | Shaft Tolerance Symbol <sup>(1)</sup> | Shaft Diameter inch |       |
| Lower Load Limit                             | Upper Load Limit              |                        |                                                 | Lower Load Limit                                                                           | Upper Load Limit                                    |                  |                                                    |       |                                       |                     |       |
| <b>Inner Ring Stationary</b>                 |                               |                        | Inner ring to be easily displaced on shaft      | Wheels<br>Non-rotating shafts                                                              | 0                                                   | C <sup>(6)</sup> | All g6                                             |       | All                                   |                     |       |
| 0                                            | C <sub>e</sub> <sup>(7)</sup> | g6                     |                                                 |                                                                                            |                                                     |                  |                                                    |       |                                       |                     |       |
| 0                                            | C <sub>e</sub>                | h6                     | Inner ring does not need to be easily displaced | Tension pulleys                                                                            | 0                                                   | C                | All h6                                             |       | All                                   |                     |       |
| <b>Inner Ring Rotating or Indeterminate</b>  |                               |                        |                                                 |                                                                                            |                                                     |                  | over                                               | incl. |                                       | over                | incl. |
| 0                                            | 0.07 C <sub>e</sub>           | j6 <sup>(2)</sup>      | Light loads                                     | Electrical apparatus<br>Machine tools<br>Pumps<br>Ventilators<br>Industrial trucks         | 0                                                   | 0.08C            | 0                                                  | 40    | j6 <sup>(8)</sup>                     | 0                   | 1.57  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 40                                                 | 140   | k6 <sup>(4)</sup>                     | 1.57                | 3.94  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 140                                                | 320   | m6 <sup>(5)</sup>                     | 5.51                | 12.60 |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 320                                                | 500   | n6                                    | 12.60               | 19.68 |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 500                                                | –     | p6                                    | 19.68               | –     |
| 0.07 C <sub>e</sub>                          | 0.15 C <sub>e</sub>           | k5                     | Normal loads                                    | Electrical motors<br>Turbines<br>Pumps<br>Combustion engines<br>Gear transmissions<br>etc. | 0.08C                                               | 0.18C            | 0                                                  | 40    | k5                                    | 0                   | 1.57  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 40                                                 | 100   | m5                                    | 1.57                | 3.94  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 100                                                | 140   | m6                                    | 3.94                | 5.51  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 140                                                | 320   | n6                                    | 5.51                | 12.60 |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 320                                                | 500   | p6                                    | 12.60               | 19.68 |
| 500                                          | –                             | r6                     | 19.68                                           | –                                                                                          |                                                     |                  |                                                    |       |                                       |                     |       |
| 0.15 C <sub>e</sub>                          | C <sub>e</sub>                | m5                     | Heavy loads<br>Shock loads                      | Rail vehicles<br>Traction motors                                                           | 0.18C                                               | C                | 0                                                  | 40    | m5 <sup>(3)</sup>                     | 0                   | 1.57  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 40                                                 | 65    | m6 <sup>(3)</sup>                     | 1.57                | 2.56  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 65                                                 | 140   | n6 <sup>(3)</sup>                     | 2.56                | 5.51  |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 140                                                | 320   | p6 <sup>(3)</sup>                     | 5.51                | 12.60 |
|                                              |                               |                        |                                                 |                                                                                            |                                                     |                  | 320                                                | 500   | r6 <sup>(3)</sup>                     | 12.60               | 19.68 |
| 500                                          | –                             | r7 <sup>(3)</sup>      | 19.68                                           | –                                                                                          |                                                     |                  |                                                    |       |                                       |                     |       |
| <b>Thrust Loads</b>                          |                               |                        |                                                 |                                                                                            |                                                     |                  | Not suggested, consult your Timken representative. |       |                                       |                     |       |
| 0                                            | C <sub>e</sub>                | j6 <sup>(3)</sup>      | Pure thrust loads                               | All                                                                                        |                                                     |                  |                                                    |       |                                       |                     |       |

(1) For solid shaft. See pages A61 for numerical values.

(2) Use j5 for accurate applications.

(3) Bearings with greater than nominal clearance must be used.

(4) Use k5 for accurate applications.

(5) Use m5 for accurate applications.

(6) C = Dynamic Load Rating.

(7) C<sub>e</sub> = Extended Dynamic Load Rating (Ball Bearings).

(8) Use j5 for accurate applications.

| HOUSING                                                               |                                                                        |                                         |                                 |
|-----------------------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------|---------------------------------|
| Operating Conditions                                                  | Examples                                                               | Housing Tolerance Symbol <sup>(1)</sup> | Outer Ring Displaceable Axially |
| <b>Outer Ring Rotating</b>                                            |                                                                        |                                         |                                 |
| Heavy loads with thin-wall housing                                    | Crane support wheels<br>Wheel hubs (roller bearings)<br>Crank bearings | P6                                      | No                              |
| Normal to heavy loads                                                 | Wheel hubs (ball bearings)<br>Crank bearings                           | N6                                      | No                              |
| Light loads                                                           | Conveyor rollers<br>Rope sheaves<br>Tension pulleys                    | M6                                      | No                              |
| <b>Indeterminate Load Direction</b>                                   |                                                                        |                                         |                                 |
| Heavy shock loads                                                     | Electric traction motors                                               | M7                                      | No                              |
| Normal to heavy loads, axial displacement of outer ring not required. | Electric motors<br>Pumps<br>Crankshaft main bearings                   | K6                                      | No, normally                    |
| Light to normal loads, axial displacement of outer ring desired.      | Electric motors<br>Pumps<br>Crankshaft main bearings                   | J6                                      | Yes, normally                   |
| <b>Outer Ring Stationary</b>                                          |                                                                        |                                         |                                 |
| Shock loads, temporary complete unloading                             | Heavy rail vehicles                                                    | J6                                      | Yes, normally                   |
| All loads                                                             | One-piece housing                                                      | H6                                      | Easily                          |
|                                                                       | Radially split housing                                                 | H7                                      | Easily                          |
| Heat supplied through shaft                                           | Drier cylinders                                                        | G7                                      | Easily                          |

\* Below this line, housing can either be one piece or split; above this line, a split housing is not suggested.

(1) Cast iron steel housing. See pages A61 to A72 for numerical values.

Where wider tolerances are permissible, P7, N7, M7, K7, J7 and H7 values may be used in place of P6, N6, M6, K6, J6, and H6 values respectively.

## FITTING PRACTICES - continued

### RADIAL BALL BEARINGS ABEC 1 AND ABEC 3 BALL BEARINGS

#### Shaft and housing fits

The tables on the following pages show information supplemental to and coherent with that found on pages A125 through A139 as applied to ball bearings. Actual shaft and housing diameters are listed for ABEC 1, ABEC 3 and angular contact 7000WN Series. These suggestions can be used for most applications having light to normal loads. Shaft and housing fits for wide inner ring ball bearings are found on page A133.

### ABEC 7 BALL BEARINGS

#### Shaft fits

As a general rule, it is suggested that the shaft size and tolerance for seating ABEC 7 super precision bearings be the same as the bearing bore thus producing an average line-to-line fit. For larger shaft sizes, the average fit increases to a slight interference.

#### EXAMPLE

| Bore Size, Inches | Shaft Diameter, Inches | Resultant Mounting Fits, Inches | Average Fit  |
|-------------------|------------------------|---------------------------------|--------------|
| Max. 2.1654       | Min. 2.1652            | .0002 tight                     | line-to-line |
| Min. 2.1652       | Max. 2.1654            | .0002 loose                     |              |

### HOUSING FITS

Under normal conditions of rotating shaft, the outer ring is stationary and should be mounted with a hand push or light tapping fit. Should the housing be the rotating member, the same fundamental considerations apply in mounting the outer race as in the case of an inner ring mounted on a rotating shaft.

As a general rule, the minimum housing bore dimensions for super precision bearings may be established as the same as the maximum bearing outside diameter. If the bearing O.D. tolerance is .0003 inch, the maximum housing bore should be established as .0003 inch larger than the minimum housing bore dimension.

#### EXAMPLE

| Outside Diameter, Inches | Housing Bore, Inches | Resultant Mounting Fits, Inches | Average Fit Inches |
|--------------------------|----------------------|---------------------------------|--------------------|
| Max. 3.5433              | Min. 3.5433          | .0000 tight                     | .0003 loose        |
| Min. 3.5430              | Max. 3.5436          | .0006 loose                     |                    |

On high-speed applications, it is extremely important that the floating bearing or pair can move axially to compensate for thermal changes. It cannot float laterally if restricted by a tight housing bore or by the radial expansion of the bearing itself. Cases involving unusual conditions should be submitted to your Timken representative for suggestions.

It is equally important that all shaft and housing shoulders be absolutely square and that the faces of the spacers be square and parallel.

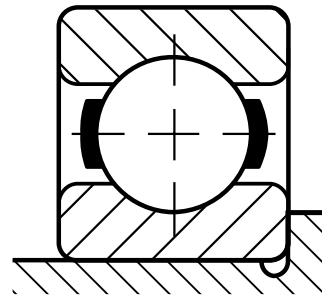
### Selective assembly

Under certain conditions it may be desirable to control fits more accurately without the added expense of using closer-tolerance bearings and mating parts. This can be accomplished by selective assembly of bearings, shafts and housings after they have been sized and grouped according to bores and outside diameters. Generally, however, it is more satisfactory for production and servicing to use closer shaft and housing tolerances with bearings having a higher degree of precision.

Bearings with coded bores and O.D.s are available on special order to facilitate this selective assembly process.

### Shafts and housing fillets

The suggested shaft and housing fillet radii listed in the dimension tables of the product catalogs should be used to assure proper seating of the bearings against shaft and housing shoulders. The manufacturing tolerances on bearing corner radii are such that the corners will clear the cataloged fillet radii when the bearings are tightly seated against shoulders. Shaft and housing radii and shoulders should be free from nicks and burrs. Whenever possible, undercutting of bearing seats and adjacent shoulders per figure below is advisable to help avoid tapered bearing seats and assure clearing corners.



FITTING PRACTICES - continued

SHAFT AND HOUSING FITS RADIAL BALL BEARING  
Shaft fits, ABEC 1, ABEC 3

Note: These tables are to be used for applications where only one ring (either inner or outer) has an interference fit with its shaft and housing. The guidelines for operating conditions covering these tables are found on page A123. In cases where interference fits are used for both rings, bearings with a special internal clearance may be required. Shaft diameter dimensions are for solid steel shafts. Consult your Timken representative when using hollow shafts.

| SHAFT FITS, ABEC 1, ABEC 3                 |                |        |        |        |                                                                                                  |        |        |        |                      |         |                      |         |                                                                                                  |        |        |        |                |         |        |         |
|--------------------------------------------|----------------|--------|--------|--------|--------------------------------------------------------------------------------------------------|--------|--------|--------|----------------------|---------|----------------------|---------|--------------------------------------------------------------------------------------------------|--------|--------|--------|----------------|---------|--------|---------|
| Basic Bearing Number                       | Bore Tolerance |        |        |        | Shaft Rotating, Load Stationary or Shaft Stationary, Load Rotating (Typical Inner Ring Rotation) |        |        |        |                      |         |                      |         | Shaft Stationary, Load Stationary or Shaft Rotating, Load Rotating (Typical Outer Ring Rotation) |        |        |        |                |         |        |         |
|                                            |                |        |        |        | Shaft Diameter                                                                                   |        |        |        | Mean Fit Tight       |         |                      |         | Shaft diameter                                                                                   |        |        |        | Mean Fit Loose |         |        |         |
|                                            | Max.           |        | Min.   |        | Max.                                                                                             |        | Min.   |        | ABEC 1               |         | ABEC 3               |         | Max.                                                                                             |        | Min.   |        | ABEC 1         |         | ABEC 3 |         |
|                                            | mm             | in.    | mm     | in.    | mm                                                                                               | in.    | mm     | in.    | mm                   | in.     | mm                   | in.     | mm                                                                                               | in.    | mm     | in.    | mm             | in.     | mm     | in.     |
| <b>Extra-Small 30, S, F-Flanged Series</b> |                |        |        |        |                                                                                                  |        |        |        |                      |         |                      |         |                                                                                                  |        |        |        |                |         |        |         |
| 33K3, F33K3                                | 3.175          | 0.1250 | 3.167  | 0.1247 | 3.180                                                                                            | 0.1252 | 3.175  | 0.1250 | 0.006                | 0.00025 | 0.005                | 0.00020 | 3.170                                                                                            | 0.1248 | 3.162  | 0.1245 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 33K4                                       | 3.175          | 0.1250 | 3.167  | 0.1247 | 3.180                                                                                            | 0.1252 | 3.175  | 0.1250 | 0.006                | 0.00025 | 0.005                | 0.00020 | 3.170                                                                                            | 0.1248 | 3.162  | 0.1245 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 33K5                                       | 4.762          | 0.1875 | 3.754  | 0.1872 | 4.768                                                                                            | 0.1877 | 4.762  | 0.1875 | 0.006                | 0.00025 | 0.005                | 0.00020 | 4.752                                                                                            | 0.1873 | 4.750  | 0.1870 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 34K                                        | 4.000          | 0.1575 | 3.992  | 0.1572 | 4.006                                                                                            | 0.1577 | 4.001  | 0.1575 | 0.006                | 0.00025 | 0.005                | 0.00020 | 3.995                                                                                            | 0.1573 | 3.988  | 0.1570 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 35K                                        | 5.000          | 0.1969 | 4.992  | 0.1966 | 5.006                                                                                            | 0.1971 | 5.001  | 0.1969 | 0.006                | 0.00025 | 0.005                | 0.00020 | 4.996                                                                                            | 0.1967 | 4.989  | 0.1964 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 36K                                        | 6.000          | 0.2362 | 5.992  | 0.2359 | 6.005                                                                                            | 0.2364 | 5.999  | 0.2362 | 0.006                | 0.00025 | 0.005                | 0.00020 | 5.994                                                                                            | 0.2360 | 5.987  | 0.2357 | 0.005          | 0.00020 | 0.006  | 0.00025 |
| 37K                                        | 7.000          | 0.2756 | 6.992  | 0.2753 | 7.005                                                                                            | 0.2758 | 6.998  | 0.2755 | 0.005                | 0.00020 | 0.004                | 0.00015 | 6.995                                                                                            | 0.2754 | 6.985  | 0.2750 | 0.006          | 0.00025 | 0.008  | 0.00030 |
| 38K,38KV                                   | 8.000          | 0.3150 | 7.992  | 0.3147 | 8.006                                                                                            | 0.3152 | 7.998  | 0.3149 | 0.005                | 0.00020 | 0.004                | 0.00015 | 7.996                                                                                            | 0.3148 | 7.986  | 0.3144 | 0.006          | 0.00025 | 0.008  | 0.00030 |
| 39K                                        | 9.000          | 0.3543 | 8.992  | 0.3540 | 9.004                                                                                            | 0.3545 | 8.997  | 0.3542 | 0.005                | 0.00020 | 0.004                | 0.00015 | 8.994                                                                                            | 0.3541 | 8.984  | 0.3537 | 0.006          | 0.00025 | 0.008  | 0.00030 |
| S1K,S1K7,FS1K7                             | 6.350          | 0.2500 | 6.342  | 0.2497 | 6.355                                                                                            | 0.2502 | 6.347  | 0.2499 | 0.005                | 0.00020 | 0.004                | 0.00015 | 6.345                                                                                            | 0.2498 | 6.335  | 0.2494 | 0.006          | 0.00025 | 0.008  | 0.00030 |
| S3K,FS3K                                   | 9.525          | 0.3750 | 9.517  | 0.3747 | 9.530                                                                                            | 0.3752 | 9.522  | 0.3749 | 0.005                | 0.00020 | 0.004                | 0.00015 | 9.520                                                                                            | 0.3748 | 9.510  | 0.3744 | 0.006          | 0.00025 | 0.008  | 0.00030 |
| S5K                                        | 12.700         | 0.5000 | 12.692 | 0.4997 | 12.705                                                                                           | 0.5002 | 12.697 | 0.4999 | 0.005                | 0.00020 | 0.004                | 0.00015 | 12.695                                                                                           | 0.4998 | 12.682 | 0.4993 | 0.008          | 0.00030 | 0.009  | 0.00035 |
| S7K                                        | 15.875         | 0.6250 | 15.867 | 0.6247 | 15.880                                                                                           | 0.6252 | 15.872 | 0.6249 | 0.005                | 0.00020 | 0.004                | 0.00015 | 15.870                                                                                           | 0.6248 | 15.857 | 0.6243 | 0.008          | 0.00030 | 0.009  | 0.00035 |
| S8K                                        | 19.050         | 0.7500 | 19.040 | 0.7496 | 19.060                                                                                           | 0.7504 | 19.053 | 0.7501 | 0.011                | 0.00045 | 0.009                | 0.00035 | 19.042                                                                                           | 0.7497 | 19.030 | 0.7492 | 0.009          | 0.00035 | 0.011  | 0.00045 |
| S9K                                        | 22.225         | 0.8750 | 22.215 | 0.8746 | 22.235                                                                                           | 0.8754 | 22.228 | 0.8751 | 0.011                | 0.00045 | 0.009                | 0.00035 | 22.217                                                                                           | 0.8747 | 22.205 | 0.8742 | 0.009          | 0.00035 | 0.011  | 0.00045 |
| S10K                                       | 25.400         | 1.0000 | 25.390 | 0.9996 | 25.410                                                                                           | 1.0004 | 25.403 | 1.0001 | 0.011                | 0.00045 | 0.009                | 0.00035 | 25.392                                                                                           | 0.9997 | 25.380 | 0.9992 | 0.009          | 0.00035 | 0.011  | 0.00045 |
| S11K                                       | 28.575         | 1.1250 | 28.565 | 1.1246 | 28.585                                                                                           | 1.1254 | 28.578 | 1.1251 | 0.011                | 0.00045 | 0.009                | 0.00035 | 28.567                                                                                           | 1.1247 | 28.555 | 1.1242 | 0.009          | 0.00035 | 0.011  | 0.00045 |
| S12K                                       | 31.750         | 1.2500 | 31.737 | 1.2495 | 31.763                                                                                           | 1.2505 | 31.753 | 1.2501 | 0.014                | 0.00055 | 0.011                | 0.00045 | 31.740                                                                                           | 1.2496 | 31.725 | 1.2490 | 0.011          | 0.00045 | 0.014  | 0.00055 |
| F2DD-2                                     | 3.183          | 0.1253 | 3.175  | 0.1250 | 3.175                                                                                            | 0.1250 | 3.167  | 0.1247 | 0.008 <sup>(1)</sup> | 0.00030 | 0.006 <sup>(1)</sup> | 0.00025 | 3.175                                                                                            | 0.1250 | 3.167  | 0.1247 | 0.008          | 0.00030 | 0.006  | 0.00025 |
| F2                                         | 4.770          | 0.1878 | 4.762  | 0.1875 | 4.762                                                                                            | 0.1875 | 4.755  | 0.1872 | 0.008 <sup>(1)</sup> | 0.00030 | 0.006 <sup>(1)</sup> | 0.00025 | 4.762                                                                                            | 0.1875 | 4.755  | 0.1872 | 0.008          | 0.00030 | 0.006  | 0.00025 |
| F3                                         | 4.770          | 0.1878 | 4.762  | 0.1875 | 4.762                                                                                            | 0.1875 | 4.755  | 0.1872 | 0.008 <sup>(1)</sup> | 0.00030 | 0.006 <sup>(1)</sup> | 0.00025 | 4.762                                                                                            | 0.1875 | 4.755  | 0.1872 | 0.008          | 0.00030 | 0.006  | 0.00025 |
| F4                                         | 6.358          | 0.2503 | 6.350  | 0.2500 | 6.350                                                                                            | 0.2500 | 6.342  | 0.2497 | 0.008 <sup>(1)</sup> | 0.00030 | 0.006 <sup>(1)</sup> | 0.00025 | 6.350                                                                                            | 0.2500 | 6.342  | 0.2497 | 0.008          | 0.00030 | 0.006  | 0.00025 |
| F5                                         | 7.946          | 0.3128 | 7.938  | 0.3125 | 7.938                                                                                            | 0.3125 | 7.930  | 0.3122 | 0.008 <sup>(1)</sup> | 0.00030 | 0.006 <sup>(1)</sup> | 0.00025 | 7.938                                                                                            | 0.3125 | 7.930  | 0.3122 | 0.008          | 0.00030 | 0.006  | 0.00025 |

<sup>(1)</sup> Mean fit loose. These sizes have plus bore tolerances.



# ENGINEERING

A

## FITTING PRACTICES - continued

### SHAFT AND HOUSING FITS RADIAL BALL BEARING

#### Shaft fits, ABEC 1, ABEC 3

Note: These tables are to be used for applications where only one ring (either inner or outer) has an interference fit with its shaft and housing. The guidelines for operating conditions covering these tables are found on page A123. In cases where interference fits are used for both rings, bearings with a special internal clearance may be required. Shaft diameter dimensions are for solid steel shafts. Consult your Timken representative when using hollow shafts.

| SHAFT FITS, ABEC 1, ABEC 3                          |                |         |                |         |                                                                                                              |         |                |         |                                                                    |        |        |         |                                                                                                              |         |         |         |       |         |       |         |
|-----------------------------------------------------|----------------|---------|----------------|---------|--------------------------------------------------------------------------------------------------------------|---------|----------------|---------|--------------------------------------------------------------------|--------|--------|---------|--------------------------------------------------------------------------------------------------------------|---------|---------|---------|-------|---------|-------|---------|
| Basic Bearing Number                                | Bore Tolerance |         |                |         | These diameters result in shaft to bearing bore fit which closely conforms to k5 listed on pages A66 and A72 |         |                |         |                                                                    |        |        |         | These diameters result in shaft to bearing bore fit which closely conforms to g6 listed on pages A66 and A72 |         |         |         |       |         |       |         |
|                                                     |                |         |                |         | Shaft Rotating, Load Stationary or Shaft Stationary, Load Rotating                                           |         |                |         | Shaft Stationary, Load Stationary or Shaft Rotating, Load Rotating |        |        |         |                                                                                                              |         |         |         |       |         |       |         |
|                                                     | Shaft Diameter |         | Mean Fit Tight |         | Shaft Diameter                                                                                               |         | Mean Fit Loose |         | Max.                                                               | Min.   | ABEC 1 | ABEC 3  | Max.                                                                                                         | Min.    | ABEC 1  | ABEC 3  |       |         |       |         |
|                                                     | Max.           | Min.    |                |         | Max.                                                                                                         | Min.    | ABEC 1         | ABEC 3  | Max.                                                               | Min.   | ABEC 1 | ABEC 3  | Max.                                                                                                         | Min.    | ABEC 1  | ABEC 3  |       |         |       |         |
|                                                     | mm             | in.     | mm             | in.     | mm                                                                                                           | in.     | mm             | in.     | mm                                                                 | in.    | mm     | in.     | mm                                                                                                           | in.     | mm      | in.     |       |         |       |         |
| <b>9100, 9300, 200, 300, 400, 5200, 5300 SERIES</b> |                |         |                |         |                                                                                                              |         |                |         |                                                                    |        |        |         |                                                                                                              |         |         |         |       |         |       |         |
| 00                                                  | 10             | 0.3937  | 9.992          | 0.3934  | 10.005                                                                                                       | 0.3939  | 9.997          | 0.3936  | 0.005                                                              | 0.0002 | 0.004  | 0.00015 | 9.995                                                                                                        | 0.3935  | 9.985   | 0.3931  | 0.006 | 0.00025 | 0.008 | 0.00030 |
| 01                                                  | 12             | 0.4724  | 11.992         | 0.4721  | 12.004                                                                                                       | 0.4726  | 11.996         | 0.4723  | 0.005                                                              | 0.0002 | 0.004  | 0.00015 | 11.994                                                                                                       | 0.4722  | 11.981  | 0.4717  | 0.008 | 0.00030 | 0.009 | 0.00035 |
| 02                                                  | 15             | 0.5906  | 14.992         | 0.5903  | 15.006                                                                                                       | 0.5908  | 14.999         | 0.5905  | 0.005                                                              | 0.0002 | 0.004  | 0.00015 | 14.996                                                                                                       | 0.5904  | 14.983  | 0.5899  | 0.008 | 0.00030 | 0.009 | 0.00035 |
| 03                                                  | 17             | 0.6693  | 16.992         | 0.6690  | 17.005                                                                                                       | 0.6695  | 16.998         | 0.6692  | 0.005                                                              | 0.0002 | 0.004  | 0.00015 | 16.995                                                                                                       | 0.6691  | 16.982  | 0.6686  | 0.008 | 0.00030 | 0.009 | 0.00035 |
| 04                                                  | 20             | 0.7874  | 19.990         | 0.7870  | 20.010                                                                                                       | 0.7879  | 20.002         | 0.7875  | 0.013                                                              | 0.0005 | 0.009  | 0.00035 | 19.992                                                                                                       | 0.7871  | 19.980  | 0.7866  | 0.009 | 0.00035 | 0.011 | 0.00045 |
| 05                                                  | 25             | 0.9843  | 24.990         | 0.9839  | 25.014                                                                                                       | 0.9848  | 25.004         | 0.9844  | 0.013                                                              | 0.0005 | 0.009  | 0.00035 | 24.994                                                                                                       | 0.9840  | 24.981  | 0.9835  | 0.009 | 0.00035 | 0.011 | 0.00045 |
| 06                                                  | 30             | 1.1811  | 29.990         | 1.1807  | 30.010                                                                                                       | 1.1816  | 30.002         | 1.1812  | 0.013                                                              | 0.0005 | 0.009  | 0.00035 | 29.992                                                                                                       | 1.1808  | 29.980  | 1.1803  | 0.009 | 0.00035 | 0.011 | 0.00045 |
| 07                                                  | 35             | 1.3780  | 34.987         | 1.3775  | 35.014                                                                                                       | 1.3785  | 35.004         | 1.3781  | 0.014                                                              | 0.0006 | 0.011  | 0.00045 | 34.991                                                                                                       | 1.3776  | 34.976  | 1.3770  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 08                                                  | 40             | 1.5748  | 39.987         | 1.5743  | 40.013                                                                                                       | 1.5753  | 40.002         | 1.5749  | 0.014                                                              | 0.0006 | 0.011  | 0.00045 | 39.990                                                                                                       | 1.5744  | 39.975  | 1.5738  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 09                                                  | 45             | 1.7717  | 44.987         | 1.7712  | 45.014                                                                                                       | 1.7722  | 45.004         | 1.7718  | 0.014                                                              | 0.0006 | 0.011  | 0.00045 | 44.991                                                                                                       | 1.7713  | 44.976  | 1.7707  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 10                                                  | 50             | 1.9685  | 49.987         | 1.9680  | 50.013                                                                                                       | 1.9690  | 50.002         | 1.9686  | 0.014                                                              | 0.0006 | 0.011  | 0.00045 | 49.990                                                                                                       | 1.9681  | 49.974  | 1.9675  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 11                                                  | 55             | 2.1654  | 54.985         | 2.1648  | 55.016                                                                                                       | 2.1660  | 55.004         | 2.1655  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 54.991                                                                                                       | 2.1650  | 54.973  | 2.1643  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 12                                                  | 60             | 2.3622  | 59.985         | 2.3616  | 60.015                                                                                                       | 2.3628  | 60.002         | 2.3623  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 59.990                                                                                                       | 2.3618  | 59.972  | 2.3611  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 13                                                  | 65             | 2.5591  | 64.985         | 2.5585  | 65.016                                                                                                       | 2.5597  | 65.004         | 2.5592  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 64.991                                                                                                       | 2.5587  | 64.973  | 2.5580  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 14                                                  | 70             | 2.7559  | 69.985         | 2.7553  | 70.015                                                                                                       | 2.7565  | 70.002         | 2.7560  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 69.990                                                                                                       | 2.7555  | 69.972  | 2.7548  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 15                                                  | 75             | 2.9528  | 74.985         | 2.9522  | 75.016                                                                                                       | 2.9534  | 75.004         | 2.9529  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 74.991                                                                                                       | 2.9524  | 74.973  | 2.9517  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 16                                                  | 80             | 3.1496  | 79.985         | 3.1490  | 80.015                                                                                                       | 3.1502  | 80.002         | 3.1497  | 0.017                                                              | 0.0007 | 0.014  | 0.00055 | 79.990                                                                                                       | 3.1492  | 79.972  | 3.1485  | 0.011 | 0.00045 | 0.014 | 0.00055 |
| 17                                                  | 85             | 3.3465  | 84.980         | 3.3457  | 85.019                                                                                                       | 3.3472  | 85.004         | 3.3466  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 84.988                                                                                                       | 3.3460  | 84.968  | 3.3452  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 18                                                  | 90             | 3.5433  | 89.980         | 3.5425  | 90.018                                                                                                       | 3.5440  | 90.002         | 3.5434  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 89.987                                                                                                       | 3.5428  | 89.967  | 3.5420  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 19                                                  | 95             | 3.7402  | 94.980         | 3.7394  | 95.019                                                                                                       | 3.7409  | 95.004         | 3.7403  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 94.988                                                                                                       | 3.7397  | 94.968  | 3.7389  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 20                                                  | 100            | 3.9370  | 99.980         | 3.9362  | 100.018                                                                                                      | 3.9377  | 100.002        | 3.9371  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 99.987                                                                                                       | 3.9365  | 99.967  | 3.9357  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 21                                                  | 105            | 4.1339  | 104.980        | 4.1331  | 105.019                                                                                                      | 4.1346  | 105.004        | 4.1340  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 104.988                                                                                                      | 4.1334  | 104.968 | 4.1326  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 22                                                  | 110            | 4.3307  | 109.980        | 4.3299  | 110.018                                                                                                      | 4.3314  | 110.002        | 4.3308  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 109.987                                                                                                      | 4.3302  | 109.967 | 4.3294  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| <b>EXTRA-LARGE SERIES</b>                           |                |         |                |         |                                                                                                              |         |                |         |                                                                    |        |        |         |                                                                                                              |         |         |         |       |         |       |         |
| 124, 224, 324                                       | 120            | 4.7244  | 119.980        | 4.7236  | 120.018                                                                                                      | 4.7251  | 120.002        | 4.7245  | 0.020                                                              | 0.0008 | 0.017  | 0.00065 | 119.987                                                                                                      | 4.7239  | 119.967 | 4.7231  | 0.013 | 0.00050 | 0.017 | 0.00065 |
| 126, 226, 326                                       | 130            | 5.1181  | 129.975        | 5.1171  | 130.020                                                                                                      | 5.1189  | 130.002        | 5.1182  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 129.984                                                                                                      | 5.1175  | 129.962 | 5.1166  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 128, 228, 328                                       | 140            | 5.5118  | 139.975        | 5.5108  | 140.020                                                                                                      | 5.5126  | 140.002        | 5.5119  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 139.984                                                                                                      | 5.5112  | 139.962 | 5.5103  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 9130, 130, 230, 330                                 | 150            | 5.9055  | 149.975        | 5.9045  | 150.020                                                                                                      | 5.9063  | 150.002        | 5.9056  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 149.984                                                                                                      | 5.9049  | 149.962 | 5.9040  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 9132, 132, 232                                      | 160            | 6.2992  | 159.975        | 6.2982  | 160.020                                                                                                      | 6.3000  | 160.002        | 6.2993  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 159.984                                                                                                      | 6.2986  | 159.962 | 6.2977  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 9134, 134, 234                                      | 170            | 6.6929  | 169.975        | 6.6919  | 170.020                                                                                                      | 6.6937  | 170.002        | 6.6930  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 169.984                                                                                                      | 6.6923  | 169.962 | 6.6914  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 9136, 136, 236, 336                                 | 180            | 7.0866  | 179.975        | 7.0856  | 180.020                                                                                                      | 7.0874  | 180.002        | 7.0867  | 0.024                                                              | 0.0010 | 0.019  | 0.00075 | 179.984                                                                                                      | 7.0860  | 179.962 | 7.0851  | 0.014 | 0.00055 | 0.019 | 0.00075 |
| 9138, 138, 238, 338                                 | 190            | 7.4803  | 189.970        | 7.4791  | 190.025                                                                                                      | 7.4813  | 190.005        | 7.4805  | 0.030                                                              | 0.0012 | 0.024  | 0.00095 | 189.984                                                                                                      | 7.4797  | 189.956 | 7.4786  | 0.014 | 0.00055 | 0.020 | 0.00080 |
| 9140, 240, 340                                      | 200            | 7.8740  | 199.969        | 7.8728  | 200.025                                                                                                      | 7.8750  | 200.005        | 7.8742  | 0.030                                                              | 0.0012 | –      | –       | 199.984                                                                                                      | 7.8734  | 199.954 | 7.8722  | 0.015 | 0.00060 | –     | –       |
| 9142, 242, 342                                      | 210            | 8.2677  | 212.509        | 8.2665  | 209.771                                                                                                      | 8.2587  | 210.002        | 8.2678  | 0.030                                                              | 0.0012 | –      | –       | 209.987                                                                                                      | 8.2672  | 209.951 | 8.2658  | 0.015 | 0.00060 | –     | –       |
| 9144, 244, 344                                      | 220            | 8.6614  | 219.969        | 8.6602  | 220.025                                                                                                      | 8.6624  | 220.005        | 8.6616  | 0.030                                                              | 0.0012 | –      | –       | 219.984                                                                                                      | 8.6608  | 219.954 | 8.6596  | 0.015 | 0.00060 | –     | –       |
| 9146, 246                                           | 230            | 9.0551  | 229.969        | 9.0539  | 230.025                                                                                                      | 9.0561  | 230.005        | 9.0553  | 0.030                                                              | 0.0012 | –      | –       | 230.022                                                                                                      | 9.0545  | 229.951 | 9.0533  | 0.015 | 0.00060 | –     | –       |
| 248, 348                                            | 240            | 9.4488  | 239.969        | 9.4476  | 240.025                                                                                                      | 9.4498  | 240.005        | 9.4490  | 0.030                                                              | 0.0012 | –      | –       | 239.984                                                                                                      | 9.4482  | 239.954 | 9.4470  | 0.015 | 0.00060 | –     | –       |
| 250                                                 | 250            | 9.8425  | 249.964        | 9.8411  | 250.020                                                                                                      | 9.8434  | 250.005        | 9.8426  | 0.030                                                              | 0.0012 | –      | –       | 250.022                                                                                                      | 9.8418  | 249.972 | 9.8406  | 0.015 | 0.00060 | –     | –       |
| 9152, 252, 352                                      | 260            | 10.2362 | 259.964        | 10.2348 | 260.027                                                                                                      | 10.2373 | 260.005        | 10.2364 | 0.036                                                              | 0.0014 | –      | –       | 259.982                                                                                                      | 10.2355 | 259.951 | 10.2343 | 0.015 | 0.00060 | –     | –       |
| 9156, 256, 356                                      | 280            | 11.0236 | 279.964        | 11.0222 | 280.027                                                                                                      | 11.0247 | 280.005        | 11.0238 | 0.036                                                              | 0.0014 | –      | –       | 279.982                                                                                                      | 11.0229 | 279.951 | 11.0217 | 0.015 | 0.00060 | –     | –       |
| 9160, 260                                           | 300            | 11.8110 | 299.964        | 11.8096 | 300.027                                                                                                      | 11.8121 | 300.005        | 11.8112 | 0.036                                                              | 0.0014 | –      | –       | 299.982                                                                                                      | 11.8103 | 299.951 | 11.8091 | 0.015 | 0.00060 | –     | –       |
| 9164, 264                                           | 320            | 12.5984 | 319.964        | 12.5970 | 320.030                                                                                                      | 12.5996 | 320.005        | 12.5986 | 0.038                                                              | 0.0015 | –      | –       | 319.982                                                                                                      | 12.5977 | 319.946 | 12.5963 | 0.015 | 0.00060 | –     | –       |
| 9180                                                | 400            | 15.7480 | 399.969        | 15.7464 | 400.030                                                                                                      | 15.7492 | 400.005        | 15.7482 | 0.038                                                              | 0.0015 | –      | –       | 399.982                                                                                                      | 15.7473 | 399.946 | 15.7459 | 0.015 | 0.00060 | –     | –       |

FITTING PRACTICES - continued

SHAFT FITS, 7000WN

Note: These tables are to be used for applications where only one ring (either inner or outer) has an interference fit with its shaft and housing. The guidelines for operating conditions covering these tables are found on page A123. In cases where interference fits are used for both rings, bearings with a special internal clearance may be required. Shaft diameter dimensions are for solid steel shafts. Consult your Timken representative when using hollow shafts.

| SHAFT FITS, 7000WN SINGLE ROW ANGULAR CONTACT BEARINGS |                       |        |         |        |                                                |        |         |        |                |         |
|--------------------------------------------------------|-----------------------|--------|---------|--------|------------------------------------------------|--------|---------|--------|----------------|---------|
| Bearing Bore Number                                    | Bearing Bore Diameter |        |         |        | Shaft Rotating, Load Stationary Shaft Diameter |        |         |        | Mean Tight Fit |         |
|                                                        | Max.                  |        | Min.    |        | Min.                                           |        | Max.    |        | mm             | in.     |
|                                                        | mm                    | in.    | mm      | in.    | mm                                             | in.    | mm      | in.    |                |         |
| 00                                                     | 10                    | 0.3937 | 9.992   | 0.3934 | 9.997                                          | 0.3936 | 10.005  | 0.3939 | 0.005          | 0.0002  |
| 01                                                     | 12                    | 0.4724 | 11.991  | 0.4721 | 11.996                                         | 0.4723 | 12.004  | 0.4726 | 0.005          | 0.0002  |
| 02                                                     | 15                    | 0.5906 | 14.994  | 0.5903 | 14.999                                         | 0.5905 | 15.006  | 0.5908 | 0.005          | 0.0002  |
| 03                                                     | 17                    | 0.6693 | 16.993  | 0.6690 | 16.998                                         | 0.6692 | 17.005  | 0.6695 | 0.005          | 0.0002  |
| 04                                                     | 20                    | 0.7874 | 19.992  | 0.7871 | 19.997                                         | 0.7873 | 20.005  | 0.7876 | 0.005          | 0.0002  |
| 05                                                     | 25                    | 0.9843 | 24.994  | 0.9840 | 24.999                                         | 0.9842 | 25.006  | 0.9845 | 0.005          | 0.0002  |
| 06                                                     | 30                    | 1.1811 | 29.992  | 1.1808 | 29.997                                         | 1.1810 | 30.005  | 1.1813 | 0.005          | 0.0002  |
| 07                                                     | 35                    | 1.3780 | 34.994  | 1.3777 | 34.999                                         | 1.3779 | 35.009  | 1.3783 | 0.006          | 0.00025 |
| 08                                                     | 40                    | 1.5748 | 39.992  | 1.5745 | 39.997                                         | 1.5747 | 40.008  | 1.5751 | 0.006          | 0.00025 |
| 09                                                     | 45                    | 1.7717 | 44.994  | 1.7714 | 44.999                                         | 1.7716 | 45.009  | 1.7720 | 0.006          | 0.00025 |
| 10                                                     | 50                    | 1.9685 | 49.992  | 1.9682 | 49.997                                         | 1.9684 | 50.008  | 1.9688 | 0.006          | 0.00025 |
| 11                                                     | 55                    | 2.1654 | 54.991  | 2.1650 | 54.999                                         | 2.1653 | 55.011  | 2.1658 | 0.009          | 0.00035 |
| 12                                                     | 60                    | 2.3622 | 59.990  | 2.3618 | 59.997                                         | 2.3621 | 60.010  | 2.3626 | 0.009          | 0.00035 |
| 13                                                     | 65                    | 2.5591 | 64.991  | 2.5587 | 64.999                                         | 2.5590 | 65.011  | 2.5595 | 0.009          | 0.00035 |
| 14                                                     | 70                    | 2.7559 | 69.990  | 2.7555 | 69.997                                         | 2.7558 | 70.010  | 2.7563 | 0.009          | 0.00035 |
| 15                                                     | 75                    | 2.9528 | 74.991  | 2.9524 | 74.999                                         | 2.9527 | 75.011  | 2.9532 | 0.009          | 0.00035 |
| 16                                                     | 80                    | 3.1496 | 79.990  | 3.1492 | 79.997                                         | 3.1495 | 80.010  | 3.1500 | 0.009          | 0.00035 |
| 17                                                     | 85                    | 3.3465 | 84.988  | 3.3460 | 84.999                                         | 3.3464 | 85.014  | 3.3470 | 0.011          | 0.00045 |
| 18                                                     | 90                    | 3.5433 | 89.987  | 3.5428 | 89.997                                         | 3.5432 | 90.013  | 3.5438 | 0.011          | 0.00045 |
| 19                                                     | 95                    | 3.7402 | 94.988  | 3.7397 | 94.999                                         | 3.7401 | 95.014  | 3.7407 | 0.011          | 0.00045 |
| 20                                                     | 100                   | 3.9370 | 99.987  | 3.9365 | 99.997                                         | 3.9369 | 100.013 | 3.9375 | 0.011          | 0.00045 |
| 21                                                     | 105                   | 4.1339 | 104.988 | 4.1334 | 104.999                                        | 4.1338 | 105.014 | 4.1344 | 0.011          | 0.00045 |
| 22                                                     | 110                   | 4.3307 | 109.987 | 4.3302 | 109.997                                        | 4.3306 | 110.012 | 4.3312 | 0.011          | 0.00045 |
| 24                                                     | 120                   | 4.7244 | 119.987 | 4.7239 | 119.997                                        | 4.7243 | 120.012 | 4.7249 | 0.011          | 0.00045 |
| 26                                                     | 130                   | 5.1181 | 129.982 | 5.1174 | 129.997                                        | 5.1180 | 130.015 | 5.1187 | 0.015          | 0.0006  |
| 28                                                     | 140                   | 5.5118 | 139.982 | 5.5111 | 139.997                                        | 5.5117 | 140.015 | 5.5124 | 0.015          | 0.0006  |
| 30                                                     | 150                   | 5.9055 | 149.982 | 5.9048 | 149.997                                        | 5.9054 | 150.015 | 5.9061 | 0.015          | 0.0006  |

# ENGINEERING

## FITTING PRACTICES - continued

### HOUSING FITS RADIAL BALL BEARING Housing fits, ABEC 1, ABEC 3

Note: These tables are to be used for applications where only one ring (either inner or outer) has an interference fit with its shaft and housing. The guidelines for operating conditions covering these tables are found on page A123. In cases where interference fits are used for both rings, bearings with a special internal clearance may be required. Housing bore diameter dimensions are for steel materials. Consult your Timken representative when using other housing materials.

| HOUSING FITS, ABEC 1, ABEC 3 |                   |                  |                  |                          |                                                                                                                       |        |                |        |                                                                        |         |                |         |                                                                                                                       |        |                |        |              |         |                |         |
|------------------------------|-------------------|------------------|------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------|--------|----------------|--------|------------------------------------------------------------------------|---------|----------------|---------|-----------------------------------------------------------------------------------------------------------------------|--------|----------------|--------|--------------|---------|----------------|---------|
| Basic Bearing Number         |                   |                  |                  |                          | These diameters result in a bearing O.D. to housing bore fit which closely conforms to H6 listed on pages A66 and A72 |        |                |        |                                                                        |         |                |         | These diameters result in a bearing O.D. to housing bore fit which closely conforms to M7 listed on pages A66 and A72 |        |                |        |              |         |                |         |
|                              |                   |                  |                  |                          | Housing Stationary, Load Stationary or Housing Rotating, Load Rotating                                                |        |                |        | Housing Rotating, Load Stationary or Housing Stationary, Load Rotating |         |                |         | Housing Bore                                                                                                          |        | Mean Fit Loose |        | Housing Bore |         | Mean Fit Tight |         |
| Extra Small                  | Extra Light       | Light            | Medium           | Heavy                    | Housing Bore                                                                                                          |        | Mean Fit Loose |        | Housing Bore                                                           |         | Mean Fit Tight |         | ABEC 1                                                                                                                |        | ABEC 3         |        |              |         |                |         |
|                              |                   |                  |                  |                          | Min.                                                                                                                  | Max    | ABEC 1         | ABEC 3 | Min.                                                                   | Max.    | ABEC 1         | ABEC 3  | Min.                                                                                                                  | Max.   | ABEC 1         | ABEC 3 |              |         |                |         |
|                              |                   |                  |                  |                          | mm                                                                                                                    | in.    | mm             | in.    | mm                                                                     | in.     | mm             | in.     | mm                                                                                                                    | in.    | mm             | in.    |              |         |                |         |
| <b>30, S, F</b>              | <b>9100, 9300</b> | <b>200,</b>      | <b>300,</b>      | <b>400<sup>(2)</sup></b> |                                                                                                                       |        |                |        |                                                                        |         |                |         |                                                                                                                       |        |                |        |              |         |                |         |
|                              |                   | <b>5200,7200</b> | <b>5300,7300</b> | <b>7400</b>              |                                                                                                                       |        |                |        |                                                                        |         |                |         |                                                                                                                       |        |                |        |              |         |                |         |
| <b>SERIES</b>                | <b>SERIES</b>     | <b>SERIES</b>    | <b>SERIES</b>    | <b>SERIES</b>            |                                                                                                                       |        |                |        |                                                                        |         |                |         |                                                                                                                       |        |                |        |              |         |                |         |
| 33K3, F33K3                  | —                 | —                | —                | —                        | 9.525                                                                                                                 | 0.3750 | 9.535          | 0.3754 | 0.010                                                                  | 0.00040 | 0.009          | 0.00035 | 9.507                                                                                                                 | 0.3743 | 9.525          | 0.3750 | 0.004        | 0.00015 | 0.005          | 0.00020 |
| 33K4                         | —                 | —                | —                | —                        | 12.700                                                                                                                | 0.5000 | 12.710         | 0.5004 | 0.010                                                                  | 0.00040 | 0.009          | 0.00035 | 12.682                                                                                                                | 0.4993 | 12.700         | 0.5000 | 0.004        | 0.00015 | 0.005          | 0.00020 |
| 33K5, F33K5                  | —                 | —                | —                | —                        | 12.700                                                                                                                | 0.5000 | 12.710         | 0.5004 | 0.010                                                                  | 0.00040 | 0.009          | 0.00035 | 12.682                                                                                                                | 0.4993 | 12.700         | 0.5000 | 0.004        | 0.00015 | 0.005          | 0.00020 |
| 34K                          | —                 | —                | —                | —                        | 15.999                                                                                                                | 0.6299 | 16.010         | 0.6303 | 0.010                                                                  | 0.00040 | 0.009          | 0.00035 | 15.982                                                                                                                | 0.6292 | 15.999         | 0.6299 | 0.004        | 0.00015 | 0.005          | 0.00020 |
| 35K                          | —                 | —                | —                | —                        | 18.999                                                                                                                | 0.7480 | 19.012         | 0.7485 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 18.979                                                                                                                | 0.7472 | 18.999         | 0.7480 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| 36K                          | —                 | —                | —                | —                        | 18.999                                                                                                                | 0.7480 | 19.012         | 0.7485 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 18.979                                                                                                                | 0.7472 | 18.999         | 0.7480 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| 37K                          | —                 | —                | —                | —                        | 21.999                                                                                                                | 0.8661 | 22.012         | 0.8666 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 21.979                                                                                                                | 0.8653 | 21.999         | 0.8661 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| 38K                          | —                 | —                | —                | —                        | 21.999                                                                                                                | 0.8661 | 22.012         | 0.8666 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 21.979                                                                                                                | 0.8653 | 21.999         | 0.8661 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| 38KV                         | —                 | —                | —                | —                        | 24.000                                                                                                                | 0.9449 | 24.013         | 0.9454 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 23.980                                                                                                                | 0.9441 | 24.000         | 0.9449 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| 39K                          | 9100              | —                | —                | —                        | 25.999                                                                                                                | 1.0236 | 26.012         | 1.0241 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 25.979                                                                                                                | 1.0228 | 25.999         | 1.0236 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| S1K7, FS1K7                  | —                 | —                | —                | —                        | 15.875                                                                                                                | 0.6250 | 15.885         | 0.6254 | 0.010                                                                  | 0.00040 | 0.009          | 0.00035 | 15.857                                                                                                                | 0.6243 | 15.875         | 0.6250 | 0.004        | 0.00015 | 0.005          | 0.00020 |
| S1K                          | —                 | —                | —                | —                        | 19.050                                                                                                                | 0.7500 | 19.063         | 0.7505 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 19.030                                                                                                                | 0.7492 | 19.050         | 0.7500 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| S3K, FS3K                    | —                 | —                | —                | —                        | 22.225                                                                                                                | 0.8750 | 22.238         | 0.8755 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 22.205                                                                                                                | 0.8742 | 22.225         | 0.8750 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| S5K                          | —                 | —                | —                | —                        | 28.575                                                                                                                | 1.1250 | 28.588         | 1.1255 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 28.555                                                                                                                | 1.1242 | 28.575         | 1.1250 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| S7K                          | —                 | —                | —                | —                        | 34.925                                                                                                                | 1.3750 | 34.940         | 1.3756 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 34.900                                                                                                                | 1.3740 | 34.925         | 1.3750 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| S8K                          | —                 | —                | —                | —                        | 41.275                                                                                                                | 1.6250 | 41.290         | 1.6256 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 41.250                                                                                                                | 1.6240 | 41.275         | 1.6250 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| S9K                          | —                 | —                | —                | —                        | 47.625                                                                                                                | 1.8750 | 47.640         | 1.8756 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 47.600                                                                                                                | 1.8740 | 47.625         | 1.8750 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| S10K                         | —                 | —                | —                | —                        | 50.800                                                                                                                | 2.0000 | 50.818         | 2.0007 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 50.770                                                                                                                | 1.9988 | 50.800         | 2.0000 | 0.009        | 0.00035 | 0.010          | 0.00040 |
| S11K                         | —                 | —                | —                | —                        | 53.975                                                                                                                | 2.1250 | 53.993         | 2.1257 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 53.945                                                                                                                | 2.1238 | 53.975         | 2.1250 | 0.009        | 0.00035 | 0.010          | 0.00040 |
| S12K                         | —                 | —                | —                | —                        | 57.150                                                                                                                | 2.2500 | 57.168         | 2.2507 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 57.120                                                                                                                | 2.2488 | 57.150         | 2.2500 | 0.009        | 0.00035 | 0.010          | 0.00040 |
| F2002                        | —                 | —                | —                | —                        | 9.525                                                                                                                 | 0.3750 | 9.533          | 0.3753 | 0.000                                                                  | 0.00000 | 0.000          | 0.00000 | 9.522                                                                                                                 | 0.3749 | 9.533          | 0.3753 | 0.000        | 0.00000 | 0.000          | 0.00000 |
| F2                           | —                 | —                | —                | —                        | 11.112                                                                                                                | 0.4375 | 11.120         | 0.4378 | 0.000                                                                  | 0.00000 | 0.000          | 0.00000 | 11.110                                                                                                                | 0.4374 | 11.120         | 0.4378 | 0.000        | 0.00000 | 0.000          | 0.00000 |
| F3                           | —                 | —                | —                | —                        | 14.285                                                                                                                | 0.5624 | 14.295         | 0.5628 | 0.000                                                                  | 0.00000 | 0.000          | 0.00000 | 14.285                                                                                                                | 0.5624 | 14.295         | 0.5628 | 0.000        | 0.00000 | 0.000          | 0.00000 |
| F4                           | —                 | —                | —                | —                        | 15.872                                                                                                                | 0.6249 | 15.883         | 0.6253 | 0.000                                                                  | 0.00000 | 0.000          | 0.00000 | 15.872                                                                                                                | 0.6249 | 15.883         | 0.6253 | 0.000        | 0.00000 | 0.000          | 0.00000 |
| F5                           | —                 | —                | —                | —                        | 17.460                                                                                                                | 0.6874 | 17.470         | 0.6878 | 0.000                                                                  | 0.00000 | 0.000          | 0.00000 | 17.460                                                                                                                | 0.6874 | 17.470         | 0.6878 | 0.000        | 0.00000 | 0.000          | 0.00000 |
| —                            | 9101, 9302        | —                | —                | —                        | 28.001                                                                                                                | 1.1024 | 28.014         | 1.1029 | 0.011                                                                  | 0.00045 | 0.000          | 0.00040 | 27.981                                                                                                                | 1.1016 | 28.001         | 1.1024 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| —                            | 9303              | 200              | —                | —                        | 30.000                                                                                                                | 1.1811 | 30.013         | 1.1816 | 0.011                                                                  | 0.00045 | 0.010          | 0.00040 | 29.980                                                                                                                | 1.1803 | 30.000         | 1.1811 | 0.005        | 0.00020 | 0.006          | 0.00025 |
| —                            | 9102              | 201              | —                | —                        | 31.999                                                                                                                | 1.2598 | 32.014         | 1.2604 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 31.974                                                                                                                | 1.2588 | 31.999         | 1.2598 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | 9103              | 202              | 300              | —                        | 35.001                                                                                                                | 1.3780 | 35.016         | 1.3786 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 34.976                                                                                                                | 1.3770 | 35.001         | 1.3780 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | 9304              | —                | 301              | —                        | 37.000                                                                                                                | 1.4567 | 37.015         | 1.4573 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 36.975                                                                                                                | 1.4557 | 37.000         | 1.4567 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | —                 | 203              | —                | —                        | 40.000                                                                                                                | 1.5748 | 40.015         | 1.5754 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 39.975                                                                                                                | 1.5738 | 40.000         | 1.5748 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | 9104, 9305        | —                | 302              | —                        | 41.999                                                                                                                | 1.6535 | 42.014         | 1.6541 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 41.974                                                                                                                | 1.6525 | 41.999         | 1.6535 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | 9105, 9306        | 204              | 303              | —                        | 47.000                                                                                                                | 1.8504 | 47.015         | 1.8510 | 0.014                                                                  | 0.00055 | 0.011          | 0.00045 | 46.975                                                                                                                | 1.8494 | 47.000         | 1.8504 | 0.006        | 0.00025 | 0.009          | 0.00035 |
| —                            | —                 | 205              | 304              | —                        | 51.999                                                                                                                | 2.0472 | 52.017         | 2.0479 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 51.968                                                                                                                | 2.0460 | 51.999         | 2.0472 | 0.009        | 0.00035 | 0.010          | 0.00040 |
| —                            | 9106, 9307        | —                | —                | —                        | 55.001                                                                                                                | 2.1654 | 55.019         | 2.1661 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 54.971                                                                                                                | 2.1642 | 55.001         | 2.1654 | 0.009        | 0.00035 | 0.010          | 0.00040 |
| —                            | 9107, 9308        | 206              | 305              | 403                      | 61.999                                                                                                                | 2.4409 | 62.017         | 2.4416 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 61.968                                                                                                                | 2.4397 | 61.999         | 2.4409 | 0.009        | 0.00030 | 0.010          | 0.00040 |
| —                            | 9108              | —                | —                | —                        | 68.001                                                                                                                | 2.6772 | 68.019         | 2.6779 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 67.970                                                                                                                | 2.6760 | 68.001         | 2.6772 | 0.009        | 0.00030 | 0.010          | 0.00040 |
| —                            | 9310              | 207              | 306              | 404                      | 71.999                                                                                                                | 2.8346 | 72.017         | 2.8353 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 71.968                                                                                                                | 2.8334 | 71.999         | 2.8346 | 0.009        | 0.00030 | 0.010          | 0.00040 |
| —                            | 9109              | —                | —                | —                        | 75.001                                                                                                                | 2.9528 | 75.019         | 2.9535 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 74.971                                                                                                                | 2.9516 | 75.001         | 2.9528 | 0.009        | 0.00030 | 0.010          | 0.00040 |
| —                            | 9110              | 208              | 307              | 405                      | 80.000                                                                                                                | 3.1496 | 80.018         | 3.1503 | 0.015                                                                  | 0.00060 | 0.014          | 0.00055 | 79.969                                                                                                                | 3.1484 | 80.000         | 3.1496 | 0.009        | 0.00030 | 0.010          | 0.00040 |
| —                            | 9312              | 209              | —                | —                        | 85.001                                                                                                                | 3.3465 | 85.024         | 3.3474 | 0.019                                                                  | 0.00080 | 0.017          | 0.00065 | 84.966                                                                                                                | 3.3451 | 85.001         | 3.3465 | 0.010        | 0.00040 | 0.013          | 0.00050 |
| —                            | 9111              | 210              | 308              | 406                      | 90.000                                                                                                                | 3.5433 | 90.023         | 3.5442 | 0.019                                                                  | 0.00080 | 0.017          | 0.00065 | 89.964                                                                                                                | 3.5419 | 90.000         | 3.5433 | 0.010        | 0.00040 | 0.013          | 0.00050 |
| —                            | 9112              | —                | —                | —                        | 95.001                                                                                                                | 3.7402 | 95.023         | 3.7411 | 0.019                                                                  | 0.00080 | 0.017          | 0.00065 | 94.965                                                                                                                | 3.7388 | 95.001         | 3.7402 | 0.010        | 0.00040 | 0.013          | 0.00050 |
| —                            | 9113              | 211              | 309              | 407                      | 100.000                                                                                                               | 3.9370 | 100.023        | 3.9379 | 0.019                                                                  | 0.00080 | 0.017          | 0.00065 | 99.964                                                                                                                | 3.9356 | 100.000        | 3.9370 | 0.010        | 0.00040 | 0.013          | 0.00050 |
| —                            | 9114              | 212              | 310              | 408                      | 110.000                                                                                                               | 4.3307 | 110.023        | 4.3316 | 0.019                                                                  | 0.00080 | 0.017          | 0.00065 | 109.964                                                                                                               | 4.3293 | 110.000        | 4.3307 | 0.010        | 0.00040 | 0.013          | 0.00050 |

<sup>(2)</sup>400 Series are "specials," consult your Timken representative.

FITTING PRACTICES - continued

HOUSING FITS, ABEC 1, ABEC 3

Note: These tables are to be used for applications where only one ring (either inner or outer) has an interference fit with its shaft and housing. The guidelines for operating conditions covering these tables are found on page A123. In cases where interference fits are used for both rings, bearings with a special internal clearance may be required. Housing bore diameter dimensions are for steel materials. Consult your Timken representative when using other housing materials.

| HOUSING FITS, ABEC 1, ABEC 3 |             |                |                |                |                                                                                                            |         |                |         |                                                                        |        |                |         |                                                                                                              |         |         |         |       |        |       |         |
|------------------------------|-------------|----------------|----------------|----------------|------------------------------------------------------------------------------------------------------------|---------|----------------|---------|------------------------------------------------------------------------|--------|----------------|---------|--------------------------------------------------------------------------------------------------------------|---------|---------|---------|-------|--------|-------|---------|
| Basic Bearing Number         |             |                |                |                | These diameters result in a bearing O.D. to housing bore fit which closely conforms to H6 beginning on A61 |         |                |         |                                                                        |        |                |         | These diameters result in a bearing O.D. to housing bore fit which closely conforms to M7 listed on page A63 |         |         |         |       |        |       |         |
| Extra Small                  | Extra Light | Light          | Medium         | Heavy          | Housing Stationary, Load Stationary or Housing Rotating, Load Rotating                                     |         |                |         | Housing Rotating, Load Stationary or Housing Stationary, Load Rotating |        |                |         |                                                                                                              |         |         |         |       |        |       |         |
|                              |             |                |                |                | Housing Bore                                                                                               |         | Mean Fit Loose |         | Housing Bore                                                           |        | Mean Fit Tight |         |                                                                                                              |         |         |         |       |        |       |         |
|                              |             |                |                |                | Min.                                                                                                       | Max     | ABEC 1         | ABEC 3  | Min.                                                                   | Max.   | ABEC 1         | ABEC 3  | Min.                                                                                                         | Max.    | ABEC 1  | ABEC 3  |       |        |       |         |
|                              |             |                |                |                | mm                                                                                                         | in.     | mm             | in.     | mm                                                                     | in.    | mm             | in.     | mm                                                                                                           | in.     | mm      | in.     |       |        |       |         |
| 30,S,F                       | 9100, 9300  | 200,5200, 7200 | 300,5300, 7300 | 400,5400, 7400 |                                                                                                            |         |                |         |                                                                        |        |                |         |                                                                                                              |         |         |         |       |        |       |         |
| SERIES                       | SERIES      | SERIES         | SERIES         | SERIES         |                                                                                                            |         |                |         |                                                                        |        |                |         |                                                                                                              |         |         |         |       |        |       |         |
| —                            | 9115        | —              | —              | —              | 115.001                                                                                                    | 4.5276  | 115.024        | 4.5285  | 0.019                                                                  | 0.0008 | 0.017          | 0.00065 | 114.965                                                                                                      | 4.5262  | 115.001 | 4.5276  | 0.010 | 0.0004 | 0.013 | 0.00050 |
| —                            | —           | 213            | 311            | 409            | 120.000                                                                                                    | 4.7244  | 120.023        | 4.7253  | 0.019                                                                  | 0.0008 | 0.017          | 0.00065 | 119.964                                                                                                      | 4.7230  | 120.000 | 4.7244  | 0.010 | 0.0004 | 0.013 | 0.00050 |
| —                            | —           | 214            | —              | —              | 125.001                                                                                                    | 4.9213  | 125.026        | 4.9223  | 0.023                                                                  | 0.0009 | 0.019          | 0.00075 | 124.960                                                                                                      | 4.9197  | 125.001 | 4.9213  | 0.010 | 0.0004 | 0.014 | 0.00055 |
| —                            | 9117        | 215            | 312            | 410            | 130.000                                                                                                    | 5.1181  | 130.025        | 5.1191  | 0.023                                                                  | 0.0009 | 0.019          | 0.00075 | 129.959                                                                                                      | 5.1165  | 130.000 | 5.1181  | 0.010 | 0.0004 | 0.014 | 0.00055 |
| —                            | 9118        | 216            | 313            | 411            | 140.000                                                                                                    | 5.5118  | 140.025        | 5.5128  | 0.023                                                                  | 0.0009 | 0.019          | 0.00075 | 139.959                                                                                                      | 5.5102  | 140.000 | 5.5118  | 0.010 | 0.0004 | 0.014 | 0.00055 |
| —                            | 9120        | 217            | 314            | 412            | 150.000                                                                                                    | 5.9055  | 150.025        | 5.9065  | 0.023                                                                  | 0.0009 | 0.019          | 0.00075 | 149.959                                                                                                      | 5.9039  | 150.000 | 5.9055  | 0.010 | 0.0004 | 0.014 | 0.00055 |
| —                            | 120-2       | 218            | 315            | —              | 160.000                                                                                                    | 6.2992  | 160.025        | 6.3002  | 0.025                                                                  | 0.0010 | 0.020          | 0.00080 | 159.959                                                                                                      | 6.2976  | 160.000 | 6.2992  | 0.008 | 0.0003 | 0.013 | 0.00050 |
| —                            | 9121        | —              | —              | 413            | 160.000                                                                                                    | 6.2992  | 160.025        | 6.3002  | 0.025                                                                  | 0.0010 | 0.020          | 0.00080 | 159.959                                                                                                      | 6.2976  | 160.000 | 6.2992  | 0.008 | 0.0003 | 0.013 | 0.00050 |
| —                            | 9122        | 129            | 316            | —              | 170.000                                                                                                    | 6.6929  | 170.025        | 6.6939  | 0.025                                                                  | 0.0010 | 0.020          | 0.00080 | 169.959                                                                                                      | 6.6913  | 170.000 | 6.6929  | 0.008 | 0.0003 | 0.013 | 0.00050 |
| —                            | 122         | —              | —              | —              | 175.000                                                                                                    | 6.8898  | 175.026        | 6.8908  | 0.025                                                                  | 0.0010 | 0.020          | 0.00080 | 174.960                                                                                                      | 6.8882  | 175.001 | 6.8898  | 0.008 | 0.0003 | 0.013 | 0.00050 |
| —                            | 9124        | 220            | 317            | 414            | 180.000                                                                                                    | 7.0866  | 180.025        | 7.0876  | 0.025                                                                  | 0.0010 | 0.020          | 0.00080 | 179.959                                                                                                      | 7.0850  | 180.000 | 7.0866  | 0.008 | 0.0003 | 0.013 | 0.00050 |
| —                            | 124         | 221            | 318            | 415            | 190.000                                                                                                    | 7.4803  | 190.028        | 7.4815  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 189.954                                                                                                      | 7.4785  | 190.000 | 7.4803  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 9126        | 222            | 319            | 416            | 200.000                                                                                                    | 7.8740  | 200.028        | 7.8752  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 199.954                                                                                                      | 7.8722  | 200.000 | 7.8740  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 126         | —              | —              | —              | 205.001                                                                                                    | 8.0709  | 205.029        | 8.0721  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 204.955                                                                                                      | 8.0691  | 205.001 | 8.0709  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 9128        | —              | —              | —              | 210.000                                                                                                    | 8.2677  | 210.028        | 8.2689  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 209.954                                                                                                      | 8.2659  | 210.000 | 8.2677  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | —           | 224            | 320            | —              | 215.001                                                                                                    | 8.4646  | 215.029        | 8.4658  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 214.955                                                                                                      | 8.4628  | 215.001 | 8.4646  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 128         | —              | —              | —              | 220.000                                                                                                    | 8.6614  | 220.028        | 8.6626  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 219.954                                                                                                      | 8.6596  | 220.000 | 8.6614  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 9130        | —              | 321            | 418            | 225.001                                                                                                    | 8.8583  | 225.029        | 8.8595  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 224.955                                                                                                      | 8.8565  | 225.001 | 8.8583  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | —           | 226            | —              | —              | 230.000                                                                                                    | 9.0551  | 230.027        | 9.0563  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 229.954                                                                                                      | 9.0533  | 230.000 | 9.0551  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 130         | —              | —              | —              | 235.001                                                                                                    | 9.2520  | 235.029        | 9.2532  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 234.955                                                                                                      | 9.2502  | 235.001 | 9.2520  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 9132        | —              | 322            | —              | 240.000                                                                                                    | 9.4488  | 240.027        | 9.4506  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 239.954                                                                                                      | 9.4470  | 240.000 | 9.4488  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 132         | 228            | —              | —              | 250.000                                                                                                    | 9.8425  | 250.027        | 9.8437  | 0.029                                                                  | 0.0012 | 0.023          | 0.00090 | 249.954                                                                                                      | 9.8407  | 250.000 | 9.8425  | 0.008 | 0.0003 | 0.014 | 0.00055 |
| —                            | 9134        | —              | 324            | —              | 259.999                                                                                                    | 10.2362 | 260.032        | 10.2374 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 259.942                                                                                                      | 10.2342 | 259.999 | 10.2362 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | 134         | —              | —              | 420            | 265.001                                                                                                    | 10.4331 | 265.034        | 10.4343 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 264.950                                                                                                      | 10.4311 | 265.001 | 10.4331 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | —           | 230            | —              | —              | 269.999                                                                                                    | 10.6299 | 270.032        | 10.6311 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 269.949                                                                                                      | 10.6279 | 269.999 | 10.6299 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | 136,9136    | —              | 326            | —              | 279.999                                                                                                    | 11.0236 | 280.032        | 11.0248 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 279.949                                                                                                      | 11.0216 | 279.999 | 11.0236 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | 9138        | 232            | —              | —              | 289.999                                                                                                    | 11.4173 | 290.039        | 11.4185 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 289.949                                                                                                      | 11.4153 | 289.999 | 11.4173 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | 138         | —              | 328            | —              | 299.999                                                                                                    | 11.8110 | 300.032        | 11.8122 | 0.033                                                                  | 0.0013 | 0.027          | 0.00105 | 299.949                                                                                                      | 11.8090 | 299.999 | 11.8110 | 0.008 | 0.0003 | 0.015 | 0.00060 |
| —                            | 9140        | 234            | —              | —              | 309.999                                                                                                    | 12.2047 | 310.029        | 12.2059 | 0.033                                                                  | 0.0013 | —              | —       | 309.949                                                                                                      | 12.2027 | 309.999 | 12.2047 | 0.008 | 0.0003 | —     | —       |
| —                            | —           | 236            | 330            | —              | 319.999                                                                                                    | 12.5984 | 320.035        | 12.5998 | 0.038                                                                  | 0.0015 | —              | —       | 319.943                                                                                                      | 12.5962 | 319.999 | 12.5984 | 0.008 | 0.0003 | —     | —       |
| —                            | 9144        | 238            | —              | —              | 339.999                                                                                                    | 13.3858 | 340.035        | 13.3872 | 0.038                                                                  | 0.0015 | —              | —       | 339.943                                                                                                      | 13.3836 | 339.999 | 13.3858 | 0.008 | 0.0003 | —     | —       |
| —                            | 9146        | 240            | —              | —              | 359.999                                                                                                    | 14.1732 | 360.035        | 14.1746 | 0.038                                                                  | 0.0015 | —              | —       | 359.943                                                                                                      | 14.1710 | 359.999 | 14.1732 | 0.008 | 0.0003 | —     | —       |
| —                            | —           | 242            | 336            | —              | 380.007                                                                                                    | 14.9606 | 380.035        | 14.9620 | 0.038                                                                  | 0.0015 | —              | —       | 379.943                                                                                                      | 14.9584 | 379.999 | 14.9606 | 0.008 | 0.0003 | —     | —       |
| —                            | 9152        | 244            | 338            | —              | 399.999                                                                                                    | 15.7480 | 400.035        | 15.7494 | 0.038                                                                  | 0.0015 | —              | —       | 399.943                                                                                                      | 15.7458 | 399.999 | 15.7480 | 0.008 | 0.0003 | —     | —       |
| —                            | 9156        | 246            | 340            | —              | 419.999                                                                                                    | 16.5354 | 420.040        | 16.5370 | 0.038                                                                  | 0.0017 | —              | —       | 419.936                                                                                                      | 16.5329 | 419.999 | 16.5354 | 0.010 | 0.0004 | —     | —       |
| —                            | —           | 248            | 342            | —              | 439.999                                                                                                    | 17.3228 | 440.040        | 17.3244 | 0.038                                                                  | 0.0017 | —              | —       | 439.936                                                                                                      | 17.3203 | 439.999 | 17.3228 | 0.010 | 0.0004 | —     | —       |
| —                            | 9160        | 250            | 344            | —              | 459.999                                                                                                    | 18.1102 | 460.040        | 18.1118 | 0.038                                                                  | 0.0017 | —              | —       | 459.936                                                                                                      | 18.1077 | 459.999 | 18.1102 | 0.010 | 0.0004 | —     | —       |
| —                            | 9164        | 252            | —              | —              | 479.999                                                                                                    | 18.8976 | 480.040        | 18.8992 | 0.038                                                                  | 0.0017 | —              | —       | 479.936                                                                                                      | 18.8951 | 479.999 | 18.8976 | 0.010 | 0.0004 | —     | —       |
| —                            | —           | 256            | 348            | —              | 499.999                                                                                                    | 19.6850 | 500.040        | 19.6866 | 0.038                                                                  | 0.0017 | —              | —       | 499.936                                                                                                      | 19.6825 | 499.999 | 19.6850 | 0.010 | 0.0004 | —     | —       |
| —                            | —           | 260            | 352            | —              | 539.999                                                                                                    | 21.2598 | 540.042        | 21.2615 | 0.048                                                                  | 0.0019 | —              | —       | 539.930                                                                                                      | 21.2571 | 539.999 | 21.2598 | 0.010 | 0.0004 | —     | —       |
| —                            | —           | 264            | 356            | —              | 579.999                                                                                                    | 22.8346 | 580.042        | 22.8363 | 0.048                                                                  | 0.0019 | —              | —       | 579.930                                                                                                      | 22.8319 | 579.999 | 22.8346 | 0.010 | 0.0004 | —     | —       |
| —                            | 9180        | —              | —              | —              | 599.999                                                                                                    | 23.6220 | 600.042        | 23.6237 | 0.048                                                                  | 0.0019 | —              | —       | 599.930                                                                                                      | 23.6193 | 599.999 | 23.6220 | 0.010 | 0.0004 | —     | —       |

FITTING PRACTICES - continued

SHAFT AND HOUSING SHOULDERS

Shaft and housing shoulder diameters for radial roller and thrust ball and roller bearings are also found in the respective dimension tables. Shaft and housing shoulders for ball bearings are shown below.

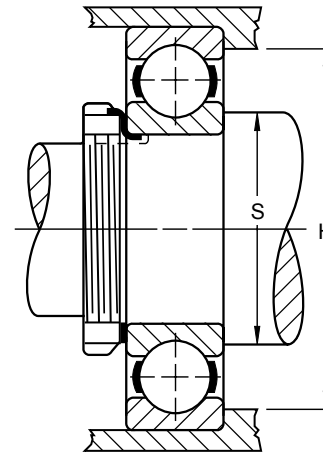
RADIAL BALL BEARINGS

The preferred method of locating bearings on shafts and in housings is to provide accurate shoulders perpendicular to the shaft axis. Shoulders should be large enough to exceed the theoretical point of tangency between the corner radius and the face of the bearing, and small enough to permit bearing removal with proper pullers.

These tables give the suggested maximum and minimum shaft and housing shoulder diameters for the majority of applications. Where design limitations do not permit conformance to these suggested diameters, your Timken representative should be consulted.

Suggested shaft and housing fillet radii are listed in the dimensional tables of each product catalog and must be used to assure proper seating against shaft and housing shoulders.

Shaft and housing diameters for radial ball bearings are shown below and on the following two pages. For radial cylindrical, spherical and tapered roller bearings, refer to the respective dimension tables. Housing shoulders for wide inner ring bearings are shown on page A133.



| EXTRA-LIGHT 9300 SERIES |                  |      |                  |      |
|-------------------------|------------------|------|------------------|------|
| Basic Bearing Number    | Shaft Shoulder   |      | Housing Shoulder |      |
|                         | ± 0.25 mm ±.010" |      | ± 0.25 mm ±.010" |      |
|                         | mm               | in.  | mm               | in.  |
| 9301K                   | 14.7             | 0.58 | 21.6             | 0.85 |
| 9302K                   | 17.8             | 0.70 | 25.4             | 1.00 |
| 9303K                   | 19.8             | 0.78 | 27.4             | 1.08 |
| 9304K                   | 23.9             | 0.94 | 33.5             | 1.32 |
| 9305K                   | 29.0             | 1.14 | 38.6             | 1.52 |
| 9306K                   | 33.5             | 1.32 | 43.4             | 1.71 |
| 9307K                   | 39.6             | 1.56 | 50.8             | 2.00 |
| 9308K                   | 45.0             | 1.77 | 57.4             | 2.26 |
| 9309K                   | 50.3             | 1.98 | 63.2             | 2.49 |
| 9310K                   | 54.9             | 2.16 | 67.6             | 2.66 |
| 9311K                   | 61.0             | 2.40 | 74.7             | 2.94 |
| 9312K                   | 65.8             | 2.59 | 79.8             | 3.14 |

| EXTRA-SMALL SERIES   |                    |      |      |      |            |      |      |      |
|----------------------|--------------------|------|------|------|------------|------|------|------|
| Basic Bearing Number | Shoulder Diameters |      |      |      |            |      |      |      |
|                      | Shaft, S           |      |      |      | Housing, H |      |      |      |
|                      | Max.               |      | Min. |      | Max.       |      | Min. |      |
|                      | mm                 | in.  | mm   | in.  | mm         | in.  | mm   | in.  |
| 33K3                 | 5.1                | 0.20 | 4.8  | 0.19 | 8.1        | 0.32 | 7.9  | 0.31 |
| 33K4                 | 6.1                | 0.24 | 5.8  | 0.23 | 11.2       | 0.44 | 10.9 | 0.43 |
| 33K5                 | 6.6                | 0.26 | 6.4  | 0.25 | 11.2       | 0.44 | 10.9 | 0.43 |
| 34K                  | 6.6                | 0.26 | 6.4  | 0.25 | 14.2       | 0.56 | 14.0 | 0.55 |
| 35K                  | 9.4                | 0.37 | 9.1  | 0.36 | 17.0       | 0.67 | 16.8 | 0.66 |
| 36K                  | 9.4                | 0.37 | 9.1  | 0.36 | 17.0       | 0.67 | 16.8 | 0.66 |
| 37K                  | 11.2               | 0.44 | 10.7 | 0.42 | 20.1       | 0.79 | 19.6 | 0.77 |
| 38K                  | 11.4               | 0.45 | 10.9 | 0.43 | 20.1       | 0.79 | 19.6 | 0.77 |
| 38KV                 | 11.4               | 0.45 | 10.9 | 0.43 | 20.1       | 0.79 | 19.6 | 0.77 |
| 39K                  | 13.0               | 0.51 | 12.5 | 0.49 | 23.1       | 0.91 | 22.6 | 0.89 |
| S1K7                 | 8.6                | 0.34 | 8.1  | 0.32 | 14.2       | 0.56 | 13.7 | 0.54 |
| S1K                  | 9.4                | 0.37 | 8.9  | 0.35 | 17.5       | 0.69 | 17.0 | 0.67 |
| S3K                  | 12.7               | 0.50 | 12.2 | 0.48 | 20.3       | 0.80 | 19.8 | 0.78 |
| S5K                  | 16.0               | 0.63 | 15.5 | 0.61 | 25.1       | 0.99 | 24.6 | 0.97 |
| S7K                  | 21.3               | 0.84 | 20.3 | 0.80 | 31.5       | 1.24 | 30.5 | 1.20 |
| S8K                  | 24.6               | 0.97 | 23.6 | 0.93 | 37.1       | 1.46 | 35.6 | 1.40 |
| S9K                  | 28.9               | 1.14 | 27.9 | 1.10 | 41.9       | 1.65 | 40.9 | 1.61 |
| S10K                 | 31.5               | 1.24 | 30.5 | 1.20 | 46.7       | 1.84 | 45.7 | 1.80 |
| S11K                 | 34.0               | 1.34 | 33.0 | 1.30 | 49.5       | 1.95 | 48.5 | 1.91 |
| S12K                 | 39.4               | 1.55 | 38.4 | 1.51 | 55.9       | 2.20 | 50.8 | 2.00 |

FITTING PRACTICES - continued

SHAFT AND HOUSING SHOULDERS  
RADIAL BALL BEARINGS

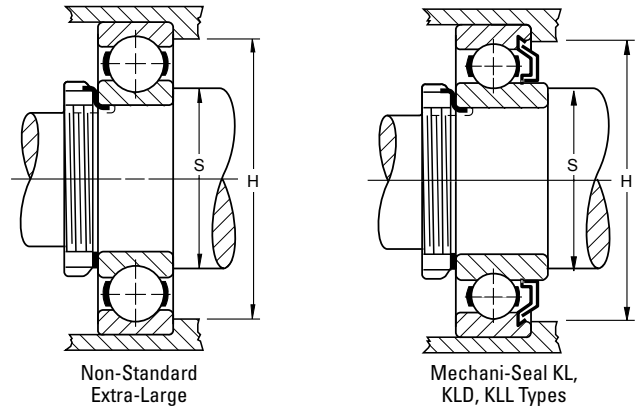
| RADIAL BALL BEARINGS |                                              |       |       |       |            |       |       |       |                                                     |       |       |       |            |       |       |       |                                                      |      |       |       |            |       |       |       |       |       |
|----------------------|----------------------------------------------|-------|-------|-------|------------|-------|-------|-------|-----------------------------------------------------|-------|-------|-------|------------|-------|-------|-------|------------------------------------------------------|------|-------|-------|------------|-------|-------|-------|-------|-------|
| Basic Bearing Number | Extra-Light • 9100 Series Shoulder Diameters |       |       |       |            |       |       |       | Light • 200, 5200, 7200WN Series Shoulder Diameters |       |       |       |            |       |       |       | Medium • 300, 5300, 7300WN Series Shoulder Diameters |      |       |       |            |       |       |       |       |       |
|                      | Shaft, S                                     |       |       |       | Housing, H |       |       |       | Shaft, S                                            |       |       |       | Housing, H |       |       |       | Shaft, S                                             |      |       |       | Housing, H |       |       |       |       |       |
|                      | Max.                                         | Min.  | Max.  | Min.  | Max.       | Min.  | Max.  | Min.  | Max.                                                | Min.  | Max.  | Min.  | Max.       | Min.  | Max.  | Min.  | Max.                                                 | Min. |       |       |            |       |       |       |       |       |
|                      | mm                                           | in.   | mm    | in.   | mm         | in.   | mm    | in.   | mm                                                  | in.   | mm    | in.   | mm         | in.   | mm    | in.   | mm                                                   | in.  |       |       |            |       |       |       |       |       |
| 9100                 | 13.2                                         | 0.52  | 11.9  | 0.47  | 24.1       | 0.95  | 23.1  | 0.91  | 200                                                 | 14.2  | 0.56  | 12.7  | 0.50       | 24.9  | 0.98  | 24.6  | 0.97                                                 | 300  | 15.0  | 0.59  | 12.7       | 0.50  | 30.0  | 1.18  | 29.2  | 1.15  |
| 9101                 | 18.0                                         | 0.71  | 14.0  | 0.55  | 25.9       | 1.02  | 24.6  | 0.97  | 201                                                 | 16.3  | 0.64  | 14.7  | 0.58       | 26.9  | 1.06  | 26.7  | 1.05                                                 | 301  | 17.5  | 0.69  | 16.0       | 0.63  | 31.0  | 1.22  | 30.7  | 1.21  |
| 9102                 | 19.0                                         | 0.75  | 17.0  | 0.67  | 30.0       | 1.18  | 28.7  | 1.13  | 202                                                 | 19.0  | 0.75  | 17.5  | 0.69       | 30.0  | 1.18  | 29.2  | 1.15                                                 | 302  | 20.6  | 0.81  | 19.0       | 0.75  | 36.1  | 1.42  | 35.6  | 1.40  |
| 9103                 | 20.6                                         | 0.81  | 19.0  | 0.75  | 33.0       | 1.30  | 31.8  | 1.25  | 203                                                 | 21.3  | 0.84  | 19.6  | 0.77       | 34.0  | 1.34  | 33.3  | 1.31                                                 | 303  | 23.1  | 0.91  | 21.1       | 0.83  | 40.9  | 1.61  | 40.6  | 1.60  |
| 9104                 | 24.9                                         | 0.98  | 22.6  | 0.89  | 37.1       | 1.46  | 35.8  | 1.41  | 204                                                 | 25.4  | 1.00  | 23.9  | 0.94       | 40.9  | 1.61  | 40.1  | 1.58                                                 | 304  | 26.9  | 1.06  | 23.9       | 0.94  | 45.0  | 1.77  | 44.4  | 1.75  |
| 9105                 | 30.0                                         | 1.18  | 27.4  | 1.08  | 41.9       | 1.65  | 40.6  | 1.60  | 205                                                 | 31.0  | 1.22  | 29.0  | 1.14       | 46.0  | 1.81  | 45.2  | 1.78                                                 | 305  | 33.3  | 1.31  | 29.0       | 1.14  | 55.1  | 2.17  | 53.1  | 2.09  |
| 9106                 | 35.1                                         | 1.38  | 34.0  | 1.34  | 49.0       | 1.93  | 47.8  | 1.88  | 206                                                 | 37.3  | 1.47  | 34.0  | 1.34       | 56.1  | 2.21  | 54.9  | 2.16                                                 | 306  | 39.6  | 1.56  | 34.0       | 1.34  | 65.0  | 2.56  | 62.0  | 2.44  |
| 9107                 | 41.4                                         | 1.63  | 38.9  | 1.53  | 56.1       | 2.21  | 54.6  | 2.15  | 207                                                 | 43.7  | 1.72  | 38.9  | 1.53       | 65.0  | 2.56  | 62.7  | 2.47                                                 | 307  | 45.2  | 1.78  | 42.9       | 1.69  | 71.1  | 2.80  | 69.1  | 2.72  |
| 9108                 | 46.0                                         | 1.81  | 43.9  | 1.73  | 62.0       | 2.44  | 60.7  | 2.39  | 208                                                 | 49.3  | 1.94  | 43.9  | 1.73       | 72.9  | 2.87  | 70.6  | 2.78                                                 | 308  | 50.8  | 2.00  | 49.0       | 1.93  | 81.0  | 3.19  | 77.7  | 3.06  |
| 9109                 | 51.6                                         | 2.03  | 49.3  | 1.94  | 69.1       | 2.72  | 67.8  | 2.67  | 209                                                 | 54.1  | 2.13  | 49.3  | 1.94       | 78.0  | 3.07  | 75.4  | 2.97                                                 | 309  | 52.8  | 2.09  | 51.3       | 2.03  | 87.4  | 3.44  | 84.1  | 3.31  |
| 9110                 | 56.4                                         | 2.22  | 54.1  | 2.13  | 73.9       | 2.91  | 72.6  | 2.86  | 210                                                 | 59.4  | 2.34  | 54.1  | 2.13       | 83.1  | 3.27  | 80.5  | 3.17                                                 | 310  | 63.5  | 2.50  | 59.9       | 2.36  | 100.1 | 3.94  | 95.2  | 3.75  |
| 9111                 | 63.0                                         | 2.48  | 59.2  | 2.33  | 83.1       | 3.27  | 81.8  | 3.22  | 211                                                 | 64.5  | 2.54  | 61.2  | 2.41       | 93.5  | 3.68  | 90.4  | 3.56                                                 | 311  | 69.8  | 2.75  | 65.0       | 2.56  | 110.0 | 4.33  | 104.9 | 4.13  |
| 9112                 | 67.8                                         | 2.67  | 64.3  | 2.53  | 88.1       | 3.47  | 86.9  | 3.42  | 212                                                 | 71.4  | 2.81  | 67.8  | 2.67       | 101.1 | 3.98  | 98.3  | 3.87                                                 | 312  | 74.7  | 2.94  | 72.1       | 2.84  | 118.1 | 4.65  | 112.8 | 4.44  |
| 9113                 | 72.1                                         | 2.84  | 69.1  | 2.72  | 93.0       | 3.66  | 91.7  | 3.61  | 213                                                 | 77.0  | 3.03  | 72.6  | 2.86       | 111.0 | 4.37  | 106.4 | 4.19                                                 | 313  | 81.0  | 3.19  | 77.0       | 3.03  | 128.0 | 5.04  | 122.2 | 4.81  |
| 9114                 | 79.0                                         | 3.11  | 73.9  | 2.91  | 103.1      | 4.06  | 100.8 | 3.97  | 214                                                 | 81.8  | 3.22  | 77.7  | 3.06       | 116.1 | 4.57  | 112.0 | 4.41                                                 | 314  | 87.4  | 3.44  | 82.0       | 3.23  | 137.9 | 5.43  | 130.3 | 5.13  |
| 9115                 | 84.1                                         | 3.31  | 79.0  | 3.11  | 108.0      | 4.25  | 105.7 | 4.16  | 215                                                 | 87.4  | 3.44  | 82.6  | 3.25       | 120.9 | 4.76  | 116.6 | 4.59                                                 | 315  | 98.6  | 3.88  | 87.1       | 3.43  | 148.1 | 5.83  | 139.7 | 5.50  |
| 9116                 | 90.4                                         | 3.56  | 84.1  | 3.31  | 118.1      | 4.65  | 114.3 | 4.50  | 216                                                 | 93.7  | 3.69  | 90.2  | 3.55       | 130.0 | 5.12  | 125.2 | 4.93                                                 | 316  | 100.1 | 3.94  | 91.9       | 3.62  | 158.0 | 6.22  | 149.4 | 5.88  |
| 9117                 | 95.2                                         | 3.75  | 88.9  | 3.50  | 122.9      | 4.84  | 119.6 | 4.71  | 217                                                 | 98.6  | 3.88  | 95.2  | 3.75       | 140.0 | 5.51  | 134.9 | 5.31                                                 | 317  | 104.9 | 4.13  | 99.1       | 3.90  | 166.1 | 6.54  | 157.2 | 6.19  |
| 9118                 | 102.4                                        | 4.03  | 97.5  | 3.84  | 131.1      | 5.16  | 130.3 | 5.13  | 218                                                 | 105.7 | 4.16  | 100.1 | 3.94       | 150.1 | 5.91  | 142.7 | 5.62                                                 | 318  | 111.3 | 4.38  | 103.9      | 4.09  | 176.0 | 6.93  | 165.1 | 6.50  |
| 9120                 | 111.3                                        | 4.38  | 107.4 | 4.23  | 141.0      | 5.55  | 138.2 | 5.44  | 219                                                 | 111.3 | 4.38  | 106.9 | 4.21       | 158.0 | 6.22  | 153.9 | 6.06                                                 | 319  | 117.6 | 4.63  | 109.0      | 4.29  | 185.9 | 7.32  | 174.8 | 6.88  |
| 9121                 | 118.4                                        | 4.66  | 115.1 | 4.53  | 150.1      | 5.91  | 146.0 | 5.75  | 220                                                 | 117.6 | 4.63  | 112.0 | 4.41       | 167.9 | 6.61  | 160.3 | 6.31                                                 | 320  | 124.0 | 4.88  | 114.0      | 4.49  | 200.9 | 7.91  | 187.4 | 7.38  |
| 9122                 | 124.7                                        | 4.91  | 119.9 | 4.72  | 160.0      | 6.30  | 157.0 | 6.18  | 221                                                 | 124.0 | 4.88  | 117.1 | 4.61       | 178.1 | 7.01  | 174.8 | 6.88                                                 | 321  | 130.3 | 5.13  | 119.1      | 4.69  | 211.1 | 8.31  | 196.8 | 7.75  |
| 9124                 | 134.1                                        | 5.28  | 130.0 | 5.12  | 169.9      | 6.69  | 165.1 | 6.50  | 222                                                 | 130.3 | 5.13  | 121.9 | 4.80       | 188.0 | 7.40  | 179.3 | 7.06                                                 | 322  | 139.7 | 5.50  | 124.0      | 4.88  | 226.1 | 8.90  | 209.6 | 8.25  |
| 9126                 | 147.6                                        | 5.81  | 140.0 | 5.51  | 190.0      | 7.48  | 184.1 | 7.25  | 224                                                 | 143.0 | 5.63  | 132.1 | 5.20       | 202.9 | 7.99  | 192.0 | 7.56                                                 | 324  | 152.4 | 6.00  | 134.1      | 5.28  | 246.1 | 9.69  | 226.8 | 8.93  |
| 9128                 | 153.9                                        | 6.06  | 147.6 | 5.81  | 200.2      | 7.88  | 195.1 | 7.68  | 226                                                 | 152.4 | 6.00  | 144.0 | 5.67       | 215.9 | 8.50  | 206.5 | 8.13                                                 | 326  | 163.6 | 6.44  | 148.1      | 5.83  | 262.1 | 10.32 | 246.1 | 9.69  |
| 9130                 | 167.4                                        | 6.59  | 162.1 | 6.38  | 213.1      | 8.39  | 206.5 | 8.13  | 228                                                 | 165.1 | 6.50  | 153.9 | 6.06       | 236.0 | 9.29  | 223.8 | 8.81                                                 | 328  | 176.0 | 6.93  | 158.0      | 6.22  | 281.9 | 11.10 | 263.7 | 10.38 |
| 9132                 | 176.8                                        | 6.96  | 166.6 | 6.56  | 228.6      | 9.00  | 222.2 | 8.75  | 230                                                 | 177.0 | 6.97  | 164.1 | 6.46       | 256.0 | 10.08 | 241.3 | 9.50                                                 | 330  | 189.0 | 7.44  | 167.9      | 6.61  | 302.0 | 11.89 | 280.9 | 11.06 |
| 9134                 | 192.0                                        | 7.56  | 182.1 | 7.17  | 247.9      | 9.76  | 239.8 | 9.44  | 232                                                 | 186.9 | 7.36  | 174.0 | 6.85       | 276.1 | 10.87 | 260.4 | 10.25                                                | 332  | 188.0 | 7.84  | 178.0      | 7.01  | 322.1 | 12.68 | 294.1 | 11.58 |
| 9138                 | 212.9                                        | 8.38  | 201.9 | 7.95  | 278.1      | 10.95 | 266.7 | 10.50 | 234                                                 | 202.7 | 7.98  | 188.0 | 7.40       | 292.1 | 11.50 | 276.4 | 10.88                                                | 334  | 213.4 | 8.40  | 188.0      | 7.40  | 342.1 | 13.47 | 311.7 | 12.27 |
| 9140                 | 224.5                                        | 8.84  | 212.1 | 8.35  | 297.9      | 11.73 | 285.0 | 11.22 | 236                                                 | 212.9 | 8.38  | 198.1 | 7.80       | 302.0 | 11.89 | 281.7 | 11.09                                                | 336  | 223.5 | 8.80  | 198.1      | 7.80  | 362.0 | 14.25 | 331.5 | 13.05 |
| 9144                 | 246.4                                        | 9.70  | 233.9 | 9.21  | 326.1      | 12.84 | 310.9 | 12.24 | 238                                                 | 222.8 | 8.77  | 208.0 | 8.19       | 322.1 | 12.68 | 301.8 | 11.88                                                | 338  | 237.5 | 9.35  | 212.1      | 8.35  | 378.2 | 14.89 | 345.2 | 13.59 |
| 9148                 | 266.7                                        | 10.50 | 254.0 | 10.00 | 345.9      | 13.62 | 330.7 | 13.02 | 240                                                 | 239.3 | 9.42  | 217.9 | 8.58       | 342.1 | 13.47 | 319.3 | 12.57                                                | 340  | 249.9 | 9.84  | 222.0      | 8.74  | 398.0 | 15.67 | 365.0 | 14.37 |
| 9152                 | 291.8                                        | 11.49 | 278.1 | 10.95 | 382.0      | 15.04 | 366.8 | 14.44 | 242                                                 | 246.1 | 9.69  | 225.3 | 8.87       | 362.2 | 14.26 | 336.8 | 13.26                                                | 342  | 260.1 | 10.24 | 232.2      | 9.14  | 418.3 | 16.47 | 385.3 | 15.17 |
| 9156                 | 313.2                                        | 12.33 | 297.9 | 11.73 | 402.1      | 15.83 | 386.8 | 15.23 | 244                                                 | 257.6 | 10.14 | 238.0 | 9.37       | 382.0 | 15.04 | 356.6 | 14.04                                                | 344  | 272.5 | 10.73 | 242.1      | 9.53  | 437.9 | 17.24 | 405.4 | 15.96 |
| 9160                 | 339.3                                        | 13.36 | 318.0 | 12.52 | 442.0      | 17.40 | 421.6 | 16.60 | 246                                                 | 268.7 | 10.58 | 247.9 | 9.76       | 402.1 | 15.83 | 370.8 | 14.60                                                | 348  | 292.6 | 11.52 | 262.1      | 10.32 | 478.0 | 18.82 | 439.9 | 17.32 |
| 9164                 | 360.4                                        | 14.19 | 338.1 | 13.31 | 462.0      | 18.19 | 441.7 | 17.39 | 248                                                 | 283.5 | 11.16 | 258.1 | 10.16      | 421.9 | 16.61 | 385.6 | 15.18                                                | 352  | 318.5 | 12.54 | 288.0      | 11.34 | 512.1 | 20.16 | 474.0 | 18.66 |
| 9180                 | 457.2                                        | 18.00 | 431.8 | 17.00 | 561.8      | 22.12 | 549.1 | 21.62 | 250                                                 | 293.4 | 11.55 | 268.0 | 10.55      | 442.0 | 17.40 | 398.8 | 15.70                                                | 356  | 341.1 | 13.43 | 308.1      | 12.13 | 551.9 | 21.73 | 511.3 | 20.13 |

**FITTING PRACTICES - continued**

**SHAFT AND HOUSING SHOULDERS  
RADIAL BALL BEARINGS**

| <b>HEAVY • 400, 7400 SERIES</b> |                    |      |       |      |            |      |       |      |  |
|---------------------------------|--------------------|------|-------|------|------------|------|-------|------|--|
| Basic Bearing Number            | Shoulder Diameters |      |       |      |            |      |       |      |  |
|                                 | Shaft, S           |      |       |      | Housing, H |      |       |      |  |
|                                 | Max.               |      | Min.  |      | Max.       |      | Min.  |      |  |
|                                 | mm                 | in.  | mm    | in.  | mm         | in.  | mm    | in.  |  |
| 7405                            | 37.3               | 1.47 | 34.0  | 1.34 | 71.1       | 2.80 | 66.8  | 2.63 |  |
| 7406                            | 43.7               | 1.72 | 39.1  | 1.54 | 81.0       | 3.19 | 76.2  | 3.00 |  |
| 7407                            | 49.0               | 1.93 | 43.9  | 1.73 | 90.9       | 3.58 | 85.9  | 3.38 |  |
| 7408                            | 55.6               | 2.19 | 50.0  | 1.97 | 100.1      | 3.94 | 93.7  | 3.69 |  |
| 7409                            | 62.0               | 2.44 | 55.1  | 2.17 | 110.0      | 4.33 | 101.6 | 4.00 |  |
| 7410                            | 68.3               | 2.69 | 62.0  | 2.44 | 118.1      | 4.65 | 111.3 | 4.38 |  |
| 7411                            | 74.4               | 2.93 | 67.1  | 2.64 | 128.0      | 5.04 | 120.7 | 4.75 |  |
| 7412                            | 81.0               | 3.19 | 72.1  | 2.84 | 137.9      | 5.43 | 130.3 | 5.13 |  |
| 7413                            | 88.9               | 3.50 | 77.0  | 3.03 | 148.1      | 5.83 | 139.7 | 5.50 |  |
| 7414                            | 93.7               | 3.69 | 84.1  | 3.31 | 166.1      | 6.54 | 155.7 | 6.13 |  |
| 7415                            | 99.8               | 3.93 | 88.9  | 3.50 | 176.0      | 6.93 | 163.6 | 6.44 |  |
| 7416                            | 104.9              | 4.13 | 94.0  | 3.70 | 185.9      | 7.32 | 173.0 | 6.81 |  |
| 7418                            | 119.1              | 4.69 | 108.0 | 4.25 | 207.0      | 8.15 | 196.9 | 7.75 |  |
| 7420                            | 131.3              | 5.17 | 119.9 | 4.72 | 233.9      | 9.21 | 223.3 | 8.79 |  |

| <b>NON-STANDARD EXTRA-LARGE</b> |                    |       |       |       |            |       |       |       |  |
|---------------------------------|--------------------|-------|-------|-------|------------|-------|-------|-------|--|
| Basic Bearing Number            | Shoulder Diameters |       |       |       |            |       |       |       |  |
|                                 | Shaft, S           |       |       |       | Housing, H |       |       |       |  |
|                                 | Max.               |       | Min.  |       | Max.       |       | Min.  |       |  |
|                                 | mm                 | in.   | mm    | in.   | mm         | in.   | mm    | in.   |  |
| 120W2                           | 117.6              | 4.63  | 111.8 | 4.40  | 150.1      | 5.91  | 146.0 | 5.75  |  |
| 122W                            | 124.7              | 4.91  | 120.1 | 4.73  | 162.8      | 6.41  | 158.8 | 6.25  |  |
| 124W                            | 134.1              | 5.28  | 130.0 | 5.12  | 178.1      | 7.01  | 174.5 | 6.87  |  |
| 126W                            | 147.8              | 5.82  | 139.7 | 5.50  | 193.0      | 7.60  | 185.7 | 7.31  |  |
| 128W                            | 157.2              | 6.19  | 150.1 | 5.91  | 207.8      | 8.18  | 202.2 | 7.96  |  |
| 130W                            | 167.4              | 6.59  | 162.1 | 6.38  | 223.0      | 8.78  | 216.2 | 8.51  |  |
| 132W                            | 189.0              | 7.44  | 174.0 | 6.85  | 234.7      | 9.24  | 223.8 | 8.81  |  |
| 134W                            | 191.0              | 7.52  | 185.2 | 7.29  | 249.7      | 9.83  | 244.1 | 9.61  |  |
| 136W                            | 203.2              | 8.00  | 195.3 | 7.69  | 264.7      | 10.42 | 257.8 | 10.15 |  |
| 138W                            | 214.4              | 8.44  | 205.2 | 8.08  | 284.7      | 11.21 | 276.1 | 10.87 |  |
| 224W                            | 143.0              | 5.63  | 132.1 | 5.20  | 203.2      | 8.00  | 192.0 | 7.56  |  |
| 226                             | 152.4              | 6.00  | 144.0 | 5.67  | 215.9      | 8.50  | 206.5 | 8.13  |  |
| 228                             | 165.1              | 6.50  | 153.9 | 6.06  | 236.0      | 9.29  | 223.8 | 8.81  |  |
| 276-2                           | 401.8              | 15.82 | 400.1 | 15.75 | 463.6      | 18.25 | 461.5 | 18.17 |  |



Housing shoulder diameters of bearings with Mechani-Seals differ slightly from those of other types to allow for clearance between the external rotating member of the seal and the housing shoulder.

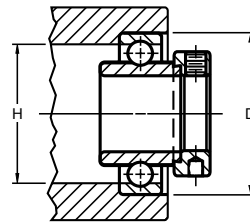
| <b>MECHANI-SEAL KL, KLD, KLL TYPES</b> |                              |      |      |      |  |
|----------------------------------------|------------------------------|------|------|------|--|
| Basic Bearing Number                   | Housing Shoulder Diameter, H |      |      |      |  |
|                                        | Max.                         |      | Min. |      |  |
|                                        | mm                           | in.  | mm   | in.  |  |
| 36                                     | 17.0                         | 0.67 | 16.8 | 0.66 |  |
| 36V                                    | 17.0                         | 0.67 | 16.8 | 0.66 |  |
| 37                                     | 20.1                         | 0.79 | 19.6 | 0.77 |  |
| 37V                                    | 20.1                         | 0.79 | 19.6 | 0.77 |  |
| 34                                     | 20.1                         | 0.79 | 19.6 | 0.77 |  |
| 38V                                    | 20.1                         | 0.79 | 19.6 | 0.77 |  |
| 39                                     | 23.1                         | 0.91 | 22.6 | 0.89 |  |
| 39V                                    | 23.1                         | 0.91 | 22.6 | 0.89 |  |
| 200                                    | 27.7                         | 1.09 | 26.2 | 1.03 |  |
| 201                                    | 29.5                         | 1.16 | 27.7 | 1.09 |  |
| 20-2                                   | 29.5                         | 1.16 | 27.7 | 1.09 |  |
| 201-3                                  | 29.5                         | 1.16 | 27.7 | 1.09 |  |
| 202                                    | 32.5                         | 1.28 | 31.0 | 1.22 |  |
| 202-2                                  | 32.5                         | 1.28 | 31.0 | 1.22 |  |
| 202-3                                  | 32.5                         | 1.28 | 31.0 | 1.22 |  |
| 202-4                                  | 32.5                         | 1.28 | 31.0 | 1.22 |  |
| 203                                    | 36.6                         | 1.44 | 35.8 | 1.41 |  |
| 204                                    | 43.7                         | 1.72 | 41.1 | 1.62 |  |
| 204-2                                  | 43.7                         | 1.72 | 41.1 | 1.62 |  |
| 205                                    | 48.5                         | 1.91 | 46.7 | 1.84 |  |
| 205-2                                  | 48.5                         | 1.91 | 46.7 | 1.84 |  |
| 206                                    | 57.9                         | 2.28 | 56.4 | 2.22 |  |
| 207                                    | 67.6                         | 2.66 | 64.3 | 2.53 |  |
| 208                                    | 75.4                         | 2.97 | 71.4 | 2.81 |  |
| 209                                    | 80.3                         | 3.16 | 77.0 | 3.03 |  |
| 209-2                                  | 80.3                         | 3.16 | 77.0 | 3.03 |  |
| 211                                    | 93.7                         | 3.69 | 90.4 | 3.56 |  |



FITTING PRACTICES - continued

WIDE INNER RING BALL BEARINGS

When shafts are selected for use with wide inner ring bearings, a minimum slip fit is very desirable for the most satisfactory mounting. Special shaft limits are required in certain cases, and a variety of standard fits can be used, including a press fit. The suggested figures are noted below. In some applications, it may be permissible to use increased shaft tolerances. In such cases, applications should be forwarded to your Timken representative for complete suggestions.



Bearing bore tolerance:

1/2" - 2 3/16" = nominal to **+0.013 mm** +.0005";  
 2 1/4" - 3 3/16" = nominal to **+0.015 mm** +.0006";  
 3 7/16" - 3 15/16" = nominal to **+0.018 mm** +.0007";

Shaft tolerances:

1/2" - 1 15/16" = nominal to **-0.013 mm** -.0005";  
 2" - 3 15/16" = nominal to **-0.025 mm** -.0010";

HOUSING, SHOULDERS AND SHAFT DIAMETERS

| BEARING NUMBER |            |            |             |              | Shaft Size<br>mm<br>in. | Basic Outer Ring Size | House Stationary <sup>(1)</sup>   |                |                                | Shoulder Diameter H |                |
|----------------|------------|------------|-------------|--------------|-------------------------|-----------------------|-----------------------------------|----------------|--------------------------------|---------------------|----------------|
| KRR Type       | G-KRR Type | RA-RR Type | GRA-RR Type | GYA-RR* Type |                         |                       | Housing Bore, D<br>Min. mm<br>in. | Max. mm<br>in. | Mean Fit<br>Loose<br>mm<br>in. | Max. mm<br>in.      | Min. mm<br>in. |
| 1008KRR        | —          | RA008RR    | GRA008RR    | GYA008RR     | 1/2                     | 203                   | 1.5748                            | 1.5754         | 0.0005                         | 1.37                | 1.34           |
| —              | —          | RA009RR    | GRA009RR    | GYA009RR     | 9/16                    |                       | <b>40.000</b>                     | <b>40.015</b>  | <b>0.013</b>                   | <b>34.8</b>         | <b>34.0</b>    |
| 1010KRR(KR)    | G1010KRR   | RA010RR    | GRA010RR    | GYA010RR     | 5/8                     |                       |                                   |                |                                |                     |                |
| 1011KRR        | G1011KRR   | —          | —           | —            | 11/16                   |                       |                                   |                |                                |                     |                |
| E17KRR         | GE17KRR    | RAE17RR    | GRAE17RR    | GYAE17RR     | <b>17</b>               |                       |                                   |                |                                |                     |                |
| 1012KRR(KR)    | G1012KRR   | RA012RR    | GRA012RR    | GYA012RR     | 3/4                     | 204                   | 1.8504                            | 1.8510         | 0.0005                         | 1.61                | 1.60           |
| E20KRR         | GE20KRR    | RAE20RR    | GRAE20RR    | GYAE20RR     | <b>20</b>               |                       | <b>47.000</b>                     | <b>47.015</b>  | <b>0.013</b>                   | <b>40.9</b>         | <b>40.6</b>    |
| 1013KRR        | —          | RA013RR    | GRA013RR    | GYA013RR     | 13/16                   | 205                   | 2.0472                            | 2.0479         | 0.0006                         | 1.81                | 1.80           |
| 1014KRR        | G1014KRR   | RA014RR    | GRA014RR    | GYA014RR     | 7/8                     |                       | <b>51.999</b>                     | <b>52.017</b>  | <b>0.015</b>                   | <b>46.0</b>         | <b>45.7</b>    |
| 1015KRR(KR)    | G1015KRR   | RA015RR    | GRA015RR    | GYA015RR     | 15/16                   |                       |                                   |                |                                |                     |                |
| 1100KRR(KR)    | G1100KRR   | RA100RR    | GRA100RR    | GYA100RR     | 1                       |                       |                                   |                |                                |                     |                |
| E25KRR         | GE25KRR    | RAE25RR    | GRAE25RR    | GYAE25RR     | <b>25</b>               |                       |                                   |                |                                |                     |                |
| —              | —          | —          | —           | —            | —                       |                       |                                   |                |                                |                     |                |
| 1102KRR(KR)    | G1102KRR   | RA102RR    | GRA102RR    | GYA102RR     | 1 1/16                  | 206                   | 2.4409                            | 2.4416         | 0.0006                         | 2.21                | 2.16           |
| 1103KRR(KR)    | G1103KRR   | RA103RR    | GRA103RR    | GYA103RR     | 1 1/8                   |                       | <b>61.999</b>                     | <b>62.017</b>  | <b>0.015</b>                   | <b>56.1</b>         | <b>54.9</b>    |
| —              | —          | —          | —           | —            | 1 3/16                  |                       |                                   |                |                                |                     |                |
| E30KRR         | GE30KRR    | RAE30RR    | GRAE30RR    | GYAE30RR     | <b>30</b>               |                       |                                   |                |                                |                     |                |
| 1104KRR(KR)    | G1104KRR   | RA104RR    | GRA104RR    | GYA104RR     | 1 1/4                   | 207                   | 2.8346                            | 2.8353         | 0.0006                         | 2.56                | 2.47           |
| 1105KRR        | —          | RA105RR    | GRA105RR    | GYA105RR     | 1 5/16                  |                       | <b>71.999</b>                     | <b>72.017</b>  | <b>0.015</b>                   | <b>56.1</b>         | <b>54.9</b>    |
| 1106KRR        | G1106KRR   | RA106RR    | GRA106RR    | GYA106RR     | 1 3/8                   |                       |                                   |                |                                |                     |                |
| 1107KRR(KR)    | G1107KRR   | RAA107RR   | GRA107RR    | GYA107RR     | 1 7/16                  |                       |                                   |                |                                |                     |                |
| E35KRR         | GE35KRR    | RAE35RR    | GRAE35RR    | GYAE35RR     | <b>35</b>               |                       |                                   |                |                                |                     |                |
| —              | —          | —          | —           | —            | —                       |                       |                                   |                |                                |                     |                |
| 1108KRR(KR)    | G1108KRR   | RA108RR    | GRA108RR    | GYA108RR     | 1 1/2                   | 208                   | 3.1496                            | 3.1503         | 0.0006                         | 2.87                | 2.78           |
| —              | —          | RA106RR    | GRA106RR    | GYA106RR     | 1 9/16                  |                       | <b>80.000</b>                     | <b>80.018</b>  | <b>0.020</b>                   | <b>78.0</b>         | <b>75.4</b>    |
| —              | —          | —          | GRAE40RR    | GYAE40RR     | <b>40</b>               |                       |                                   |                |                                |                     |                |
| 1110KRR        | G1110KRR   | RA110RR    | GRA110RR    | GYA110RR     | 1 5/8                   | 209                   | 3.3465                            | 3.3474         | 0.0008                         | 3.07                | 2.97           |
| 1111KRR(KR)    | G1111KRR   | RA111RR    | GRA111RR    | GYA111RR     | 1 11/16                 |                       | <b>85.001</b>                     | <b>85.024</b>  | <b>0.020</b>                   | <b>78.0</b>         | <b>75.4</b>    |
| 1112KRR(KR)    | G1112KRR   | RA112RR    | GRA112RR    | GYA112RR     | 1 3/4                   |                       |                                   |                |                                |                     |                |
| E45KRR         | —          | —          | GRAE45RR    | GYAE45RR     | <b>45</b>               |                       |                                   |                |                                |                     |                |
| —              | —          | —          | —           | —            | —                       |                       |                                   |                |                                |                     |                |
| 1114KRR        | —          | RA113RR    | GRA113RR    | GYA113RR     | 1 13/16                 | 210                   | 3.5433                            | 3.5442         | 0.0008                         | 3.27                | 3.19           |
| 1115KRR(KR)    | G1115KRR   | RA114RR    | GRA114RR    | GYA114RR     | 1 7/8                   |                       | <b>90.000</b>                     | <b>90.023</b>  | <b>0.020</b>                   | <b>83.1</b>         | <b>81.0</b>    |
| —              | —          | RA115RR    | GRA115RR    | GYA115RR     | 1 15/16                 |                       |                                   |                |                                |                     |                |
| —              | —          | —          | GRA115RR2   | —            | 2                       |                       |                                   |                |                                |                     |                |
| E50KRR         | GE50KRR    | RAE50RR    | GRAE50RR    | GYAE50RR     | <b>50</b>               |                       |                                   |                |                                |                     |                |
| 1200KRR(KR)    | G1200KRR   | RA200RR    | GRA200RR    | GYA200RR     | 2                       | 211                   | 3.9370                            | 3.9379         | 0.0008                         | 3.58                | 3.56           |
| —              | —          | RA201RR    | GRA201RR    | GYA201RR     | 2 1/16                  |                       | <b>100.000</b>                    | <b>100.023</b> | <b>0.020</b>                   | <b>90.9</b>         | <b>90.4</b>    |
| 1202KRR        | —          | RA202RR    | GRA202RR    | GYA202RR     | 2 1/8                   |                       |                                   |                |                                |                     |                |
| 1203KRR(KR)    | G1203KRR   | RA203RR    | GRA203RR    | GYA203RR     | 2 3/16                  |                       |                                   |                |                                |                     |                |
| E55KRR         | GE55KRR    | RAE55RR    | GRAE55RR    | GYAE55RR     | <b>55</b>               |                       |                                   |                |                                |                     |                |
| —              | —          | —          | —           | —            | —                       |                       |                                   |                |                                |                     |                |
| 1204KRR        | —          | —          | —           | —            | 2 1/4                   | 212                   | 4.3307                            | 4.3316         | 0.0008                         | 3.98                | 3.87           |
| 1207KRR(KR)    | G1207KRR   | —          | —           | —            | 2 7/16                  |                       | <b>110.000</b>                    | <b>110.02</b>  | <b>0.020</b>                   | <b>101.1</b>        | <b>98.3</b>    |
| E60KRR         | GE60KRR    | —          | —           | —            | <b>60</b>               |                       |                                   |                |                                |                     |                |
| 1215KRR        | —          | —          | —           | —            | 2 15/16                 | 215                   | 5.1181                            | 5.1191         | 0.0009                         | 4.76                | 4.59           |
| E75KRR         | —          | —          | —           | —            | <b>75</b>               |                       | <b>130.000</b>                    | <b>130.025</b> | <b>0.023</b>                   | <b>120.9</b>        | <b>116.6</b>   |

<sup>(1)</sup> When the housing revolves in relation to the shaft, housing bore dimensions shown on page A134 should be used. Outer ring tolerances and housing fillet radii correspond to equivalent 299 Series single-row radial bearings.

\* Available as non-relubricatable type (omit Prefix "G").

FITTING PRACTICES - continued

SHAFT AND HOUSING FITS  
RADIAL SPHERICAL ROLLER BEARINGS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions.

| SHAFT                                                    |                                                                              |                                                                                                                           |                                |       |                                 |                                                                                     |
|----------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------|---------------------------------|-------------------------------------------------------------------------------------|
| Conditions                                               |                                                                              | Examples                                                                                                                  | Shaft Diameter                 |       | Tolerance Symbol <sup>(1)</sup> | Remarks                                                                             |
| Stationary inner ring load                               | The inner ring to be easily displaced on the shaft                           | Two-bearing shaft mechanism                                                                                               | See table below for shaft size |       | s4                              | See table below for shaft size                                                      |
|                                                          | The inner ring not to be easily displaced on the shaft                       | Wheel on non-rotating shaft<br>Tension pulleys and rope sheaves                                                           | All diameters                  |       | g6<br>h6                        |                                                                                     |
| Rotating inner ring load or indeterminate load direction | Light and variable loads<br>$P \leq 0.07C$                                   | Electrical apparatus, machine tools, pumps, ventilators, industrial trucks                                                | over                           | incl. | k6<br>m6                        | In very accurate applications k5 and m5 are used instead of k6 and m6 respectively. |
|                                                          |                                                                              |                                                                                                                           | 18                             | 100   |                                 |                                                                                     |
|                                                          | 100                                                                          | 200                                                                                                                       |                                |       |                                 |                                                                                     |
|                                                          | Normal and heavy loads<br>$P > 0.07C$<br>$\leq 0.25C$                        | Applications in general, electrical motors, turbines, pumps, combustion engines, gear transmissions, woodworking machines | 18                             | 65    | m5                              |                                                                                     |
| 65                                                       |                                                                              |                                                                                                                           | 100                            | m6    |                                 |                                                                                     |
| 100                                                      |                                                                              |                                                                                                                           | 140                            | n6    |                                 |                                                                                     |
| 140                                                      |                                                                              |                                                                                                                           | 280                            | p6    |                                 |                                                                                     |
| Very heavy loads and shock loads<br>$P > 0.25C$          | Journal boxes for locomotives and other heavy rail vehicles, traction motors | 280                                                                                                                       | 500                            | r6    |                                 |                                                                                     |
|                                                          |                                                                              | 500                                                                                                                       | and up                         | r7    |                                 |                                                                                     |
|                                                          |                                                                              | 18                                                                                                                        | 65                             | m6    |                                 |                                                                                     |
|                                                          |                                                                              | 65                                                                                                                        | 100                            | n6    |                                 |                                                                                     |
|                                                          |                                                                              |                                                                                                                           | 100                            | 140   | p6                              |                                                                                     |
|                                                          |                                                                              |                                                                                                                           | 140                            | 200   | r6                              |                                                                                     |
|                                                          |                                                                              |                                                                                                                           | 200                            | 500   | r7                              |                                                                                     |
|                                                          |                                                                              |                                                                                                                           |                                |       |                                 |                                                                                     |
| Bearings with Tapered Bore and Adapter Sleeve            |                                                                              | Applications in general                                                                                                   | All diameters                  |       |                                 | See tables for Reduction of RIC on page A76.                                        |
| All loads                                                |                                                                              |                                                                                                                           |                                |       |                                 |                                                                                     |

<sup>(1)</sup> For solid steel shaft. See tables on pages A62-A72 for numerical value.

s4 fits

A centrifugal force load produces a rotating outer ring load and a stationary inner ring load, even though the inner ring rotates. This makes it desirable to fit the outer ring tight in the housing (using a P6 fit as shown on pages A63 and A69), and the inner ring loose on the shaft using an s4 fit as listed in the table. The standard W33 bearing with oil groove and oil holes can be used.

**Note:** The s4 fit designation as referenced on this page is a special fit tolerance developed by The Timken Company for this specific application. It DOES NOT conform to ISO standards similarly published as s4 preferred shaft fits.

| S4 FITS                                                                                                                                    |     |                            |              |                     |      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------|--------------|---------------------|------|-----|
| Data shown in thousandths of a millimeter (15=0.015 mm) or ten-thousandths of an inch (6=.0006"). See dimensional tables for nominal bore. |     |                            |              |                     |      |     |
| Bore                                                                                                                                       |     | Variance from Nominal Bore |              |                     |      |     |
| over                                                                                                                                       | mm  | incl.                      | Tolerance +0 | Shaft Diameter Max. | Min. | Fit |
|                                                                                                                                            | mm  |                            | mm           | mm                  | mm   | mm  |
|                                                                                                                                            |     |                            | in.          | in.                 | in.  | in. |
| 50                                                                                                                                         | 80  |                            | -15          | -25                 | -36  | 10L |
|                                                                                                                                            |     |                            | -6           | -10                 | -14  | 36L |
|                                                                                                                                            |     |                            |              |                     |      | 4L  |
| 80                                                                                                                                         | 120 |                            | -20          | -33                 | -43  | 14L |
|                                                                                                                                            |     |                            |              |                     |      | 13L |
|                                                                                                                                            |     |                            | -8           | -13                 | -17  | 43L |
|                                                                                                                                            |     |                            |              |                     |      | 5L  |
| 120                                                                                                                                        | 180 |                            | -25          | -41                 | -53  | 17L |
|                                                                                                                                            |     |                            |              |                     |      | 15L |
|                                                                                                                                            |     |                            | -10          | -16                 | -21  | 53L |
|                                                                                                                                            |     |                            |              |                     |      | 6L  |
| 180                                                                                                                                        | 250 |                            | -30          | -48                 | -64  | 21L |
|                                                                                                                                            |     |                            |              |                     |      | 18L |
|                                                                                                                                            |     |                            | -12          | -19                 | -25  | 64L |
|                                                                                                                                            |     |                            |              |                     |      | 7L  |
|                                                                                                                                            |     |                            |              |                     | 25L  |     |

## FITTING PRACTICES - continued

SHAFT AND HOUSING FITS  
RADIAL SPHERICAL ROLLER BEARINGS

These charts are guidelines for specifying shaft and housing fits related to particular operating conditions.

| HOUSING                            |                                            |                                                                          |                                                                  |                                                         |                                                     |
|------------------------------------|--------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------|
| Conditions                         |                                            | Examples                                                                 | Tolerance Symbol <sup>(2)</sup>                                  | Remarks                                                 |                                                     |
| One piece bearing housing          | Rotating outer ring load                   | Variable load direction                                                  |                                                                  | The outer ring is not displaceable axially              |                                                     |
|                                    |                                            | Heavy loads on bearings in thin walled housings                          | Two-bearing eccentric shaft mechanism                            |                                                         | P6                                                  |
|                                    |                                            | Normal and heavy loads                                                   | Supporting wheels in cranes, wheel hubs, crank bearings          |                                                         | P7                                                  |
|                                    |                                            | Light and variable loads                                                 | Wheel hubs, crank bearings                                       |                                                         | N7                                                  |
| Split or one piece bearing housing | Indeterminate load direction               | Heavy shock loads                                                        | Conveyor rollers, rope sheaves, tension pulleys                  | The outer ring is, as a rule, not displaceable axially. |                                                     |
|                                    |                                            | Heavy and normal loads, axial displacement of outer ring not required    | Electrical traction motors                                       |                                                         | M7                                                  |
|                                    | Stationary outer ring load                 | Normal and light loads, axial displacement of the outer ring desirable   | Electrical motors, pumps, crankshaft main bearings               | K7                                                      | The outer ring is, as a rule, displaceable axially. |
|                                    |                                            | Shock loads, temporarily complete unloading                              | Electrical motors, pumps, crankshaft main bearings               |                                                         |                                                     |
| One piece bearing housing          | Applications requiring particular accuracy | Very accurate running and small deflections under variable loads         | Journal boxes for rail vehicles                                  | J7                                                      |                                                     |
|                                    |                                            | Very accurate running under light loads and indeterminate load direction | Bearing applications in general, journal boxes for rail vehicles | H7                                                      |                                                     |
|                                    |                                            | Very accurate running, axial displacement of outer ring desirable        | Line shaftings                                                   | H8                                                      |                                                     |
| One piece bearing housing          | Applications requiring particular accuracy | Very accurate running and small deflections under variable loads         | Dryer cylinders                                                  | G7                                                      |                                                     |
|                                    |                                            | Very accurate running under light loads and indeterminate load direction | For main spindles in machine tools                               | M6<br>N6<br>P6                                          |                                                     |
|                                    |                                            | Very accurate running, axial displacement of outer ring desirable        | Held bearings in high speed centrifugal force compressors        | K6                                                      |                                                     |
| One piece bearing housing          | Applications requiring particular accuracy | Very accurate running, axial displacement of outer ring desirable        | Floating bearings in high speed centrifugal force compressors    | J6                                                      |                                                     |
|                                    |                                            | Very accurate running and small deflections under variable loads         |                                                                  |                                                         |                                                     |
|                                    |                                            | Very accurate running under light loads and indeterminate load direction |                                                                  |                                                         |                                                     |

<sup>(2)</sup> Cast iron or steel housing. For numerical values see tables on pages A62-A69.

For housings of light metal, tolerances generally are selected which give a slightly tighter fit than those given in the table.

**FITTING PRACTICES - continued**

**SHAFT AND HOUSING FITS  
THRUST BALL BEARINGS**

| TYPE TVB<br>SHAFT                                                                                                               |          |                |         | TYPE TVL AND DTVL<br>SHAFT      |          |                |        |         |         |
|---------------------------------------------------------------------------------------------------------------------------------|----------|----------------|---------|---------------------------------|----------|----------------|--------|---------|---------|
| Shaft and housing diameters shown as variance from nominal dimensions. Shaft and housing data shown in millimeters over inches. |          |                |         |                                 |          |                |        |         |         |
| Bearing Bore<br>Nominal (Min.)                                                                                                  |          | Shaft Diameter |         | Bearing Bore<br>Nominal (Max.)  |          | Shaft Diameter |        |         |         |
| over                                                                                                                            | incl.    | Max.           | Min.    | over                            | incl.    | Max.           | Min.   | Max.    | Min.    |
| mm                                                                                                                              | mm       | mm             | mm      | mm                              | mm       | mm             | mm     | mm      | mm      |
| in.                                                                                                                             | in.      | in.            | in.     | in.                             | in.      | in.            | in.    | in.     | in.     |
| 0.000                                                                                                                           | 171.450  | +0             | -0.030  | 0.000                           | 504.825  | +0.076         | +0     | -0.152  | -0.076  |
| 0.0000                                                                                                                          | 6.7500   | +0             | -0.0012 | 0.0000                          | 19.8750  | +0.0030        | +0     | -0.0060 | -0.0030 |
| 171.450                                                                                                                         | 508.000  | +0             | -0.038  | 504.825                         | 1524.000 | +0.127         | +0     | -0.254  | -0.127  |
| 6.7500                                                                                                                          | 20.0000  | +0             | -0.0015 | 19.8750                         | 60.0000  | +0.0050        | +0     | -0.0100 | -0.0050 |
| <b>HOUSING</b>                                                                                                                  |          |                |         | <b>HOUSING</b>                  |          |                |        |         |         |
| Bearing Bore<br>Nominal (Min.)                                                                                                  |          | Housing Bore   |         | Bearing O. D.<br>Nominal (Max.) |          | Shaft Diameter |        |         |         |
| over                                                                                                                            | incl.    | Max.           | Min.    | over                            | incl.    | Max.           | Min.   | Max.    | Min.    |
| mm                                                                                                                              | mm       | mm             | mm      | mm                              | mm       | mm             | mm     | mm      | mm      |
| in.                                                                                                                             | in.      | in.            | in.     | in.                             | in.      | in.            | in.    | in.     | in.     |
| 119.858                                                                                                                         | 441.325  | +0.229         | +0.127  | 0.000                           | 584.000  | +0.152         | 0.076  | -0.152  | -0.076  |
| 4.7188                                                                                                                          | 17.3750  | +0.0090        | +0.0050 | 0.0000                          | 23.0000  | +0.0060        | 0.0030 | -0.0060 | -0.0030 |
| 441.325                                                                                                                         | 1000.000 | +0.254         | +0.152  | 584.000                         | 1778.000 | +0.254         | 0.127  | -0.254  | -0.127  |
| 17.3750                                                                                                                         | 39.3701  | +0.0100        | +0.0060 | 23.0000                         | 70.0000  | +0.0100        | 0.0050 | -0.0100 | -0.0050 |

\* Dowel pin suggested.

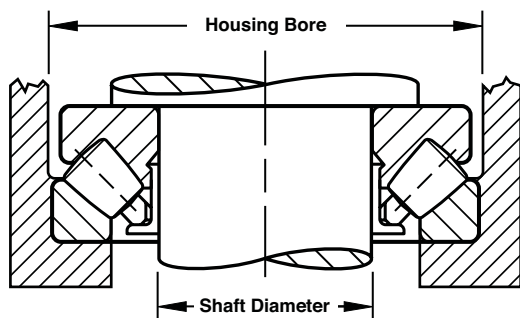
\*\* Dowel pin required.

FITTING PRACTICES - continued

**SHAFT AND HOUSING FITS  
THRUST SPHERICAL ROLLER BEARING**

Tolerances for housing bore and for shaft diameters are shown as variance from nominal bearing dimension. Data is shown in inches over millimeters. When application calls for thrust loads only, the housing must be relieved by 1/16 in. on diameter so that no radial load is carried on the bearing. All tolerances are in number of micrometers (µm) and ten thousandths of an inch (.0001 in.).

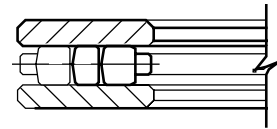
| SHAFT                                                                           |            |                 |            |               |            | HOUSING                                                                         |             |                                      |             |                              |            |                     |            |
|---------------------------------------------------------------------------------|------------|-----------------|------------|---------------|------------|---------------------------------------------------------------------------------|-------------|--------------------------------------|-------------|------------------------------|------------|---------------------|------------|
| Tolerances are 1/1000 of a millimeter (µm) and 1/10,000 of an inch (5 = .0005") |            |                 |            |               |            | Tolerances are 1/1000 of a millimeter (µm) and 1/10,000 of an inch (5 = .0005") |             |                                      |             |                              |            |                     |            |
| Bearing Bore                                                                    |            | Shaft Diameter  |            |               |            | Bearing O.D.                                                                    |             | Housing Bore                         |             |                              |            |                     |            |
| Nominal (Max.)                                                                  |            | Stationary Load |            | Rotating Load |            | Nominal (Max.)                                                                  |             | Springs in Housing Light Radial Load |             | Combined Axial & Radial Load |            |                     |            |
| inches                                                                          |            | Max.            | Min.       | Max.          | Min.       | inches                                                                          |             | Min.                                 | Max.        | Stationary Outer Ring        |            | Rotating Outer Ring |            |
| over                                                                            | incl.      | mm              | mm         | mm            | mm         | over                                                                            | incl.       | mm                                   | mm          | mm                           | mm         | mm                  | mm         |
| in.                                                                             | in.        | in.             | in.        | in.           | in.        | in.                                                                             | in.         | in.                                  | in.         | in.                          | in.        | in.                 | in.        |
| <b>80</b>                                                                       | <b>120</b> | <b>+13</b>      | <b>-10</b> | <b>+25</b>    | <b>+3</b>  | <b>180</b>                                                                      | <b>250</b>  | <b>+15</b>                           | <b>+61</b>  | <b>-18</b>                   | <b>+28</b> | <b>-33</b>          | <b>+13</b> |
| 3.1496                                                                          | 4.7244     | +5              | -4         | +10           | +1         | 7.0866                                                                          | 9.8425      | +6                                   | +24         | -7                           | +11        | -13                 | +5         |
| <b>120</b>                                                                      | <b>180</b> | <b>+15</b>      | <b>-10</b> | <b>+28</b>    | <b>+3</b>  | <b>250</b>                                                                      | <b>315</b>  | <b>+18</b>                           | <b>+69</b>  | <b>-18</b>                   | <b>+33</b> | <b>-36</b>          | <b>+15</b> |
| 4.7244                                                                          | 7.0866     | +6              | -4         | +11           | +1         | 9.8425                                                                          | 12.4016     | +7                                   | +27         | -7                           | +13        | -14                 | +6         |
| <b>180</b>                                                                      | <b>200</b> | <b>+18</b>      | <b>-13</b> | <b>+36</b>    | <b>+5</b>  | <b>315</b>                                                                      | <b>400</b>  | <b>+18</b>                           | <b>+74</b>  | <b>-18</b>                   | <b>+38</b> | <b>-41</b>          | <b>+15</b> |
| 7.0866                                                                          | 7.8740     | +7              | -5         | +14           | +2         | 12.4016                                                                         | 15.7480     | +7                                   | +29         | -7                           | +15        | -16                 | +6         |
| <b>200</b>                                                                      | <b>240</b> | <b>+18</b>      | <b>-13</b> | <b>+46</b>    | <b>+15</b> | <b>400</b>                                                                      | <b>500</b>  | <b>+20</b>                           | <b>+84</b>  | <b>-23</b>                   | <b>+41</b> | <b>-46</b>          | <b>+18</b> |
| 7.8740                                                                          | 9.4488     | +7              | -5         | +18           | +6         | 15.7480                                                                         | 19.6850     | +8                                   | +33         | -9                           | +16        | -18                 | +7         |
| <b>240</b>                                                                      | <b>315</b> | <b>+18</b>      | <b>-15</b> | <b>+51</b>    | <b>+20</b> | <b>500</b>                                                                      | <b>630</b>  | <b>+23</b>                           | <b>+91</b>  | <b>-23</b>                   | <b>+46</b> | <b>-48</b>          | <b>+20</b> |
| 9.4488                                                                          | 12.4016    | +7              | -6         | +20           | +8         | 19.6850                                                                         | 24.8031     | +9                                   | +36         | -9                           | +18        | -19                 | +8         |
| <b>315</b>                                                                      | <b>400</b> | <b>+18</b>      | <b>-18</b> | <b>+56</b>    | <b>+20</b> | <b>630</b>                                                                      | <b>800</b>  | <b>+23</b>                           | <b>+102</b> | <b>-23</b>                   | <b>+51</b> | <b>-51</b>          | <b>+23</b> |
| 12.4016                                                                         | 15.7480    | +7              | -7         | +22           | +8         | 24.8031                                                                         | 31.4960     | +9                                   | +40         | -9                           | +20        | -20                 | +9         |
| <b>400</b>                                                                      | <b>500</b> | <b>+23</b>      | <b>-18</b> | <b>+86</b>    | <b>+46</b> | <b>800</b>                                                                      | <b>1000</b> | <b>+25</b>                           | <b>+109</b> | <b>-25</b>                   | <b>+58</b> | <b>-58</b>          | <b>+25</b> |
| 15.7480                                                                         | 19.6850    | +9              | -7         | +34           | +18        | 31.4960                                                                         | 39.3700     | +10                                  | +43         | -10                          | +23        | -23                 | +10        |
| <b>500</b>                                                                      | <b>630</b> | <b>+23</b>      | <b>-20</b> | <b>+86</b>    | <b>+43</b> | <b>1000</b>                                                                     | <b>1250</b> | <b>+28</b>                           | <b>+122</b> | <b>-28</b>                   | <b>+66</b> | <b>-64</b>          | <b>+30</b> |
| 19.6850                                                                         | 24.8031    | +9              | -8         | +34           | +17        | 39.3700                                                                         | 49.2126     | +11                                  | +48         | -11                          | +26        | -25                 | +12        |



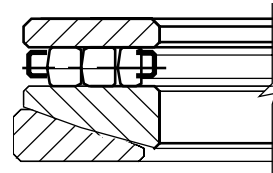
FITTING PRACTICES - continued

SHAFT AND HOUSING FITS  
THRUST CYLINDRICAL ROLLER BEARINGS

| SHAFT<br>TYPE TP AND TPS                                                                                                                     |           |                |           |           |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------|-----------|-----------|
| Tolerances for housing bore and for shaft diameters shown as variance from nominal bearing dimension. Data shown in millimeters over inches. |           |                |           |           |
| Bearing Bore<br>Nominal (Min.)                                                                                                               |           | Shaft Diameter |           |           |
| over                                                                                                                                         | incl.     | Max.           | Min.      |           |
| mm<br>in.                                                                                                                                    | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. |
| 47.625                                                                                                                                       | 53.975    | -0.025         | -0.051    |           |
| 1.8750                                                                                                                                       | 2.1250    | -0.0010        | -0.0020   |           |
| 53.975                                                                                                                                       | 63.500    | -0.028         | -0.053    |           |
| 2.1250                                                                                                                                       | 2.5000    | -0.0011        | -0.0021   |           |
| 63.500                                                                                                                                       | 76.200    | -0.030         | -0.056    |           |
| 2.5000                                                                                                                                       | 3.0000    | -0.0012        | -0.0022   |           |
| 76.200                                                                                                                                       | 88.900    | -0.033         | -0.058    |           |
| 3.0000                                                                                                                                       | 3.5000    | -0.0012        | -0.0023   |           |
| 88.900                                                                                                                                       | 177.800   | -0.038         | -0.064    |           |
| 3.5000                                                                                                                                       | 7.0000    | -0.0015        | -0.0025   |           |
| 177.800                                                                                                                                      | 228.600   | -0.038         | -0.076    |           |
| 7.0000                                                                                                                                       | 9.0000    | -0.0015        | -0.0030   |           |
| 228.600                                                                                                                                      | 304.800   | -0.046         | -0.084    |           |
| 9.0000                                                                                                                                       | 12.0000   | -0.0018        | -0.0030   |           |
| 304.800                                                                                                                                      | 381.000   | -0.051         | -0.089    |           |
| 12.0000                                                                                                                                      | 15.0000   | -0.0020        | -0.0035   |           |
| 381.000                                                                                                                                      | 482.600   | -0.051         | -0.102    |           |
| 15.0000                                                                                                                                      | 19.0000   | -0.0020        | -0.0040   |           |
| 482.600                                                                                                                                      | 584.200   | -0.064         | -0.114    |           |
| 19.0000                                                                                                                                      | 23.0000   | -0.0025        | -0.0045   |           |
| 584.200                                                                                                                                      | 762.000   | -0.076         | -0.140    |           |
| 23.0000                                                                                                                                      | 30.0000   | -0.0030        | -0.0055   |           |



TP



TPS

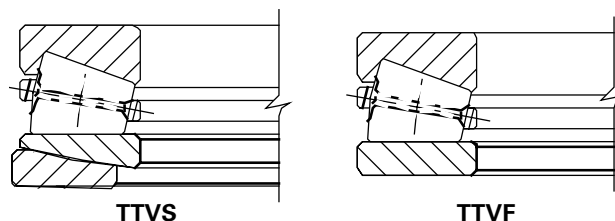
| HOUSING<br>TYPE TPS                         |           |                                      |           |           |
|---------------------------------------------|-----------|--------------------------------------|-----------|-----------|
| Deviations in $\mu\text{m}$ / 0.0001 inches |           |                                      |           |           |
| Bearing O. D.<br>Nominal (Min.)             |           | Housing Diameter<br>Deviation from D |           |           |
| over                                        | incl.     | high                                 | low       |           |
| mm<br>in.                                   | mm<br>in. | mm<br>in.                            | mm<br>in. | mm<br>in. |
| 50.800                                      | 60.325    | +38                                  | +13       |           |
| 2.0000                                      | 2.3750    | +15                                  | +5        |           |
| 60.325                                      | 82.550    | +43                                  | +18       |           |
| 2.3750                                      | 3.2500    | +17                                  | +7        |           |
| 82.550                                      | 93.663    | +48                                  | +23       |           |
| 3.2500                                      | 3.6875    | +19                                  | +9        |           |
| 93.663                                      | 101.600   | +53                                  | +28       |           |
| 3.6875                                      | 4.0000    | +21                                  | +11       |           |
| 101.600                                     | 115.092   | +71                                  | +33       |           |
| 4.0000                                      | 4.5312    | +28                                  | +13       |           |
| 115.092                                     | 254.000   | +76                                  | +38       |           |
| 4.5312                                      | 10.0000   | +30                                  | +15       |           |
| 254.000                                     | 457.200   | +102                                 | +51       |           |
| 10.0000                                     | 18.0000   | +40                                  | +20       |           |
| 457.200                                     | 558.800   | +127                                 | +64       |           |
| 18.0000                                     | 22.0000   | +50                                  | +25       |           |
| 558.800                                     | 660.400   | +140                                 | +64       |           |
| 22.0000                                     | 26.0000   | +55                                  | +25       |           |
| 660.400                                     | 711.200   | +152                                 | +76       |           |
| 26.0000                                     | 28.0000   | +60                                  | +30       |           |
| 711.200                                     | 863.600   | +178                                 | +76       |           |
| 28.0000                                     | 34.0000   | +70                                  | +30       |           |
| 863.600                                     | 965.200   | +203                                 | +89       |           |
| 34.0000                                     | 38.0000   | +80                                  | +35       |           |
| 965.200                                     | 1117.600  | +229                                 | +102      |           |
| 38.0000                                     | 44.0000   | +90                                  | +40       |           |

| HOUSING<br>TYPE TP                          |           |              |           |           |
|---------------------------------------------|-----------|--------------|-----------|-----------|
| Deviations in $\mu\text{m}$ / 0.0001 inches |           |              |           |           |
| Bearing O. D.<br>Nominal (Min.)             |           | Housing Bore |           |           |
| over                                        | incl.     | Max.         | Min.      |           |
| mm<br>in.                                   | mm<br>in. | mm<br>in.    | mm<br>in. | mm<br>in. |
| 115.092                                     | 254.000   | +0.076       | +0.038    |           |
| 4.5312                                      | 10.0000   | +0.0030      | +0.0015   |           |
| 254.000                                     | 457.200   | +0.102       | +0.051    |           |
| 10.0000                                     | 18.0000   | +0.0040      | +0.002    |           |
| 457.200                                     | 558.800   | +0.127       | +0.064    |           |
| 18.0000                                     | 22.0000   | +0.0050      | +0.0025   |           |
| 558.800                                     | 660.400   | +0.140       | +0.064    |           |
| 22.0000                                     | 26.0000   | +0.0055      | +0.0025   |           |
| 660.400                                     | 711.200   | +0.152       | +0.076    |           |
| 26.0000                                     | 28.0000   | +0.0060      | +0.0030   |           |
| 711.200                                     | 863.600   | +0.178       | +0.076    |           |
| 28.0000                                     | 34.0000   | +0.0070      | +0.0030   |           |
| 863.600                                     | 965.200   | +0.203       | +0.089    |           |
| 34.0000                                     | 38.0000   | +0.0080      | +0.0035   |           |
| 965.200                                     | 1117.600  | +0.229       | +0.102    |           |
| 38.0000                                     | 44.0000   | +0.0090      | +0.0040   |           |

FITTING PRACTICES - continued

SHAFT AND HOUSING FITS  
THRUST TAPERED ROLLER BEARINGS

Tolerances for housing bore and shaft diameters are shown as variance from nominal bearing dimension. Data is shown in millimeters over inches. When one washer is piloted by the housing, sufficient clearances must be allowed at the outside diameter of the other washer as well as at the bore of both washers to prevent cross-loading of the rollers. For most applications, this clearance is approximately 1/16 in. (1.588 mm, .0625 in.).

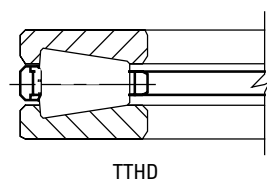


| SHAFT                       |          |                |      |
|-----------------------------|----------|----------------|------|
| TYPES TTVS AND TTVF         |          |                |      |
| Bearing Bore Nominal (Min.) |          | Shaft Diameter |      |
| over                        | incl.    | Max. +0        | Min. |
| mm                          | mm       | mm             | mm   |
| in.                         | in.      | in.            | in.  |
| 0.000                       | 304.800  | -0.051         |      |
| 0.0000                      | 12.0000  | -0.0020        |      |
| 304.800                     | 508.000  | -0.051         |      |
| 12.0000                     | 20.0000  | -0.0020        |      |
| 508.000                     | 711.200  | -0.076         |      |
| 20.0000                     | 28.0000  | -0.0030        |      |
| 711.200                     | 1219.200 | -0.102         |      |
| 28.0000                     | 48.0000  | -0.0040        |      |
| 1219.200                    | 1727.200 | -0.127         |      |
| 48.0000                     | 68.0000  | -0.0050        |      |

| HOUSING                     |         |              |         |
|-----------------------------|---------|--------------|---------|
| TYPES TTVS AND TTVF         |         |              |         |
| Bearing Bore Nominal (Min.) |         | Housing Bore |         |
| over                        | incl.   | Max.         | Min.    |
| mm                          | mm      | mm           | mm      |
| in.                         | in.     | in.          | in.     |
| 161.925                     | 265.113 | +0.060       | +0.025  |
| 6.3750                      | 10.4375 | +0.0025      | +0.0010 |
| 265.113                     | 317.500 | +0.076       | +0.025  |
| 10.3475                     | 12.5000 | +0.0030      | +0.0010 |
| 317.500                     | 482.600 | +0.102       | +0.051  |
| 12.5000                     | 19.0000 | +0.0040      | +0.0020 |
| 482.600                     | 603.250 | +0.113       | +0.051  |
| 19.0000                     | 23.7500 | +0.0045      | +0.0020 |
| 603.250                     | 711.200 | +0.152       | +0.076  |
| 23.7500                     | 28.0000 | +0.0060      | +0.0030 |
| 711.200                     | 838.200 | +0.178       | +0.076  |
| 28.0000                     | 33.0000 | +0.0070      | +0.0030 |

FITTING GUIDELINES - TTHD BEARINGS

| FITTING GUIDELINES - TTHD BEARINGS         |          |               |                              |               |           |                              |               |                 |
|--------------------------------------------|----------|---------------|------------------------------|---------------|-----------|------------------------------|---------------|-----------------|
| (Tolerances and fits in µm and 0.0001 in.) |          |               |                              |               |           |                              |               |                 |
| BORE mm (in.)                              |          | Rotating Race |                              |               |           |                              |               | Stationary Race |
| over                                       | incl.    | Tolerance     | Class 2 Shaft O.D. Deviation | Resultant Fit | Tolerance | Class 3 Shaft O.D. Deviation | Resultant Fit | Class 2 and 3   |
| 0                                          | 304.800  | 0             | +76                          | 76 T          | 0         | +51                          | 51 T          |                 |
|                                            |          | +25           | +50                          | 25 T          | +13       | +38                          | 25 T          |                 |
| 0                                          | 12       | 0             | +30                          | 30 T          | 0         | +20                          | 20 T          |                 |
|                                            |          | +10           | +20                          | 10 T          | +5        | +15                          | 10 T          |                 |
| 304.800                                    | 609.600  | 0             | +152                         | 152 T         | 0         | +102                         | 102 T         |                 |
|                                            |          | +51           | +102                         | 51 T          | +25       | +76                          | 51 T          |                 |
| 12                                         | 24       | 0             | +60                          | 60 T          | 0         | +40                          | 40 T          |                 |
|                                            |          | +20           | +40                          | 20 T          | +10       | +30                          | 20 T          |                 |
| 609.600                                    | 914.400  | 0             | +204                         | 204 T         | 0         | +127                         | 127 T         |                 |
|                                            |          | +76           | +127                         | 51 T          | +38       | +89                          | 51 T          |                 |
| 24                                         | 36       | 0             | +80                          | 80 T          | 0         | +50                          | 50 T          |                 |
|                                            |          | +30           | +50                          | 20 T          | +15       | +35                          | 20 T          |                 |
| 914.400                                    | 1219.200 | 0             | +254                         | 254 T         | 0         | +153                         | 153 T         |                 |
|                                            |          | +102          | +153                         | 51 T          | +51       | +102                         | 51 T          |                 |
| 36                                         | 48       | 0             | +100                         | 100 T         | 0         | +60                          | 60 T          |                 |
|                                            |          | +40           | +60                          | 20 T          | +20       | +40                          | 20 T          |                 |
| 1219.200                                   |          | 0             | +305                         | 305 T         | 0         | +204                         | 204 T         |                 |
|                                            |          | +127          | +178                         | 51 T          | +76       | +127                         | 51 T          |                 |
| 48                                         |          | 0             | 120                          | +120 T        | 0         | +80                          | 80 T          |                 |
|                                            |          | +50           | +70                          | 20 T          | +30       | +50                          | 20 T          |                 |



All sizes Provide a minimum radial clearance of 2.5 mm (0.1 in.) between race bore and shaft O.D.

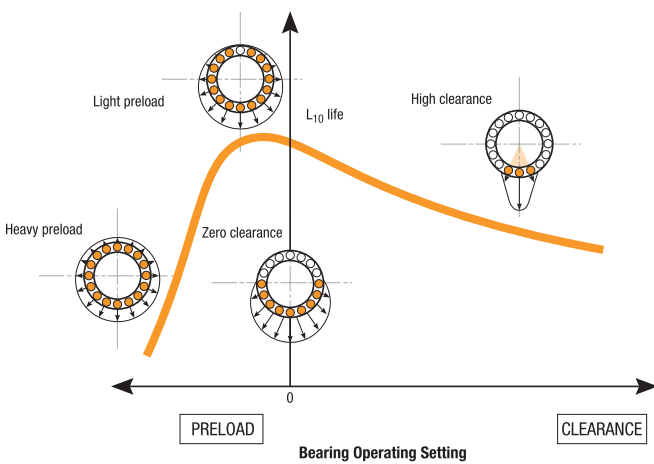
- Rotating race O.D. must have a minimum radial clearance of 2.5 mm (0.1 in.)
- TTHD stationary race O.D. must have a minimum loose fit of 0.25 to 0.37 mm (0.01 to 0.015 in.)
- TTHDFL washer when stationary may be loose fit on its O.D. (same as the TTHD) or may be 0.025 to 0.076 mm (0.001 to 0.003 in.) tight.



# A BEARING SETTING

## SETTING TAPERED ROLLER BEARINGS

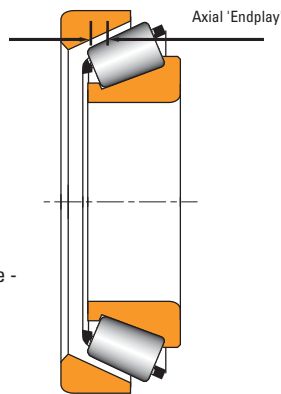
Setting is defined as a specific amount of either endplay or preload. Establishing the setting at the time of assembly is an inherent advantage of tapered roller bearings. They can be set to provide optimum performance in almost any application. The following figure gives an example of the relationship between fatigue life and bearing setting. Unlike some types of anti-friction bearings, tapered roller bearings do not rely strictly on housing or shaft fits to obtain a certain bearing setting. One race can be moved axially relative to the other to obtain the desired bearing setting.



Relationship between bearing setting and fatigue life.

At assembly, the conditions of bearing setting are defined as:

- **Endplay** – An axial clearance between rollers and races producing a measurable axial shaft movement when a small axial force is applied - first in one direction, then in the other, while oscillating or rotating the shaft.



- **Preload** – An axial interference between rollers and races such that there is no measurable axial shaft movement when a small axial force is applied – in both directions, while oscillating or rotating the shaft.
- **Line-to-line** – A zero setting condition: the transitional point between endplay and preload.

Bearing setting obtained during initial assembly and adjustment is the cold or ambient bearing setting and is established before the equipment is subjected to service.

Bearing setting during operation is known as the operating bearing setting and is a result of changes in the ambient bearing setting due to thermal expansion and deflections encountered during service.

The ambient bearing setting necessary to produce the optimum operating bearing setting varies with the application. Application experience, or testing, generally permits the determination of optimum settings. Frequently, however, the exact relationship of ambient to operating bearing setting is an unknown and an educated estimate has to be made. To determine a suggested ambient bearing setting for a specific application, consult your Timken representative.

Generally, the ideal operating bearing setting is near zero to maximize bearing life. Most bearings are set with endplay at assembly to reach the desired near zero setting at operating temperature when mounted.

### Standard mounting

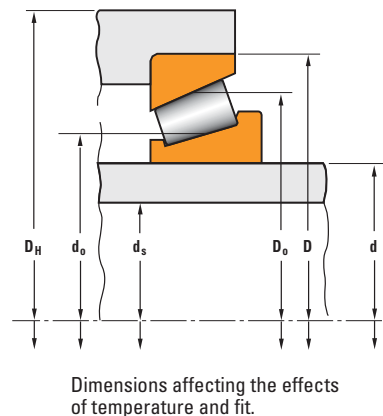
$$\text{Operating setting} = \text{mounted setting} \pm \text{temperature effect} \pm \text{deflection}$$

### Pre-set assemblies

$$\text{Mounted EP or PL} = \text{Bench EP or Bench PL} - \text{effect of fits}$$

$$\text{Operating setting} = \text{mounted EP or PL (MEP or MPL)} \pm \text{temperature effect} \pm \text{deflection}$$

The temperature and fit effects will depend upon the type of mounting, bearing geometry and size, shaft and housing size and material according to the following sketch:



BEARING SETTING - continued

TEMPERATURE EFFECT  
(IN A TWO-ROW MOUNTING)

Symbols used:

- $\delta_S$  = interference fit of inner race on shaft
- $\delta_H$  = interference fit of outer race in housing
- $K_n$  = K-factor for bearing #n
- $d$  = bearing bore diameter
- $d_o$  = mean inner race diameter
- $D$  = bearing outside diameter
- $D_o$  = mean outer race diameter
- $L$  = distance between bearing geometric center lines, mm (in.)
- $\alpha$  = coefficient of linear expansion:  $11 \times 10^{-6}/^\circ\text{C}$  ( $6.1 \times 10^{-6}/^\circ\text{F}$ ) for ferrous metal shaft and housing materials
- $d_s$  = shaft inside diameter
- $D_H$  = housing outside diameter
- $\Delta T$  = temperature difference between shaft/inner race + rollers and housing/bearing outer race

DIRECT MOUNTING

$$\text{Thermal Lateral Loss} = \alpha \Delta T \left[ \left( \frac{K_1}{0.39} \times \frac{D_{o1}}{2} \right) + \left( \frac{K_2}{0.39} \times \frac{D_{o2}}{2} \right) + L \right]$$

INDIRECT MOUNTING

$$\text{Thermal Lateral Loss} = \alpha \Delta T \left[ \left( \frac{K_1}{0.39} \times \frac{D_{o1}}{2} \right) + \left( \frac{K_2}{0.39} \times \frac{D_{o2}}{2} \right) - L \right]$$

Note: Positive lateral loss is the amount of setting reduction or loss of endplay.

FIT EFFECT (SINGLE-ROW)

SOLID SHAFT/HEAVY SECTION HOUSING

Inner Race:

$$F = 0.5 \left( \frac{K}{0.39} \right) \left( \frac{d}{d_o} \right) \delta_S$$

Outer Race:

$$F = 0.5 \left( \frac{K}{0.39} \right) \left( \frac{D}{D_o} \right) \delta_H$$

Hollow shaft/thin wall section

$$\text{Inner Race: } F = 0.5 \left( \frac{K}{0.39} \right) \left( \frac{d}{d_o} \right) \left[ \frac{1 - \left( \frac{d_s}{d} \right)^2}{1 - \left( \frac{d_s}{d_o} \right)^2} \right] \delta_S$$

$$\text{Outer Race: } F = 0.5 \left( \frac{K}{0.39} \right) \left( \frac{D_o}{D} \right) \left[ \frac{1 - \left( \frac{D}{D_H} \right)^2}{1 - \left( \frac{D_o}{D_H} \right)^2} \right] \delta_H$$

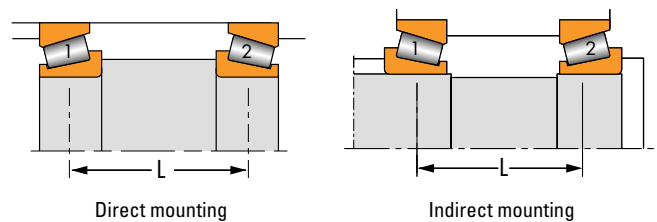
Note: These equations apply only to ferrous shaft and housing.

SETTING METHODS FOR  
TAPERED ROLLER BEARINGS

Upper and lower limits of bearing setting value are determined by consideration of the following factors:

- Application type.
- Duty.
- Operational features of adjacent mechanical drive elements.
- Changes in bearing setting due to temperature differentials and deflections.
- Size of bearing and method of obtaining bearing setting.
- Lubrication method.
- Housing and shaft material.

The setting value to be applied during assembly will depend on any changes that may occur during operation. In the absence of experience with bearings of similar size and operating conditions, bearing setting range suggestions should be obtained from your Timken representative.



Use the push-pull method (manual setting) to measure any axial endplay (used as reference) while rotating the shaft or the housing. Correct this reference value to the final required endplay or preload by changing the setting on the adjusting device. Fig. A-25 and A-26 are typical examples of manual setting applications.

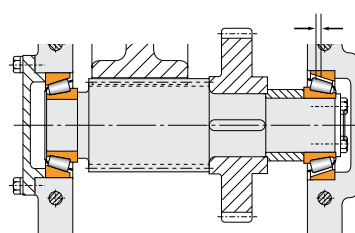


Fig. A-25  
Axial clearance (endplay).

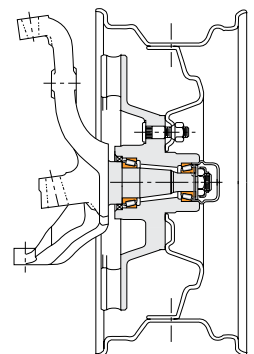
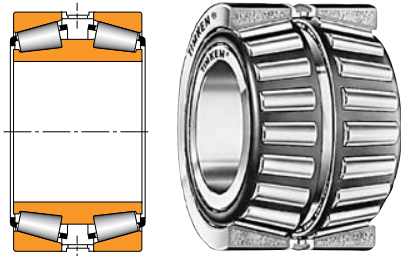


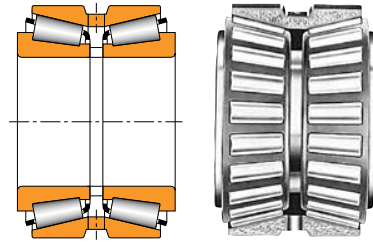
Fig. A-26  
Truck nondriven wheel.

BEARING SETTING - continued

PRESET BEARING ASSEMBLIES

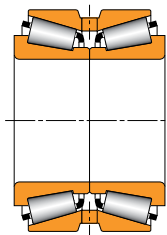


TDI with outer race spacer

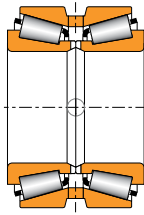


TDO with inner race spacer

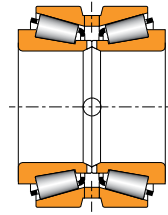
Fig. A-27  
Typical preset  
bearing  
assemblies.



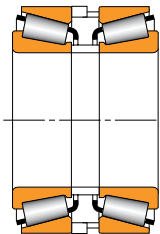
TNA



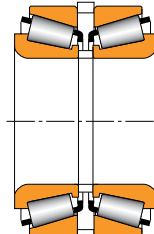
TNASW



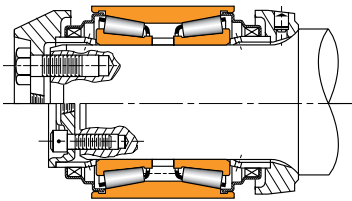
TNASWE



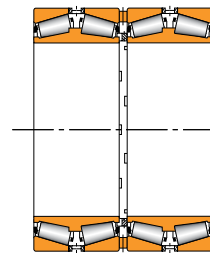
SR



SS



AP



TQO



If the application requires the use of multi-row bearing assemblies, preset bearings can be used (Fig. A-27). Various types of multi-row bearing combinations can be provided with spacers that are ground and custom-fitted to provide a bearing setting to meet the requirements of the application (Fig. A-28). Types SS, TDI, TDIT and TDO, listed in this publication, are examples.

Each matched assembly has an identifying serial number marked on each outer race, inner race and spacer. Some small preset assemblies are not marked with a serial number but their component parts are supplied as a boxed set.

A preset bearing assembly contains a specific fixed internal clearance (or preload) built in during manufacture. The value of this "setting" is referred to as "bench endplay" (BEP) or "bench preload" (BPL) and is normally determined by The Timken Company during the design stage of new equipment. Components from one bearing assembly are NOT interchangeable with similar parts from another.

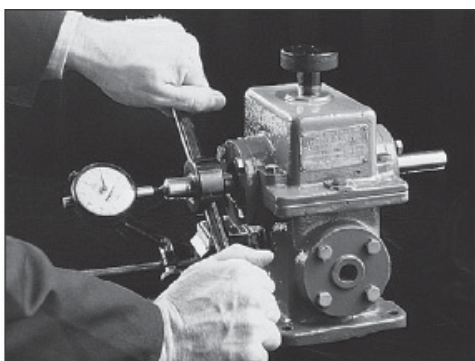
Bearing settings for types TNA, TNASW, TNASWE (standard version) and SR bearings are obtained through close axial tolerance control and components from these assemblies are interchangeable for bearings having bore sizes under 305 mm (12 in.).

**BEARING SETTING - continued**

The Timken Company has developed various automated bearing setting techniques. The advantages of these techniques are:

- Reduced set-up time.
- Reduced assembly cost.
- Increased consistency and reliability of bearing settings.
- In most cases they can be applied to the assembly line for moderate and high volume production.

It is possible to select and adapt one of the following automated setting methods for a wide range of applications.



**Fig. A-28**  
Bearing setting.

**“Set-Right”™**

This technique applies the laws of probability. The setting in the bearing is controlled by the radial and axial tolerances of the various components of the assembly.

**“Acro-Set”™**

The Acro-Set method is achieved through measurement of a shim or spacer gap with a specified set-up load applied. The correct shim or spacer dimension is then taken from a prepared chart or by a direct instrument reading. This technique is based on Hooke's law, which states that within the elastic limit, deformation or deflection is proportional to the load applied. It is applicable to either endplay or preload bearing settings.

**“Torque-Set”™**

The Torque-Set technique is a method of obtaining correct bearing settings by using low-speed bearing rolling torque as a basis for determining the amount of deformation or deflection of the assembly parts affecting bearing settings. This technique is applicable regardless of whether the final bearing setting is preload or endplay.

**“Projecta-Set”™**

The Projecta-Set technique is used to “project” an inaccessible shim or spacer gap to a position where it can easily be measured. This is achieved using a spacer and a gauging sleeve. The Projecta-Set technique is of most benefit on applications where the inner and outer races are an interference fit and therefore disassembly for adjustment is more difficult and time-consuming than with loose-fitting races.

Deciding which automated bearing setting technique should be used must be made early in the design sequence. It is necessary to review each application to determine the most economical method and necessary fixtures and tools. The final decision will be based on the size and weight of the unit, machining tolerances, production volume, access to retaining devices (locknuts, end plates, etc.) and available tools. Your Timken representative can assist in determining the best method to obtain the correct bearing setting.

## DUPLEX SETS OF BALL BEARINGS AND PRELOADING

Two single-row ball bearings manufactured specially for use as a unit are known as a duplex bearing. It may be considered analogous to a double-row bearing having the same bore and outside diameter, but twice the single-row bearing width.

The main purpose of duplex bearings in an application is to achieve greater axial and radial rigidity than is possible with one single-row bearing. The extra “stiffness” in these bearings is obtained by “preloading.” Preloading is incorporated into bearings by selective face grinding which is described in detail below.

Although angular contact bearings, such as the 7000, M-WI and MMWI types, are more commonly used in duplex arrangements, other types of bearings such as radial single-row open, shielded and sealed types, can be duplexed where required to meet specific conditions.

**PRELOADING**

Preloading to a predetermined value is accomplished by grinding a certain amount of material off inner or outer ring faces so that before mounting the two single bearings as a duplex pair, the faces on abutting sides are offset an amount equal to the deflection under the “preload.”

When mounted, these faces are clamped together so that the bearings are subjected to an internal load caused by one bearing opposing the other. This “preloading” materially decreases subsequent deflection due to external loads applied to the clamped-up pair.

Timken has established, for each bearing size, standard preload levels which are considered proper for most duplex bearing applications. Special preloads can also be provided to satisfy

BEARING SETTING - continued

extreme requirements. For example, a heavily loaded, slow-speed rotating shaft may require heavier than normal preload in order to minimize deflection. It must be remembered, however, that although heavy preload provides slightly greater rigidity, it reduces bearing life and increases power consumption; therefore preload levels should be chosen with care.

The axial deflection of a bearing subject to thrust loading is based on Hertz's theories for elastic bodies in contact. The general expression is:

$$\delta = K \left( \frac{T^2}{nd^2} \right)^{1/3}$$

- where  $\delta$  = axial deflection
- K = a constant based on bearing geometry
- T = thrust load applied
- n = number of balls
- d = ball diameter

A typical axial deflection curve for an unpreloaded single-row angular contact bearing is shown in Figure A-29, as curve A. This curve represents the deflection characteristics of bearing "A" being subjected to thrust load T. The amount of deflection due to load T<sub>1</sub> is much greater than the increase in deflection caused by doubling the thrust load to T<sub>2</sub>. This illustrates the non-linear deflection of a ball bearing.

Curves C<sub>1</sub> and C<sub>2</sub> show the deflection of bearings A and B flushmounted as a pair, shown below, with each bearing having a preload of T<sub>1</sub> and T<sub>2</sub> lbs., respectively. Comparing curves C<sub>1</sub> and C<sub>2</sub> with A shows the deflection of the preloaded pair is much less than that of a single unpreloaded bearing. This has been accomplished essentially by eliminating the "high deflection" points of curve A (from no load to T<sub>1</sub> or T<sub>2</sub> lbs.).

Curves B<sub>1</sub> and B<sub>2</sub> show the axial deflection of bearing B as mounted in Figure A-30 below from the preloaded conditions T<sub>1</sub> or T<sub>2</sub> to a no preload condition.

Preloading can be accomplished by the use of springs or spacer width adjustment, but your Timken representative should be consulted for design review.

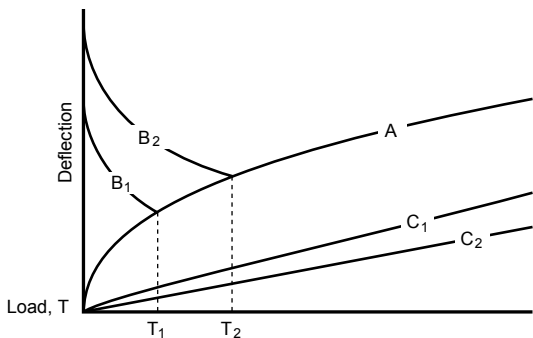


Fig. A-29 Axial load-deflection curve of back-to-back mounted angular-contact bearings. Curve A is for Bearing A, B is for bearing B, and C<sub>1</sub> and C<sub>2</sub> are preload curves.

TYPICAL APPLICATIONS

Deep well pumps, marine propeller shafts, machine tool spindles, gear shafts, speed reducers, elevator worm drives, and similar applications often require the use of preloaded duplex bearings.

WIDTH TOLERANCES

To allow for face grinding of single bearings to specified preload for use in duplex pairs or other multiple bearing units, the inner and outer ring width tolerance of each bearing is greater than that for a standard single bearing as follows:

| Bearing Bore mm |       | Width Tolerance ABEC | Width Tolerance ABEC |
|-----------------|-------|----------------------|----------------------|
| over            | incl. | 1,3                  | 5,7,9                |
| 0               | 50    | +0.000° -0.010°      | +0.000° -0.010°      |
| 50              | 80    | +0.000° -0.015°      | +0.000° -0.010°      |
| 80              | 120   | +0.000° -0.015°      | +0.000° -0.015°      |
| 120             | 180   | +0.000° -0.020°      | +0.000° -0.015°      |
| 180             | 315   | +0.000° -0.020°      | +0.000° -0.020°      |
| 315             | 400   | +0.000° -0.025°      | +0.000° -0.025°      |

The inner and outer ring width tolerances of duplex pairs and other multiple bearing units equal the tolerances listed above times the number of bearings in the unit. For example, a duplex pair of 2MM9115 WI DUL bearings has an inner and outer ring width tolerance of .010 in x 2 or .020 in.

MOUNTINGS OF BALL BEARINGS

Duplex bearings may be used with spacers between the matching faces in order to increase the system's resistance to moment loading or to increase the system rigidity by using the bearings to minimize shaft deflection. Shaft and housing spacers should be ground together on a surface grinder to obtain exactly equal lengths to assure that the built-in preload will be maintained. Since duplex bearings provide a very rigid mounting, it is important that special attention be given to correct shaft and housing fits, squareness of shaft and housing shoulders and alignment of all mating parts. In order to prevent cramping of bearings and an abnormal increase in preload which could result in excessive heat and possible bearing damage, suggested shaft and housing tolerances must be followed, shaft and housing shoulders must be square, bearing spacers must be of equal length and all parts must be free of nicks and burrs.

Typical preloaded mountings are shown here.

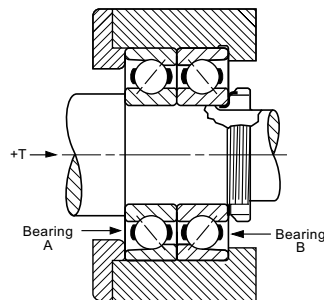


Fig. A-30 Typical preload mountings

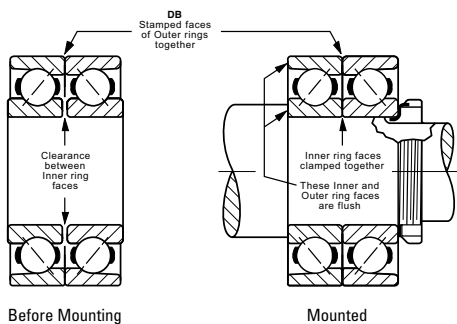


BEARING SETTING - continued

TYPICAL MOUNTINGS OF DUPLEX BEARINGS

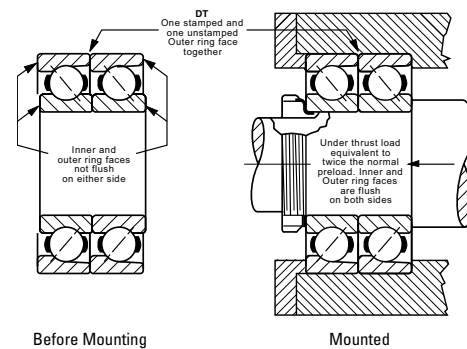
**Back-to-Back Mounting, DB or ("O")**  
**(Contact angles diverging toward shaft centerline)**

Before mounting, there is clearance between the two adjacent inner ring faces. After mounting, these faces are clamped together to provide an internal preload on each bearing. This arrangement is well suited for pulleys, sheaves and in other applications where there are overturning loads and also in all floating positions where thermal expansion of shaft occurs. It also provides axial and radial rigidity and equal thrust capacity in either direction when used in a fixed location. Back-to-back is the most commonly used of all duplex arrangements. Specify bearing number followed by suffix DU. Examples: 7207W-DU, 2MM207WI-DU. Also available as two single flush-ground bearings, e.g., 7207W SU (2 bearings).



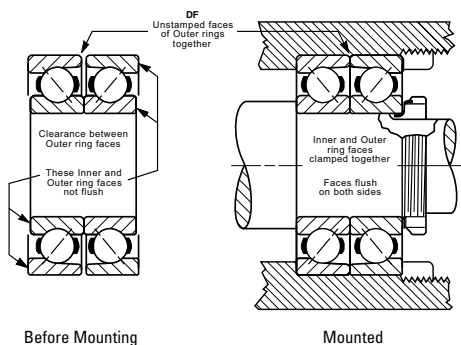
**Tandem Mounting, DT**

Before mounting, the inner ring faces of each bearing are offset from the outer ring faces. After mounting, when a thrust load is applied equal to that of twice the normal preload, the inner and outer ring faces are brought into alignment on both sides. This arrangement provides double thrust capacity in one direction only. More than two bearings can be used in tandem if additional thrust capacity is required. Timken pairs for tandem mounting should be specified as DU. Examples: 7205W-DU, 2M205WI-DU. Also available as two single flush-ground bearings with suffix SU, e.g., 7210W SU (two bearings).



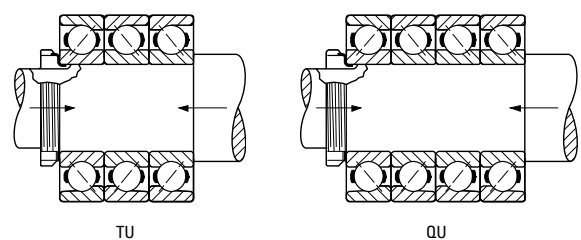
**Face-to-Face Mounting, DF or ("X")**  
**(Contact angles converging toward shaft centerline)**

Before mounting, there is clearance between the two adjacent outer ring faces. After mounting, these faces are clamped together between the housing shoulder and cover plate shoulder providing an internal preload on each bearing. This arrangement provides equal thrust capacity in either direction as well as radial and axial rigidity. Since the face-to-face mounting has inherent disadvantages of low resistance to moment loading and thermal instability, it should not be considered unless a significantly more convenient method of assembly or disassembly occurs from its use. Timken pairs for face-to-face mounting should be ordered as DU. Examples: 7212W-DU, 2M212WI-DU. Also available as two single flush-ground bearings, e.g., 7212W SU (two bearings).



**Other Mountings**

Flush ground (DU) pairs may be mounted in combination with a single flush-ground bearing as a "triplex" (TU) set shown below illustrates a "quadruplex" (QU) set where three bearings in tandem are mounted back-to-back with a single bearing. These arrangements provide high capacity in one direction and also a positively rigid mounting capable of carrying a moderate amount of reverse thrust.



## LUBRICATION AND SEALS

### LUBRICATION

To help maintain a rolling bearing's anti-friction characteristics, lubrication is needed to:

- Minimize rolling resistance due to deformation of the rolling elements and raceway under load by separating the mating surfaces.
- Minimize sliding friction occurring between rolling elements, raceways and cage.
- Transfer heat (with oil lubrication).
- Protect from corrosion and, with grease lubrication, from contaminant ingress.

Modern lubricants do this very effectively, although in many applications the means by which they accomplish this are extremely complex and not completely understood. Because the principles involved with lubricating rolling element bearings are complex and do not have to be known to employ lubricants successfully, this discussion will stress the practical rather than the theoretical aspects of lubrication.

### LUBRICATION SELECTION

The wide range of bearing types and operating conditions precludes any simple, all-inclusive statement or guideline allowing the selection of the proper lubricant. At the design level, the first consideration is whether oil or grease is best for the particular operation. The advantages of oil and grease are outlined in the table below. When heat must be carried away from the bearing, oil must be used. It is nearly always preferred for very high-speed applications. For limiting speeds of grease and oil-lubricated bearings, refer to the section entitled "Speed, Heat and Torque" section.

| ADVANTAGES OF OIL AND GREASE                 |                                                       |
|----------------------------------------------|-------------------------------------------------------|
| OIL                                          | GREASE                                                |
| Carries heat away from the bearings          | Simplifies seal design and acts as a sealant          |
| Carries away moisture and particulate matter | Permits prelubrication of sealed or shielded bearings |
| Easily controlled lubrication                | Generally requires less frequent lubrication          |

### LUBRICANT ADDITIVES

Additives are materials, usually chemicals, that improve specific properties when added to lubricants. Additives, when properly formulated into a lubricant, can increase lubricant life, provide greater resistance to corrosion, increase load-carrying capacity and enhance other properties. Additives are very complex and should not be added indiscriminately to lubricants as a cure-all for all lubrication problems.

The more common lubricant additives include:

- Oxidation inhibitors for increasing lubricant service life.
- Rust or corrosion inhibitors to protect surfaces from rust or corrosion.

- Demulsifiers to promote oil and water separation.
- Viscosity-index improvers to decrease viscosity sensitivity to temperature change.
- Pour-point depressants to lower the pouring point at low temperatures.
- Lubricity agents to modify friction.
- Antiwear agents to retard wear.
- Extreme pressure (EP) additives to prevent scoring under boundary-lubrication conditions.
- Detergents and dispersants to maintain cleanliness.
- Antifoam agents to reduce foam.
- Tackiness agents to improve adhesive properties.

Inorganic additives such as molybdenum disulphide, graphite, and zinc oxide are sometimes included in lubricants. In most tapered roller bearing applications, inorganic additives are of no significant benefit; conversely, as long as the concentration is low and the particle size small, they are not harmful.

Recently, the effects of lubricant chemistry on bearing life (as opposed to the purely physical characteristics) have received much emphasis. Rust, oxidation, extreme pressure and anti-wear additive packages are widely used in engine and gear oils. Fatigue testing has shown these additives may, depending on their chemical formulation, concentration and operating temperature, have a positive or negative impact on bearing life.

Consult your Timken representative for more information regarding lubricant additives.

### GUIDANCE FOR OIL/GREASE SELECTION

#### Oil lubrication

Oils used for bearing lubrication should be high-quality, non-oxidizing mineral oils or synthetic oils with similar properties. Selection of the proper type of oils depends on bearing speed, load, operating temperature and method of lubrication.

Some features and advantages of oil lubrication, in addition to the above, are as follows:

- Oil is a better lubricant for high speeds or high temperatures. It can be cooled to help reduce bearing temperature.
- With oil, it is easier to handle and control the amount of lubricant reaching the bearing. It is harder to retain in the bearing. Lubricant losses may be higher than with grease.
- As a liquid, oil can be introduced to the bearing in many ways, such as drip-feed, wick-feed, pressurized circulating systems, oil-bath or air-oil mist. Each is suited to certain types of applications.
- Oil is easier to keep clean for recirculating systems. Oil may be introduced to the bearing housing in many ways.



**LUBRICATION AND SEALS - continued**

The most common systems are:

- **Oil bath.** The housing is designed to provide a sump through which the rolling elements of the bearing will pass. Generally, the oil level should be no higher than the center point of the lowest rolling element. If speed is high, lower oil levels should be used to reduce churning. Gages or controlled elevation drains are used to achieve and maintain the proper oil level.
- **Circulating system.** This system has the advantages of:
  - An adequate supply of oil for both cooling and lubrication.
  - Metered control of the quantity of oil delivered to each bearing.
  - Removal of contaminants and moisture from the bearing by flushing action.
  - Suitability for multiple bearing installations.
  - Large reservoir, which reduces deterioration. Increased lubricant life provides economical efficiency.
  - Incorporation of oil filtering devices.
  - Positive control to deliver the lubricant where needed.

A typical circulating oil system consists of an oil reservoir, pump, piping and filter. A cooler may be required.

- **Oil-mist lubrication.** Oil-mist lubrication systems are used in high-speed, continuous operation applications. This system permits close control of the amount of lubricant reaching the bearings. The oil may be metered, atomized by compressed air and mixed with air, or it may be picked up from a reservoir using a venturi effect. In either case, the air is filtered and supplied under sufficient pressure to assure adequate lubrication of the bearings. Control of this type of lubrication system is accomplished by monitoring the operating temperatures of the bearings being lubricated. The continuous passage of the pressurized air and oil through the labyrinth seals used in the system prevents the entrance of contaminants from the atmosphere to the system. The successful operation of this type of system is based upon the following factors: proper location of the lubricant entry ports in relation to the bearings being lubricated, avoidance of excessive pressure drops across void spaces within the system, the proper air pressure and oil quantity ratio to suit the particular application, and the adequate exhaust of the air-oil mist after lubrication has been accomplished. To ensure “wetting” of the bearings and to prevent possible damage to the rolling elements and races, it is imperative that the oil mist system be turned on for several minutes before the equipment is started. The importance of “wetting” the bearing before starting cannot be overstated and has particular significance for equipment that has been idled for extended periods of time.

**WARNING**

**Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure, creating a risk of serious bodily harm.**

**OIL LUBRICATION GUIDELINES****Oil lubrication**

Lubricating oils are commercially available in many forms for automotive, industrial, aircraft and other uses. Oils are classified as either petroleum types (refined from crude oil) or synthetic types (produced by chemical synthesis).

**Petroleum oils**

Petroleum oils are used for nearly all oil-lubricated applications of Timken bearings. These oils have physical and chemical properties that can help in the selection of the correct oil for any bearing application.

**Synthetic oils**

Synthetic oils cover a broad range of categories, and include polyalphaolefins, silicones, polyglycols, and various esters. In general, synthetic oils are less prone to oxidation and can operate at extreme hot or cold temperatures. Physical properties such as pressure-viscosity coefficients tend to vary between oil types and caution should be used when making oil selections.

The polyalphaolefins (PAO) have a hydrocarbon chemistry, which parallel petroleum oil both in their chemical structures and pressure-viscosity coefficients. Therefore, PAO oil is mostly used in the oil-lubricated applications of Timken bearings when severe temperature environments (hot and cold) are encountered or when extended lubricant life is required. The silicone, ester and polyglycol oils have an oxygen based chemistry that is structurally quite different from petroleum oils and PAO oils. This difference has a profound effect on its physical properties where pressure-viscosity coefficients can be lower compared to mineral and PAO oils. This means that these types of synthetic oils may actually generate a smaller EHD film thickness than a mineral or PAO oil of equal viscosity at operating temperature. Reductions in bearing fatigue life and increases in bearing wear could result from this reduction of lubricant film thickness.

**SELECTION OF OILS**

The selection of oil viscosity for any bearing application requires consideration of several factors: load, speed, bearing setting, type of oil, and environmental factors. Since viscosity varies inversely with temperature, a viscosity value must always be stated with the temperature at which it was determined. High viscosity oil is used for low-speed or high-ambient temperature applications. Low viscosity oil is used for high-speed or low-ambient temperature applications.

**Approximate Temperature Limits  
For Oils**

|                         |        |        |
|-------------------------|--------|--------|
| Petroleum               | 149° C | 300° F |
| Super Refined Petroleum | 177° C | 350° F |
| Synthetic Hydrocarbon   | 204° C | 400° F |
| Synthetic Esters        | 204° C | 400° F |
| Silicones               | 260° C | 500° F |
| Polyphenylether         | 288° C | 550° F |
| Perfluorinated          | 316° C | 600° F |

LUBRICATION AND SEALS - continued

CLASSIFICATION

There are several classifications of oils based on viscosity grades. The most familiar are the Society of Automotive Engineers (SAE) classifications for automotive engine and gear oils. The American Society for Testing and Materials (ASTM) and the International Organization for Standardization (ISO) have adopted standard viscosity grades for industrial fluids. Fig. A-31 shows the viscosity comparisons of ISO/ASTM with SAE classification systems at 40° C.

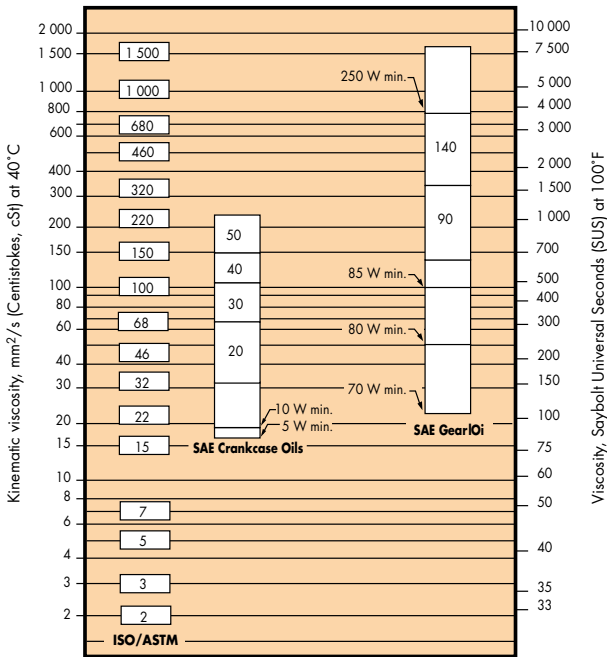


Fig. A-31 Viscosity classification comparison between ISO/ASTM grades (ISO 3448/ASTM D2442) and SAE grades (SAE J 300-80 for crankcase oils, SAE J 306-81 for axle and manual transmission oils).

The figure below can be used to predict the oil's kinematic viscosity versus temperature (use base oil for grease).

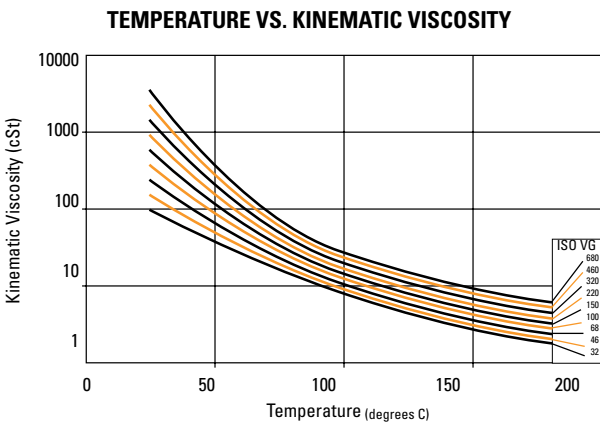


Fig. A-31a

TYPICAL OIL LUBRICATION GUIDELINES

In this section, the properties and characteristics of lubricants for typical tapered roller bearing applications are listed. These general characteristics have resulted from long successful performance in these applications.

General purpose rust and oxidation lubricating oil

General purpose rust and oxidation (R&O) inhibited oils are the most common type of industrial lubricant. They are used to lubricate Timken bearings in all types of industrial applications where conditions requiring special considerations do not exist.

SUGGESTED GENERAL PURPOSE R&O LUBRICATING OIL PROPERTIES

|                  |                                                     |
|------------------|-----------------------------------------------------|
| Base stock       | Solvent refined, high viscosity-index petroleum oil |
| Additives        | Corrosion and oxidation inhibitors                  |
| Viscosity index  | 80 min.                                             |
| Pour point       | -10° C max.                                         |
| Viscosity grades | ISO/ ASTM 32 through 220                            |

Some low-speed and/or high-ambient temperature applications require the higher viscosity grades, and high-speed and/or low-temperature applications require the lower viscosity grades.

Industrial extreme pressure (EP) gear oil

Extreme pressure gear oils are used to lubricate Timken bearings in all types of heavily loaded industrial equipment. They should be capable of withstanding heavy loads including abnormal shock loads common in heavy-duty equipment.

SUGGESTED INDUSTRIAL EP GEAR OIL PROPERTIES

|                  |                                                                                                                    |
|------------------|--------------------------------------------------------------------------------------------------------------------|
| Base stock       | Solvent refined, high viscosity index petroleum oil                                                                |
| Additives        | Corrosion and oxidation inhibitors. Extreme pressure (EP) additive* - 15.8 kg (35 lb) min. "OK" Timken load rating |
| Viscosity index  | 80 min.                                                                                                            |
| Pour point       | -10° C max.                                                                                                        |
| Viscosity grades | ISO/ ASTM 100, 150, 220, 320, 460                                                                                  |

\* ASTM D 2782

Industrial EP gear oils should be composed of a highly refined petroleum oil-based stock plus appropriate inhibitors and additives. They should not contain materials that are corrosive or abrasive to bearings. The inhibitors should provide long-term protection from oxidation and protect the bearing from corrosion in the presence of moisture. The oils should resist foaming in service and have good water separation properties. An EP additive protects against scoring under boundary-lubrication conditions. The viscosity grades suggested represent a wide range. High temperature and/or slow-speed applications generally require the higher viscosity grades. Low temperatures and/or high speeds require the use of lower viscosity grades.

LUBRICATION AND SEALS - *continued*

## LUBRICATING GREASES

## Definition

According to the ASTM definition, lubricating grease is a "solid to semi-fluid product of the dispersion of a thickening agent in a liquid lubricant; other ingredients imparting special properties may be included." If this definition were applied in the manner a chemist would use to illustrate a chemical reaction, the composition of a grease could be described by the formula below.

| Fluids         | +Thickening Agents   | +Special Ingredients | =Lubricating Grease |
|----------------|----------------------|----------------------|---------------------|
| Mineral Oils   | Soaps                | Oxidation Inhibitors |                     |
| Esters         | Lithium, Sodium      | Rust Inhibitors      |                     |
| Organic Esters | Barium, Calcium      | VI Improver          |                     |
| Glycols        | Strontium            | Tackiness            |                     |
| Silicones      | Non-Soap (Inorganic) | Perfumes             |                     |
|                | Microgel (Clay)      | Dyes                 |                     |
|                | Carbon Black         | Metal Deactivator    |                     |
|                | Silica-gel           |                      |                     |
|                | Non-Soap (Organic)   |                      |                     |
|                | Urea compounds       |                      |                     |
|                | Terephthamate        |                      |                     |
|                | Organic Dyes         |                      |                     |

At this time, there is no known universal anti-friction bearing grease. Each individual grease has certain limiting properties and characteristics.

Synthetic lubricating fluids, such as esters, organic esters and silicones, are used with conventional thickeners or chemical additives to provide greases capable of performing over an extremely wide range of temperatures, from as low as -73° C (-100° F) to a high of 288° C (550° F).

The successful use of lubricating grease in roller bearings depends on the physical and chemical properties of the lubricant pertaining to the bearing, its application, installation and general environmental factors. Because the choice of a lubricating grease for a particular bearing under certain service conditions is often difficult to make, your Timken representative should be consulted for proper suggestions.

## Grease lubrication

The simplest lubrication system for any bearing application is grease. Conventionally, greases used in Timken bearing applications are petroleum oils of some specific viscosity that are thickened to the desired consistency by some form of metallic soap. Greases are available in many soap types such as sodium, calcium, lithium, calcium-complex and aluminium-complex. Organic and inorganic type non-soap thickeners also are used in some products.

## Soap type

Calcium greases have good water resistance. Sodium greases generally have good stability and will operate at higher temperatures, but they absorb water and cannot be used where moisture is present. Lithium, calcium-complex and aluminium-complex greases generally combine the higher temperature properties and stability of sodium grease with the water resistance of calcium grease. These greases are often referred to as multi-purpose greases since they combine the two most important lubricant advantages into one product.

## CHARACTERISTICS AND OPERATING ENVIRONMENTS

Listed below are the general characteristics of prominent rolling bearing greases.

| Thickener            | Typical Dropping PT |      | Usable** Temperature |     | Typical Water Resistance |
|----------------------|---------------------|------|----------------------|-----|--------------------------|
|                      | C                   | F    | C                    | F   |                          |
| Sodium Soap          | 260+                | 500+ | 121                  | 250 | Poor                     |
| Lithium Soap         | 193                 | 380  | 104                  | 220 | Good                     |
| Polyurea             | 238                 | 460  | 149                  | 300 | Excellent                |
| Lithium Complex Soap | 260+                | 500+ | 163                  | 325 | Good                     |

\*\* Continuous operation with no relubrication. Depending upon the formulation the service limits may vary. The usable limit can be extended significantly with relubrication.

Polyurea as a thickener for lubricating fluids is one of the most significant lubrication developments in more than 30 years. Polyurea grease performance in a wide range of bearing applications is outstanding, and in a relatively short time it has gained acceptance as a factory-packed lubricant for ball bearings.

## Consistency

Greases may vary in consistency from semifluids hardly thicker than a viscous oil, to solid grades almost as hard as a soft wood.

Consistency is measured by a penetrometer, in which a standard weighted cone is dropped into the grease. The distance the cone penetrates (measured in tenths of a millimeter in a specific time) is the penetration number.

The National Lubricating Grease Institute (N.L.G.I.) classification of grease consistency is shown below:

| NLGI Grease Grades | Penetration Number |
|--------------------|--------------------|
| 0                  | 355-385            |
| 1                  | 310-340            |
| 2                  | 265-295            |
| 3                  | 220-250            |
| 4                  | 175-205            |
| 5                  | 130-160            |
| 6                  | 85-115             |

Grease consistency is not fixed; it normally becomes softer when sheared or "worked." In the laboratory this "working" is accomplished by forcing a perforated plate up and down through a closed container of grease. This "working" does not compare with the violent shearing action that takes place in a ball bearing and does not necessarily correlate with actual performance.

## LUBRICATION AND SEALS - *continued*

### Low Temperatures

Starting torque in a grease-lubricated ball bearing at low temperatures can be critical. Some greases may function adequately as long as the bearing is operating, but resistance to initial movement is such that the starting torque is excessive. In certain smaller machines, starting is an impossibility when very cold. Under such operating circumstances, the greases containing low-temperature characteristic oils are generally required.

If the operating temperature range is wide, synthetic fluid greases offer definite advantages. Greases are available to provide very low starting and running torque at temperatures as low as -73° C (-100° F). In certain instances, these greases perform better in this respect than oil.

An important point concerning lubricating greases is that the starting torque is not necessarily a function of the consistency or the channel properties of the grease. It appears to be more a function of the individual properties of the particular grease and is difficult to measure. Experience alone will indicate whether one grease is superior to another.

### High Temperatures

The high temperature limit for modern grease is generally a function of the thermal and oxidation stability of the fluid and the effectiveness of the oxidation inhibitors. The graph, to the right, was prepared using military-specification greases to illustrate the thermal limitations of mineral oil, ester, silicone, and fluorinated ether greases. The limits as shown apply only to prelubricated bearings or to applications where relubrication is not possible. Where provisions have been made for relubrication, the temperature limits may be extended provided the interval between cycles is reduced accordingly.

A rule of thumb, developed from years of testing grease-lubricated bearings, indicates that grease life is halved for every 10° C (18° F) increase in temperature. For example, if a particular grease is providing 2,000 hours of life at 90° C (194° F) by raising the temperature to 100° C (212° F) reduction in life to approximately 1,000 hours would result. On the other hand, 4,000 hours could be expected by lowering the temperature to 80° C (176° F).

It becomes obvious that the reactions started by the normal reaction of lubricant with oxygen increases rapidly at higher temperatures. The lubricants undergo a series of chemical reactions, that ultimately result in the development of viscous or hard residues that interfere with the operation of the bearing.

Thermal stability, oxidation resistance, and temperature limitations must be considered when selecting greases for high-temperature applications. In non-relubricatable applications, highly refined mineral oils or chemically stable synthetic fluids are required as the oil component of greases for operation at temperatures above 121° C (250° F).

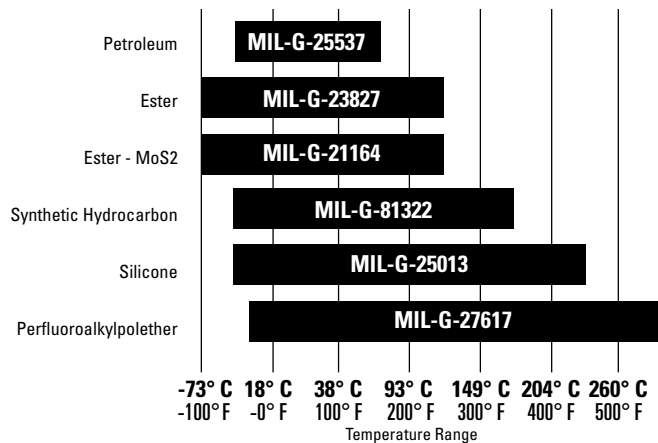
### Approximate Temperature Limits For Grease Thickeners

|           |         |         |
|-----------|---------|---------|
| Soaps     | 121° C  | 250° F  |
| Complexes | 177° C  | 350° F  |
| Polyureas | 177° C  | 350° F  |
| Non-soap  | >260° C | >500° F |

### Timken Multi-Use Lithium Grease

|                              |                                    |
|------------------------------|------------------------------------|
| Soap Type:                   | Lithium                            |
| Consistency:                 | NLGI No. 1 or No. 2                |
| Additives:                   | Corrosion and oxidation inhibitors |
| Base Oil:                    | Petroleum/Mineral                  |
| Base Oil Viscosity at 40° C: | 145.6                              |
| Pour Point:                  | -18° C max.                        |
| Color:                       | Light Brown                        |

LUBRICATION GREASE TEMPERATURE RANGES



LUBRICATION AND SEALS - continued

Grease Compatibility Chart

|                                                        | Al Complex   | Ba Complex   | Ca Stearate  | Ca 12 Hydroxy | Ca Complex   | Ca Sulfonate | Clay Non-Soap | Li Stearate  | Li 12 Hydroxy | Li Complex   | Polyurea     | Polyurea S S |
|--------------------------------------------------------|--------------|--------------|--------------|---------------|--------------|--------------|---------------|--------------|---------------|--------------|--------------|--------------|
| <b>Aluminum Complex</b>                                | Best Choice  | Incompatible | Incompatible | Compatible    | Incompatible | Borderline   | Incompatible  | Incompatible | Incompatible  | Compatible   | Incompatible | Compatible   |
| <b>Timken Food Safe</b>                                | Best Choice  | Incompatible | Incompatible | Compatible    | Incompatible | Borderline   | Incompatible  | Incompatible | Incompatible  | Compatible   | Incompatible | Compatible   |
| <b>Barium Complex</b>                                  | Incompatible | Best Choice  | Incompatible | Compatible    | Incompatible | Compatible   | Incompatible  | Incompatible | Incompatible  | Incompatible | Incompatible | Borderline   |
| <b>Calcium Stearate</b>                                | Incompatible | Incompatible | Best Choice  | Compatible    | Incompatible | Compatible   | Compatible    | Compatible   | Borderline    | Compatible   | Incompatible | Compatible   |
| <b>Calcium 12 Hydroxy</b>                              | Compatible   | Compatible   | Compatible   | Best Choice   | Borderline   | Borderline   | Compatible    | Compatible   | Compatible    | Compatible   | Incompatible | Compatible   |
| <b>Calcium Complex</b>                                 | Incompatible | Incompatible | Incompatible | Borderline    | Best Choice  | Incompatible | Incompatible  | Incompatible | Incompatible  | Compatible   | Compatible   | Compatible   |
| <b>Calcium Sulfonate</b>                               | Borderline   | Compatible   | Compatible   | Borderline    | Incompatible | Best Choice  | Incompatible  | Borderline   | Borderline    | Compatible   | Incompatible | Compatible   |
| <b>Timken Premium Mill<br/>Timken Heavy Duty Moly</b>  | Borderline   | Compatible   | Compatible   | Borderline    | Incompatible | Best Choice  | Incompatible  | Borderline   | Borderline    | Compatible   | Incompatible | Compatible   |
| <b>Clay Non-Soap</b>                                   | Incompatible | Incompatible | Compatible   | Compatible    | Incompatible | Incompatible | Best Choice   | Incompatible | Incompatible  | Incompatible | Incompatible | Borderline   |
| <b>Lithium Stearate</b>                                | Incompatible | Incompatible | Compatible   | Compatible    | Incompatible | Borderline   | Incompatible  | Best Choice  | Compatible    | Compatible   | Incompatible | Compatible   |
| <b>Lithium 12 Hydroxy</b>                              | Incompatible | Incompatible | Borderline   | Compatible    | Incompatible | Borderline   | Incompatible  | Compatible   | Best Choice   | Compatible   | Incompatible | Compatible   |
| <b>Lithium Complex</b>                                 | Compatible   | Incompatible | Compatible   | Compatible    | Compatible   | Compatible   | Incompatible  | Compatible   | Compatible    | Best Choice  | Incompatible | Compatible   |
| <b>Polyurea Conventional</b>                           | Incompatible | Incompatible | Incompatible | Incompatible  | Incompatible | Incompatible | Incompatible  | Incompatible | Incompatible  | Incompatible | Best Choice  | Compatible   |
| <b>Polyurea Shear Stable</b>                           | Compatible   | Borderline   | Compatible   | Compatible    | Compatible   | Compatible   | Borderline    | Compatible   | Compatible    | Compatible   | Compatible   | Best Choice  |
| <b>Timken Multi-Use</b>                                | Incompatible | Incompatible | Borderline   | Compatible    | Incompatible | Borderline   | Incompatible  | Compatible   | Best Choice   | Compatible   | Incompatible | Compatible   |
| <b>Timken All Purpose<br/>Timken Premium Synthetic</b> | Compatible   | Incompatible | Compatible   | Compatible    | Compatible   | Compatible   | Incompatible  | Compatible   | Compatible    | Best Choice  | Incompatible | Compatible   |
| <b>Timken High Speed</b>                               | Incompatible | Incompatible | Incompatible | Incompatible  | Incompatible | Incompatible | Incompatible  | Incompatible | Incompatible  | Incompatible | Best Choice  | Compatible   |
| <b>Timken Pillow Block</b>                             | Compatible   | Borderline   | Compatible   | Compatible    | Compatible   | Compatible   | Borderline    | Compatible   | Compatible    | Compatible   | Compatible   | Best Choice  |

**WARNING**

Mixing grease types can cause the lubricant to become ineffective, which can result in equipment failure, creating a risk of serious bodily harm.

## LUBRICATION AND SEALS - *continued*

### WET CONDITIONS

Water and moisture can be particularly conducive to bearing damage. Lubricating greases may provide a measure of protection from this contamination. Certain greases, the calcium, lithium and non-soap type, for example, are highly water-resistant. However, these greases exhibit poor rust preventative characteristics unless properly inhibited.

Sodium-soap greases emulsify with small amounts of moisture that may be present and prevent the moisture from coming in contact with the bearing surfaces. In certain applications, this characteristic may be advantageous; however, emulsions are generally considered undesirable.

Many bearing applications require lubricants with special properties or lubricants formulated specifically for certain environments, such as:

- Friction Oxidation (Fretting Corrosion).
- Chemical and Solvent Resistance.
- Food Handling.
- Quiet Running.
- Space and/or Vacuum.
- Electrical Conductivity.

For assistance with these or other areas requiring special lubricants, consult your Timken representative.

### CONTAMINATION

#### Abrasive particles

When tapered roller bearings operate in a clean environment, the primary cause of damage is the eventual fatigue of the surfaces where rolling contact occurs. However, when particle contamination enters the bearing system, it is likely to cause damage such as bruising, which can shorten bearing life.

When dirt from the environment or metallic wear debris from some component in the application is allowed to contaminate the lubricant, wear can become the predominant cause of bearing damage. If, due to particle contamination of the lubricant, bearing wear becomes significant, changes will occur to critical bearing dimensions that could adversely affect machine operation.

Bearings operating in a contaminated lubricant exhibit a higher initial rate of wear than those running in an uncontaminated lubricant. But, with no further contaminant ingress, this wear rate quickly diminishes as the contamination particles are reduced in size as they pass through the bearing contact area during normal operation.

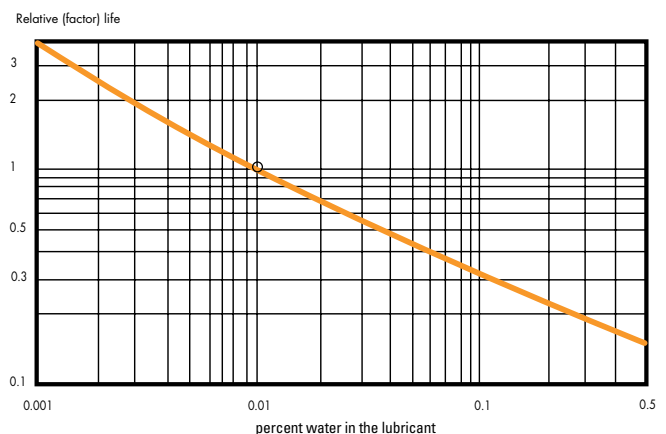
### Water

Either dissolved or suspended water in lubricating oils can exert a detrimental influence on bearing fatigue life. Water can cause bearing etching that also can reduce bearing fatigue life. The exact mechanism by which water lowers fatigue life is not fully understood. It has been suggested that water enters microcracks in the bearing races that are caused by repeated stress cycles. This leads to corrosion and hydrogen embrittlement in the microcracks, reducing the time required for these cracks to propagate to an unacceptable size spall.

Water-base fluids such as water glycol and invert emulsions also have shown a reduction in bearing fatigue life. Although water from these sources is not the same as contamination, the results support the previous discussion concerning water-contaminated lubricants.

The following chart gives a good idea of the influence of water on bearing life. Based on Timken Technology tests, it was determined that water content of 0.01 percent (100 parts per million) or less, had no effect on bearing life. Greater amounts of water in the oil will reduce bearing life significantly.

#### LIFE REDUCTION WITH WATER CONTAMINATION





## LUBRICATION AND SEALS - *continued*

### GREASES - APPLICATIONS AND LUBRICATING METHODS

Grease lubrication is generally applicable to the following conditions, and features low-to-moderate speed applications within operating temperature limits of the grease:

- Easily confined in the housing. This is important in the food, textile and chemical industries.
- Bearing enclosure and seal design simplified.
- Improves the efficiency of external mechanical seals to give better protection to the bearing.
- Successfully used for integrally-sealed, prelubricated ball bearings.

### Advantages of prelubricated ball bearings

Prelubricated shielded and sealed bearings are extensively used with much success in applications where:

- Grease might be injurious to other parts of the mechanism.
- Cost and space limitations preclude the use of a grease filled housing.
- Housings cannot be kept free of dirt and grit, water or other contaminants.
- Relubrication is impossible or would be a hazard to satisfactory use.

Prelubricated Timken bearings are prepacked with greases that have chemical and mechanical stability and have demonstrated long life characteristics in rotating bearings. Greases are filtered several times to remove all harmful material and accurately metered so that each bearing receives the proper amount of grease.

### GREASE LUBRICATION FOR BEARING / HOUSING ASSEMBLIES

Polyurea and lithium-based greases are normally preferred for general purpose bearing lubrication and are advantageous in high moisture applications. Both greases have good water-resistant characteristics. For temperature ranges of standard greases, see chart below.

The grease must be carefully selected with regard to its consistency at operating temperature. It should not exhibit thickening, separation of oil, acid formation or hardening to any marked degree. It should be smooth, non-fibrous and entirely free from chemically active ingredients. Its melting point should be considerably higher than the operating temperature.

Frictional torque is influenced by the quantity and the quality of lubricant present. Excessive quantities of grease cause churning. This results in excessive temperatures, separation of the grease components, and breakdown in lubrication values. In normal speed applications, the housings should be kept approximately one-third to one-half full.

Only on low speed applications may the housing be entirely filled with grease. This method of lubrication is a safeguard against the entry of foreign matter, where sealing provisions are inadequate for exclusion of contaminants or moisture.

During periods of non-operation, it is often wise to completely fill the housings with grease to protect the bearing surfaces. Prior to subsequent operation, the excess grease should be removed and the proper level restored.

Applications utilizing grease lubrication should have a grease fitting and a vent at opposite ends of the housing near the top. A drain plug should be located near the bottom of the housing to allow purging of the old grease from the bearing.

Relubricate at regular intervals to prevent damage to the bearing. Relubrication intervals are difficult to determine. If plant practice or experience with other applications is not available, consult your lubricant supplier.

#### STANDARD LUBRICATION - TIMKEN BALL BEARINGS

| Bearing Type                                                             | Grease Type                                        | Grease Temperature Range |
|--------------------------------------------------------------------------|----------------------------------------------------|--------------------------|
| <b>Radial Bearings</b><br>(Double shielded and Single and Double Sealed) | Polyurea thickener<br>Petroleum oil                | -30° to +275° F          |
| <b>Wide Inner Ring Bearings</b><br>(Contact Seal Types)                  | Polyurea thickener<br>Petroleum oil                | -30° to +275° F          |
| <b>Wide Inner Ring Bearings</b><br>(Labyrinth Seal Types)                | Synthetic thickener<br>Synthetic hydrocarbon fluid | -65° to +325° F          |

Note: Open type bearings and single shielded types are NOT prelubricated. They have a rust preventative coating only and must be lubricated by the customer or end-user before operation.



## LUBRICATION AND SEALS - *continued*

### Multi-purpose industrial grease

These are typical of greases that can be used to lubricate many Timken bearing applications in all types of standard equipment. Special consideration should be given to applications where speed, load, temperature or environmental conditions are extreme.

#### Timken Multi-Use Lithium Grease

|                              |                                    |
|------------------------------|------------------------------------|
| Soap Type:                   | Lithium                            |
| Consistency:                 | NLGI No. 1 or No. 2                |
| Additives:                   | Corrosion and oxidation inhibitors |
| Base Oil:                    | Petroleum/Mineral                  |
| Base Oil Viscosity at 40° C: | 145.6                              |
| Pour Point:                  | -18° C max.                        |
| Color:                       | Light Brown                        |

General purpose industrial grease should be a smooth, homogeneous and uniform, premium-quality product composed of petroleum oil, a thickener, and appropriate inhibitors. It should not contain materials that are corrosive or abrasive to tapered roller bearings. The grease should have excellent mechanical and chemical stability and should not readily emulsify with water. The grease should contain inhibitors to provide long-term protection against oxidation in high-performance applications and protect the bearings from corrosion in the presence of moisture.

The suggested base oil viscosity covers a fairly wide range. Lower viscosity products should be used in high-speed and/or lightly loaded applications to minimize heat generation and torque. Higher viscosity products should be used in moderate- to low-speed applications and under heavy loads to maximize lubricant film thickness.

### Mineral grease

When conventional (mineral) greases are used, the rib speed should be limited to 5 m/s. This limit can be increased under pure radial loads up to 13 m/s provided that the bearings remain in endplay under all operating conditions. Generally, No. 2 consistency greases are used with medium- to low-viscosity base oils.

$$V_{mg} = f_{mg} \times V = f_{mg} \times \left[ \frac{\pi}{4} \times T \times (D^2 - d^2) \times 10^{-3} - \frac{M}{7.8 \times 10^{-3}} \right] \text{ (cm}^3\text{)}$$

where:

- $f_{mg}$  = factor depending on speed:  $0.3 < f_{mg} < 0.5$
- $V$  = free volume of the bearing (cm<sup>3</sup>)
- $T$  = overall bearing width (mm)
- $D$  = cup outer diameter (mm)
- $d$  = cone bore (mm)
- $M$  = bearing weight (kg)

### Synthetic grease fill

The use of "low torque" greases (or synthetic greases) can be considered for rib speeds over 2,560 fpm (13 m/s), up to maximum of 4,920 fpm (25 m/s). Experience has shown that stabilized temperatures, around 15° C to 20° C (60° F to 68° F) above ambient, can be obtained at the maximum permissible speed.

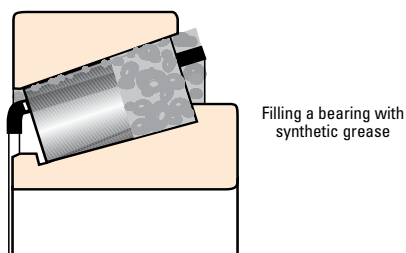
The following procedures must be respected to achieve the above performance:

- Very small initial quantity of grease is applied to prevent excessive churning.
- Initial run-in period to evacuate unnecessary grease from the bearing.
- Good spindle design to retain grease around the bearings.
- Efficient sealing to protect against external contamination.

$$V_{sg} = f_{sg} \times V = f_{sg} \times \left[ \frac{\pi}{4} \times T \times (D^2 - d^2) \times 10^{-3} - \frac{M}{7.8 \times 10^{-3}} \right] \text{ (cm}^3\text{)}$$

where:

- $f_{sg}$  = factor depending on speed:  $0.15 < f_{sg} < 0.3$

LUBRICATION AND SEALS - *continued*

When using synthetic greases, the limiting factor is the "lubrication for life" concept (without re-greasing).

A normal way to fill the bearing with grease is to do it by hand before heating and fitting the components. For the cone, the free volume corresponding to the first third of the rollers, starting from their large end, is filled with grease; an additional quantity is provided below the cage. For the cup, a thin film of grease is spread all around the race.

Grease lubrication of spindle bearings is generally preferred by machine tool builders over oil circulation lubrication due to its simplicity and low heat generation. For high loads or high speeds, circulating oil is probably the most widely used method because of its capability to remove heat from the spindle.

**RE-GREASING CYCLE**

The two primary considerations that determine the re-greasing cycle on any application are operating temperature and sealing efficiency. Obviously, seal leakage will dictate frequent relubrication. Every attempt should be made to maintain seals at peak efficiency. It is generally stated that the higher the temperature, the more rapidly the grease oxidizes. Grease life is reduced by approximately half for every 10° C rise in temperature.

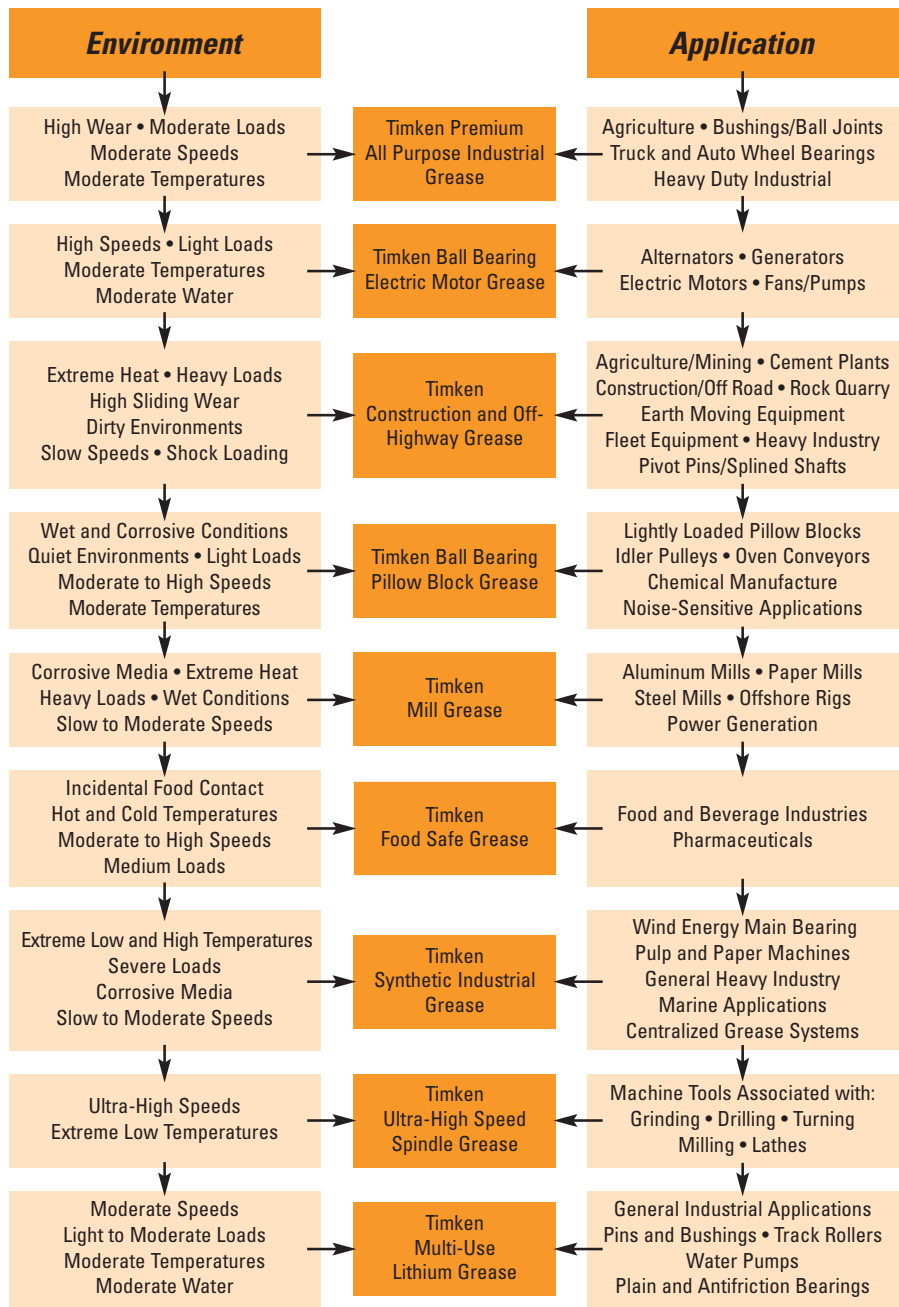
The higher the operating temperature, the more often the grease must be replenished. In most cases, experience in the specific application will dictate the frequency of lubrication.

**LUBRICATION AND SEALS - *continued***

Timken application specific lubricants have been developed by leveraging our knowledge of tribology and anti-friction bearings and how these two elements affect overall system performance. Timken lubricants help bearings and related components operate effectively in demanding industrial operations. High-temperature,

anti-wear and water-resistant additives offer superior protection in challenging environments. This chart is intended to provide an overview of the Timken greases available for general applications. Contact your local Timken representative for a more detailed publication on Timken lubrication solutions.

**LUBRICATION SELECTION GUIDE**



This selection guide is not intended to replace the specifications by the equipment builder.

LUBRICATION AND SEALS - *continued***SEALS****SELECTING THE RIGHT SEAL**

When selecting the proper seal design for any Timken bearing application, it is necessary to consider the type of lubricant, the operation environment, the speed of the application and general operating conditions.

**Shaft finish**

It is important to ensure that no spiral grooves result from machining of shaft surfaces since these will tend to draw lubricant out of, or contaminant into, the bearing cavity. Plunge grinding normally produces a satisfactory surface finish.

**Grease lubrication - venting**

Venting should be provided in the cavity between the two bearings when grease lubrication is used in conjunction with rubbing or non-rubbing seals. This will prevent an ingress of contamination past the seals, in the event of a pressure differential between the bearing cavity and atmosphere.

**Vertical shaft closures - oil lubrication**

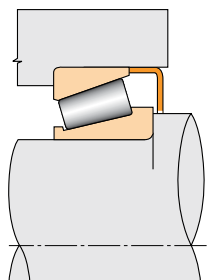
Lubricating vertical shaft bearings is a difficult problem. Normally, grease, oil mist or oil-air lubrication is used because of the simplicity. However, some high speed and/or heavy load applications will use circulating oil. This requires a very good sealing system and a suction pump to remove the oil from the bottom bearing position.

**NON-RUBBING SEALS****Metal stampings**

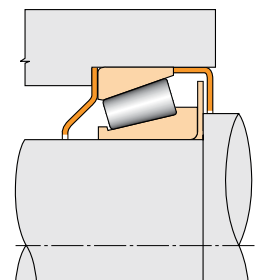
Metal stamping closures are effective in clean applications. Where environmental conditions are dirty, stampings are used in combination with other closure elements to provide an effective labyrinth against the entry of foreign matter into the bearing chamber.

The stamping shown in Fig. A-32 is effective for applications that are grease-lubricated and operate in clean conditions. The design illustrated in Fig. A-33 uses stampings on both sides of the bearing to keep the grease in close proximity to the bearing. The flinger mounted at the outer side of the bearing adds a labyrinth effect.

Stampings should be designed to provide a clearance of 0.5 to 0.6 mm (0.020 to 0.025 in.) on diameters between rotating and stationary parts. A minimum axial clearance of 3 mm (0.125 in.) should be provided.



**Fig. A-32**  
Metal stamping.

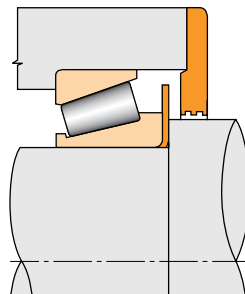


**Fig. A-33**  
Metal stampings.

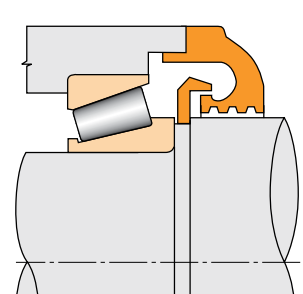
**Machined flingers**

Machined parts, along with other closure elements, can be used in place of stampings where closer clearances are desired. This results in a more efficient retention of lubricant and exclusion of foreign matter from the bearing housing. Examples are shown in Fig. A-34 and A-35.

An umbrella-shaped flinger is shown in Fig. A-35 combined with an annular groove closure. At high shaft speeds this combination effectively retains oil and keeps out dirt.



**Fig. A-34**  
Machined flinger combined with annular grooves.



**Fig. A-35**  
Machined umbrella flinger combined with annular grooves.

LUBRICATION AND SEALS - continued

Annular grooves

Annular groove closures are often used with grease lubrication in place of radial lip seals where considerable grit and dust are encountered. The closure usually has several grooves machined in the bore or on the outside diameter depending on the design. They become filled with grease, which tends to harden and provide a tight closure. When used with oil, the grooves tend to interrupt the capillary action which would otherwise draw oil out of the bearing cavity. Annular grooves with a machined labyrinth effectively protect a grease-lubricated bearing when the unit is required to operate in an extremely dirty environment (Fig. A-36). This type of closure is most effective when applied with close-running clearances and the maximum possible number of grooves. Suggested dimensions are shown in Fig. A-37.

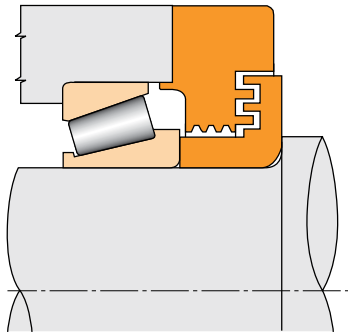
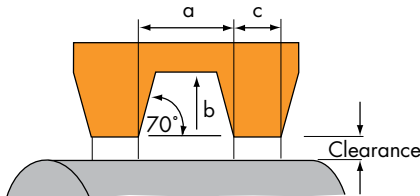


Fig. A-36  
Annular grooves combined with machined labyrinth.



|                     |                              |                                    |
|---------------------|------------------------------|------------------------------------|
| dimension "a"       | 3.20 - 4.80<br>0.125 - 0.190 |                                    |
| dimension "b"       | 4.00 - 4.80<br>0.160 - 0.190 |                                    |
| dimension "c"       | 0.5a                         |                                    |
| diametral clearance | 0.25 - 0.40<br>0.010 - 0.016 | for diameters to<br>50 mm (2 in)   |
|                     | 1.3 max.<br>0.05 max.        | for diameters<br>over 50 mm (2 in) |

Fig. A-37  
Annular grooves. Suggested dimensions (mm, in.).

RUBBING SEALS

Radial lip seals

Many types and styles of radial lip seals are commercially available to satisfy different sealing requirements. In clean environments, where the primary requirement is the retention of lubricant in the bearing housing, a single lip seal with the lip pointing inward is often used. Where the critical concern is exclusion of contaminants, the lip is usually pointed outwards (Fig. A-38).

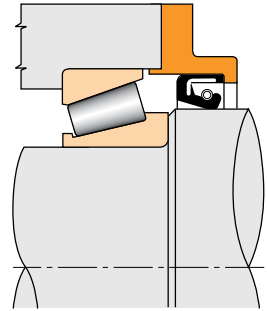


Fig. A-38  
Radial lip seals.

Lip seals are available with or without a spring-loaded lip. The spring maintains a constant pressure of the lip on the sealing surface, thereby providing a more efficient seal for a longer period of time. When environmental conditions require a seal to prevent contaminants from entering the bearing chamber as well as retaining the lubricant, a double or triple lip seal is often used. Additional fingers or shrouds should be used as primary seals where extremely dirty conditions are present so that the seal lip and sealing surface are protected to avoid rapid wear and premature seal damage (Fig. A-39).

Seal wear surfaces are normally required to have a surface finish in the order of 0.25-0.40  $\mu\text{m}$  (10-15  $\mu\text{in.}$ )  $R_a$ . For applications exposed to severe contamination, the seal wear surface should in general have a minimum surface hardness of Rockwell C-45. The seal supplier should be consulted for more specific guidance.

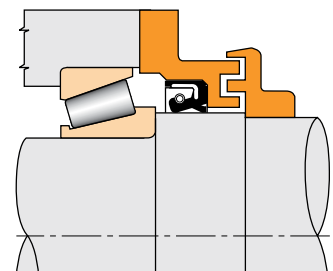
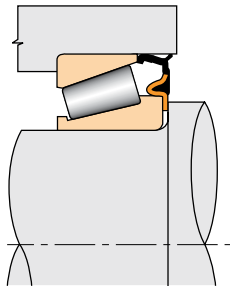


Fig. A-39  
Lip seal plus machined labyrinth.

LUBRICATION AND SEALS - *continued***“DUO FACE®-PLUS” seals**

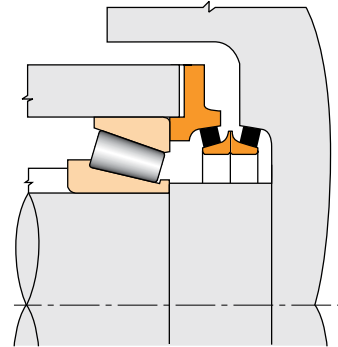
The “DUO FACE®-PLUS” seal (Fig. A-40) has double lips that seal in the housing bore and the ground surface of the outer race front face. This eliminates the need to machine a special seal surface. The “DUO FACE®-PLUS” seal has proven successful in many different types of grease-lubricated applications. The range of Timken bearings available with “DUO FACE®-PLUS” seals is listed in this book. Also, a brochure showing application examples is available on request.



**Fig. A-40**  
DUO FACE®-PLUS seal.

**Mechanical face seals**

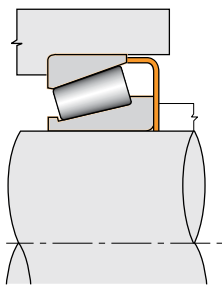
These are often used in extremely dirty environments where rotational speeds are low. Fig. A-42 shows one of the proprietary types of mechanical face seals available. This type of seal generally needs to run in an oil bath. Designs are also available for high-speed and other special applications.



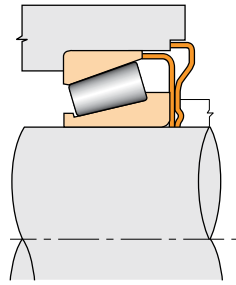
**Fig. A-42**  
Mechanical face seal for low speeds and contaminated environment.

**Diaphragm seals**

Diaphragm seals (Fig. A-41) are commercially available. The metallic lip is designed to be spring-loaded against the narrow face of the outer race. The type shown in Fig. A-41b has a second lip which seals against the housing.



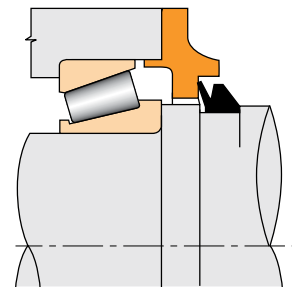
**Fig. A-41**  
Diaphragm seal.



**Fig. A-41b**  
Diaphragm seal.

**V-ring seals**

V-ring seals can be used in conjunction with grease or oil lubrication. As rotational speeds increase, the lip tends to pull away from the sealing surface and act like a flinger. This seal may be used with either oil or grease lubrication (Fig A-43). Consult your V-ring seal supplier for application restrictions.



**Fig. A-43**  
V-ring seals.

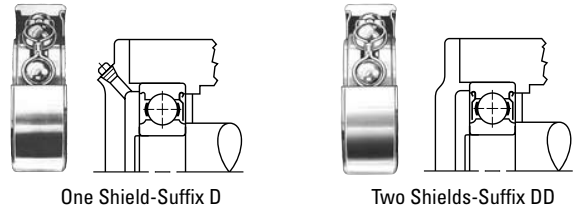
**LUBRICATION AND SEALS - continued**

**BALL BEARINGS WITH SHIELDS AND SEALS**

**Shields (D-Type)**

Both K and W single-row radial types are available with one shield, designated by suffix D, or two shields, suffix DD. A shield on one side provides protection against the entrance of coarse dirt or chips and makes it possible to relubricate the bearing from the open side as shown (at right).

Double-shielded bearings are prelubricated with the correct amount of Timken suggested ball bearing grease and are designed for applications where relubrication is not required. Typical mountings are shown.



One Shield-Suffix D

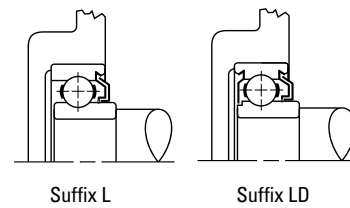
Two Shields-Suffix DD

**Labyrinth or Mechani-Seals (L-Type)**

Bearings with Mechani-Seals are made in the non-filling slot type only and are available with a single seal, designated by suffix L, one seal and one shield, suffix LD, and two seals, suffix LL. These bearings have standard bores, outside diameters and outer ring widths, but the inner ring is wider than standard unshielded and shielded sizes. As illustrated, in the L and LD-Types, the inner rings are offset slightly on the side opposite the seal in order to permit clearance when the bearings are mounted in blind housings.

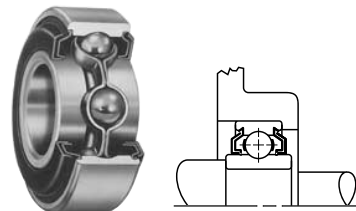
The Mechani-Seal was developed by Timken to provide a frictionless seal for effective grease retention and exclusion of foreign material. It consists of two "dished" steel plates. The inner member is fixed securely in the outer ring of the bearing and provides an ample grease chamber plus effective grease retention. The outer member is pressed on the outside diameter of the inner ring and rotates as a slinger to throw off contaminants. Close running clearances between the inner and outer members assure effective sealing under extremely severe conditions. This seal configuration is very effective under high speed, because it is virtually frictionless and utilizes slinger action. Mechani-Seal bearings are very popular in high-speed pneumatic tools, small electric motors, pumps, domestic appliances and similar high-speed applications. A typical mounting arrangement for the LL-Type is shown.

Wide-type radial bearings (W-LL-Type) with Mechani-Seals are designated by the prefix W and suffix LL for two seals. They are made in standard bores and outside diameters, but in widths the same as those of corresponding size double-row bearings. The extra width affords greater space for long-life factory-filtered grease and provides extra support on shafts and in housings so that locknuts and lockwashers are not needed on applications such as electric motors. A typical mounting is shown (at right).

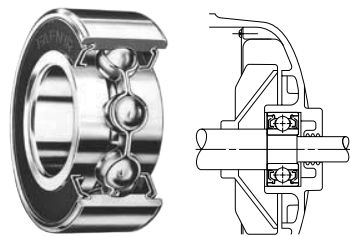


Suffix L

Suffix LD



Two Mechani-Seals Suffix LL



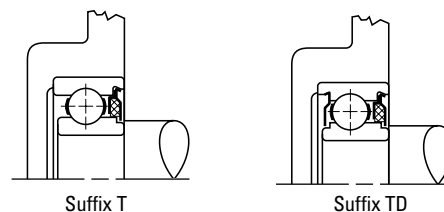
W-LL-Type Typical Mounting



LUBRICATION AND SEALS - *continued***Felt Seals (T-Type)**

The felt seal consists of two metal plates fixed in the outer ring of the bearing that enclose a felt washer. This felt washer, which is saturated with oil before assembly in the bearing, contacts the ground outside diameter of the inner ring to provide sealing with minimum friction drag.

Bearings with felt seals are made only in the non-filling slot type and are available with one seal (designated by the suffix T), one seal and one shield (identified by suffix TD), and two seals (suffix TT). Bore and outside diameters of these bearings are the same as standard unshielded and shielded types, but overall widths are greater. As illustrated, in the T- and TD-types, the inner rings are offset slightly on the opposite side of the seal to permit clearance when the bearings are mounted in blind housings as illustrated.

**Rubber Seals (P-Type)**

Radial bearings with rubber seals having one or two seals are designated by the suffixes P and PP, respectively. With the exception of the extra-small sizes, they are dimensionally interchangeable with open-type and shielded bearings.

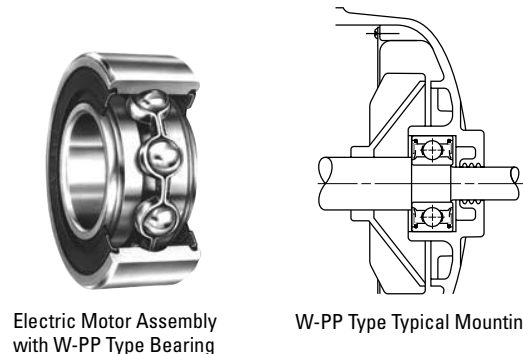
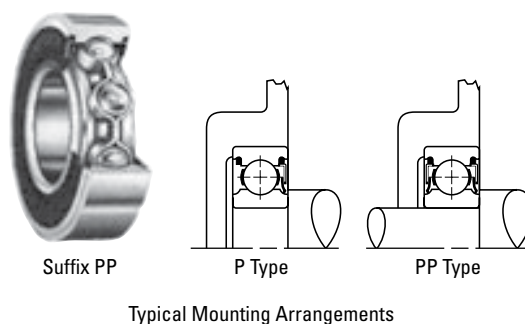
The P-Type design is a positive contact seal using a molded synthetic rubber. Firmly fixed to the outer ring, the seal flares outward and rides on the inner ring. The flare-out of the seal against the inner ring radius assures constant positive contact to provide an effective barrier against the entrance of contaminants or loss of lubricants.

Because they interchange dimensionally with standard single-row radial types, Timken® rubber seal bearings provide a convenient compact design.

Wide-type radial rubber seal bearings (W-PP Type) designated by prefix W and suffix PP for two seals are made with standard bores and outside diameters, but with widths the same as those as corresponding double-row bearings. This design also utilizes a molded seal.

The extra width offers a larger contact area for the shaft and housing and also provides additional space for displacement of grease under agitation.

These wide type rubber seal bearings are particularly well-suited for use by electric motor manufacturers where their advantages have helped simplify design. A typical example of motor design simplification is illustrated (right).



**LUBRICATION AND SEALS - *continued***

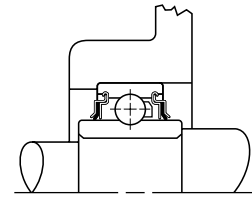
**Rubber Seals (R-Type)**

One of the most advanced sealing designs introduced by Timken is the R-Type rubber seal bearing. This is a positive contact seal of three-piece construction, utilizing a synthetic rubber seal retained by two steel caps. The seal flares outward and rides or wipes on the ground land of the inner ring. In this design, the rubber sealing element is completely protected by a closely fitting outer cap or shroud, which nests tightly against the seal member following its flared-out shape at the inner ring of the outside diameter. The innermost member is crimped into a groove in the outer ring and encapsulates the seal and outside shroud. Providing firm seal contact, the back-up plate of the seal assembly has a close clearance with the outside diameter of the inner ring, preventing the seal from being pushed inward.

Laboratory tests have clearly established the superior performance of the shroud-type R-Seal. With improved lubricant retention and greater protection against contaminants, the shroud design guards the rubber seal against abrasive damage by dirt and fiber wrap, which may be prevalent in agriculture and textile applications. This seal construction also is available in standard and heavy series wide inner ring bearings.



Shroud Seal suffix RR



Shroud Seal suffix RR

**Tri-Ply Seals**

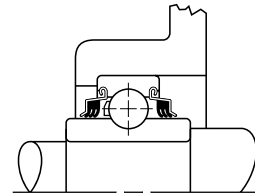
Tri-Ply Shroud Seal ball bearings are designed for bearing applications involving exceptionally severe contamination or abrasion environments. They are produced in many types and sizes, both in the radial and wide inner ring designs.

Each Tri-Ply seal consists of a triple-lip nitrile seal molded to a heavy metal shroud cap. All three seal lips have heavy flare-out contact with the inner ring outside diameter and provide exceptionally effective protection against the loss of lubricant and the entrance of wet or abrasive contaminants. The shroud cap, which nests closely with the outside seal lip, helps protect the rubber seal members from wrap and abrasion.

A feature of these bearings is the balanced design, consisting of deep raceways, large ball size, and extra-wide or heavy inner rings. The use of Tri-Ply bearings simplifies housing designs, and their extra inner ring width provides greater support on the shaft. These bearings are widely used on conveyors and farm machinery such as disc harrows, hillers, tomato harvesters, cotton harvesters, etc.



Tri-Ply Seals



## SPEED, HEAT AND TORQUE

### SPEED RATINGS

#### RADIAL BALL BEARINGS

There is no precise method for determining the maximum speed at which a ball bearing may operate. Bearing characteristics and features of surrounding parts, shafts, housing and other component as well as basic service conditions are all variables dependent upon each other for continued satisfactory high-speed performance.

The safe operating speed of a bearing is often limited by the temperature within the bearing, which, in turn, is dependent upon the temperature surrounding the application, accuracy of bearings, shafts, housings, auxiliary parts, etc., and the type and amount of lubricant.

Radial bearings with proper internal refinements will operate at high speeds for long periods if properly installed and lubricated. Tolerance grade, cage design, and lubricant are bearing characteristics which affect speed limitations.

Bearings with ABEC 1 tolerances are generally satisfactory for normal speeds with grease or oil lubrication.

Ball bearings with ABEC 5 tolerances or better and ring-piloted composition cages lubricated with an efficient, non-churning, cooling oil-mist system have exceptional high-speed ability.

In the case of duplex mountings, as frequently used in a high-speed machine tool spindles, bearing preload and contact angle affect the permissible speeds.

The values in the accompanying table may be used as a general guide for determining the safe maximum speed of standard types of Timken ball bearings. To obtain the speed value for any bearing size with inner ring rotating, multiply the pitch diameter in millimeters (or, in the case of extra-small inch dimension bearings, the nearest millimeter equivalent) by the speed in revolutions per minute. Refer to page A164 for the most suitable bearing type, cage style, tolerance guide and type of lubrication.

For outer ring rotation of ball bearings, multiply the speed value (pitch or mean dia. in. mm x RPM of the outer ring) by the following factors before referring to the table of speed values.

#### BALL BEARING SERIES FACTOR

|                                                         |     |
|---------------------------------------------------------|-----|
| Extra-small (30 and S) and extra-light (9100 and M9300) | 1.3 |
| Light (200, 5200 and 7200)                              | 1.5 |
| Medium (300, 5300 and 7300)                             | 1.7 |

Although the speed values shown in the tables on the following page are based on many years of research and accumulated data, numerous application of Timken bearings are successfully operating with speed values far in excess of those tabulated. Such applications require particular consideration of proper tolerance grade, lubrication, the effect of centrifugal force on rolling elements and other factors. For further information consult your Timken representative.

Conversely, under certain application conditions of load, temperature, contamination, etc., limiting speeds may be less than the figures shown. These values do not apply to certain special bearings, such as radial Tri-Ply series, square or hex bore bearings.

The speed capability of a bearing in any application is subject to a number of factors including:

- Temperature.
- Bearing setting or clearance.
- Lubrication.
- Bearing design.

The relative importance of each of these factors depends on the nature of the application. The effect of each factor is not isolated – each contributes in varying degrees, depending on the application and overall speed capability of the design.

An understanding of how each of these factors affects performance as speeds change is required to achieve the speed capabilities inherent in a bearing.

#### SPHERICAL AND CYLINDRICAL ROLLER BEARINGS

For Timken cylindrical and spherical roller bearings, the thermal speed ratings are listed in the bearing tables. These values have been determined by balancing the heat generated within the bearing with the heat dissipated from the bearing. In calculating these numbers, the following assumptions have been made:

- The radial load is five percent of the static load rating.
- For oil, it is assumed to be in a bath with the fill to the middle of the lowest rolling element. For grease it is assumed a 30 percent bearing cavity fill.
- The oil viscosity is assumed to be 12 cSt (ISO VG32) operated at 70° C, (158° F) and the grease base oil viscosity is assumed to be 22 cSt operated at 70° C (158° F). The bearing and its components are at 70° C and the bearing environment is at 20° C (68° F).
- The housing and shaft are steel or cast iron.
- The bearing rotational axis is horizontal.
- The outer ring is stationary and the inner ring is rotating.
- The bearing radial internal clearance complies with class normal and standard fits are used.
- The bearing does not contain seals.
- The bearing does not experience misalignment or axial load.

The thermal speed ratings are for reference only and can be considerably lower or higher depending on your application. Consult your Timken representative for more accurate information regarding a bearing's speed limitations in your application.

| RADIAL BALL BEARINGS                                                                                                               |                                                                                                                                                 |                               |                               |                         |                         |             |                                                   |                    |                    |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------|-------------------------|-------------|---------------------------------------------------|--------------------|--------------------|
| d <sub>m</sub> X N VALUES (d <sub>m</sub> * IN MILLIMETERS X RPM)                                                                  |                                                                                                                                                 |                               |                               |                         |                         |             |                                                   |                    |                    |
| Bearing Type / Series                                                                                                              | Cage Type                                                                                                                                       | ABEC 1                        |                               | ABEC 3                  |                         |             | ABEC 5 and 7<br>Circulating<br>Oil <sup>(1)</sup> |                    |                    |
|                                                                                                                                    |                                                                                                                                                 | Grease                        | Oil <sup>(1)</sup>            | Grease                  | Oil <sup>(1)</sup>      | Grease      | Grease                                            | Oil <sup>(1)</sup> | Oil Mist           |
| <b>BALL BEARINGS</b>                                                                                                               |                                                                                                                                                 |                               |                               |                         |                         |             |                                                   |                    |                    |
| <b>SINGLE-ROW</b>                                                                                                                  |                                                                                                                                                 |                               |                               |                         |                         |             |                                                   |                    |                    |
| Non-Filling Slot<br>9300K, 9100K                                                                                                   | Ball Piloted Molded Nylon (PRB)                                                                                                                 | 250,000                       | 300,000                       | 250,000                 | 300,000                 | —           | 300,000                                           | 300,000            | 300,000            |
| 200K,<br>300K,<br>XLS, and variations                                                                                              | Pressed Steel, Brass<br>Ring Piloted Molded Reinforced Nylon (PRC)<br>Composition (CR)                                                          | 300,000<br>350,000            | 350,000<br>400,000            | 300,000<br>350,000      | 350,000<br>450,000      | —<br>—      | 350,000<br>400,000                                | 400,000<br>550,000 | 450,000<br>650,000 |
| Filling Slot<br>200W and variations<br>300W and variations                                                                         | Ball Piloted Molded Nylon (PRB)<br>Pressed Steel                                                                                                | 250,000<br>250,000            | 250,000<br>300,000            | —<br>—                  | —<br>—                  | —<br>—      | —<br>—                                            | —<br>—             | —<br>—             |
| Angular Contact<br>7200WN<br>7300WN                                                                                                | Ball Piloted Pressed Steel, Molded Nylon (PRB)<br>Ring Piloted Brass (MBR), Ball Piloted Br (MBR)<br>Ring Piloted Molded Reinforced Nylon (PRC) | 200,000<br>300,000<br>350,000 | 300,000<br>400,000<br>400,000 | 300,000<br>—<br>350,000 | 350,000<br>—<br>400,000 | —<br>—<br>— | —<br>—<br>—                                       | —<br>—<br>—        | —<br>—<br>—        |
| Angular Contact-<br>Extra precision<br>2M9300WI, 2M200WI,<br>2M300WI, 2M9100WI,<br>2MM9300WI,<br>2MM9100,<br>2MM200WI,<br>2MM300WI | Ring Piloted Composition (CR) or (PRC)                                                                                                          | 350,000                       | 400,000                       | 750,000                 | 1,000,000               | 1,200,000   | 1,000,000                                         | 1,400,000          | 1,700,000          |
| <b>DOUBLE-ROW</b>                                                                                                                  |                                                                                                                                                 |                               |                               |                         |                         |             |                                                   |                    |                    |
| 5200<br>5300                                                                                                                       | Ball Piloted Molded Nylon (PRB), Pressed Steel<br>Ball Piloted Brass (BR)                                                                       | 250,000                       | 300,000                       | —                       | —                       | —           | —                                                 | —                  | —                  |

\* Bore + O.D.  
2

<sup>(1)</sup> For oil bath lubrication, oil level should be maintained covering between 1/3 to 1/2 up from the bottom of the lowest ball.

**Note:** Single or double normal contact (P or PP) sealed bearings should not exceed 300,000 PDN. Consult your Timken representative for limiting speed of RR or Tri-Ply sealed bearings.

SPEED, HEAT AND TORQUE - *continued*

**TAPERED ROLLER BEARINGS**

The usual measure of the speed of a tapered roller bearing is the circumferential velocity at the midpoint of the inner race large end rib (Fig. A-44). This may be calculated as:

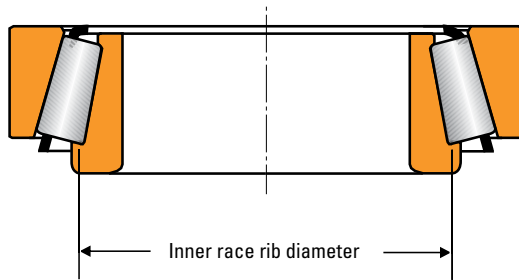
Rib speed:

$$V_r = \frac{\pi D_m n}{60000} \text{ (m/s)}$$

$$= \frac{\pi D_m n}{12} \text{ (ft/min)}$$

where:

- $D_m$  = Mean inner race large rib diameter    mm, in.
- $n$  = Bearing speed    rev/min

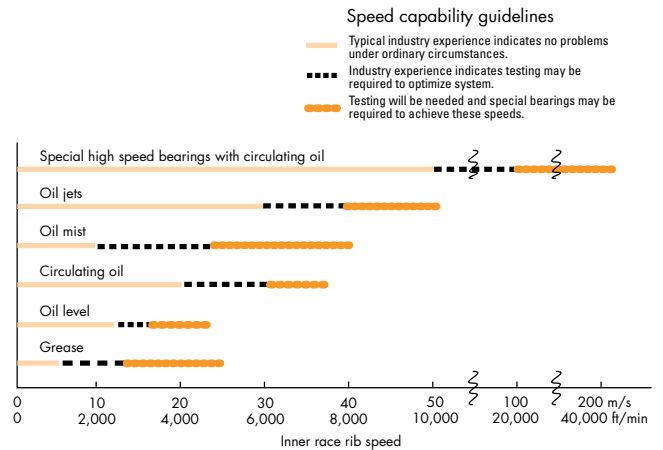


**Fig. A-44**  
Cone rib diameter. The inner race rib diameter may be scaled from a print.

The mean large rib diameter at the midpoint of the roller end contact can be scaled from a drawing of the bearing, if available, or this diameter can be determined by consulting your Timken representative. The inner cone mean large rib diameter can be approximated by taking 99 percent of larger rib O.D.

DN values (the product of the inner race bore in mm and the speed in rev/min) are often used as a measure of bearing speed by other bearing manufacturers. There is no direct relationship between the rib speed of a tapered roller bearing and DN value because of the wide variation in bearing cross sectional thickness. However, for rough approximation, one meter per second rib speed is about equal to 16,000 DN for average section bearings. One foot per minute is equal to approximately 80 DN.

**SPEED CAPABILITY GUIDELINES FOR VARIOUS TYPES OF LUBRICATION SYSTEMS**



**Fig. A-45**

Fig. A-45 is a summary of guidelines relating to speed and temperature based on customer experience, customer tests and research conducted by The Timken Company. Consult your Timken representative with questions regarding high-speed capability.

SPEED, HEAT AND TORQUE - *continued***OPERATING TEMPERATURES  
TEMPERATURE LIMITATIONS**

Bearing equilibrium temperature is not simply a question of speed. It is also dependent on the heat generation rate of all contributing heat sources, nature of the heat flow between sources, and heat dissipation rate of the system. Seals, gears, clutches, and oil supply temperature affect bearing operating temperature.

Heat dissipation rate is governed by such factors as type of lubrication system, materials and masses of the shaft and housing and intimacy of contact with the bearing, and surface area and character of the fluid both inside and outside the housing.

Temperature of the outer surface of the housing is not an accurate indication of bearing temperature. The inner ring temperature is often greater than the outer ring temperature and both are usually greater than the outer surface of the housing. There are temperature gradients within the bearing with the temperature of the internal parts usually being greater than the outer surfaces. Although the temperature of the outer ring O.D. or the inner ring I.D., or the oil outlet is often used as an indicator of bearing temperature, it should be recognized that these are generally not the highest bearing temperatures.

During transient conditions, such as at startup, bearing temperatures will often peak and then reduce to a lower level. This is due to the thermal changes taking place between the bearing, shaft and housing causing variations in setting and internal loading. Also, a new bearing will usually generate more heat until it runs in.

The allowable operating temperature depends on:

- Equipment requirements
- Lubrication limitations
- Bearing material limitations
- Reliability requirements

Each factor is an area of increasing concern as operating temperatures rise.

The equipment designer must decide how operating temperature will affect the performance of the equipment being designed. Precision machine tools, for example, can be very sensitive to thermal expansions. In many cases it is important that the temperature rise over ambient be minimized and held to 20 to 25° C (36 to 45° F) for some precision spindles.

Most industrial equipment can operate satisfactorily with considerably higher temperature rises. Thermal ratings on gear drives, for example, are based on 93° C (200° F).

Some equipment such as plastic calendars and gas turbine engines operate continuously at temperatures well above 100° C (212° F).

Standard bearing steels cannot maintain the desired minimum hot hardness of 58 HRC much above 135° C (275° F).

Standard Timken spherical roller bearings are dimensionally stabilized up to 200° C. Upon request, the bearings can be ordered with dimensional stabilization up to 250° C (S2 suffix) or 300° C (S3 suffix). Consult your Timken representative for availability in specific part numbers.

Standard Timken cylindrical roller bearings are dimensionally stabilized up to 150° C. Upon request, the bearings can be ordered

with dimensional stabilization up to 200° C (S1 suffix), 250° C (S2 suffix) or 300° C (S3 suffix).

Dimensional stability of Timken ball bearings is achieved by tempering the hardened steel until any further growth by transformation of austenite to martensite is balanced by shrinkage from tempering martensite. This balance is never perfect, and some size change will always occur, the amount depending upon the operating time and temperature of the bearings and the composition of and heat treatment of the steel. The ABMA definition for stabilized rings and balls permits a change of less than .0001 inch per inch after exposure to a temperature of 300° F for 2,500 hours. Rings and balls used at elevated temperatures are defined as stable by ABMA where there is a size change of less than .00015 inch per inch after 1,500 hours exposure at temperatures of 450°, 600° and 800° F.

Above this, special high-temperature steels are used by Timken.

Timken CBS 600™ steel should be considered for temperatures between 150 to 230° C (300 to 450° F) and Timken CBS 1000M™ steel should be used for temperatures above 230° C (450° F). Also, CBS 600 and CBS 1000M have increased resistance to scoring - important in very high-speed applications. Consult your Timken representative for availability of S1, S2, S3 suffixes or high-temperature steels in specific part numbers and applications.

Although bearings can operate satisfactorily at higher temperatures, an upper temperature limit of 80 to 95° C (176 to 203° F) is usually more practical for small, high volume equipment where prototype testing is possible. Higher operating temperatures increase the risk of damage from some unforeseen transient condition. If prototype testing is not practical, an upper design limit of 80° C (176° F) is appropriate unless prior experience on similar equipment suggests otherwise.

History on some machines operating at higher temperatures, such as high-speed rolling mills, offers good background data for establishing limits on new similar machines.

Obviously none of the above examples of equipment, lubricant or bearing materials limitations are single point limitations but rather areas of gradually increasing concern. It is the responsibility of the equipment designer to weigh all relevant factors and make the final determination of what operating temperature is satisfactory for his particular machine.

Suggested materials for use in rings, balls and rollers at various operating temperatures are listed together with data on chemical composition, hardness and dimensional stability. A temperature of 427° C (800° F) is generally the top limit for successful bearing operation using steels. Above 427° C (800° F), or below where lubricant is not permitted, cast or wrought cobalt alloys are generally used. Although chosen primarily for their good retention of physical properties, they also possess good oxidation resistance at elevated temperatures.

Suggested materials for cages, shields, and seals are tabulated on page A168 with their temperature capabilities.

SPEED, HEAT AND TORQUE - *continued***Other Considerations**

Until now, temperature limitation has been discussed in reference to metallurgical considerations. However, installations which operate at high temperatures for extended periods may lose the quality of shaft and housing fits. Carefully machined and heat-treated shafts and housings will minimize trouble from this source. In some applications the internal clearance of bearings may be partially absorbed. For example, during the first few seconds of rotation a massive housing may keep the outer race cooler than the inner race and rolling elements even if the housing is already at some elevated temperature and, also, during heat soakback when rotation stops heat may flow back to the bearing along the shaft. If, while stationary, the effects of heat soakback more than removes the radial internal clearance, radial brinell of the races may occur and the bearing will be rough during subsequent rotation. Bearings with extra internal looseness may be required to compensate for the above conditions.

**HEAT GENERATION AND DISSIPATION**

One of the major benefits of oil-lubricated systems is that the heat generated by the bearings is carried away by the circulating oil and dissipated through the system.

**Heat generation**

Under normal operating conditions, most of the torque and heat generated by the bearing is due to the elastohydrodynamic losses at the roller/race contacts.

The following equation is used to calculate the heat generated by the bearing:

$$\begin{aligned} Q_{\text{gen}} &= k_4 n M \\ M &= k_1 G_1 (n\mu)^{0.62} (P_{\text{eq}})^{0.3} \end{aligned}$$

where:

|                  |                                                                                                                   |
|------------------|-------------------------------------------------------------------------------------------------------------------|
| $Q_{\text{gen}}$ | = generated heat (W or Btu/min)                                                                                   |
| $M$              | = running torque N.m or lbf-in.                                                                                   |
| $n$              | = rotational speed (RPM)                                                                                          |
| $G_1$            | = geometry factor from bearing data tables                                                                        |
| $\mu$            | = viscosity at operating temperature (cP)                                                                         |
| $P_{\text{eq}}$  | = equivalent dynamic load (N or lbf)                                                                              |
| $k_1$            | = bearing torque constant<br>= $2.56 \times 10^{-6}$ for $M$ in N-m<br>= $3.54 \times 10^{-5}$ for $M$ in lbf-in. |

**Heat dissipation**

The heat dissipation rate of a bearing system is affected by many factors. The modes of heat transfer need to be considered. Major heat transfer modes in most systems are conduction through the housing walls, convection at the inside and outside surfaces of the housing, and convection by the circulating lubricant. In many applications, overall heat dissipation can be divided into two categories: Heat removed by circulating oil and heat removed through the housing.

**Heat dissipation by circulating oil**

Heat dissipated by a circulating oil system is:

$$Q_{\text{oil}} = k_5 f (\theta_o - \theta_i)$$

If a circulating lubricant other than petroleum oil is used, the heat carried away by that lubricant will be:

$$Q_{\text{oil}} = k_6 C_p \rho f (\theta_o - \theta_i)$$

The following factors apply to the heat generation and dissipation equations listed on this page.

|       |                                                                                                                                                                                                                                          |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $k_4$ | Dimensional factor to calculate heat generation rate<br>$k_4 = 0.105$ for $Q_{\text{gen}}$ in W when $M$ in N-m<br>$= 6.73 \times 10^{-4}$ for $Q_{\text{gen}}$ in Btu/min when $M$ in lbf-in.                                           |
| $k_5$ | Dimensional factor to calculate heat carried away by a petroleum oil<br>$k_5 = 28$ for $Q_{\text{oil}}$ in W when $f$ in L/min and $\theta$ in °C<br>$= 0.42$ for $Q_{\text{oil}}$ in Btu/min when $f$ in U.S. pt/min and $\theta$ in °F |
| $k_6$ | Dimensional factor to calculate heat carried away by a circulating fluid<br>$k_6 = 1.67 \times 10^{-5}$ for $Q_{\text{oil}}$ in W<br>$= 1.67 \times 10^{-2}$ for $Q_{\text{oil}}$ in Btu/min                                             |

|                  |                                          |                                           |
|------------------|------------------------------------------|-------------------------------------------|
| $Q_{\text{oil}}$ | Heat dissipation rate of circulating oil | W, Btu/min                                |
| $\theta_i$       | Oil inlet temperature                    | °C, °F                                    |
| $\theta_o$       | Oil outlet temperature                   | °C, °F                                    |
| $C_p$            | Specific heat of lubricant               | J/(kg x °C),<br>Btu/(lb x °F)             |
| $f$              | Lubricant flow rate                      | L/min,<br>U.S. pt/min                     |
| $\rho$           | Lubricant density                        | kg/m <sup>3</sup> ,<br>lb/ft <sup>3</sup> |



# ENGINEERING

A

## SPEED, HEAT AND TORQUE - *continued*

These tables provide standard operating temperatures for common bearing component materials. They should be used for reference purposes only. Other bearing component materials are available on request. Contact your Timken representative for further information.

### OPERATING TEMPERATURES FOR BEARING COMPONENT MATERIALS

| RINGS, BALLS AND ROLLERS SINGLE-ROW                                                        |                                                                                            |                  |                |                                                                                                                                                                                                                                                                                                                                                                |        |                |                 |                 |                  |                  |                  |                  |
|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| Material                                                                                   | Approximate Chemical Analysis-%                                                            | Temp. °F         | Hardness HRC   | Operating Temperature                                                                                                                                                                                                                                                                                                                                          |        |                |                 |                 |                  |                  |                  |                  |
|                                                                                            |                                                                                            |                  |                | -100° F<br>-73° C                                                                                                                                                                                                                                                                                                                                              | -65° F | 0° F<br>-17° C | 100° F<br>38° C | 200° F<br>93° C | 250° F<br>149° C | 300° F<br>149° C | 400° F<br>204° C | 500° F<br>260° C |
| Low alloy carbon-chromium bearing steels. 52100 and others per ASTM A295                   | 1C<br>0.5-1.5Cr<br>0.35Mn                                                                  | 70               | 60             | STANDARD DIMENSIONAL STABILIZATION<br><.0001 in/in dimensional change in 2,500 hours at 212° F. Good oxidation resistance.                                                                                                                                                                                                                                     |        |                |                 |                 |                  |                  |                  |                  |
| Low alloy carbon-chromium bearing steels. 52100 and others per ASTM A295                   | 1C<br>0.5-1.5Cr<br>0.35Mn                                                                  | 70<br>350<br>450 | 60<br>58<br>54 | Heat stabilized per FS136 <.0001 in/in dimensional change in 2,500 hours at 300° F. When given a stabilizing heat treatment, A295 steel is suitable for many applications in the 350-450° F range; however, it is not as stable dimensionally as it is at temperatures below 350° F. If utmost stability is required, use materials in the 600° F group below. |        |                |                 |                 |                  |                  |                  |                  |
| Deep hardening steels for heavy sections per ASTM A485                                     | 1C 1-1.8Cr<br>1-1.5 Mn .06Si                                                               | 70<br>450<br>600 | 58<br>55<br>52 | As heat treated and tempered, it is stabilized, <.0001 in/in dimensional change in 2500 HR at 300° F (149° C).                                                                                                                                                                                                                                                 |        |                |                 |                 |                  |                  |                  |                  |
| Carburizing steels per ASTM A534<br>(a) low alloy 4118<br>(b) 8620<br>(c) high nickel 3310 | .2C, .5Cr, .80Mn, .12Mo<br>.2C, .5Cr, .80 Mn, .20 Mo, .55Ni<br>.10C, 1.60Cr, .50Mn, 3.50Ni | 70               | 58             | 4118, 8620 steel frequently used to achieve extra ductility in inner rings for locking device bearings. 3310 and others used for extra thick section rings.                                                                                                                                                                                                    |        |                |                 |                 |                  |                  |                  |                  |
| Corrosion Resistant 440C stainless steel per ASTM A756                                     | 1C 18Cr                                                                                    | 70               | 58             | Excellent corrosion resistance.                                                                                                                                                                                                                                                                                                                                |        |                |                 |                 |                  |                  |                  |                  |
| Corrosion Resistant 440C stainless steel per ASTM A756                                     | 1C 18Cr                                                                                    | 70<br>450<br>600 | 58<br>55<br>52 | As heat stabilized for maximum hardness at high temperatures (FS238). Good oxidation resistance at higher temperatures. Note load capacity drops off more rapidly at higher temperatures than M50 shown below, which should be considered if loads are high. <.0001 in/in dimensional change in 1,200 hours.                                                   |        |                |                 |                 |                  |                  |                  |                  |
| M-50<br>Medium<br>High Speed                                                               | 4 Cr. 4 Mo<br>1V 0.8C                                                                      | 70<br>450<br>600 | 60<br>59<br>57 | Recommended where stable high hardness at elevated temperature is required. <.0001 in/in dimensional change in 1,200 hours at 600° F.                                                                                                                                                                                                                          |        |                |                 |                 |                  |                  |                  |                  |

Dimensional stability data shown above is the permanent metallurgical growth and/or shrinkage only. Thermal expansion effects are not included. Bearings have been made of special material for operation at temperatures above 800° F. Consult your Timken representative regarding the application.

Note: ASTM A295 bearing steels are suitable for many applications up to 250° F but are not as dimensionally stable as they are at temperatures below 212° F.

### OPERATING TEMPERATURES FOR BEARING COMPONENT MATERIALS

| CAGES, SHIELDS AND SEALS                     |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
|----------------------------------------------|------------------|----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                                              | -65° F<br>-54° C | 0° F<br>-17° C | 100° F<br>38° C | 200° F<br>93° C | 300° F<br>149° C | 400° F<br>204° C | 500° F<br>260° C | 600° F<br>316° C | 700° F<br>371° C | 800° F<br>427° C |
| <b>CAGES</b>                                 |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Molded 6/6 Nylon (PRB)                       |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Molded 6/6 Fiberglass reinforced Nylon (PRC) |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Phenolic Resin Laminate                      |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Low Carbon Pressed Steel                     |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Pressed Stainless Steel                      |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Machined Brass                               |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Machined Iron-Silicone                       |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Machined Steel                               |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| <b>SHIELDS</b>                               |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Low Carbon Steel                             |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Stainless Steel                              |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Nylon                                        |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| <b>SEALS</b>                                 |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Buna N                                       |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Polyacrylic                                  |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Fluoroelastomer                              |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| Stabilized TFE Fluorocarbon*                 |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |
| TFE Fluorocarbon* (with glass fabric)        |                  |                |                 |                 |                  |                  |                  |                  |                  |                  |

\* Limited life above these temperatures.

SPEED, HEAT AND TORQUE - continued

TORQUE

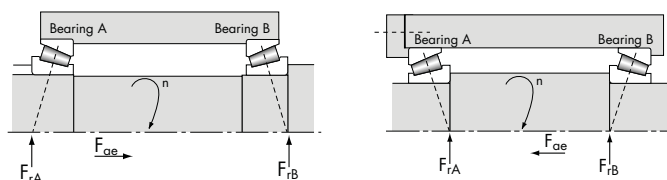
TAPERED ROLLER BEARINGS

Running torque-M

The rotational resistance of a rolling bearing is dependent on load, speed, lubrication conditions and bearing internal characteristics.

The following formulas yield approximations to values of bearing running torque. The formulas apply to bearings lubricated by oil. For bearings lubricated by grease or oil mist, torque is usually lower, although for grease lubrication this depends on amount and consistency of the grease. The formulas also assume the bearing running torque has stabilized after an initial period referred to as "running-in."

Single-row tapered roller bearing

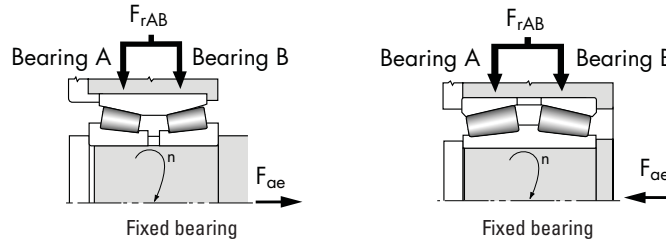


Design (external thrust,  $F_{ae}$ , onto bearing A)

| Thrust condition                                                | Net bearing thrust load                                                           | $M = k_1 G_1 (n\mu)^{0.62} \left( \frac{f_1 F_r}{K} \right)^{0.3}$ $n_{min} = \frac{k_2}{G_2 \mu} \left( \frac{f_2 F_r}{K} \right)^{2/3}$ |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| $\frac{0.47 F_{rA}}{K_A} \leq \frac{0.47 F_{rB}}{K_B} + F_{ae}$ | $F_{aA} = \frac{0.47 F_{rB}}{K_B} + F_{ae}$<br>$F_{aB} = \frac{0.47 F_{rB}}{K_B}$ |                                                                                                                                           |
| $\frac{0.47 F_{rA}}{K_A} > \frac{0.47 F_{rB}}{K_B} + F_{ae}$    | $F_{aA} = \frac{0.47 F_{rA}}{K_A}$<br>$F_{aB} = \frac{0.47 F_{rA}}{K_A} - F_{ae}$ |                                                                                                                                           |

NOTE: The torque equations will be underestimated if operating speed,  $n$ , is less than  $n_{min}$ . For values of  $f_1$  and  $f_2$ , refer to figure A-46 on page A171.

**Double-row tapered roller bearing**



Design (external thrust,  $F_{ae}$ , onto bearing A)

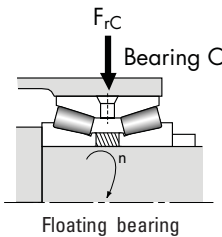
**Fixed position**

| Load condition                         | Radial load on each row $F_r$                                                                |                                                                                                                                                                                                                                                           |
|----------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $F_{ae} > \frac{0.47 F_{rAB}}{K_A}$    | Bearing B is unloaded<br>$F_{rA} = F_{rAB}$<br>$F_{aA} = F_{ae}$                             | $M = k_1 G_1 (n\mu)^{0.62} \left( \frac{f_1 F_{rAB}}{K} \right)^{0.3}$<br>$n_{min} = \frac{k_2}{G_2\mu} \left( \frac{f_2 F_{rAB}}{K} \right)^{2/3}$                                                                                                       |
| $F_{ae} \leq \frac{0.47 F_{rAB}}{K_A}$ | $F_{rA} = \frac{F_{rAB}}{2} + 1.06 K F_{ae}$<br>$F_{rB} = \frac{F_{rAB}}{2} - 1.06 K F_{ae}$ | $M = k_1 G_1 (n\mu)^{0.62} \left( \frac{0.060}{K} \right)^{0.3} (F_{rA}^{0.3} + F_{rB}^{0.3})$<br>$n_{minA} = \frac{k_2}{G_2\mu} \left( \frac{1.78 F_{rA}}{K} \right)^{2/3}$ ; $n_{minB} = \frac{k_2}{G_2\mu} \left( \frac{1.78 F_{rB}}{K} \right)^{2/3}$ |

**Floating position**

$$M = 2 k_1 G_1 (n\mu)^{0.62} \left( \frac{0.030 F_{rC}}{K} \right)^{0.3}$$

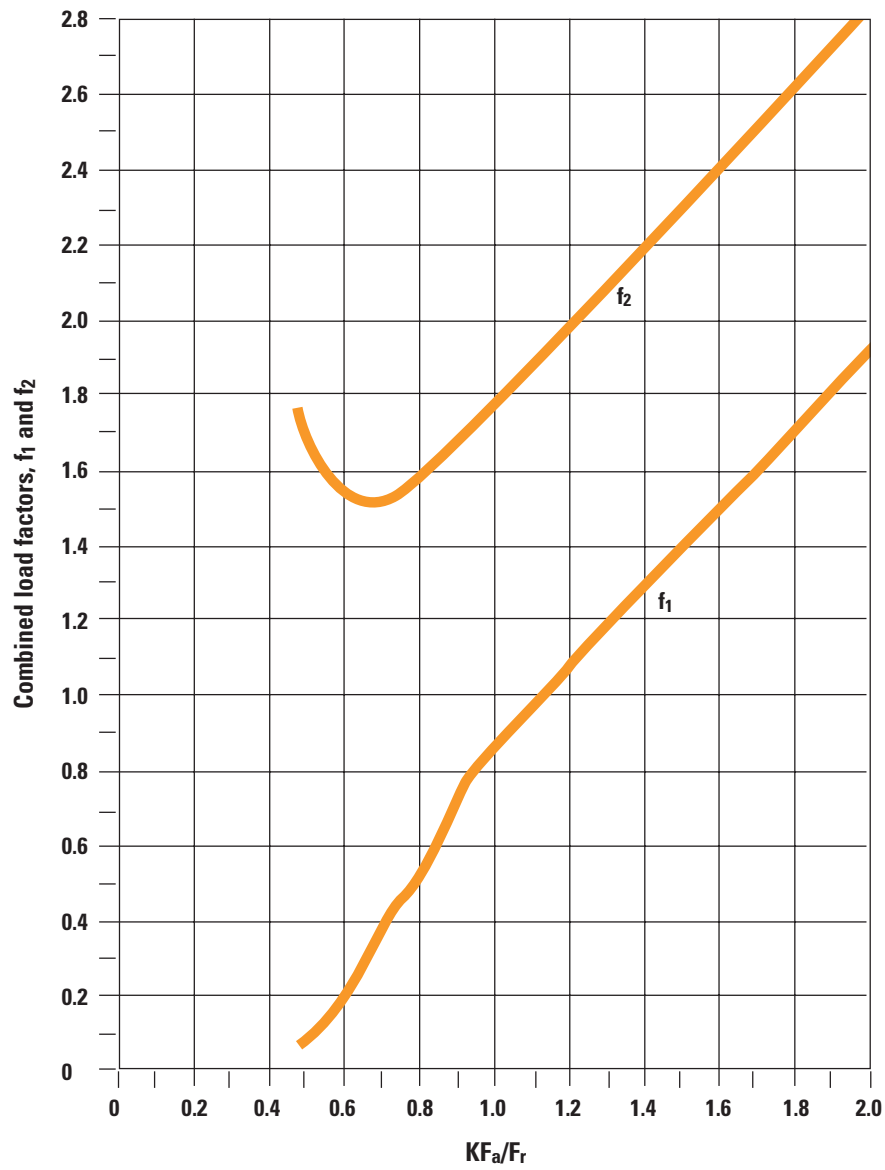
$$n_{min} = \frac{k_2}{G_2\mu} \left( \frac{0.890 F_r}{K} \right)^{2/3}$$



NOTE: The torque equations will be underestimated if operating speed,  $n$ , is less than  $n_{min}$ . For values of  $f_1$  and  $f_2$ , refer to figure A-46 on page A171.

- $M$  = running torque, N.m (lbf-in.)
- $F_r$  = radial load, N (lbf)
- $G_1$  = geometry factor from bearing data tables
- $G_2$  = geometry factor from bearing data tables
- $K$  = K-factor
- $n$  = speed of rotation, rev/min
- $k_1$  =  $2.56 \times 10^{-6}$  (metric) or  $3.54 \times 10^{-5}$  (inch)
- $k_2$  = 625 (metric) or 1700 (inch)
- $\mu$  = lubricant dynamic viscosity at operating temperature centipoise  
For grease, use the base oil viscosity.
- $f_1$  = combined load factor, see chart on A171
- $f_2$  = combined load factor, see chart on A171

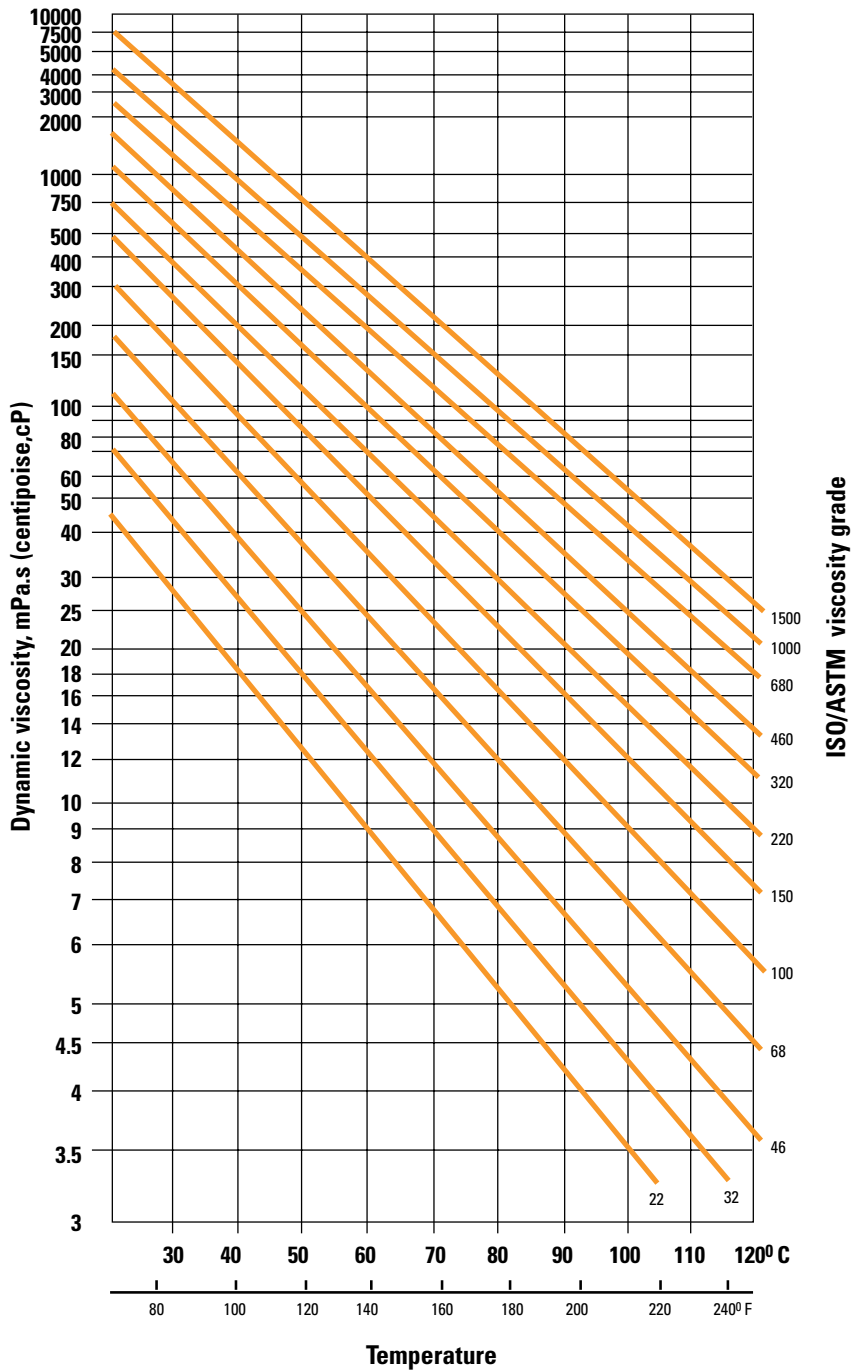
SPEED, HEAT AND TORQUE - *continued*



**DETERMINATION OF COMBINED LOAD FACTORS  $f_1$  AND  $f_2$**

| Load condition                | $f_1$ and $f_2$                       |
|-------------------------------|---------------------------------------|
| $KF_a/F_r > 2.0$              | $f_1 = KF_a/F_r$<br>$f_2 = f_1 + 0.8$ |
| $0.47 \leq KF_a/F_r \leq 2.0$ | use graph above                       |
| $KF_a/F_r = 0.47$             | $f_1 = 0.06$<br>$f_2 = 1.78$          |

Fig. A-46



Viscosities in mPa.s (centipoise, cP) for ISO/ASTM industrial fluid lubricant grade designations. Assumes: Viscosity Index 90; Specific Gravity 0.875 at 40° C.

Fig. A-47

SPEED, HEAT AND TORQUE - continued

NEEDLE ROLLER BEARINGS

Empirical torque equations for radial and thrust needle bearings were developed by Timken:

$$M = d_m (4.5 \times 10^{-7} v^{0.3} n^{0.6} + 0.12F_r^{0.4})$$

Testing also showed that full complement radial needle roller bearings operate at 1.5 to 2 times the torque determined for caged radial needle roller bearings. Similarly, the running torque of thrust needle roller bearings is given:

$$M = 4.5 \times 10^{-7} v^{0.3} n^{0.6} d_m + 0.016F_a l$$

In both equations, the mean diameter  $d_m$  is the average of the bore and O.D. Of the bearings, while the length (l) in the thrust bearing torque equation can be approximated using the bearing's radial section (e.g.,  $l = 1/2 [E_a - E_b]$ ). Finally, note that the viscosity is in units of centistokes, while that for tapered roller bearings was in centipoise. A typical conversion factor for mineral oil is 1 cSt = 0.875 cp.

Both of the aforementioned equations were determined for circulating oil lubrication systems. For grease lubrication, the viscosity of the base oil should be used to estimate the running torque.

CYLINDRICAL AND SPHERICAL ROLLER AND BALL BEARINGS

The torque equations for cylindrical and spherical roller bearings are given as follows, where the coefficients are based on series and found in the following table:

$$M = \begin{cases} f_1 F_B d_m + 10^{-7} f_0 (v \cdot n)^{2/3} d_m^3 & \text{if } (v \cdot n) \geq 2000 \\ f_1 F_B d_m + 160 \times 10^{-7} f_0 d_m^3 & \text{if } (v \cdot n) < 2000 \end{cases}$$

Again, note that the viscosity is in units of centistokes. The load term ( $F_B$ ) is dependent on bearing type as follows:

Radial Ball: 
$$F_B = \max \left( \begin{matrix} 0.9F_a \cot \alpha - 0.1F_r \\ \text{or} \\ F_r \end{matrix} \right)$$

Radial Cylindrical and Spherical Roller: 
$$F_B = \max \left( \begin{matrix} 0.8F_a \cot \alpha \\ \text{or} \\ F_r \end{matrix} \right)$$

Thrust Ball and Cylindrical and Spherical Roller: 
$$F_B = F_a$$

COEFFICIENTS FOR THE TORQUE EQUATION

| Bearing Type                                                               | Dimension Series | $f_0$   | $f_1$   |
|----------------------------------------------------------------------------|------------------|---------|---------|
| Single-row deep groove ball bearings                                       | 18               | 1.7     | 0.00010 |
|                                                                            | 28               | 1.7     | 0.00010 |
|                                                                            | 38               | 1.7     | 0.00010 |
|                                                                            | 19               | 1.7     | 0.00015 |
|                                                                            | 39               | 1.7     | 0.00015 |
|                                                                            | 00               | 1.7     | 0.00015 |
|                                                                            | 10               | 1.7     | 0.00015 |
|                                                                            | 02               | 2       | 0.00020 |
|                                                                            | 03               | 2.3     | 0.00020 |
|                                                                            | 04               | 2.3     | 0.00020 |
| Single-row angular contact ball bearings $22^\circ < \alpha \leq 45^\circ$ | 02               | 2       | 0.00025 |
|                                                                            | 03               | 3       | 0.00035 |
| Double-row or paired single-row angular contact ball bearings              | 32               | 5       | 0.00035 |
|                                                                            | 33               | 7       | 0.00035 |
| Gothic Arch ball bearings                                                  | 02               | 2       | 0.00037 |
|                                                                            | 03               | 3       | 0.00037 |
| Single-row cylindrical roller bearings with cage                           | 10               | 2       | 0.00020 |
|                                                                            | 02               | 2       | 0.00030 |
|                                                                            | 22               | 3       | 0.00040 |
|                                                                            | 03               | 2       | 0.00035 |
|                                                                            | 23               | 4       | 0.00040 |
|                                                                            | 04               | 2       | 0.00040 |
| Single-row cylindrical roller bearings full complement                     | 18               | 5       | 0.00055 |
|                                                                            | 29               | 6       | 0.00055 |
|                                                                            | 30               | 7       | 0.00055 |
|                                                                            | 22               | 8       | 0.00055 |
|                                                                            | 23               | 12      | 0.00055 |
| Spherical Roller Bearings                                                  | 39               | 4.5     | 0.00017 |
|                                                                            | 30               | 4.5     | 0.00017 |
|                                                                            | 40               | 6.5     | 0.00027 |
|                                                                            | 31               | 5.5     | 0.00027 |
|                                                                            | 41               | 7       | 0.00049 |
|                                                                            | 22               | 4       | 0.00019 |
|                                                                            | 32               | 6       | 0.00036 |
|                                                                            | 03               | 3.5     | 0.00019 |
| 23                                                                         | 4.5              | 0.00030 |         |
| Double-row cylindrical roller bearings full complement                     | 48               | 9       | 0.00055 |
|                                                                            | 49               | 11      | 0.00055 |
|                                                                            | 50               | 13      | 0.00055 |
| Thrust cylindrical roller bearings                                         | 11               | 3       | 0.00150 |
|                                                                            | 12               | 4       | 0.00150 |
| Thrust spherical roller bearings                                           | 92               | 2.5     | 0.00023 |
|                                                                            | 93               | 2.5     | 0.00023 |
|                                                                            | 94               | 3       | 0.00030 |

CONVERSION TABLES

| TO CONVERT FROM                                 | TO                        | MULTIPLY BY      |                                            |
|-------------------------------------------------|---------------------------|------------------|--------------------------------------------|
| <b>ACCELERATION</b>                             |                           |                  |                                            |
| foot/second <sup>2</sup>                        | meter/second <sup>2</sup> | m/s <sup>2</sup> | 0.3048                                     |
| inch/second <sup>2</sup>                        | meter/second <sup>2</sup> | m/s <sup>2</sup> | 0.0254                                     |
| <b>AREA</b>                                     |                           |                  |                                            |
| foot <sup>2</sup>                               | meter <sup>2</sup>        | m <sup>2</sup>   | 0.09290304                                 |
| inch <sup>2</sup>                               | meter <sup>2</sup>        | m <sup>2</sup>   | 0.00064516                                 |
| inch <sup>2</sup>                               | millimeter <sup>2</sup>   | mm <sup>2</sup>  | 645.16                                     |
| yard <sup>2</sup>                               | meter <sup>2</sup>        | m <sup>2</sup>   | 0.836127                                   |
| mile <sup>2</sup> (U.S. statute)                | meter <sup>2</sup>        | m <sup>2</sup>   | 2589988                                    |
| <b>BENDING MOMENT OR TORQUE</b>                 |                           |                  |                                            |
| dyne-centimeter                                 | newton-meter              | N • m            | 0.0000001                                  |
| kilogram-force-meter                            | newton-meter              | N • m            | 9.806650                                   |
| pound-force-inch                                | newton-meter              | N • m            | 0.1129848                                  |
| pound-force-foot                                | newton-meter              | N • m            | 1.355818                                   |
| <b>ENERGY</b>                                   |                           |                  |                                            |
| BTU (International Table)                       | joule                     | J                | 1055.056                                   |
| foot-pound-force                                | joule                     | J                | 1.355818                                   |
| kilowatt-hour                                   | megajoule                 | MJ               | 3.6                                        |
| <b>FORCE</b>                                    |                           |                  |                                            |
| kilogram-force                                  | newton                    | N                | 9.806650                                   |
| kilopound-force                                 | newton                    | N                | 9.806650                                   |
| pound-force (lbf)                               | newton                    | N                | 4.448222                                   |
| <b>LENGTH</b>                                   |                           |                  |                                            |
| fathom                                          | meter                     | m                | 1.8288                                     |
| foot                                            | meter                     | m                | 0.3048                                     |
| inch                                            | millimeter                | mm               | 25.4                                       |
| microinch                                       | micrometer                | µm               | 0.0254                                     |
| micron (µm)                                     | millimeter                | mm               | 0.0010                                     |
| mile (U.S. statute)                             | meter                     | m                | 1609.344                                   |
| yard                                            | meter                     | m                | 0.9144                                     |
| nautical mile                                   | meter                     | m                | 1852                                       |
| <b>MASS</b>                                     |                           |                  |                                            |
| kilogram-force-second <sup>2</sup> /meter(mass) | kilogram                  | kg               | 9.806650                                   |
| kilogram-mass                                   | kilogram                  | kg               | 1.0                                        |
| pound-mass (lbm avoirdupois)                    | kilogram                  | kg               | 0.4535924                                  |
| ton (long, 2240 lbm)                            | kilogram                  | kg               | 1016.047                                   |
| ton (short, 2000 lbm)                           | kilogram                  | kg               | 907.1847                                   |
| tonne                                           | kilogram                  | kg               | 1000.000                                   |
| <b>POWER</b>                                    |                           |                  |                                            |
| BTU (International Table)/hour                  | watt                      | W                | 0.293071                                   |
| BTU (International Table)/minute                | watt                      | W                | 17.58427                                   |
| horsepower (550 ft lbf/s)                       | kilowatt                  | kW               | 0.745700                                   |
| BTU (Thermochemical)/minute                     | watt                      | W                | 17.57250                                   |
| <b>PRESSURE OR STRESS (FORCE/AREA)</b>          |                           |                  |                                            |
| newton/meter <sup>2</sup>                       | pascal                    | Pa               | 1.0000                                     |
| kilogram-force/centimeter <sup>2</sup>          | pascal                    | Pa               | 98066.50                                   |
| kilogram-force/meter <sup>2</sup>               | pascal                    | Pa               | 9.806650                                   |
| kilogram-force/millimeter <sup>2</sup>          | pascal                    | Pa               | 9806650                                    |
| pound-force/foot <sup>2</sup>                   | pascal                    | Pa               | 47.88026                                   |
| pound-force/inch <sup>2</sup> (psi)             | megapascal                | MPa              | 0.006894757                                |
| <b>TEMPERATURE</b>                              |                           |                  |                                            |
| degree Celsius                                  | kelvin                    | k                | t <sub>k</sub> = t <sub>c</sub> + 273.15   |
| degree Fahrenheit                               | kelvin                    | k                | k = 5/9 (t <sub>r</sub> + 459.67)          |
| degree Fahrenheit                               | degree Celsius            | °C               | t <sub>c</sub> = 5/9 (t <sub>r</sub> - 32) |
| <b>VELOCITY</b>                                 |                           |                  |                                            |
| foot/minute                                     | meter/second              | m/s              | 0.00508                                    |
| foot/second                                     | meter/second              | meter/second     | m/s                                        |
| 0.3048                                          |                           |                  |                                            |
| inch/second                                     | meter/second              | m/s              | 0.0254                                     |
| kilometer/hour                                  | meter/second              | m/s              | 0.27778                                    |
| mile/hour (U.S. statute)                        | meter/second              | m/s              | 0.44704                                    |
| mile/hour (U.S. statute)                        | kilometer/hour            | km/h             | 1.609344                                   |
| <b>VOLUME</b>                                   |                           |                  |                                            |
| foot <sup>3</sup>                               | meter <sup>3</sup>        | m <sup>3</sup>   | 0.02831685                                 |
| gallon (U.S. liquid)                            | liter                     | l                | 3.785412                                   |
| liter                                           | meter <sup>3</sup>        | m <sup>3</sup>   | 0.001                                      |
| inch <sup>3</sup>                               | meter <sup>3</sup>        | m <sup>3</sup>   | 0.00001638706                              |
| inch <sup>3</sup>                               | centimeter <sup>3</sup>   | cm <sup>3</sup>  | 16.38706                                   |
| inch <sup>3</sup>                               | millimeter <sup>3</sup>   | mm <sup>3</sup>  | 16387.06                                   |
| ounce (U.S. fluid)                              | centimeter <sup>3</sup>   | cm <sup>3</sup>  | 29.57353                                   |
| yard <sup>3</sup>                               | meter <sup>3</sup>        | m <sup>3</sup>   | 0.7645549                                  |

| VISCOSITY CONVERSION TABLE |                |               |             |
|----------------------------|----------------|---------------|-------------|
| SUS                        | R <sup>*</sup> | E             | cSt         |
| Saybolt (sec.)             | Redwood (sec.) | Engler (deg.) | Centistokes |
| 35                         | 32.2           | 1.18          | 2.7         |
| 40                         | 36.2           | 1.32          | 4.3         |
| 45                         | 40.6           | 1.46          | 5.9         |
| 50                         | 44.9           | 1.60          | 7.4         |
| 55                         | 49.1           | 1.75          | 8.9         |
| 60                         | 53.5           | 1.88          | 10.4        |
| 65                         | 57.9           | 2.02          | 11.8        |
| 70                         | 62.3           | 2.15          | 13.1        |
| 75                         | 67.6           | 2.31          | 14.5        |
| 80                         | 71.0           | 2.42          | 15.8        |
| 85                         | 75.1           | 2.55          | 17.0        |
| 90                         | 79.6           | 2.68          | 18.2        |
| 95                         | 84.2           | 2.81          | 19.4        |
| 100                        | 88.4           | 2.95          | 20.6        |
| 110                        | 97.1           | 3.21          | 23.0        |
| 120                        | 105.9          | 3.49          | 25.0        |
| 130                        | 114.8          | 3.77          | 27.5        |
| 140                        | 123.6          | 4.04          | 29.8        |
| 150                        | 132.4          | 4.32          | 32.1        |
| 160                        | 141.1          | 4.59          | 34.3        |
| 170                        | 150.0          | 4.88          | 36.5        |
| 180                        | 158.8          | 5.15          | 38.8        |
| 190                        | 167.5          | 5.44          | 41.0        |
| 200                        | 176.4          | 5.72          | 43.2        |
| 220                        | 194.0          | 6.28          | 47.5        |
| 240                        | 212            | 6.85          | 51.9        |
| 260                        | 229            | 7.38          | 56.5        |
| 280                        | 247            | 7.95          | 60.5        |
| 300                        | 265            | 8.51          | 64.9        |
| 325                        | 287            | 9.24          | 70.3        |
| 350                        | 309            | 9.95          | 75.8        |
| 375                        | 331            | 10.7          | 81.2        |
| 400                        | 353            | 11.4          | 86.8        |
| 425                        | 375            | 12.1          | 92.0        |
| 450                        | 397            | 12.8          | 97.4        |
| 475                        | 419            | 13.5          | 103         |
| 500                        | 441            | 14.2          | 108         |
| 550                        | 485            | 15.6          | 119         |
| 600                        | 529            | 17.0          | 130         |
| 650                        | 573            | 18.5          | 141         |
| 700                        | 617            | 19.9          | 152         |
| 750                        | 661            | 21.3          | 163         |
| 800                        | 705            | 22.7          | 173         |
| 850                        | 749            | 24.2          | 184         |
| 900                        | 793            | 25.6          | 195         |
| 950                        | 837            | 27.0          | 206         |
| 1000                       | 882            | 28.4          | 217         |
| 1200                       | 1058           | 34.1          | 260         |
| 1400                       | 1234           | 39.8          | 302         |
| 1600                       | 1411           | 45.5          | 347         |
| 1800                       | 1587           | 51            | 390         |
| 2000                       | 1763           | 57            | 433         |
| 2500                       | 2204           | 71            | 542         |
| 3000                       | 2646           | 85            | 650         |
| 3500                       | 3087           | 99            | 758         |
| 4000                       | 3526           | 114           | 867         |
| 4500                       | 3967           | 128           | 974         |
| 5000                       | 4408           | 142           | 1082        |
| 5500                       | 4849           | 156           | 1150        |
| 6000                       | 5290           | 170           | 1300        |
| 6500                       | 5730           | 185           | 1400        |
| 7000                       | 6171           | 199           | 1510        |
| 7500                       | 6612           | 213           | 1630        |
| 8000                       | 7053           | 227           | 1740        |
| 8500                       | 7494           | 242           | 1850        |
| 9000                       | 7934           | 256           | 1960        |
| 9500                       | 8375           | 270           | 2070        |
| 10000                      | 8816           | 284           | 2200        |



CONVERSION TABLES - continued

INCHES TO MILLIMETERS — UNITS

| inches | 0      | 1      | 2      | 3      | 4       | 5       | 6       | 7       | 8       | 9       |         |
|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|
| 0      | 0.0000 | 0.000  | 25.400 | 50.800 | 76.200  | 101.600 | 127.000 | 152.400 | 177.800 | 203.200 | 228.600 |
| 1/16   | 0.0625 | 1.588  | 26.988 | 52.388 | 77.788  | 103.188 | 128.588 | 153.988 | 179.388 | 204.788 | 230.188 |
| 1/8    | 0.1250 | 3.175  | 28.575 | 53.975 | 79.375  | 104.775 | 130.175 | 155.575 | 180.975 | 206.375 | 231.775 |
| 3/16   | 0.1875 | 4.763  | 30.162 | 55.562 | 80.962  | 106.362 | 131.762 | 157.162 | 182.562 | 207.962 | 233.362 |
| 1/4    | 0.2500 | 6.350  | 31.750 | 57.150 | 82.550  | 107.950 | 133.350 | 158.750 | 184.150 | 209.550 | 234.950 |
| 5/16   | 0.3125 | 7.938  | 33.338 | 58.738 | 84.138  | 109.538 | 134.938 | 160.338 | 185.735 | 211.138 | 236.538 |
| 3/8    | 0.3750 | 9.525  | 34.925 | 60.325 | 85.725  | 111.125 | 136.525 | 161.925 | 187.325 | 212.725 | 238.125 |
| 7/16   | 0.4375 | 11.112 | 36.512 | 61.912 | 87.312  | 112.712 | 138.112 | 163.512 | 188.912 | 214.312 | 239.712 |
| 1/2    | 0.5000 | 12.700 | 38.100 | 63.500 | 88.900  | 114.300 | 139.700 | 165.100 | 190.500 | 215.900 | 241.300 |
| 9/16   | 0.5625 | 14.288 | 39.688 | 65.088 | 90.488  | 115.888 | 141.288 | 166.688 | 192.088 | 217.488 | 242.888 |
| 5/8    | 0.6250 | 15.875 | 41.275 | 66.675 | 92.075  | 117.475 | 142.875 | 168.275 | 193.675 | 219.075 | 244.475 |
| 11/16  | 0.6875 | 17.462 | 42.862 | 68.262 | 93.662  | 119.062 | 144.462 | 169.862 | 195.262 | 220.662 | 246.062 |
| 3/4    | 0.7500 | 19.050 | 44.450 | 69.850 | 95.250  | 120.650 | 146.050 | 171.450 | 196.850 | 222.250 | 247.650 |
| 13/16  | 0.8125 | 20.638 | 46.038 | 71.438 | 96.838  | 122.238 | 147.638 | 173.038 | 198.438 | 223.838 | 249.238 |
| 7/8    | 0.8750 | 22.225 | 47.625 | 73.025 | 98.425  | 123.825 | 149.225 | 174.625 | 200.025 | 225.425 | 250.825 |
| 15/16  | 0.9375 | 23.812 | 49.212 | 74.612 | 100.012 | 125.412 | 150.812 | 176.212 | 201.612 | 227.012 | 252.412 |

| inches | 10     | 11      | 12      | 13      | 14      | 15      |         |
|--------|--------|---------|---------|---------|---------|---------|---------|
| 0      | 0.0000 | 254.000 | 279.400 | 304.800 | 330.200 | 355.600 | 381.000 |
| 1/16   | 0.0625 | 255.588 | 280.988 | 306.388 | 331.788 | 357.188 | 382.588 |
| 1/8    | 0.1250 | 257.175 | 282.575 | 307.975 | 333.375 | 358.775 | 384.175 |
| 3/16   | 0.1875 | 258.762 | 284.162 | 309.562 | 334.962 | 360.362 | 385.762 |
| 1/4    | 0.2500 | 260.350 | 285.750 | 311.150 | 336.550 | 361.950 | 387.350 |
| 5/16   | 0.3125 | 261.938 | 287.338 | 312.738 | 338.138 | 363.538 | 388.938 |
| 3/8    | 0.3750 | 263.525 | 288.925 | 314.325 | 339.725 | 365.125 | 390.525 |
| 7/16   | 0.4375 | 265.112 | 290.512 | 315.912 | 341.312 | 366.712 | 392.112 |
| 1/2    | 0.5000 | 266.700 | 292.100 | 317.500 | 342.900 | 368.300 | 393.700 |
| 9/16   | 0.5625 | 268.288 | 293.688 | 319.088 | 344.488 | 369.888 | 395.288 |
| 5/8    | 0.6250 | 269.875 | 295.275 | 320.675 | 346.075 | 371.475 | 396.875 |
| 11/16  | 0.6875 | 271.462 | 296.862 | 322.262 | 347.662 | 373.062 | 398.462 |
| 3/4    | 0.7500 | 273.050 | 298.450 | 323.850 | 349.250 | 374.650 | 400.050 |
| 13/16  | 0.8125 | 274.638 | 300.038 | 325.438 | 350.838 | 376.238 | 401.638 |
| 7/8    | 0.8750 | 276.225 | 301.625 | 327.025 | 352.425 | 377.825 | 403.225 |
| 15/16  | 0.9375 | 277.812 | 303.212 | 328.612 | 354.012 | 379.412 | 404.812 |

B.S.I. Norm No. 350 } 1 inch = 25.400 mm  
 A.S.A. Norm No. B48.1 } (exact)  
 DIN 4890, 1 mm = 1/25.4 inches

UNITS

| inches | 10          |
|--------|-------------|
| 0      | — 254       |
| 1      | 25.4 279.4  |
| 2      | 50.8 304.8  |
| 3      | 76.2 330.2  |
| 4      | 101.6 355.6 |
| 5      | 127 381     |
| 6      | 152.4 406.4 |
| 7      | 177.8 431.8 |
| 8      | 203.2 457.2 |
| 9      | 228.6 482.6 |

FRACTIONS

| 1/10" |       | 1/100" |       | 1/1000" |        | 1/10000" |         |
|-------|-------|--------|-------|---------|--------|----------|---------|
| inch  | mm    | inches | mm    | inches  | mm     | inches   | mm      |
| 0.1   | 2.54  | 0.01   | 0.254 | 0.001   | 0.0254 | 0.0001   | 0.00254 |
| 0.2   | 5.08  | 0.02   | 0.508 | 0.002   | 0.0508 | 0.0002   | 0.00508 |
| 0.3   | 7.62  | 0.03   | 0.762 | 0.003   | 0.0762 | 0.0003   | 0.00762 |
| 0.4   | 10.16 | 0.04   | 1.016 | 0.004   | 0.1016 | 0.0004   | 0.01016 |
| 0.5   | 12.70 | 0.05   | 1.270 | 0.005   | 0.1270 | 0.0005   | 0.01270 |
| 0.6   | 15.24 | 0.06   | 1.524 | 0.006   | 0.1524 | 0.0006   | 0.01524 |
| 0.7   | 17.78 | 0.07   | 1.778 | 0.007   | 0.1778 | 0.0007   | 0.01778 |
| 0.8   | 20.32 | 0.08   | 2.032 | 0.008   | 0.2032 | 0.0008   | 0.02032 |
| 0.9   | 22.86 | 0.09   | 2.286 | 0.009   | 0.2286 | 0.0009   | 0.02286 |

MILLIMETERS TO INCHES — UNITS

| mm | 10      | 20      | 30      | 40      | 50      | 60      | 70      | 80      | 90      |         |
|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0  | —       | 0.39370 | 0.78740 | 1.18110 | 1.57480 | 1.96850 | 2.36220 | 2.75591 | 3.14961 | 3.54331 |
| 1  | 0.03937 | 0.43307 | 0.82677 | 1.22047 | 1.61417 | 2.00787 | 2.40157 | 2.79528 | 3.18898 | 3.58268 |
| 2  | 0.07874 | 0.47244 | 0.86614 | 1.25984 | 1.65354 | 2.04724 | 2.44094 | 2.83465 | 3.22835 | 3.62205 |
| 3  | 0.11811 | 0.51181 | 0.90551 | 1.29921 | 1.69291 | 2.08661 | 2.48031 | 2.87402 | 3.26772 | 3.66142 |
| 4  | 0.15748 | 0.55118 | 0.94488 | 1.33858 | 1.73228 | 2.12598 | 2.51969 | 2.91339 | 3.30709 | 3.70079 |
| 5  | 0.19685 | 0.59055 | 0.98425 | 1.37795 | 1.77165 | 2.16535 | 2.55906 | 2.95276 | 3.34646 | 3.74016 |
| 6  | 0.23622 | 0.62992 | 1.02362 | 1.41732 | 1.71102 | 2.20472 | 2.59843 | 2.99213 | 3.38583 | 3.77953 |
| 7  | 0.27559 | 0.66929 | 1.06299 | 1.45669 | 1.85039 | 2.24409 | 2.63780 | 3.03150 | 3.42520 | 3.81890 |
| 8  | 0.31496 | 0.70866 | 1.10236 | 1.49606 | 1.88976 | 2.28346 | 2.67717 | 3.07087 | 3.46457 | 3.85827 |
| 9  | 0.35433 | 0.74803 | 1.14173 | 1.53543 | 1.92913 | 2.32283 | 2.71654 | 3.11024 | 3.50394 | 3.89764 |

FRACTIONS

| 1/10 mm |         | 1/100 mm |         | 1/1000 mm |          |
|---------|---------|----------|---------|-----------|----------|
| mm      | inches  | mm       | inches  | mm        | inches   |
| 0.1     | 0.00394 | 0.01     | 0.00039 | 0.001     | 0.000039 |
| 0.2     | 0.00787 | 0.02     | 0.00079 | 0.002     | 0.000079 |
| 0.3     | 0.01181 | 0.03     | 0.00118 | 0.003     | 0.000118 |
| 0.4     | 0.01575 | 0.04     | 0.00157 | 0.004     | 0.000157 |
| 0.5     | 0.01969 | 0.05     | 0.00197 | 0.005     | 0.000197 |
| 0.6     | 0.02362 | 0.06     | 0.00236 | 0.006     | 0.000236 |
| 0.7     | 0.02756 | 0.07     | 0.00276 | 0.007     | 0.000276 |
| 0.8     | 0.03150 | 0.08     | 0.00315 | 0.008     | 0.000315 |
| 0.9     | 0.03543 | 0.09     | 0.00354 | 0.009     | 0.000354 |

CONVERSION TABLES - continued

| STEEL HARDNESS NUMBERS*                                                |                                         |                                                 |               |                       |                                     |                                     |                                 |                                                                   |                       |                       |                                   |                                     |                                  |
|------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------|---------------|-----------------------|-------------------------------------|-------------------------------------|---------------------------------|-------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|-------------------------------------|----------------------------------|
| APPROXIMATE HARDNESS CONVERSION NUMBERS FOR STEEL, BASED ON ROCKWELL C |                                         |                                                 |               |                       |                                     |                                     |                                 |                                                                   |                       |                       |                                   |                                     |                                  |
| Rockwell C-Scale Hardness Number                                       | Diamond Pyramid Hardness Number Vickers | Brinell Hardness Number 10 mm Ball 3000 kg Load |               |                       | Rockwell Hardness Number            |                                     |                                 | Rockwell Superficial Hardness Number Superficial Brale Penetrator |                       |                       | Shore Scleroscope Hardness Number | Tensile Strength (approx.) 1000 psi | Rockwell C-Scale Hardness Number |
|                                                                        |                                         | Standard Ball                                   | Hultgren Ball | Tungsten Carbide Ball | A-Scale 60 kg Load Brale Penetrator | B-Scale 100 kg Load 1/16" Dia. Ball | D-Scale 100 kg Brale Penetrator | 15-N Scale 15 kg Load                                             | 30-N Scale 30 kg Load | 45-N Scale 45 kg Load |                                   |                                     |                                  |
| 68                                                                     | 940                                     | —                                               | —             | —                     | 85.6                                | —                                   | 76.9                            | 93.2                                                              | 84.4                  | 75.4                  | 97                                | —                                   | 68                               |
| 67                                                                     | 900                                     | —                                               | —             | —                     | 85                                  | —                                   | 76.1                            | 92.9                                                              | 83.6                  | 74.2                  | 95                                | —                                   | 67                               |
| 66                                                                     | 865                                     | —                                               | —             | —                     | 84.5                                | —                                   | 75.4                            | 92.5                                                              | 82.8                  | 73.3                  | 92                                | —                                   | 66                               |
| 65                                                                     | 832                                     | —                                               | —             | 739                   | 83.9                                | —                                   | 74.5                            | 92.2                                                              | 81.9                  | 72                    | 91                                | —                                   | 65                               |
| 64                                                                     | 800                                     | —                                               | —             | 722                   | 83.4                                | —                                   | 73.8                            | 91.8                                                              | 81.1                  | 71                    | 88                                | —                                   | 64                               |
| 63                                                                     | 772                                     | —                                               | —             | 705                   | 82.8                                | —                                   | 73                              | 91.4                                                              | 80.1                  | 69.9                  | 87                                | —                                   | 63                               |
| 62                                                                     | 746                                     | —                                               | —             | 688                   | 82.3                                | —                                   | 72.2                            | 91.1                                                              | 79.3                  | 68.8                  | 85                                | —                                   | 62                               |
| 61                                                                     | 720                                     | —                                               | —             | 670                   | 81.8                                | —                                   | 71.5                            | 90.7                                                              | 78.4                  | 67.7                  | 83                                | —                                   | 61                               |
| 60                                                                     | 697                                     | —                                               | 613           | 654                   | 81.2                                | —                                   | 70.7                            | 90.2                                                              | 77.5                  | 66.6                  | 81                                | —                                   | 60                               |
| 59                                                                     | 674                                     | —                                               | 599           | 634                   | 80.7                                | —                                   | 69.9                            | 89.8                                                              | 76.6                  | 65.5                  | 80                                | 326                                 | 59                               |
| 58                                                                     | 653                                     | —                                               | 587           | 615                   | 80.1                                | —                                   | 69.2                            | 89.3                                                              | 75.7                  | 64.3                  | 78                                | 315                                 | 58                               |
| 57                                                                     | 633                                     | —                                               | 575           | 595                   | 79.6                                | —                                   | 68.5                            | 88.9                                                              | 74.8                  | 63.2                  | 76                                | 305                                 | 57                               |
| 56                                                                     | 613                                     | —                                               | 561           | 577                   | 79                                  | —                                   | 67.7                            | 88.3                                                              | 73.9                  | 62                    | 75                                | 295                                 | 56                               |
| 55                                                                     | 595                                     | —                                               | 546           | 560                   | 78.5                                | —                                   | 66.9                            | 87.9                                                              | 73                    | 60.9                  | 74                                | 287                                 | 55                               |
| 54                                                                     | 577                                     | —                                               | 534           | 543                   | 78                                  | —                                   | 66.1                            | 87.4                                                              | 72                    | 59.8                  | 72                                | 278                                 | 54                               |
| 53                                                                     | 560                                     | —                                               | 519           | 525                   | 77.4                                | —                                   | 65.4                            | 86.9                                                              | 71.2                  | 58.6                  | 71                                | 269                                 | 53                               |
| 52                                                                     | 544                                     | 500                                             | 508           | 512                   | 76.8                                | —                                   | 64.6                            | 86.4                                                              | 70.2                  | 57.4                  | 69                                | 262                                 | 52                               |
| 51                                                                     | 528                                     | 487                                             | 494           | 496                   | 76.3                                | —                                   | 63.8                            | 85.9                                                              | 69.4                  | 56.1                  | 68                                | 253                                 | 51                               |
| 50                                                                     | 513                                     | 475                                             | 481           | 481                   | 75.9                                | —                                   | 63.1                            | 85.5                                                              | 68.5                  | 55                    | 67                                | 245                                 | 50                               |
| 49                                                                     | 498                                     | 464                                             | 469           | 469                   | 75.2                                | —                                   | 62.1                            | 85                                                                | 67.6                  | 53.8                  | 66                                | 239                                 | 49                               |
| 48                                                                     | 484                                     | 451                                             | 455           | 455                   | 74.7                                | —                                   | 61.4                            | 84.5                                                              | 66.7                  | 52.5                  | 64                                | 232                                 | 48                               |
| 47                                                                     | 471                                     | 442                                             | 443           | 443                   | 74.1                                | —                                   | 60.8                            | 83.9                                                              | 65.8                  | 51.4                  | 63                                | 225                                 | 47                               |
| 46                                                                     | 458                                     | 432                                             | 432           | 432                   | 73.6                                | —                                   | 60                              | 83.5                                                              | 64.8                  | 50.3                  | 62                                | 219                                 | 46                               |
| 45                                                                     | 446                                     | 421                                             | 421           | 421                   | 73.1                                | —                                   | 59.2                            | 83                                                                | 64                    | 49                    | 60                                | 212                                 | 45                               |
| 44                                                                     | 434                                     | 409                                             | 409           | 409                   | 72.5                                | —                                   | 58.5                            | 82.5                                                              | 63.1                  | 47.8                  | 58                                | 206                                 | 44                               |
| 43                                                                     | 423                                     | 400                                             | 400           | 400                   | 72                                  | —                                   | 57.7                            | 82                                                                | 62.2                  | 46.7                  | 57                                | 201                                 | 43                               |
| 42                                                                     | 412                                     | 390                                             | 390           | 390                   | 71.5                                | —                                   | 56.9                            | 81.5                                                              | 61.3                  | 45.5                  | 56                                | 196                                 | 42                               |
| 41                                                                     | 402                                     | 381                                             | 381           | 381                   | 70.9                                | —                                   | 56.2                            | 80.9                                                              | 60.4                  | 44.3                  | 55                                | 191                                 | 41                               |
| 40                                                                     | 392                                     | 371                                             | 371           | 371                   | 70.4                                | —                                   | 55.4                            | 80.4                                                              | 59.5                  | 43.1                  | 54                                | 186                                 | 40                               |
| 39                                                                     | 382                                     | 362                                             | 362           | 362                   | 69.9                                | —                                   | 54.6                            | 79.9                                                              | 58.6                  | 41.9                  | 52                                | 181                                 | 39                               |
| 38                                                                     | 372                                     | 353                                             | 353           | 353                   | 69.4                                | —                                   | 53.8                            | 79.4                                                              | 57.7                  | 40.8                  | 51                                | 176                                 | 38                               |
| 37                                                                     | 363                                     | 344                                             | 344           | 344                   | 68.9                                | —                                   | 53.1                            | 78.8                                                              | 56.8                  | 39.6                  | 50                                | 172                                 | 37                               |
| 36                                                                     | 354                                     | 336                                             | 336           | 336                   | 68.4                                | (109)                               | 52.3                            | 78.3                                                              | 55.9                  | 38.4                  | 49                                | 168                                 | 36                               |
| 35                                                                     | 345                                     | 327                                             | 327           | 327                   | 67.9                                | (108.5)                             | 51.5                            | 77.7                                                              | 55                    | 37.2                  | 48                                | 163                                 | 35                               |
| 34                                                                     | 336                                     | 319                                             | 319           | 319                   | 67.4                                | (108)                               | 50.8                            | 77.2                                                              | 54.2                  | 36.1                  | 47                                | 159                                 | 34                               |
| 33                                                                     | 327                                     | 311                                             | 311           | 311                   | 66.8                                | (107.5)                             | 50                              | 76.6                                                              | 53.3                  | 34.9                  | 46                                | 154                                 | 33                               |
| 32                                                                     | 318                                     | 301                                             | 301           | 301                   | 66.3                                | (107)                               | 49.2                            | 76.1                                                              | 52.1                  | 33.7                  | 44                                | 150                                 | 32                               |
| 31                                                                     | 310                                     | 294                                             | 294           | 294                   | 65.8                                | (106)                               | 48.4                            | 75.6                                                              | 51.3                  | 32.5                  | 43                                | 146                                 | 31                               |
| 30                                                                     | 302                                     | 286                                             | 286           | 286                   | 65.3                                | (105.5)                             | 47.7                            | 75                                                                | 50.4                  | 31.3                  | 42                                | 142                                 | 30                               |
| 29                                                                     | 294                                     | 279                                             | 279           | 279                   | 64.7                                | (104.5)                             | 47                              | 74.5                                                              | 49.5                  | 30.1                  | 41                                | 138                                 | 29                               |
| 28                                                                     | 286                                     | 271                                             | 271           | 271                   | 64.3                                | (104)                               | 46.1                            | 73.9                                                              | 48.6                  | 28.9                  | 41                                | 134                                 | 28                               |
| 27                                                                     | 279                                     | 264                                             | 264           | 264                   | 63.8                                | (103)                               | 45.2                            | 73.3                                                              | 47.7                  | 27.8                  | 40                                | 131                                 | 27                               |
| 26                                                                     | 272                                     | 258                                             | 258           | 258                   | 63.3                                | (102.5)                             | 44.6                            | 72.8                                                              | 46.8                  | 26.7                  | 38                                | 127                                 | 26                               |
| 25                                                                     | 266                                     | 253                                             | 253           | 253                   | 62.8                                | (101.5)                             | 43.8                            | 72.2                                                              | 45.9                  | 25.5                  | 38                                | 124                                 | 25                               |
| 24                                                                     | 260                                     | 247                                             | 247           | 247                   | 62.4                                | (101)                               | 43.1                            | 71.6                                                              | 45                    | 24.3                  | 37                                | 121                                 | 24                               |
| 23                                                                     | 254                                     | 243                                             | 243           | 243                   | 62                                  | 100                                 | 42.1                            | 71                                                                | 44                    | 23.1                  | 36                                | 118                                 | 23                               |
| 22                                                                     | 248                                     | 237                                             | 237           | 237                   | 61.5                                | 99                                  | 41.6                            | 70.5                                                              | 43.2                  | 22                    | 35                                | 115                                 | 22                               |
| 21                                                                     | 243                                     | 231                                             | 231           | 231                   | 61                                  | 98.5                                | 40.9                            | 69.9                                                              | 42.3                  | 20.7                  | 35                                | 113                                 | 21                               |
| 20                                                                     | 238                                     | 226                                             | 226           | 226                   | 60.5                                | 97.8                                | 40.1                            | 69.4                                                              | 41.5                  | 19.6                  | 34                                | 110                                 | 20                               |

\* Source ASTM

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**TIMKEN**

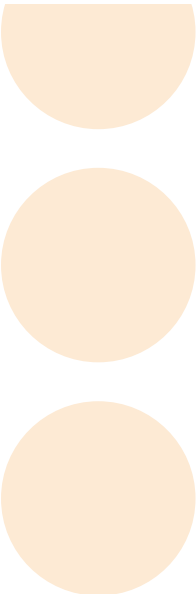
# B

## ROLLER BEARINGS

B

### **B** ROLLER BEARINGS

|                                                     |      |
|-----------------------------------------------------|------|
| <i>Part Numbering Systems</i> .....                 | B3   |
| <i>Tapered Roller Bearings</i> .....                | B15  |
| <i>Radial Cylindrical Roller Bearings</i> .....     | B325 |
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| <i>Thrust Roller Bearings</i> .....                 | B435 |
| <i>Auxiliary Parts</i> .....                        | B467 |



## TAPERED ROLLER BEARINGS

**Overview:** Timken offers the most extensive line of tapered roller bearings in the world. Tapered roller bearings consist of four interdependent components: the cone (inner ring), the cup (outer ring), the tapered rollers (rolling elements) and the cage (roller retainer). Tapered bearings are uniquely designed to manage both thrust and radial loads on rotating shafts. The steeper the cup angle, the greater the ability of the bearing to handle thrust loads.

- **Sizes:** 8 mm (0.31496 in.) bore to 2222.5 mm (87.5 in.) outside diameter (O.D.).
- **Markets:** Automotive, industrial, rail, rolling mills, crane wheels, sheaves.
- **Features:** Available in single-, double- and four-row configurations. Customized surface geometries and coatings are available.
- **Benefits:** Enhanced performance in demanding applications.

|                                     | PAGE        |
|-------------------------------------|-------------|
| <i>Part Numbering Systems</i> ..... | <i>B3</i>   |
| <i>Type TS</i> .....                | <i>B15</i>  |
| <i>Type TSF</i> .....               | <i>B195</i> |
| <i>Type TDO</i> .....               | <i>B237</i> |
| <i>Type TDI</i> .....               | <i>B297</i> |
| <i>IsoClass™ Series</i> .....       | <i>B311</i> |



# ROLLER BEARINGS



### HOW TO RECOGNIZE YOUR PART NUMBER

The part numbering systems for single-row tapered roller bearings (type TS) are internationally recognized. Several part number systems have been developed that can be classified according to “metric” or “inch” systems. Within both the metric and inch systems, different part number systems have been developed. Inch system bearings are normally assigned individual part numbers for the inner race and outer races, whereas ISO bearings are assigned a unique part number for the bearing assembly (inner race and outer race).

#### BEARING SERIES

In all the part numbering systems the term “bearing series” is used to describe bearings having the same basic internal geometry (e.g. roller size, included inner race and outer race angle). Any inner race (including roller set) can be matched with any outer race within the same series providing that the same type of bearing is being used.

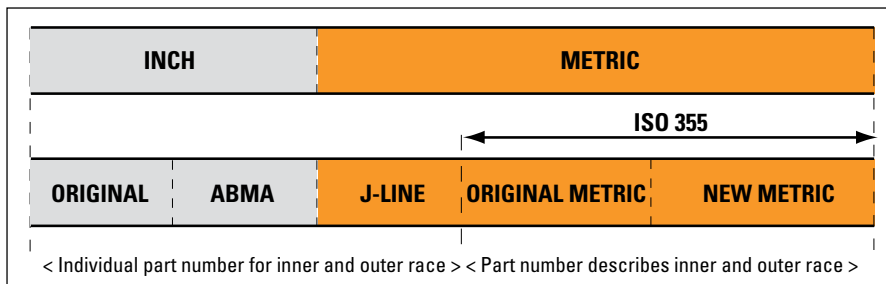
### INCH PART NUMBERING SYSTEMS

#### ORIGINAL INCH PART NUMBERING SYSTEM

The original system developed by The Timken Company was based on a family of bearings designed around a common roller. Varying the number of rollers and the angle of the raceways allows different bearings to be designed for predominant radial load (shallow angle) or thrust load (steep angle).

For example, all the tapered roller bearings in the 500 family use the same roller. However, the 595 Series has a steep angle and 24 rollers while the 525 Series has a shallow angle and 15 rollers.

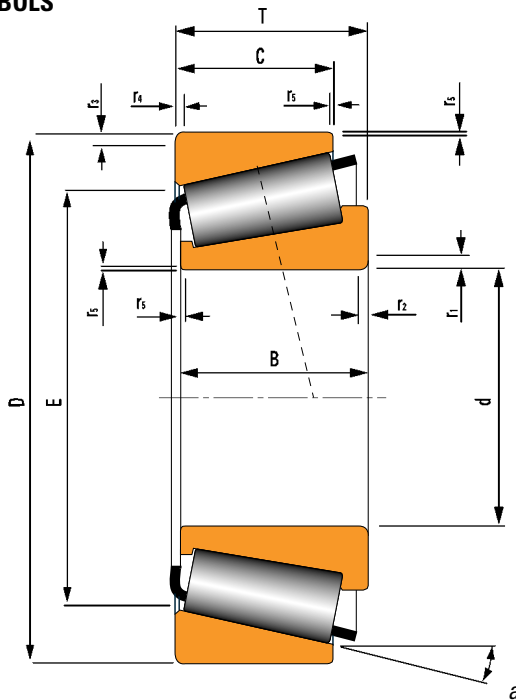
Individual part numbers are assigned to the inner race and outer races. Although there are exceptions, the general rule is that the outer race has a part number that is lower than the series number, whereas the inner race is assigned a higher number.



For example:

Series        575  
 Outer race  572  
 Inner race    576

#### SYMBOLS

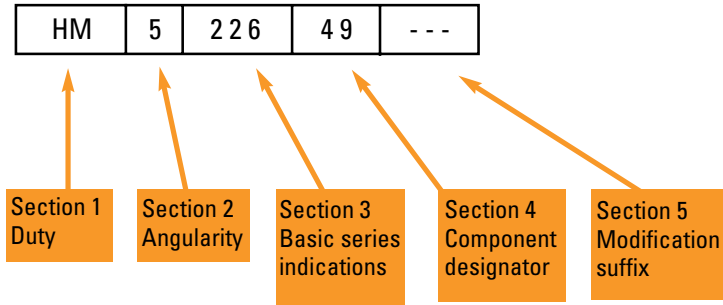


- d = bearing bore diameter
- D = bearing outside diameter
- T = bearing width
- B = inner race width
- C = outer race width
- E = outer race small inside diameter
- a = 1/2 included outer race contact angle
- r1 = inner race back face radius height
- r2 = inner race back face radius width
- r3 = outer race back face radius height
- r4 = outer race back face radius width
- r5 = inner race and outer race front face chamfer height and width





**ABMA INCH PART NUMBERING SYSTEM**



A new inch part numbering system was developed by the American Bearing Manufacturers Association (ABMA) to address the expansion in the number of new applications and tapered roller bearing designs. This part numbering system has become the international standard for inch-sized bearings.

The ABMA part numbering system applies to new bearing series only. Existing part numbers according to the original system, new part numbers that are added to the existing series and proprietary part numbers of special bearings continue to be used.

The new part number is divided into 5 alpha-numeric sections:

**Section 1 - Prefix Letters**

The prefixes will consist of one or two letters and will designate the duty class for which the bearing is designed.

|    |                    |    |                    |
|----|--------------------|----|--------------------|
| EL | Extra Light        | HM | Heavy Medium       |
| LL | Lighter than Light | H  | Heavy              |
| L  | Light              | HH | Heavier than Heavy |
| LM | Light Medium       | EH | Extra Heavy        |
| M  | Medium             | T  | Thrust only        |

**Section 2 - Angularity Designator**

The first digit following the prefix will represent the angle coding as determined by the included angle of the outer race.

| Included Outer race Angle | Code                    |   |
|---------------------------|-------------------------|---|
| 0                         | to 23° 59' 59.99"       | 1 |
| 24°                       | to 25° 29' 59.99"       | 2 |
| 25° 30'                   | to 26° 59' 59.99"       | 3 |
| 27°                       | to 28° 29' 59.99"       | 4 |
| 28° 30'                   | to 30° 29' 59.99"       | 5 |
| 30° 30'                   | to 32° 29' 59.99"       | 6 |
| 32° 30'                   | to 35° 59' 59.99"       | 7 |
| 36°                       | to 44° 59' 59.99"       | 8 |
| 45°                       | Up, but not thrust only | 9 |
| 90°                       | Thrust bearing only     | 0 |

**Section 3 - Basic Series Indication**

The 2nd, 3rd, and 4th digits following the prefix letters are reserved for the basic series indication.

The selection of the basic series indication in relation to the maximum theoretical bore of the bearing will then be in accordance with the following tabulation:

| Maximum Bore Range (inches) | Series Indication | Maximum Bore Range (inches) | Series Indication |
|-----------------------------|-------------------|-----------------------------|-------------------|
| 0 - 1                       | 00 to 19 incl.    | 15 - 16                     | 640 to 659 incl.  |
| 1 - 2                       | 20 to 99 incl.    | 16 - 17                     | 660 to 679 incl.  |
|                             | 000 to 029 incl.  | 17 - 18                     | 680 to 694 incl.  |
| 2 - 3                       | 030 to 129 incl.  | 18 - 19                     | 695 to 709 incl.  |
| 3 - 4                       | 130 to 189 incl.  | 19 - 20                     | 710 to 724 incl.  |
| 4 - 5                       | 190 to 239 incl.  | 20 - 21                     | 725 to 739 incl.  |
| 5 - 6                       | 240 to 289 incl.  | 21 - 22                     | 740 to 754 incl.  |
| 6 - 7                       | 290 to 339 incl.  | 22 - 23                     | 755 to 769 incl.  |
| 7 - 8                       | 340 to 389 incl.  | 23 - 24                     | 770 to 784 incl.  |
| 8 - 9                       | 390 to 429 incl.  | 24 - 25                     | 785 to 799 incl.  |
| 9 - 10                      | 430 to 469 incl.  | 25 - 30                     | 800 to 829 incl.  |
| 10 - 11                     | 470 to 509 incl.  | 30 - 35                     | 830 to 859 incl.  |
| 11 - 12                     | 510 to 549 incl.  | 35 - 40                     | 860 to 879 incl.  |
| 12 - 13                     | 550 to 579 incl.  | 40 - 50                     | 880 to 889 incl.  |
| 13 - 14                     | 580 to 609 incl.  | 50 - 72.5                   | 890 to 899 incl.  |
| 14 - 15                     | 610 to 639 incl.  | 72.5 and over               | 900 to 999 incl.  |

**Section 4 - Component Designator**

The 5th and 6th digits, or the last two digits, following the prefix letters will indicate the actual part number of the bearing component.

Outer race numbers will be indicated by the digits 10 to 19, inclusive, the first outer race made to minimum section in any series starting with the number 10. If more than 10 outer races appear in any series, numbers 20 to 29 will be utilized where available.

Inner race numbers will be indicated by the digits 30 to 49, inclusive, the first inner race made to minimum section in any series being numbered 49.

**Section 5 - Suffix**

This will consist of one letter to three letters in pre-arranged combinations, indicating modifications in external form or internal arrangement.

## PREFIXES AND SUFFIXES

Some of the symbols used by The Timken Company and prefixes and suffixes that are part of the ABMA part numbering standard:

| PREFIX | SUFFIX | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                                                                                                                                                |
|--------|--------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A      |        | Inner race & Outer race  | Standard basic series part number.                                                                                                                                                                                                                         |
| A      | A      | Inner race               | Different radius from basic part number.                                                                                                                                                                                                                   |
| A      | A      | Inner race               | Different bore from basic part number.                                                                                                                                                                                                                     |
| A      | A      | Inner race               | Different complement of rollers.                                                                                                                                                                                                                           |
| A      | A      | Outer race               | Different O.D. from basic part number.                                                                                                                                                                                                                     |
| A      | A      | Outer race               | Different radius from basic part number.                                                                                                                                                                                                                   |
| A      | A      | Outer race               | Different width from basic part number.                                                                                                                                                                                                                    |
| AA     |        | Inner race & Outer race  | Different bore, O.D., width or radius from basic part number.                                                                                                                                                                                              |
| AB     |        | Inner race               | Different bore, width or radius from basic part number, assembled with brass cage.                                                                                                                                                                         |
| AB     |        | Outer race               | Flanged outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                          |
| AC     |        | Inner race               | Different bore or radius, different internal geometry.                                                                                                                                                                                                     |
| AC     |        | Outer race               | Different O.D., width or radius from basic part number.                                                                                                                                                                                                    |
| AD     |        | Outer race               | Double Outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                           |
| ADW    |        | Inner race               | Double Inner race. Pilots and slots each end, holes in large rib.                                                                                                                                                                                          |
| AH     |        | Inner race               | Assembled with special cage, rollers, and/or internal geometry                                                                                                                                                                                             |
| AL     |        | Inner race               | Assembled with Duo-Face seal.                                                                                                                                                                                                                              |
| ARB    |        | Outer race               | Single outer race with snap ring groove in O.D.                                                                                                                                                                                                            |
| AS     |        | Inner race & Outer race  | Different bore, O.D., width, or radius from basic part number.                                                                                                                                                                                             |
| ASB    |        | Inner race               | Single inner race, different bore or width from basic part number, assembled with brass cage.                                                                                                                                                              |
| AV     |        | Inner race & Outer race  | Made of special steel.                                                                                                                                                                                                                                     |
| AW     |        | Inner race & Outer race  | Keyway or slotted inner race or outer race.                                                                                                                                                                                                                |
| AX     |        | Inner race & Outer race  | Different bore, O.D., width, or radius from basic part number.                                                                                                                                                                                             |
| AXB    |        | Inner race               | Different bore, width, or radius from basic part number, assembled with brass cage.                                                                                                                                                                        |
| AXD    |        | Outer race               | ISO outer race - double outer race without oil holes or groove.                                                                                                                                                                                            |
| AXV    |        | Inner race & Outer race  | Different O.D., width, or radius from basic part number. Made of special steel.                                                                                                                                                                            |
| AXX    |        | Inner race & Outer race  | Different O.D., width, or radius from basic part number. Made of special steel.                                                                                                                                                                            |
| B      |        | Outer race               | Flanged outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                          |
| B      |        | Inner race               | Inner race using brass cage.                                                                                                                                                                                                                               |
| B      |        | Inner race & Outer race  | ISO bearing with same boundary dimensions as basic part number, but with different internal geometry, steeper included outer race angle.                                                                                                                   |
| BA     |        | Outer race               | Flanged outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                          |
| BNA    |        | Inner race               | ISO inner race used in assemblies with 2 inner races mated with double outer race to form a double row non-adjusting bearing. (Non-interchangeable with other inner races having the same basic part numbers, which may vary in bore or width dimensions.) |
| BR     |        | Outer race               | Single outer race with groove in O.D. for snap ring.                                                                                                                                                                                                       |
| BS     |        | Outer race               | Flanged outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                          |
| BW     |        | Outer race               | Flanged outer race with slot. (Non-interchangeable with basic part number.)                                                                                                                                                                                |
| BX     |        | Outer race               | Flanged Outer race. (Non-interchangeable with basic part number.)                                                                                                                                                                                          |
| BXX    |        | Outer race               | Flanged single outer race. Made of special steel.                                                                                                                                                                                                          |
| C      |        | Inner race               | Single inner race, envelope dimensions same as basic part number, different internal geometry.                                                                                                                                                             |
| C      |        | Outer race               | Dimensionally different from basic part number. (Non-interchangeable.)                                                                                                                                                                                     |
| CA     |        | Inner race               | Single inner race, envelope dimensions same as basic part number, different internal geometry.                                                                                                                                                             |
| CB     |        | Inner race               | Single inner race, dimensionally different from basic part number.                                                                                                                                                                                         |
| CD     |        | Outer race               | Double outer race with oil holes and groove. One hole counter-bored for locking pin.                                                                                                                                                                       |
| CE     |        | Outer race               | Dimensionally different from basic part number. (Non-interchangeable.)                                                                                                                                                                                     |
| CN     |        | Outer race               | Neoprene cushioned outer race.                                                                                                                                                                                                                             |





## ROLLER BEARINGS

| PREFIX | SUFFIX | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                                                                       |
|--------|--------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CP     |        | Inner race & outer race  | Flash chrome plated. Otherwise, interchangeable with basic part number                                                                                                            |
| CP     |        | Inner race & outer race  | Envelope dimensions same as basic part number, different internal geometry, customized for performance.                                                                           |
| CR     |        | Inner race & outer race  | Ribbed outer race bearing series.                                                                                                                                                 |
| CS     |        | Inner race & outer race  | Dimensionally different from basic part number. (Non-interchangeable.)                                                                                                            |
| CX     |        | Inner race               | Dimensionally different from basic part number. (Non-interchangeable.)                                                                                                            |
| D      |        | Inner race & outer race  | Double inner race or Double outer race. (Non-interchangeable with basic part number.)                                                                                             |
| DA     |        | Inner race               | Double inner race. (Non-interchangeable with inner races having same basic part number.)                                                                                          |
| DA     |        | Outer race               | Spherical O.D. double outer race. (Non-interchangeable with basic part number or other double outer races having same basic numbers.)                                             |
| DB     |        | Outer race               | Double outer race with flange. (Non-interchangeable with basic part number or double outer races having same basic numbers.)                                                      |
| DB     |        | Inner race               | Double inner race assembled with brass cages.                                                                                                                                     |
| DC     |        | Outer race               | Double outer race with hole for locking pin.                                                                                                                                      |
| DD     |        | Inner race & outer Race  | Special long double inner race or outer race. (Non-interchangeable with basic part number or other double parts having same basic numbers.)                                       |
| DE     |        | Inner race & outer race  | Double inner race or double outer race having different dimensions or other characteristics from single and double parts identified with same basic part number.                  |
| DF     |        | Outer race               | Double outer race with oil holes and groove. Snap ring groove on O.D..                                                                                                            |
| DG     |        | Inner race               | Double inner race with pressure removal groove or helical groove in bore.                                                                                                         |
| DGA    |        | Inner race               | Double inner race with pressure removal groove or helical groove in bore. (Non-interchangeable with basic part number.)                                                           |
| DGE    |        | Inner race               | Double inner race with pressure removal groove or helical groove in bore. (Non-interchangeable with basic part number.)                                                           |
| DGH    |        | Inner Race               | Double inner race with pressure removal groove or helical groove in bore and with special cage, rollers, and/or internal geometry.                                                |
| DGW    |        | Inner race               | Double inner race with pressure removal groove or helical groove in bore, and having face slots.                                                                                  |
| DH     |        | Inner race               | Double inner race with special cage, rollers, and/or internal geometry.                                                                                                           |
| DP     |        | Inner race               | Double inner race with puller groove.                                                                                                                                             |
| DR     |        | Outer race               | Double outer race for ribbed outer race series. (Non-interchangeable with single and double outer races identified with same basic part number.)                                  |
| DRB    |        | Outer race               | Double outer race with snap ring groove.                                                                                                                                          |
| DS     |        | Outer race               | Crowned O.D. double outer race. (Non-interchangeable with other outer races having same basic part numbers.)                                                                      |
| DT     |        | Outer race               | Tapered O.D. double outer race. (Non-interchangeable with other outer races having same basic part numbers.)                                                                      |
| DV     |        | Inner race & outer race  | Double inner race or double outer race made of special steel.                                                                                                                     |
| DVH    |        | Inner race               | Double inner race, special steel, and/or internal geometry.                                                                                                                       |
| DW     |        | Inner race & outer race  | Double inner race or double outer race with keyway or slot. (Non-interchangeable with inner races or outer races identified with same basic part numbers.)                        |
| DWA    |        | Inner race               | Double inner race with one end extended and with oil slots in extended end. (Asymmetrical)                                                                                        |
| DWH    |        | Inner race               | Double inner race with oil slots, assembled with special cage, rollers, and/or internal geometry.                                                                                 |
| DWV    |        | Inner race & outer race  | Double inner race or double outer race with keyway or slot. (Non-interchangeable with inner races or outer races identified with same basic part numbers.) Made of special steel. |
| DX     |        | Outer race               | Adaptor for spherical or straight O.D. outer race.                                                                                                                                |
| DX     |        | Outer race               | Threaded O.D. double outer race. (Non-interchangeable with outer races identified with same basic part numbers.)                                                                  |
| DXX    |        | Inner race & outer race  | Double inner race or double outer race made of special steel.                                                                                                                     |
| E      |        | Inner race & outer race  | Inner races or outer races having special characteristics differing from and non-interchangeable with other inner races or outer races identified with the same                   |

| PREFIX | SUFFIX | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                                                                                                |
|--------|--------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |        |                          | basic part numbers.                                                                                                                                                                                        |
| ED     |        | Outer race               | Double outer races. (Non-interchangeable with other outer races identified with same basic part numbers.)                                                                                                  |
| EDC    |        |                          | Outer race Double outer races, special hole in O.D. for locking pin.                                                                                                                                       |
| EE     |        | Inner race               | Large and small ribs - close guided rollers. (Non-interchangeable with other inner races identified with same basic part numbers.)                                                                         |
| EH     |        | Inner race & outer race  | Extra heavy series.                                                                                                                                                                                        |
| EL     |        | Inner race & Outer race  | Extra light series.                                                                                                                                                                                        |
| EX     |        | Inner race & outer race  | Experimental.                                                                                                                                                                                              |
| EXX    |        | Inner race & outer race  | Inner races or outer races having special characteristics differing from and non-interchangeable with other inner races or outer races identified with the same basic part numbers. Made of special steel. |
| F      |        | Inner race               | Assembled with polymer cage.                                                                                                                                                                               |
| FL     |        | Inner race & outer race  | 'Free lateral' series, no large or small ribs.                                                                                                                                                             |
| FX     |        | Inner race & outer race  | Factory identification number only.                                                                                                                                                                        |
| G      |        | Inner race               | Retainer groove in bore.                                                                                                                                                                                   |
| H      |        | Inner race & outer race  | Heavy series. (Non-interchangeable with other inner races and outer races identified with same basic part numbers.)                                                                                        |
| H      |        | Inner race               | Assembled with special cage, rollers, and/or internal geometry.                                                                                                                                            |
| HV     |        | Inner race               | Assembled with special cage, rollers, and/or internal geometry. Made of special steel.                                                                                                                     |
| HH     |        | Inner race & Outer race  | Heavy-Heavy series. (Non-interchangeable with other inner races and outer races identified with same basic part numbers.)                                                                                  |
| HM     |        | Inner race & outer race  | Heavy-Medium series. (Non-interchangeable with other inner races outer races identified with same basic part numbers.)                                                                                     |
| HP     |        | Inner race               | Assembled with special cage and/or roller, different internal geometry. Customized for performance.                                                                                                        |
| HR     |        | Outer race               | Special outer race used in 'Hydra-Rib' bearing.                                                                                                                                                            |
| J      |        | Inner race & outer race  | Used alone or with other prefix letters to indicate metric bore and/or O.D..                                                                                                                               |
| JC     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JD     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JE     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JF     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JG     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JN     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JP     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JR     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JRM    |        | Inner race & outer race  | Metric Series, UNIPAC bearing.                                                                                                                                                                             |
| JS     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JT     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JU     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| JW     |        | Inner race & outer race  | Metric Series.                                                                                                                                                                                             |
| K      |        | Outer race               | Double outer race with heavy section. May have unusual features such as flange, tapered O.D., etc.                                                                                                         |
| K      |        | Inner race & outer race  | Through hardened components, Non-DIN 720 Part Numbers                                                                                                                                                      |
| K      |        | Miscellaneous            | K prefix with 5 or 6 digits following also used for miscellaneous components (seals, bolts, filler rings, etc.)                                                                                            |
| KP     |        | Thrust Bearing           | Cadmium plated.                                                                                                                                                                                            |
| L      |        | Inner race & outer race  | Light series. (Non-interchangeable with other inner races and outer races identified with same basic part numbers.)                                                                                        |
| L      |        | Inner race               | Inner race assembled with Duo-Face seal.                                                                                                                                                                   |
| L      |        | Outer race               | Loose rib. (Part of Unit-Bearing.)                                                                                                                                                                         |





## ROLLER BEARINGS

| PREFIX | SUFFIX           | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                                                                                                             |
|--------|------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | LA               | Inner race               | Inner race assembled with Duo-Face-Plus seal.                                                                                                                                                                           |
|        | LA, LB, LC, etc. | Seal                     | These suffixes are used on a basic Duo-Face-Plus seal number to identify the assembly resulting from the use of the seal with various inner races in the series.                                                        |
|        | LL               | Inner race & outer race  | Light-Light series.                                                                                                                                                                                                     |
|        | LM               | Inner race & outer race  | Light-Medium series.                                                                                                                                                                                                    |
|        | M                | Inner race & outer race  | Medium series.                                                                                                                                                                                                          |
|        | M                | Inner race & outer race  | Through hardened components, DIN 720 Part Numbers, IsoClass Part Numbers                                                                                                                                                |
|        | N                | Inner race               | Bock or Gilliam type bearings.                                                                                                                                                                                          |
|        | NA               | Inner race               | Two inner races mated with double outer race to form double row non-adjustable bearing. (Non-interchangeable with other inner races having same basic part numbers which may vary in bore, O.D., and width dimensions.) |
|        | NA               | Outer race               | Etched electric pencil on double outer races mated with two 'NA' type single inner races to form double row non-adjustable bearings.                                                                                    |
|        | NAV              | Inner race               | 'NA' inner race made of special steel.                                                                                                                                                                                  |
|        | NC               | Outer race               | Cushioned outer race (usually neoprene.)                                                                                                                                                                                |
|        | NI               | Inner race               | Tapered or threaded bore.                                                                                                                                                                                               |
|        | NP               | Inner race & outer race  | Used with random numbers for product differentiation.                                                                                                                                                                   |
|        | NR               | Inner race               | 'NA' type ribless inner race for ribbed outer race series.                                                                                                                                                              |
|        | NW               | Inner race               | 'NA' type inner race with slotted front face.                                                                                                                                                                           |
|        | NWV              | Inner race               | 'NA' type inner race with slotted front face. Made of special steel.                                                                                                                                                    |
|        | NX               | Inner race               | Lapped front face.                                                                                                                                                                                                      |
|        | P                | Inner race               | Puller groove.                                                                                                                                                                                                          |
|        | P                | Inner race & outer race  | Customized for performance.                                                                                                                                                                                             |
|        | R                | Inner race & outer race  | Gilliam replacement series. (Non-interchangeable with other inner races and outer races identified with same basic numbers.)                                                                                            |
|        | R                | Inner race & outer race  | Special feature bearing. (Non-interchangeable with bearings having the same basic part numbers.)                                                                                                                        |
|        | R                | Inner race & outer race  | Bock type bearing.                                                                                                                                                                                                      |
|        | R                | Inner race               | Basic part number with polymer lubricant.                                                                                                                                                                               |
|        | RB               | Outer race               | Snap ring on O.D.                                                                                                                                                                                                       |
|        | RC               | Inner race & outer race  | Special ribbed outer race bearing.                                                                                                                                                                                      |
|        | RN               | Various                  | Used with random numbers, not to exceed six (6) digits, for purchased items that are distributed by Timken.                                                                                                             |
|        | RR               | Inner race & outer race  | 'Relieved race.'                                                                                                                                                                                                        |
|        | S                | Inner race & outer race  | Special feature bearing. (Non-interchangeable with bearings having same basic part numbers.)                                                                                                                            |
|        | SA               | Inner race & outer race  | Special feature bearing. (Non-interchangeable with bearings having same basic part numbers.)                                                                                                                            |
|        | SB               | Inner race               | Assembled with brass cage.                                                                                                                                                                                              |
|        | SB               | Outer race               | Flanged outer race.                                                                                                                                                                                                     |
|        | SC               | Inner race               | With square bore.                                                                                                                                                                                                       |
|        | SD               | Inner race & outer race  | Double inner race with square bore or double outer race.                                                                                                                                                                |
|        | SH               | Inner race               | Special feature bearing, with special cage, rollers, and/or internal geometry. (Non-interchangeable with bearings having same basic part numbers.)                                                                      |
|        | SL               | Thrust bearing           | Basic part number with polymer lubricant.                                                                                                                                                                               |
|        | SR               | Inner race               | Different radius from basic part numbers.                                                                                                                                                                               |
|        | SW               | Inner race & outer race  | Slot or keyway. (Non-interchangeable with bearings having same basic part numbers.)                                                                                                                                     |
|        | SWB              | Inner race               | Slot or keyway assembled with brass cage. (Non-interchangeable with bearings having same basic part numbers.)                                                                                                           |
|        | SWV              | Inner race               | Slot or keyway made of special steel. (Non-interchangeable with bearings having same basic part numbers.)                                                                                                               |

| PREFIX | SUFFIX | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                      |
|--------|--------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|        | SX     | Outer race               | Special feature bearing. (Non-interchangeable with bearings having same basic part numbers.)                                     |
| T      |        | Race                     | Thrust bearing assemblies.                                                                                                       |
| T      |        | Outer race               | Double outer race with heavy section. May have unusual feature such as flange, tapered O.D., etc.                                |
|        | T      | Inner race               | Tapered bore.                                                                                                                    |
|        | T      | Outer race               | Tapered O.D.                                                                                                                     |
|        | TA     | Inner race               | Tapered bore 'NA' type inner race.                                                                                               |
|        | TA     | Outer race               | Tapered O.D.                                                                                                                     |
|        | TB     | Inner race               | Tapered bore inner race with brass cage.                                                                                         |
| TC     |        | Race                     | Thrust bearing assembly.                                                                                                         |
|        | TC     | Inner race               | Tapered bore.                                                                                                                    |
|        | TD     | Inner race               | Double with tapered bore.                                                                                                        |
|        | TDB    | Inner race               | Double with tapered bore, assembled with brass cages.                                                                            |
|        | TDE    | Inner race               | Double with tapered bore and extended rib.                                                                                       |
|        | TDG    | Inner race               | Double with tapered bore, pressure removal groove or spiral groove in bore.                                                      |
|        | TDGV   | Inner race               | Double with tapered bore, pressure removal groove or spiral groove in bore. Made of special steel.                               |
|        | TDH    | Inner race               | Double with tapered bore, special cage, rollers or internal geometry.                                                            |
|        | TDL    | Inner race               | Double with tapered bore, interlock feature.                                                                                     |
|        | TDV    | Inner race               | Double with tapered bore. Made of special steel.                                                                                 |
|        | TDW    | Inner race               | Double with tapered bore and slots or keys.                                                                                      |
|        | TDXX   | Inner race               | Double with tapered bore. Made of special steel.                                                                                 |
|        | TE     | Inner race               | Single, tapered bore, extended large rib.                                                                                        |
|        | TEV    | Inner race               | Single, tapered bore, extended large rib. Made of special steel.                                                                 |
|        | TL     | Inner race               | Tapered bore with interlock feature.                                                                                             |
|        | TLE    | Inner race               | Tapered bore with interlock feature and extended rib.                                                                            |
|        | TP     | Inner race               | Tapered bore inner race with puller groove.                                                                                      |
|        | TPE    | Inner race               | Tapered bore inner race with puller groove, extended inner race large rib.                                                       |
|        | TV     | Inner race & outer race  | Tapered bore inner race or outer race O.D. Made of special steel.                                                                |
|        | TW     | Inner race & outer race  | Tapered bore inner race or outer race O.D. with slots or keys.                                                                   |
|        | TWE    | Inner race & outer race  | Tapered bore inner race or outer race O.D. with locking keyway in front face, extended inner race large rib or outer race width. |
|        | TXX    | Inner race               | Tapered bore. Made of special steel.                                                                                             |
| U      |        | Inner race & outer race  | Basic series part number, unitized, self-contained.                                                                              |
|        | U      | Inner race & outer race  | Basic series part number, unitized, self-contained.                                                                              |
|        | US     | Inner race & outer race  | Special close stand.                                                                                                             |
| V      |        | Inner race & outer race  | Special close stand.                                                                                                             |
|        | V      | Inner race & outer race  | Made of special steel.                                                                                                           |
|        | VC     | Inner race               | Special internal geometry. Made of special steel.                                                                                |
|        | VH     | Inner race               | Special cage, rollers, and/or internal geometry. Made of special steel.                                                          |
|        | W      | Inner race & outer race  | Slot(s) or keyway(s).                                                                                                            |
|        | W      | Thrust Bearing           | Oil holes in retainer.                                                                                                           |
|        | WA     | Inner race & outer race  | Slot(s) or keyway(s).                                                                                                            |
|        | WB     | Inner race               | Slot(s) or keyway(s) with brass cage.                                                                                            |
|        | WC     | Inner race & outer race  | Slot(s) or keyway(s).                                                                                                            |
|        | WD     | Inner race & outer race  | Double inner race or outer race with slot(s) or keyway(s).                                                                       |
|        | WE     | Inner race & outer race  | Extended face with slot(s) or keyway(s).                                                                                         |
|        | WS     | Inner race & outer race  | Slot(s) or keyway(s).                                                                                                            |
| WV     |        | Inner race & Outer race  | Slot(s) or keyway(s). Made of special steel.                                                                                     |





## ROLLER BEARINGS

| PREFIX | SUFFIX | INNER RACE OR OUTER RACE | EXPLANATION                                                                                                                     |
|--------|--------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
|        | WXX    | Inner race & Outer race  | Slot(s) or keyway(s). Made of special steel.                                                                                    |
| X      |        | Inner race               | ISO part number.                                                                                                                |
|        | X      | Inner race               | Slot(s) or keyway(s).                                                                                                           |
|        | X      | Inner race & Outer race  | Special feature bearing. (Non-interchangeable with bearings having the same basic part number.)                                 |
|        | X      | Inner race & Outer race  | ISO bearing with same boundary dimensions as basic part number but with different internal geometry, yielding increased rating. |
|        | XA     | Inner race & Outer race  | Special feature bearing. (Non-interchangeable with bearings having the same basic part number.)                                 |
|        | XAA    | Inner race               | ISO single inner race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | XAB    | Inner race               | ISO single inner race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | XB     | Inner race               | Different bore, width, or radius, from basic part number. Assembled with brass cage.                                            |
|        | XB     | Outer race               | Special feature flanged outer race. (Non-interchangeable with bearings having the same basic part number.)                      |
|        | XC     | Inner race & Outer race  | Limited production bearings to which standard series part numbers have not been assigned.                                       |
|        | XD     | Outer race               | Double outer race, no oil holes or groove.                                                                                      |
|        | XD     | Inner race               | Double inner race, different bore or width from basic part numbers.                                                             |
|        | XD     | Inner race               | Double inner race, oil holes in large rib.                                                                                      |
|        | XDXP   | Outer race               | Double outer race, no oil holes or groove, special material and process.                                                        |
|        | XE     | Outer race               | Different bore, width, or radius from basic part number.                                                                        |
|        | XGA    | Inner race               | ISO single inner race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | XGB    | Inner race               | ISO single inner race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | XP     | Inner race               | Special steel and process.                                                                                                      |
|        | XR     | Inner race & Outer race  | Crossed roller bearings.                                                                                                        |
|        | XS     | Inner race & Outer race  | Different bore, O.D., width, or radius from basic part number.                                                                  |
|        | XV     | Inner race & Outer race  | Special feature inner race or outer race made of special steel.                                                                 |
|        | XW     | Inner race               | Slotted.                                                                                                                        |
|        | XX     | Inner race & Outer race  | Single inner race or single outer race. Made of special steel.                                                                  |
|        | Y      | Outer race               | ISO part number.                                                                                                                |
|        | YD     | Outer race               | Double outer race with oil holes, no groove.                                                                                    |
|        | YDA    | Outer race               | Double outer race with oil holes, no groove. (Non-interchangeable with bearings having the same basic part number.)             |
|        | YDV    | Outer race               | Double outer race with oil holes, no groove. made of special steel.                                                             |
|        | YDW    | Inner race               | Double outer race with oil holes, no groove. Slot(s) or keyway(s) in face(s).                                                   |
|        | YKA    | Outer race               | ISO single outer race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | YKB    | Outer race               | ISO single outer race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | YSA    | Outer race               | ISO single outer race. (Non-interchangeable with bearings having the same basic part number.)                                   |
|        | Z      | Inner race & Outer race  | Close stand part.                                                                                                               |

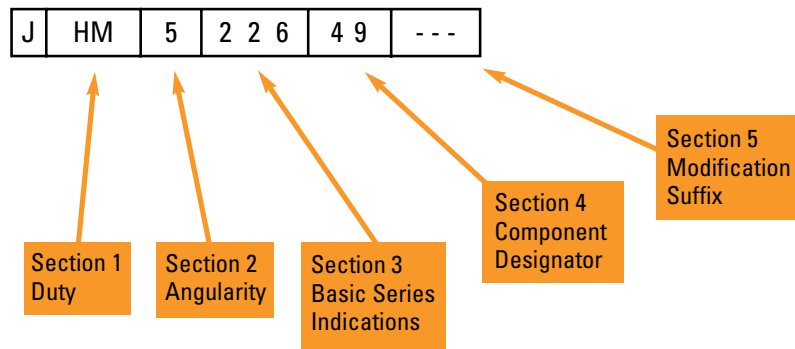
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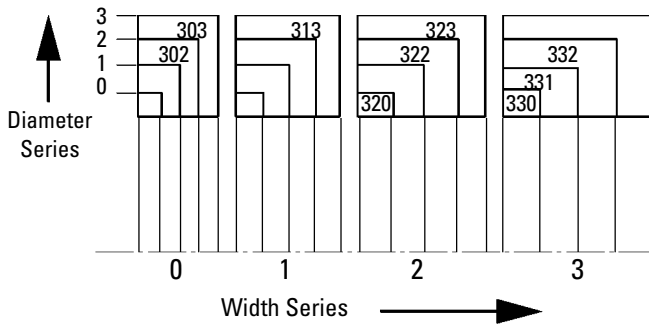
## METRIC PART NUMBERING SYSTEMS

### J-LINE PART NUMBERS

The “J” prefix letter is used in conjunction with the ABMA part numbering system to identify metric dimensioned and toleranced inner race and outer races. The bearing series designation does not contain the prefix letter “J”. J-Line bearings are referred to as inch bearings in metric bore, O.D. and width.



### ISO PART NUMBERING SYSTEM



The original metric part numbering system for tapered roller bearings was based on the ISO 15 dimensional plan for radial bearings. A 5-digit part number commencing with numeral 3 describes the bearing assembly (inner race and outer races).

#### Section 1 - Symbol for bearing type

3 always applies to tapered roller bearings.

#### Section 2 - Width series

The bearing width is classified from 0 to 3 in increasing order of width.

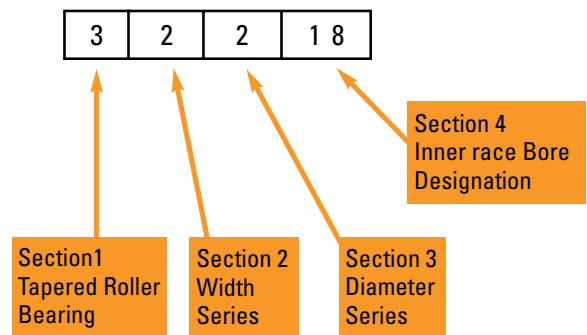
#### Section 3 - Diameter series

The bearing section height is classified from 0 through 3 in increasing order of O.D. for a given bore size.

#### Section 4 - Inner race bore designation

The 2 last digits relate to the inner race bore diameter that can be calculated by multiplying the number indicated by 5, if the bore diameter is between 20 and 500 mm. For example, bearing

32218 has a 90 mm bore. If the bore diameter is less than 20 mm, the last two digits can interpreted as follows: 00=10 mm, 01=12 mm, 02=15 mm and 03=17 mm. If the bore diameter is greater than 500 mm, then the last 3 digits (preceded by a slash) correspond to the bore size.



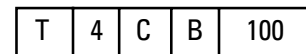
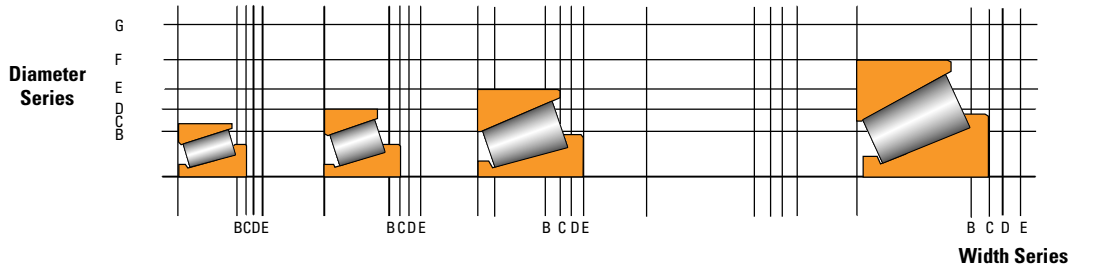


# ROLLER BEARINGS

## NEW ISO 355 PART NUMBERING SYSTEM

Finding that tapered roller bearings did not conform to the ISO 15 general plan, because dimensions given were not found to be optimal, the ISO introduced a new numbering system for tapered roller bearings in ISO 355. This system uses 3 alpha-numeric fields to define the bearing series. The bearing part number is then

defined by adding the inner race diameter in mm after the bearing series. Although all original metric part numbers were assigned a new designation in the ISO 355 plan, the original part number is still used.



Symbol for tapered roller bearings (optional)

| Angle Series Designation | a                       |         |
|--------------------------|-------------------------|---------|
|                          | over                    | incl.   |
| 1                        | Reserved for future use |         |
| 2                        | 10°                     | 13° 52' |
| 3                        | 13° 52'                 | 15° 59' |
| 4                        | 15° 59'                 | 18° 55' |
| 5                        | 18° 55'                 | 23°     |
| 6                        | 23°                     | 27°     |
| 7                        | 27°                     | 30°     |

| Diameter Series Designation | $\frac{D}{d^{0.77}}$    |       |
|-----------------------------|-------------------------|-------|
|                             | over                    | incl. |
| A                           | Reserved for future use |       |
| B                           | 3.40                    | 3.80  |
| C                           | 3.80                    | 4.40  |
| D                           | 4.40                    | 4.70  |
| E                           | 4.70                    | 5.00  |
| F                           | 5.00                    | 5.60  |
| G                           | 5.60                    | 7.00  |

| Width Series Designation | $\frac{T}{(D - d)^{0.95}}$ |       |
|--------------------------|----------------------------|-------|
|                          | over                       | incl. |
| A                        | Reserved for future use    |       |
| B                        | 0.50                       | 0.68  |
| C                        | 0.68                       | 0.80  |
| D                        | 0.80                       | 0.88  |
| E                        | 0.88                       | 1.00  |

Bearing bore diameter (mm)

**“NEW” METRIC BEARINGS**

A new range of metric bearings were also included in the ISO 355 plan. These new bearings are specifically application oriented and are designed for optimum performance.

To easily identify these part numbers against the application type, The Timken Company introduced an alpha-numeric part number designation. The part number construction is similar to that of J-Line part numbers and separate numbers are assigned to both inner race and outer races.

**J-prefix**

All of the new metric bearings are identified with a J-prefix that indicates a new metric dimensioned and toleranced bearing.

**Section 1 - Duty**

Indicates application type:

C, D & F = general purpose

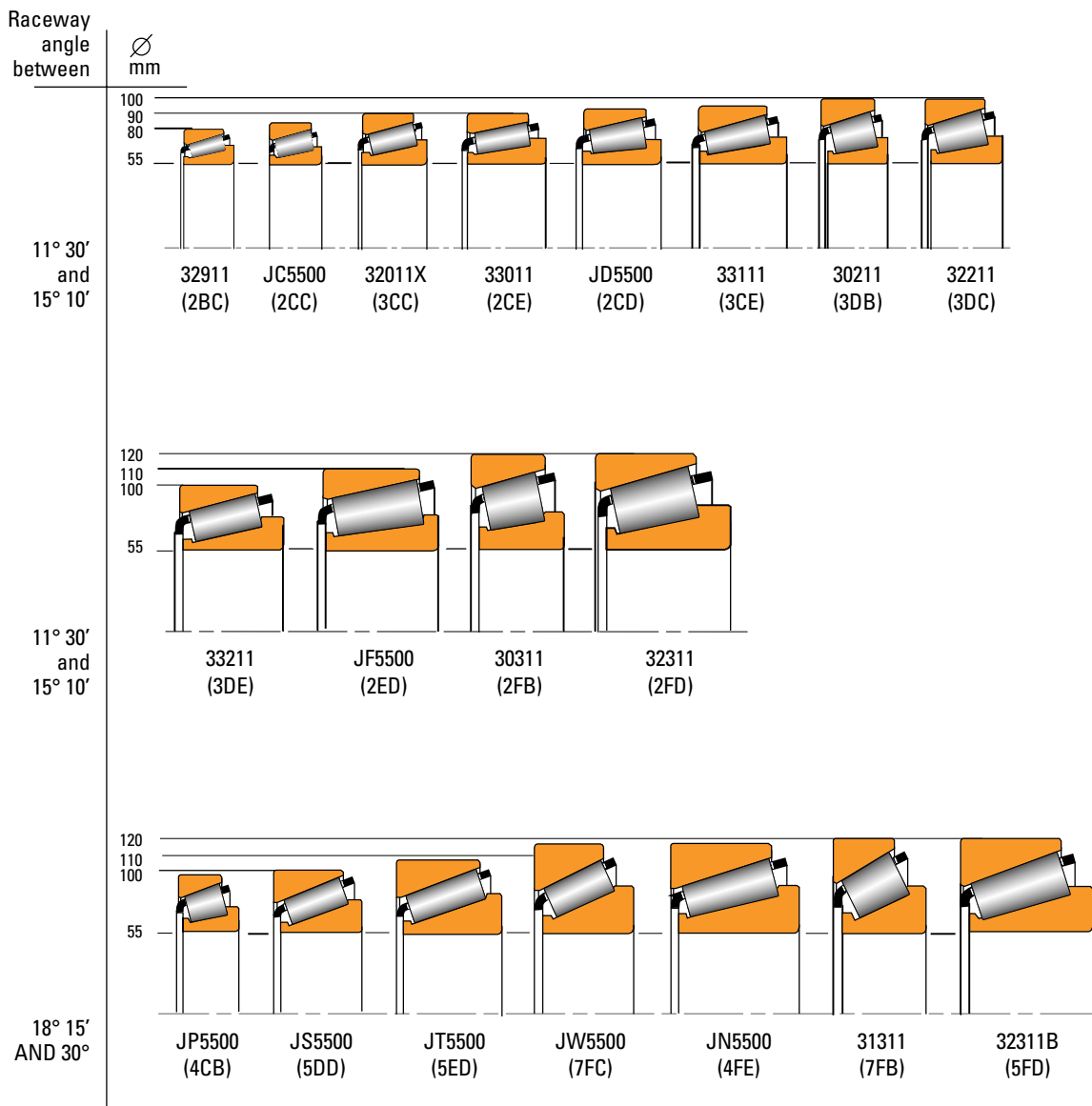
N = combination of general purpose and pinion

P = high speed

S and T = pinions

W = high axial loads

**COMPARISON TABLE: INCREASE IN SECTION FOR A 55 MM BORE BEARING**





# ROLLER BEARINGS

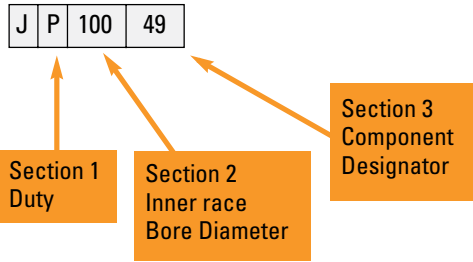
## Section 2 - Inner race Bore

The inner race bore metric diameter is included in the part number designation of both the inner race and outer races.

## Section 3 - Component Designator

Same identification as in the ABMA part numbering system.

For further explanation of prefix and suffix symbols, or proprietary part numbers of special bearings, consult your Timken sales representative.



## OPTIMUM BEARING SELECTION: ISO 355

ISO 355 offers many application-specific bearing selection options for a given bore. Depending on application and type of load, thrust and/or radial, the bearing with the optimum angle and section can be selected. For example, pinion bearings have a steep angle, whereas bearings for machine tools are generally designed with a shallow angle and a light-section. The previous table demonstrates this feature for 55 mm bore bearings.

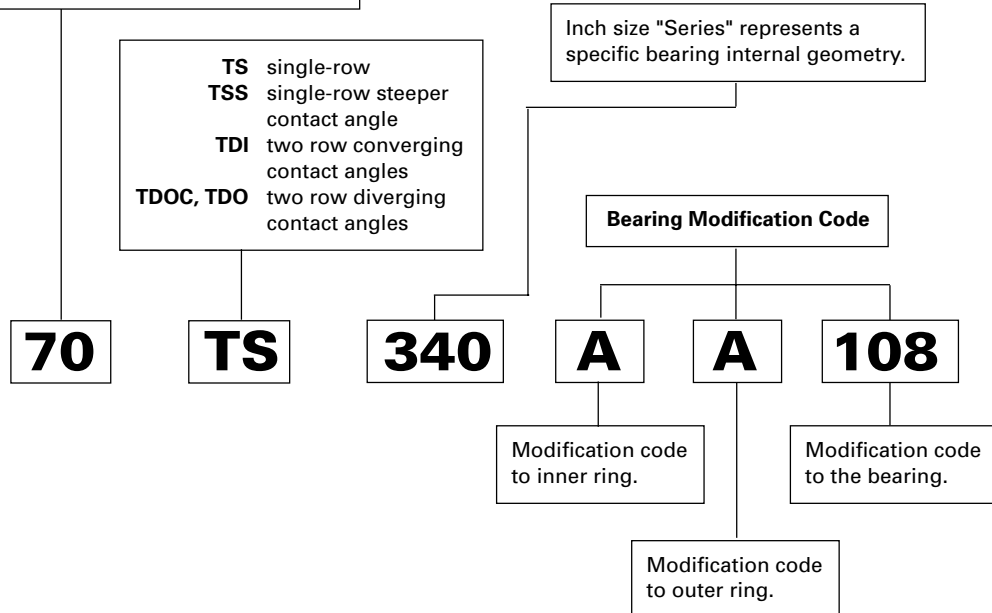
## BEARING ASSEMBLY NUMBERS

Multiple-row bearings and matched bearing assemblies are assigned a 5-digit alpha-numeric code, in combination with the inner race part number to describe the individual component parts, inspection level and the adjustment value of pre-set assemblies: e.g., LM48548-9K2A7.

An assembly number is assigned on receipt of the first order for new applications. It is very important for correct function of the bearing in a given application that the same assembly number is quoted for all subsequent orders. The Timken Company should be consulted if additional information is required on the assembly number.

## Radial Tapered Roller Bearings - Torrington

Two or three-digit size indication.  
The number is read as an actual bore (i.e., 70 is 7.0 in.) or approximate bore i.e., 83 is 8.375 in.).

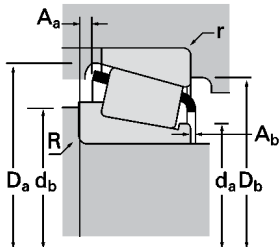
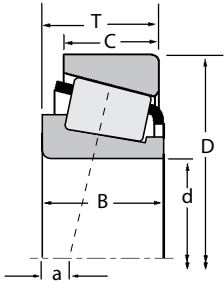






# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |         |         |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|---------|---------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> | Static  | Inner   | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |         |         |       |
| 7.938<br>0.3125         | 31.991<br>1.2595 | 10.008<br>0.3940 | 10600<br>2380          | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070           |             |                        | A2031   | A2126   |       |
| 9.525<br>0.3750         | 31.991<br>1.2595 | 10.008<br>0.3940 | 10600<br>2380          | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070           |             |                        | A2037   | A2126   |       |
| 11.112<br>0.4375        | 34.988<br>1.3775 | 10.998<br>0.4330 | 12200<br>2740          | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580          |             |                        | A4044   | A4138   |       |
| 11.987<br>0.4719        | 31.991<br>1.2595 | 10.008<br>0.3940 | 10600<br>2380          | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070           |             |                        | A2047   | A2126   |       |
| 12.680<br>0.4992        | 34.988<br>1.3775 | 10.998<br>0.4330 | 12200<br>2740          | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580          |             |                        | A4049   | A4138   |       |
| 12.700<br>0.5000        | 34.988<br>1.3775 | 10.998<br>0.4330 | 12200<br>2740          | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580          |             |                        | A4050   | A4138   |       |
| 12.700<br>0.5000        | 38.100<br>1.5000 | 13.495<br>0.5313 | 19300<br>4340          | 0.28 | 2.18 | 5010<br>1130           | 2360<br>531      | 2.12 | 17100<br>3840          |             |                        | 00050   | 00150   |       |
| 14.987<br>0.5901        | 34.988<br>1.3775 | 10.998<br>0.4330 | 12200<br>2740          | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580          |             |                        | A4059   | A4138   |       |
| 15.875<br>0.6250        | 34.988<br>1.3775 | 10.998<br>0.4330 | 14100<br>3160          | 0.32 | 1.88 | 3650<br>820            | 1990<br>447      | 1.83 | 13900<br>3130          |             |                        | L21549  | L21511  |       |
| 15.875<br>0.6250        | 39.992<br>1.5745 | 12.014<br>0.4730 | 12400<br>2790          | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770          |             |                        | A6062   | A6157   |       |
| 15.875<br>0.6250        | 41.275<br>1.6250 | 14.288<br>0.5625 | 22200<br>5000          | 0.31 | 1.93 | 5770<br>1300           | 3070<br>690      | 1.88 | 21300<br>4780          |             |                        | 03062   | 03162   |       |
| 15.875<br>0.6250        | 42.862<br>1.6875 | 14.288<br>0.5625 | 17400<br>3910          | 0.70 | 0.85 | 4510<br>1010           | 5430<br>1220     | 0.83 | 17400<br>3920          |             |                        | 11590   | 11520   |       |
| 15.875<br>0.6250        | 42.862<br>1.6875 | 16.670<br>0.6563 | 29100<br>6540          | 0.33 | 1.81 | 7550<br>1700           | 4280<br>962      | 1.76 | 29200<br>6560          |             |                        | 17580   | 17520   |       |
| 15.875<br>0.6250        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          |             |                        | 05062   | 05185   |       |
| 15.875<br>0.6250        | 49.225<br>1.9380 | 19.845<br>0.7813 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          |             |                        | 09062   | 09195   |       |
| 15.875<br>0.6250        | 49.225<br>1.9380 | 23.020<br>0.9063 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          |             |                        | 09062   | 09194   |       |
| 15.875<br>0.6250        | 53.975<br>2.1250 | 22.225<br>0.8750 | 43000<br>9670          | 0.59 | 1.02 | 11200<br>2510          | 11300<br>2540    | 0.99 | 42500<br>9560          |             |                        | 21063   | 21212   |       |
| 15.987<br>0.6294        | 46.975<br>1.8494 | 21.000<br>0.8268 | 37100<br>8350          | 0.55 | 1.10 | 9630<br>2170           | 9000<br>2020     | 1.07 | 39300<br>8840          |             |                        | HM81649 | HM81610 |       |
| 16.993<br>0.6690        | 39.982<br>1.5741 | 12.014<br>0.4730 | 12400<br>2790          | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770          |             |                        | A6067   | A6157A  |       |
| 16.993<br>0.6690        | 39.992<br>1.5745 | 12.014<br>0.4730 | 12400<br>2790          | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770          |             |                        | A6067   | A6157   |       |
| 16.993<br>0.6690        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          |             |                        | 05066   | 05185   |       |
| 17.455<br>0.6872        | 36.525<br>1.4380 | 11.112<br>0.4375 | 12100<br>2720          | 0.49 | 1.23 | 3130<br>704            | 2610<br>587      | 1.20 | 11600<br>2600          |             |                        | A5069   | A5144   |       |
| 17.462<br>0.6875        | 39.878<br>1.5700 | 13.843<br>0.5450 | 22900<br>5160          | 0.29 | 2.10 | 5950<br>1340           | 2910<br>655      | 2.04 | 23400<br>5260          |             |                        | LM11749 | LM11710 |       |
| 17.462<br>0.6875        | 44.450<br>1.7500 | 12.700<br>0.5000 | 19900<br>4460          | 0.48 | 1.25 | 5150<br>1160           | 4220<br>950      | 1.22 | 20600<br>4640          |             |                        | 4C      | 6       |       |
| 17.462<br>0.6875        | 44.450<br>1.7500 | 15.494<br>0.6100 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          |             |                        | 05068   | 05175   |       |
| 17.987<br>0.7082        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          |             |                        | 05070XS | 05185-S |       |
| 18.000<br>0.7087        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          |             |                        | 05070X  | 05185-S |       |
| 19.004<br>0.7482        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         |             |                        | 1774    | 1729    |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 0.5<br>0.02                | 12.5<br>0.49                      | 13.0<br>0.51             | 1.3<br>0.05                         | 29.0<br>1.14   | 26.0<br>1.02   | -0.20<br>-0.01 | 1.40<br>0.06   | 1.7            | 3.17           | 0.0308         | 0.05<br>0.10        |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 1.3<br>0.05                | 13.5<br>0.53                      | 15.0<br>0.59             | 1.3<br>0.05                         | 29.0<br>1.14   | 26.0<br>1.02   | -0.20<br>-0.01 | 1.40<br>0.06   | 1.7            | 3.17           | 0.0308         | 0.04<br>0.10        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 1.3<br>0.05                | 15.5<br>0.61                      | 17.5<br>0.69             | 1.3<br>0.05                         | 32.0<br>1.26   | 29.0<br>1.14   | 0.10<br>0.00   | 1.10<br>0.04   | 2.3            | 4.12           | 0.0355         | 0.06<br>0.13        |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 0.8<br>0.03                | 15.5<br>0.61                      | 16.5<br>0.65             | 1.3<br>0.05                         | 29.0<br>1.14   | 26.0<br>1.02   | -0.20<br>-0.01 | 1.40<br>0.06   | 1.7            | 3.17           | 0.0308         | 0.04<br>0.09        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 0.8<br>0.03                | 17.5<br>0.69                      | 17.5<br>0.69             | 1.3<br>0.05                         | 32.0<br>1.26   | 29.0<br>1.14   | 0.10<br>0.00   | 1.10<br>0.04   | 2.3            | 4.12           | 0.0355         | 0.05<br>0.12        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 1.3<br>0.05                | 17.0<br>0.67                      | 18.5<br>0.73             | 1.3<br>0.05                         | 32.0<br>1.26   | 29.0<br>1.14   | 0.10<br>0.00   | 1.10<br>0.04   | 2.3            | 4.12           | 0.0355         | 0.05<br>0.12        |
| 14.072<br>0.5540 | 11.112<br>0.4375 | -5.1<br>-0.20    | 1.5<br>0.06                | 16.5<br>0.65                      | 19.0<br>0.75             | 0.8<br>0.03                         | 34.0<br>1.34   | 33.0<br>1.30   | -0.40<br>-0.02 | 1.30<br>0.05   | 3.1            | 2.92           | 0.0330         | 0.08<br>0.18        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 0.8<br>0.03                | 19.0<br>0.75                      | 19.5<br>0.77             | 1.3<br>0.05                         | 32.0<br>1.26   | 29.0<br>1.14   | 0.10<br>0.00   | 1.10<br>0.04   | 2.3            | 4.12           | 0.0355         | 0.05<br>0.11        |
| 10.988<br>0.4330 | 8.712<br>0.3430  | -3.3<br>-0.13    | 1.3<br>0.05                | 19.5<br>0.77                      | 21.5<br>0.85             | 1.3<br>0.05                         | 32.5<br>1.28   | 29.0<br>1.14   | -0.30<br>-0.01 | 1.30<br>0.05   | 3              | 5.36           | 0.0348         | 0.05<br>0.11        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 1.3<br>0.05                | 20.5<br>0.81                      | 22.0<br>0.87             | 1.3<br>0.05                         | 37.0<br>1.46   | 34.0<br>1.34   | 0.50<br>0.02   | 1.60<br>0.06   | 2.9            | 5.64           | 0.0404         | 0.07<br>0.16        |
| 14.681<br>0.5780 | 11.112<br>0.4375 | -5.1<br>-0.20    | 1.3<br>0.05                | 20.0<br>0.79                      | 21.5<br>0.85             | 2.0<br>0.08                         | 37.5<br>1.48   | 34.0<br>1.34   | 0.40<br>0.02   | 1.30<br>0.05   | 4.2            | 4.01           | 0.0384         | 0.09<br>0.21        |
| 14.288<br>0.5625 | 9.525<br>0.3750  | -1.3<br>-0.05    | 1.5<br>0.06                | 22.5<br>0.89                      | 24.5<br>0.96             | 1.5<br>0.06                         | 39.5<br>1.56   | 34.5<br>1.36   | 1.50<br>0.06   | 0.60<br>0.02   | 3.4            | 4.63           | 0.0465         | 0.10<br>0.22        |
| 16.670<br>0.6563 | 13.495<br>0.5313 | -5.8<br>-0.23    | 1.5<br>0.06                | 21.0<br>0.83                      | 23.0<br>0.91             | 1.5<br>0.06                         | 39.0<br>1.54   | 36.5<br>1.44   | 0.40<br>0.02   | 1.90<br>0.08   | 5.3            | 4.53           | 0.0423         | 0.12<br>0.27        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 21.0<br>0.83                      | 23.5<br>0.93             | 1.3<br>0.05                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.13<br>0.29        |
| 21.539<br>0.8480 | 14.288<br>0.5625 | -9.1<br>-0.36    | 0.8<br>0.03                | 21.5<br>0.85                      | 22.0<br>0.87             | 1.3<br>0.05                         | 44.5<br>1.75   | 42.0<br>1.65   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.20<br>0.44        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 0.8<br>0.03                | 21.5<br>0.85                      | 22.0<br>0.87             | 3.5<br>0.14                         | 44.5<br>1.75   | 39.0<br>1.54   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.21<br>0.47        |
| 21.839<br>0.8598 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 26.0<br>1.03                      | 29.0<br>1.14             | 2.3<br>0.09                         | 50.0<br>1.97   | 43.0<br>1.69   | *<br>*         | *<br>*         | 7              | 4.14           | 0.0558         | 0.26<br>0.57        |
| 21.000<br>0.8268 | 16.000<br>0.6299 | -6.1<br>-0.24    | 1.0<br>0.04                | 23.0<br>0.90                      | 27.5<br>1.08             | 2.0<br>0.08                         | 43.0<br>1.69   | 37.5<br>1.48   | 1.40<br>0.06   | 1.30<br>0.05   | 6.1            | 4.57           | 0.0526         | 0.19<br>0.42        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 0.8<br>0.03                | 21.0<br>0.83                      | 22.0<br>0.87             | 1.3<br>0.05                         | 36.5<br>1.44   | 34.0<br>1.34   | 0.50<br>0.02   | 1.60<br>0.06   | 2.9            | 5.64           | 0.0404         | 0.07<br>0.16        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 0.8<br>0.03                | 21.0<br>0.83                      | 22.0<br>0.87             | 1.3<br>0.05                         | 37.0<br>1.46   | 34.0<br>1.34   | 0.50<br>0.02   | 1.60<br>0.06   | 2.9            | 5.64           | 0.0404         | 0.07<br>0.16        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 22.0<br>0.87                      | 24.5<br>0.96             | 1.3<br>0.05                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.13<br>0.28        |
| 11.112<br>0.4375 | 7.938<br>0.3125  | -2.0<br>-0.08    | 1.5<br>0.06                | 21.5<br>0.84                      | 23.5<br>0.93             | 1.5<br>0.06                         | 33.5<br>1.32   | 30.0<br>1.18   | 0.00<br>0.00   | 1.30<br>0.05   | 2.5            | 4.61           | 0.0376         | 0.05<br>0.11        |
| 14.605<br>0.5750 | 10.668<br>0.4200 | -5.1<br>-0.20    | 1.3<br>0.05                | 22.0<br>0.87                      | 23.5<br>0.93             | 1.3<br>0.05                         | 37.0<br>1.46   | 34.0<br>1.34   | 0.40<br>0.02   | 0.70<br>0.03   | 4.8            | 4.74           | 0.0392         | 0.08<br>0.18        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -1.8<br>-0.07    | 1.5<br>0.06                | 22.0<br>0.87                      | 24.5<br>0.96             | 1.5<br>0.06                         | 41.0<br>1.61   | 38.0<br>1.50   | 0.80<br>0.03   | 1.60<br>0.06   | 4.6            | 2.61           | 0.0456         | 0.10<br>0.21        |
| 14.381<br>0.5662 | 11.430<br>0.4500 | -4.1<br>-0.16    | 0.8<br>0.03                | 22.5<br>0.89                      | 23.0<br>0.91             | 1.5<br>0.06                         | 42.0<br>1.65   | 38.0<br>1.50   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.25        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 2.0<br>0.08                | 22.5<br>0.89                      | 26.0<br>1.02             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.27        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 22.5<br>0.89                      | 25.0<br>0.98             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.13<br>0.28        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.5<br>0.06                | 25.0<br>0.98                      | 27.0<br>1.06             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | *<br>*         | *<br>*         | 10.6           | 5.39           | 0.0521         | 0.27<br>0.59        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

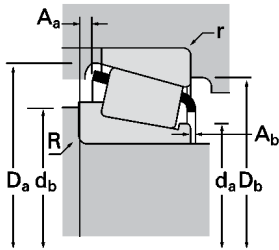
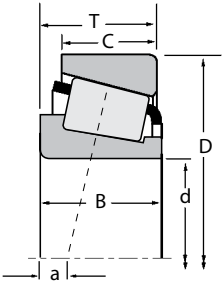




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 19.004<br>0.7482        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1774        | 1729X                  |  |                |       |       |
| 19.050<br>0.7500        | 39.992<br>1.5745 | 12.014<br>0.4730 | 12400<br>2790          | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770          | A6075       | A6157                  |  |                |       |       |
| 19.050<br>0.7500        | 41.275<br>1.6250 | 11.905<br>0.4687 | 12400<br>2790          | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770          | A6075       | A6162                  |  |                |       |       |
| 19.050<br>0.7500        | 44.450<br>1.7500 | 12.700<br>0.5000 | 19900<br>4460          | 0.48 | 1.25 | 5150<br>1160           | 4220<br>950      | 1.22 | 20600<br>4640          | 4A          | 6                      |  |                |       |       |
| 19.050<br>0.7500        | 45.237<br>1.7810 | 15.494<br>0.6100 | 30600<br>6870          | 0.30 | 2.00 | 7930<br>1780           | 4080<br>917      | 1.94 | 32000<br>7200          | LM11949     | LM11910                |  |                |       |       |
| 19.050<br>0.7500        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05075       | 05185                  |  |                |       |       |
| 19.050<br>0.7500        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05075X      | 05185-S                |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 18.034<br>0.7100 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09067       | 09195                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 19.845<br>0.7813 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09074       | 09195                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 19.845<br>0.7813 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09078       | 09195                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 21.209<br>0.8350 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09067       | 09194                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 21.209<br>0.8350 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09067       | 09196                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 23.020<br>0.9063 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09074       | 09194                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 23.020<br>0.9063 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09074       | 09196                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 23.020<br>0.9063 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09078       | 09194                  |  |                |       |       |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 23.020<br>0.9063 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09078       | 09196                  |  |                |       |       |
| 19.050<br>0.7500        | 50.800<br>2.0000 | 20.638<br>0.8125 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09074       | 09201                  |  |                |       |       |
| 19.050<br>0.7500        | 52.800<br>2.0787 | 18.034<br>0.7100 | 30600<br>6870          | 0.30 | 2.00 | 7930<br>1780           | 4080<br>917      | 1.94 | 32000<br>7200          | LM11949     | LM11919                |  |                |       |       |
| 19.050<br>0.7500        | 52.883<br>2.0820 | 18.430<br>0.7256 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09067       | 09194-S                |  |                |       |       |
| 19.050<br>0.7500        | 52.883<br>2.0820 | 20.241<br>0.7969 | 39700<br>8920          | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100          | 09074       | 09194-S                |  |                |       |       |
| 19.050<br>0.7500        | 53.975<br>2.1250 | 22.225<br>0.8750 | 43000<br>9670          | 0.59 | 1.02 | 11200<br>2510          | 11300<br>2540    | 0.99 | 42500<br>9560          | 21075       | 21212                  |  |                |       |       |
| 19.050<br>0.7500        | 53.975<br>2.1250 | 22.225<br>0.8750 | 43000<br>9670          | 0.59 | 1.02 | 11200<br>2510          | 11300<br>2540    | 0.99 | 42500<br>9560          | 21075       | 21213                  |  |                |       |       |
| 19.050<br>0.7500        | 53.975<br>2.1250 | 22.225<br>0.8750 | 43000<br>9670          | 0.59 | 1.02 | 11200<br>2510          | 11300<br>2540    | 0.99 | 42500<br>9560          | 21075A      | 21212                  |  |                |       |       |
| 19.050<br>0.7500        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1775        | 1729                   |  |                |       |       |
| 19.987<br>0.7869        | 46.982<br>1.8497 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05079       | 05185A                 |  |                |       |       |
| 19.987<br>0.7869        | 46.990<br>1.8500 | 15.250<br>0.6004 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05079       | 05186                  |  |                |       |       |
| 19.987<br>0.7869        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05079       | 05185                  |  |                |       |       |
| 19.987<br>0.7869        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560          | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720          | 05079       | 05185-S                |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.5<br>0.06                | 25.0<br>0.98                      | 27.0<br>1.06             | 1.5<br>0.06                         | 51.0<br>2.01   | 49.0<br>1.93   | *<br>*         | *<br>*         | 10.6           | 5.39           | 0.0521         | 0.27<br>0.59        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 1.0<br>0.04                | 23.0<br>0.91                      | 24.0<br>0.94             | 1.3<br>0.05                         | 37.0<br>1.46   | 34.0<br>1.34   | 0.50<br>0.02   | 1.60<br>0.06   | 2.9            | 5.64           | 0.0404         | 0.07<br>0.14        |
| 11.153<br>0.4391 | 8.730<br>0.3437  | -1.5<br>-0.06    | 1.0<br>0.04                | 23.0<br>0.91                      | 24.0<br>0.94             | 1.3<br>0.05                         | 37.0<br>1.46   | 34.5<br>1.36   | 0.50<br>0.02   | 1.60<br>0.06   | 2.9            | 5.64           | 0.0404         | 0.07<br>0.15        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -1.8<br>-0.07    | 1.5<br>0.06                | 23.5<br>0.93                      | 25.5<br>1.00             | 1.5<br>0.06                         | 41.0<br>1.61   | 38.0<br>1.50   | 0.80<br>0.03   | 1.60<br>0.06   | 4.6            | 2.61           | 0.0456         | 0.09<br>0.20        |
| 16.637<br>0.6550 | 12.065<br>0.4750 | -5.6<br>-0.22    | 1.3<br>0.05                | 23.5<br>0.93                      | 25.0<br>0.98             | 1.3<br>0.05                         | 41.5<br>1.63   | 39.5<br>1.56   | 0.20<br>0.01   | 0.70<br>0.03   | 6.6            | 5.49           | 0.0441         | 0.13<br>0.28        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.3<br>0.05                | 23.5<br>0.93                      | 25.0<br>0.98             | 1.3<br>0.05                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.27        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 23.5<br>0.93                      | 25.5<br>1.00             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.27        |
| 19.050<br>0.7500 | 14.288<br>0.5625 | -7.4<br>-0.29    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 1.3<br>0.05                         | 44.5<br>1.75   | 42.0<br>1.65   | 0.50<br>0.02   | 1.30<br>0.05   | 8              | 4.05           | 0.0452         | 0.17<br>0.39        |
| 21.539<br>0.8480 | 14.288<br>0.5625 | -9.1<br>-0.36    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.0<br>1.02             | 1.3<br>0.05                         | 44.5<br>1.75   | 42.0<br>1.65   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.18<br>0.40        |
| 21.539<br>0.8480 | 14.288<br>0.5625 | -9.1<br>-0.36    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 1.3<br>0.05                         | 44.5<br>1.75   | 42.0<br>1.65   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.18<br>0.41        |
| 19.050<br>0.7500 | 17.462<br>0.6875 | -7.4<br>-0.29    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 3.5<br>0.14                         | 44.5<br>1.75   | 39.0<br>1.54   | 0.50<br>0.02   | 1.30<br>0.05   | 8              | 4.05           | 0.0452         | 0.19<br>0.42        |
| 19.050<br>0.7500 | 17.462<br>0.6875 | -7.4<br>-0.29    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 1.5<br>0.06                         | 44.5<br>1.75   | 41.5<br>1.63   | 0.50<br>0.02   | 1.30<br>0.05   | 8              | 4.05           | 0.0452         | 0.19<br>0.43        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.0<br>1.02             | 3.5<br>0.14                         | 44.5<br>1.75   | 39.0<br>1.54   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.20<br>0.43        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.0<br>1.02             | 1.5<br>0.06                         | 44.5<br>1.75   | 41.5<br>1.63   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.20<br>0.45        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 3.5<br>0.14                         | 44.5<br>1.75   | 39.0<br>1.54   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.20<br>0.44        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 1.5<br>0.06                         | 44.5<br>1.75   | 41.5<br>1.63   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.20<br>0.45        |
| 21.539<br>0.8480 | 17.462<br>0.6875 | -9.1<br>-0.36    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.0<br>1.02             | 0.5<br>0.02                         | 45.5<br>1.79   | 44.0<br>1.73   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.21<br>0.47        |
| 16.637<br>0.6550 | 14.605<br>0.5750 | -5.6<br>-0.22    | 1.3<br>0.05                | 23.5<br>0.93                      | 25.0<br>0.98             | 1.3<br>0.05                         | 45.5<br>1.79   | 42.0<br>1.65   | 0.20<br>0.01   | 0.70<br>0.03   | 6.6            | 5.49           | 0.0441         | 0.20<br>0.44        |
| 19.050<br>0.7500 | 14.684<br>0.5781 | -7.4<br>-0.29    | 1.3<br>0.05                | 24.0<br>0.94                      | 25.5<br>1.00             | 3.3<br>0.13                         | 46.5<br>1.83   | 42.0<br>1.65   | 0.50<br>0.02   | 1.30<br>0.05   | 8              | 4.05           | 0.0452         | 0.21<br>0.45        |
| 21.539<br>0.8480 | 14.684<br>0.5781 | -9.1<br>-0.36    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.0<br>1.02             | 3.3<br>0.13                         | 46.5<br>1.83   | 42.0<br>1.65   | 2.30<br>0.09   | 0.60<br>0.02   | 8              | 4.05           | 0.0452         | 0.21<br>0.47        |
| 21.839<br>0.8598 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 26.0<br>1.03                      | 31.5<br>1.24             | 2.3<br>0.09                         | 50.0<br>1.97   | 43.0<br>1.69   | 3.30<br>0.13   | 1.80<br>0.07   | 7              | 3.55           | 0.0558         | 0.25<br>0.54        |
| 21.839<br>0.8598 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 26.0<br>1.03                      | 31.5<br>1.24             | 0.5<br>0.02                         | 50.0<br>1.97   | 44.5<br>1.75   | 3.30<br>0.13   | 1.80<br>0.07   | 7              | 3.55           | 0.0558         | 0.25<br>0.55        |
| 21.839<br>0.8598 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 26.0<br>1.03                      | 31.5<br>1.24             | 2.3<br>0.09                         | 50.0<br>1.97   | 43.0<br>1.69   | 3.30<br>0.13   | 1.80<br>0.07   | 7              | 3.55           | 0.0558         | 0.25<br>0.54        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.5<br>0.06                | 25.0<br>0.98                      | 27.0<br>1.06             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.27<br>0.59        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.5<br>1.04             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.26        |
| 14.381<br>0.5662 | 12.000<br>0.4724 | -4.1<br>-0.16    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.5<br>1.04             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.27        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.5<br>1.04             | 1.3<br>0.05                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.26        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 1.5<br>0.06                | 24.0<br>0.94                      | 26.5<br>1.04             | 1.5<br>0.06                         | 42.5<br>1.67   | 40.5<br>1.59   | 0.20<br>0.01   | 1.20<br>0.05   | 5.8            | 5.55           | 0.0448         | 0.12<br>0.26        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

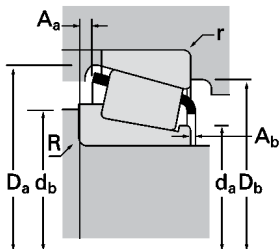
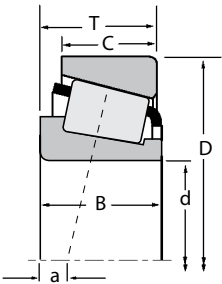
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |       |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|-------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  | Inner | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |       |       |
| 19.987<br>0.7869        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07079X      | 07204                  |  |        |  |       |       |
| 20.000<br>0.7874        | 42.000<br>1.6535 | 15.000<br>0.5906 | 25700<br>5770          | 0.37 | 1.60 | 6660<br>1500           | 4260<br>959      | 1.56 | 29400<br>6600          | XAA32004X   | YAA32004X              |  |        |  |       |       |
| 20.000<br>0.7874        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07079       | 07204                  |  |        |  |       |       |
| 20.627<br>0.8121        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1778        | 1729                   |  |        |  |       |       |
| 20.638<br>0.8125        | 49.225<br>1.9380 | 19.845<br>0.7813 | 40400<br>9080          | 0.32 | 1.86 | 10500<br>2360          | 5790<br>1300     | 1.81 | 43200<br>9720          | 12580       | 12520                  |  |        |  |       |       |
| 21.430<br>0.8437        | 50.005<br>1.9687 | 17.526<br>0.6900 | 40800<br>9170          | 0.28 | 2.16 | 10600<br>2380          | 5030<br>1130     | 2.10 | 43500<br>9780          | M12649      | M12610                 |  |        |  |       |       |
| 21.987<br>0.8656        | 45.237<br>1.7810 | 15.494<br>0.6100 | 30200<br>6780          | 0.31 | 1.96 | 7820<br>1760           | 4100<br>921      | 1.91 | 35300<br>7930          | LM12749     | LM12710                |  |        |  |       |       |
| 21.987<br>0.8656        | 45.974<br>1.8100 | 15.494<br>0.6100 | 30200<br>6780          | 0.31 | 1.96 | 7820<br>1760           | 4100<br>921      | 1.91 | 35300<br>7930          | LM12749     | LM12711                |  |        |  |       |       |
| 22.225<br>0.8750        | 42.070<br>1.6563 | 11.176<br>0.4400 | 15300<br>3450          | 0.40 | 1.51 | 3980<br>895            | 2700<br>607      | 1.47 | 16800<br>3770          | LL52549     | LL52510                |  |        |  |       |       |
| 22.225<br>0.8750        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07087       | 07196                  |  |        |  |       |       |
| 22.225<br>0.8750        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07087X      | 07196                  |  |        |  |       |       |
| 22.225<br>0.8750        | 50.005<br>1.9687 | 17.526<br>0.6900 | 40800<br>9170          | 0.28 | 2.16 | 10600<br>2380          | 5030<br>1130     | 2.10 | 43500<br>9780          | M12648A     | M12610                 |  |        |  |       |       |
| 22.225<br>0.8750        | 50.005<br>1.9687 | 17.526<br>0.6900 | 40800<br>9170          | 0.28 | 2.16 | 10600<br>2380          | 5030<br>1130     | 2.10 | 43500<br>9780          | M12648      | M12610                 |  |        |  |       |       |
| 22.225<br>0.8750        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07087       | 07204                  |  |        |  |       |       |
| 22.225<br>0.8750        | 52.000<br>2.0472 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650          | 07087X      | 07205                  |  |        |  |       |       |
| 22.225<br>0.8750        | 52.388<br>2.0625 | 19.368<br>0.7625 | 44300<br>9960          | 0.29 | 2.05 | 11500<br>2580          | 5740<br>1290     | 2.00 | 48300<br>10900         | 1380        | 1328                   |  |        |  |       |       |
| 22.225<br>0.8750        | 53.975<br>2.1250 | 19.368<br>0.7625 | 44300<br>9960          | 0.29 | 2.05 | 11500<br>2580          | 5740<br>1290     | 2.00 | 48300<br>10900         | 1380        | 1329                   |  |        |  |       |       |
| 22.225<br>0.8750        | 53.975<br>2.1250 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1755        | 1730                   |  |        |  |       |       |
| 22.225<br>0.8750        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1755        | 1729                   |  |        |  |       |       |
| 22.225<br>0.8750        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200         | 1755        | 1729X                  |  |        |  |       |       |
| 22.225<br>0.8750        | 57.150<br>2.2500 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300         | 1975        | 1922                   |  |        |  |       |       |
| 22.225<br>0.8750        | 57.150<br>2.2500 | 22.225<br>0.8750 | 51200<br>11500         | 0.35 | 1.73 | 13300<br>2990          | 7880<br>1770     | 1.69 | 55100<br>12400         | 1280        | 1220                   |  |        |  |       |       |
| 22.225<br>0.8750        | 58.738<br>2.3125 | 19.050<br>0.7500 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300         | 1975        | 1932                   |  |        |  |       |       |
| 22.225<br>0.8750        | 60.325<br>2.3750 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300         | 1975        | 1931                   |  |        |  |       |       |
| 22.225<br>0.8750        | 61.912<br>2.4375 | 36.512<br>1.4375 | 82000<br>18400         | 0.28 | 2.13 | 21300<br>4780          | 10300<br>2310    | 2.07 | 89800<br>20200         | 3655        | 3620                   |  |        |  |       |       |
| 22.225<br>0.8750        | 62.000<br>2.4409 | 17.983<br>0.7080 | 48200<br>10800         | 0.24 | 2.48 | 12500<br>2810          | 5170<br>1160     | 2.42 | 49200<br>11100         | 246X        | 242                    |  |        |  |       |       |
| 22.225<br>0.8750        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400         | 2684        | 2631                   |  |        |  |       |       |
| 22.606<br>0.8900        | 47.000<br>1.8504 | 15.500<br>0.6102 | 27500<br>6170          | 0.47 | 1.27 | 7120<br>1600           | 5760<br>1300     | 1.24 | 33000<br>7420          | LM72849     | LM72810                |  |        |  |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 26.0<br>1.02                      | 27.5<br>1.08             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.16<br>0.36        |
| 15.000<br>0.5906 | 12.000<br>0.4724 | -4.6<br>-0.18    | 2.0<br>0.08                | 25.5<br>1.00                      | 29.0<br>1.14             | 1.0<br>0.04                         | 39.5<br>1.56   | 36.5<br>1.44   | 0.40<br>0.02   | 1.40<br>0.06   | 6.2            | 6.1            | 0.0469         | 0.10<br>0.21        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 26.0<br>1.02                      | 27.5<br>1.08             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.16<br>0.36        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 0.8<br>0.03                | 26.0<br>1.02                      | 27.0<br>1.06             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | *<br>*         | *<br>*         | 10.6           | 5.39           | 0.0521         | 0.26<br>0.57        |
| 19.845<br>0.7813 | 15.875<br>0.6250 | -7.1<br>-0.28    | 1.5<br>0.06                | 26.0<br>1.02                      | 28.5<br>1.12             | 1.5<br>0.06                         | 45.5<br>1.79   | 42.5<br>1.67   | 0.90<br>0.04   | 1.10<br>0.04   | 8.6            | 6.21           | 0.0495         | 0.18<br>0.40        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -6.4<br>-0.25    | 1.3<br>0.05                | 27.5<br>1.08                      | 29.5<br>1.16             | 1.3<br>0.05                         | 46.0<br>1.81   | 44.0<br>1.73   | 0.30<br>0.01   | 1.10<br>0.04   | 9.1            | 5.63           | 0.0479         | 0.17<br>0.37        |
| 16.637<br>0.6550 | 12.065<br>0.4750 | -5.3<br>-0.21    | 1.3<br>0.05                | 26.0<br>1.02                      | 27.5<br>1.08             | 1.3<br>0.05                         | 42.0<br>1.65   | 39.5<br>1.56   | 0.60<br>0.02   | 0.40<br>0.02   | 8.2            | 6.98           | 0.0480         | 0.12<br>0.26        |
| 16.637<br>0.6550 | 12.065<br>0.4750 | -5.3<br>-0.21    | 1.3<br>0.05                | 26.0<br>1.02                      | 27.5<br>1.08             | 1.3<br>0.05                         | 42.5<br>1.67   | 40.0<br>1.57   | 0.60<br>0.02   | 0.40<br>0.02   | 8.2            | 6.98           | 0.0480         | 0.12<br>0.27        |
| 11.176<br>0.4400 | 8.636<br>0.3400  | -1.8<br>-0.07    | 1.3<br>0.05                | 26.0<br>1.02                      | 27.5<br>1.08             | 1.3<br>0.05                         | 39.5<br>1.56   | 36.5<br>1.44   | -0.20<br>-0.01 | 1.10<br>0.04   | 4.7            | 8.62           | 0.0431         | 0.07<br>0.14        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.3<br>0.05                | 27.0<br>1.06                      | 28.5<br>1.12             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.13<br>0.28        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.5<br>0.06                | 27.0<br>1.06                      | 29.0<br>1.14             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.13<br>0.28        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -6.4<br>-0.25    | 0.4<br>0.02                | 26.5<br>1.04                      | 26.5<br>1.04             | 1.3<br>0.05                         | 46.0<br>1.81   | 44.0<br>1.73   | 0.30<br>0.01   | 1.10<br>0.04   | 9.1            | 5.63           | 0.0479         | 0.16<br>0.36        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -6.4<br>-0.25    | 1.3<br>0.05                | 26.5<br>1.04                      | 28.5<br>1.12             | 1.3<br>0.05                         | 46.0<br>1.81   | 44.0<br>1.73   | 0.30<br>0.01   | 1.10<br>0.04   | 9.1            | 5.63           | 0.0479         | 0.16<br>0.36        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.3<br>0.05                | 27.0<br>1.06                      | 28.5<br>1.12             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.15<br>0.34        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 27.0<br>1.06                      | 29.0<br>1.14             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.15<br>0.34        |
| 20.168<br>0.7940 | 14.288<br>0.5625 | -7.6<br>-0.30    | 1.5<br>0.06                | 27.0<br>1.06                      | 29.5<br>1.16             | 1.5<br>0.06                         | 48.5<br>1.91   | 45.0<br>1.77   | 1.30<br>0.05   | 1.10<br>0.04   | 10.3           | 5.21           | 0.0508         | 0.20<br>0.45        |
| 20.168<br>0.7940 | 14.288<br>0.5625 | -7.6<br>-0.30    | 1.5<br>0.06                | 27.0<br>1.06                      | 29.5<br>1.16             | 1.5<br>0.06                         | 49.0<br>1.93   | 46.0<br>1.81   | 1.30<br>0.05   | 1.10<br>0.04   | 10.3           | 5.21           | 0.0508         | 0.22<br>0.48        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.3<br>0.05                | 27.5<br>1.08                      | 29.0<br>1.14             | 0.8<br>0.03                         | 50.0<br>1.97   | 48.5<br>1.91   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.22<br>0.49        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.3<br>0.05                | 27.5<br>1.08                      | 29.0<br>1.14             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.25<br>0.56        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 1.3<br>0.05                | 27.5<br>1.08                      | 29.0<br>1.14             | 1.5<br>0.06                         | 51.0<br>2.01   | 49.0<br>1.93   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.25<br>0.55        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 28.0<br>1.10                      | 29.0<br>1.14             | 1.5<br>0.06                         | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.26<br>0.57        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -6.9<br>-0.27    | 0.8<br>0.03                | 29.0<br>1.14                      | 29.5<br>1.16             | 1.5<br>0.06                         | 52.0<br>2.05   | 49.0<br>1.93   | *<br>*         | *<br>*         | 11.4           | 5.52           | 0.0556         | 0.28<br>0.63        |
| 19.355<br>0.7620 | 15.080<br>0.5937 | -5.8<br>-0.23    | 0.8<br>0.03                | 28.0<br>1.10                      | 29.0<br>1.14             | 1.3<br>0.05                         | 54.0<br>2.13   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.27<br>0.60        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 28.0<br>1.10                      | 29.0<br>1.14             | 1.3<br>0.05                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.29<br>0.65        |
| 38.354<br>1.5100 | 23.812<br>0.9375 | -19.8<br>-0.78   | 0.3<br>0.01                | 30.5<br>1.20                      | 30.5<br>1.20             | 3.3<br>0.13                         | 57.5<br>2.27   | 52.0<br>2.05   | 9.90<br>0.39   | 0.20<br>0.01   | 17             | 6.38           | 0.0592         | 0.51<br>1.12        |
| 19.000<br>0.7480 | 16.002<br>0.6300 | -6.1<br>-0.24    | 3.5<br>0.14                | 30.0<br>1.18                      | 34.5<br>1.36             | 2.0<br>0.08                         | 57.0<br>2.24   | 55.0<br>2.17   | 0.10<br>0.00   | 0.70<br>0.03   | 12.8           | 8.24           | 0.0509         | 0.29<br>0.63        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.5<br>0.06                | 32.0<br>1.26                      | 34.0<br>1.34             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.46<br>1.02        |
| 15.500<br>0.6102 | 12.000<br>0.4724 | -3.0<br>-0.12    | 1.5<br>0.06                | 28.0<br>1.10                      | 30.0<br>1.18             | 1.0<br>0.04                         | 44.0<br>1.73   | 40.5<br>1.59   | 0.60<br>0.02   | 0.90<br>0.04   | 7.5            | 8.95           | 0.0538         | 0.12<br>0.28        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

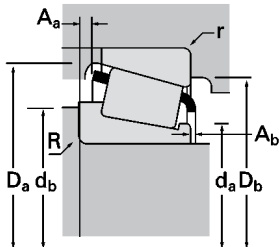
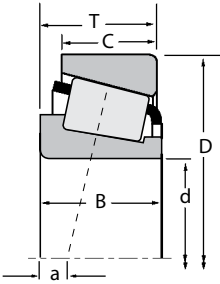
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                | Part Number |           |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|----------------|-------------|-----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static         | Inner       | Outer     |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                |             |           |
| 23.812<br>0.9375        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07093       | 07196     |
| 23.812<br>0.9375        | 50.292<br>1.9800 | 14.224<br>0.5600 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400  | L44640      | L44610    |
| 23.812<br>0.9375        | 50.800<br>2.0000 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07093       | 07210X    |
| 23.812<br>0.9375        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07093       | 07204     |
| 23.812<br>0.9375        | 53.975<br>2.1250 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1779        | 1730      |
| 23.812<br>0.9375        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1779        | 1729      |
| 23.812<br>0.9375        | 61.912<br>2.4375 | 28.575<br>1.1250 | 82000<br>18400         | 0.28 | 2.13 | 21300<br>4780          | 10300<br>2310    | 2.07 | 89800<br>20200 | 3659        | 3620      |
| 23.812<br>0.9375        | 65.088<br>2.5625 | 22.225<br>0.8750 | 50600<br>11400         | 0.73 | 0.82 | 13100<br>2950          | 16400<br>3690    | 0.80 | 55800<br>12500 | 23092       | 23256     |
| 23.812<br>0.9375        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400 | 2685        | 2631      |
| 24.000<br>0.9449        | 55.000<br>2.1654 | 25.000<br>0.9842 | 62100<br>14000         | 0.35 | 1.70 | 16100<br>3620          | 9740<br>2190     | 1.65 | 71000<br>16000 | JHM33449    | JHM33410  |
| 24.384<br>0.9600        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100 | 43096       | 43312     |
| 24.981<br>0.9835        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07098       | 07196     |
| 24.981<br>0.9835        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07098       | 07204     |
| 24.981<br>0.9835        | 52.000<br>2.0472 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07098       | 07205     |
| 24.981<br>0.9835        | 61.981<br>2.4402 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910  | 17098       | 17244A    |
| 24.981<br>0.9835        | 62.000<br>2.4409 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910  | 17098       | 17244     |
| 25.000<br>0.9843        | 47.000<br>1.8504 | 15.000<br>0.5906 | 28500<br>6410          | 0.43 | 1.39 | 7390<br>1660           | 5440<br>1220     | 1.36 | 35400<br>7950  | XAA32005X   | YAA32005X |
| 25.000<br>0.9843        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07097       | 07196     |
| 25.000<br>0.9843        | 51.994<br>2.0470 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07097       | 07204     |
| 25.000<br>0.9843        | 52.000<br>2.0472 | 14.220<br>0.5600 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400  | JL44642A    | JL44615   |
| 25.000<br>0.9843        | 52.000<br>2.0472 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07097       | 07205     |
| 25.000<br>0.9843        | 61.912<br>2.4375 | 21.018<br>0.8275 | 48200<br>10800         | 0.24 | 2.48 | 12500<br>2810          | 5170<br>1160     | 2.42 | 49200<br>11100 | 247         | 244X      |
| 25.400<br>1.0000        | 50.005<br>1.9687 | 13.495<br>0.5313 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07100-S     | 07196     |
| 25.400<br>1.0000        | 50.292<br>1.9800 | 14.224<br>0.5600 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400  | L44642      | L44610    |
| 25.400<br>1.0000        | 50.292<br>1.9800 | 14.224<br>0.5600 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400  | L44643      | L44610    |
| 25.400<br>1.0000        | 50.800<br>2.0000 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07100-S     | 07210X    |
| 25.400<br>1.0000        | 50.800<br>2.0000 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07100-SA    | 07210X    |
| 25.400<br>1.0000        | 51.986<br>2.0467 | 15.011<br>0.5910 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400  | L44643      | L44613    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.5<br>0.06                | 28.5<br>1.12                      | 30.5<br>1.20             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.12<br>0.27        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 1.5<br>0.06                | 28.5<br>1.12                      | 30.5<br>1.20             | 1.3<br>0.05                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.80<br>0.03   | 0.50<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.13<br>0.29        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 28.5<br>1.12                      | 30.5<br>1.20             | 1.5<br>0.06                         | 47.5<br>1.87   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.30        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 28.5<br>1.12                      | 30.5<br>1.20             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.15<br>0.33        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 0.8<br>0.03                | 28.5<br>1.12                      | 29.5<br>1.16             | 0.8<br>0.03                         | 50.0<br>1.97   | 48.5<br>1.91   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.21<br>0.47        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 0.8<br>0.03                | 28.5<br>1.12                      | 29.5<br>1.16             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.24<br>0.54        |
| 30.416<br>1.1975 | 23.812<br>0.9375 | -11.9<br>-0.47   | 2.3<br>0.09                | 31.5<br>1.24                      | 35.5<br>1.40             | 3.3<br>0.13                         | 57.5<br>2.27   | 52.0<br>2.05   | 2.00<br>0.08   | 0.20<br>0.01   | 17             | 6.38           | 0.0592         | 0.43<br>0.96        |
| 21.463<br>0.8450 | 15.875<br>0.6250 | -2.3<br>-0.09    | 1.5<br>0.06                | 34.5<br>1.36                      | 38.5<br>1.52             | 1.5<br>0.06                         | 63.0<br>2.48   | 53.0<br>2.09   | 3.80<br>0.15   | 2.00<br>0.08   | 11.3           | 6.57           | 0.0700         | 0.37<br>0.81        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 0.8<br>0.03                | 30.0<br>1.18                      | 31.0<br>1.22             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.45<br>0.99        |
| 25.000<br>0.9843 | 21.000<br>0.8268 | -8.9<br>-0.35    | 2.0<br>0.08                | 30.0<br>1.18                      | 35.0<br>1.38             | 2.0<br>0.08                         | 52.0<br>2.05   | 47.0<br>1.85   | 0.40<br>0.02   | 1.80<br>0.07   | 13.3           | 5.79           | 0.0592         | 0.29<br>0.65        |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 0.8<br>0.03                | 39.5<br>1.56                      | 40.5<br>1.59             | 1.5<br>0.06                         | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.64<br>1.42        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.12<br>0.26        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.31        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.31        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 30.5<br>1.20                      | 33.0<br>1.30             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.25<br>0.56        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 30.5<br>1.20                      | 33.0<br>1.30             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.25<br>0.56        |
| 15.000<br>0.5906 | 11.500<br>0.4528 | -3.3<br>-0.13    | 3.3<br>0.13                | 30.0<br>1.18                      | 37.0<br>1.46             | 1.0<br>0.04                         | 44.5<br>1.75   | 41.0<br>1.61   | 0.60<br>0.02   | 1.20<br>0.05   | 8.6            | 8.7            | 0.0546         | 0.11<br>0.25        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.12<br>0.26        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.0<br>1.77   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.31        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 1.3<br>0.05                | 30.0<br>1.18                      | 32.0<br>1.26             | 1.3<br>0.05                         | 48.0<br>1.89   | 45.5<br>1.79   | 0.80<br>0.03   | 0.50<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.14<br>0.31        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.0<br>1.14                      | 31.0<br>1.22             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.31        |
| 19.000<br>0.7480 | 17.462<br>0.6875 | -6.1<br>-0.24    | 2.0<br>0.08                | 30.0<br>1.18                      | 33.5<br>1.32             | 3.3<br>0.13                         | 57.0<br>2.24   | 52.0<br>2.05   | 0.10<br>0.00   | 0.70<br>0.03   | 12.8           | 8.24           | 0.0509         | 0.29<br>0.63        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 1.5<br>0.06                | 29.5<br>1.16                      | 31.5<br>1.24             | 1.0<br>0.04                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.12<br>0.25        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 3.5<br>0.14                | 29.5<br>1.16                      | 36.0<br>1.42             | 1.3<br>0.05                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.80<br>0.03   | 0.50<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.12<br>0.27        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 1.3<br>0.05                | 30.0<br>1.18                      | 32.0<br>1.26             | 1.3<br>0.05                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.80<br>0.03   | 0.60<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.13<br>0.28        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.5<br>1.16                      | 31.5<br>1.24             | 1.5<br>0.06                         | 47.5<br>1.87   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.13<br>0.29        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 3.3<br>0.13                | 29.5<br>1.16                      | 35.0<br>1.38             | 1.5<br>0.06                         | 47.5<br>1.87   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.13<br>0.28        |
| 14.732<br>0.5800 | 12.700<br>0.5000 | -3.3<br>-0.13    | 1.3<br>0.05                | 30.0<br>1.18                      | 32.0<br>1.26             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.80<br>0.03   | 0.60<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.15<br>0.32        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

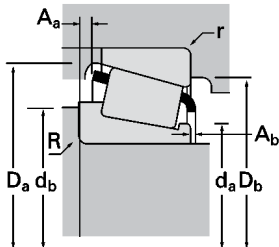
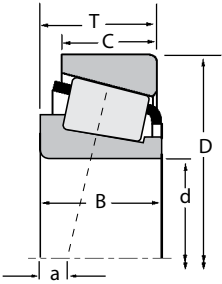




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                | Part Number |        |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|----------------|-------------|--------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static         | Inner       | Outer  |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                |             |        |
| 25.400<br>1.0000        | 52.000<br>2.0472 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07100-S     | 07205  |
| 25.400<br>1.0000        | 52.000<br>2.0472 | 15.011<br>0.5910 | 27000<br>6060          | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07100-SA    | 07205  |
| 25.400<br>1.0000        | 53.975<br>2.1250 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1780        | 1730   |
| 25.400<br>1.0000        | 56.896<br>2.2400 | 19.368<br>0.7625 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1780        | 1729   |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 17.462<br>0.6875 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300 | 15578       | 15520  |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 19.431<br>0.7650 | 44900<br>10100         | 0.55 | 1.10 | 11700<br>2620          | 10900<br>2450    | 1.07 | 52900<br>11900 | M84548      | M84510 |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1986        | 1922   |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1994X       | 1922   |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 20.218<br>0.7960 | 42000<br>9450          | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1780        | 1738X  |
| 25.400<br>1.0000        | 58.738<br>2.3125 | 19.050<br>0.7500 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1986        | 1932   |
| 25.400<br>1.0000        | 59.530<br>2.3437 | 23.368<br>0.9200 | 53800<br>12100         | 0.55 | 1.10 | 13900<br>3140          | 13000<br>2930    | 1.07 | 63300<br>14200 | M84249      | M84210 |
| 25.400<br>1.0000        | 60.325<br>2.3750 | 19.842<br>0.7812 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300 | 15578       | 15523  |
| 25.400<br>1.0000        | 60.325<br>2.3750 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1986        | 1931   |
| 25.400<br>1.0000        | 60.325<br>2.3750 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1994X       | 1931   |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 18.161<br>0.7150 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15100-SR    | 15245  |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15100       | 15245  |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15101       | 15245  |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15102       | 15245  |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15100       | 15244  |
| 25.400<br>1.0000        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15101       | 15244  |
| 25.400<br>1.0000        | 63.100<br>2.4843 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400 | 2687        | 2630   |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15100       | 15250  |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15101       | 15250  |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15102       | 15250  |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15100-S     | 15250X |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100 | 15101       | 15250X |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 20.638<br>0.8125 | 50600<br>11400         | 0.73 | 0.82 | 13100<br>2950          | 16400<br>3690    | 0.80 | 55800<br>12500 | 23101X      | 23250X |
| 25.400<br>1.0000        | 65.088<br>2.5625 | 22.225<br>0.8750 | 50600<br>11400         | 0.73 | 0.82 | 13100<br>2950          | 16400<br>3690    | 0.80 | 55800<br>12500 | 23100       | 23256  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 1.5<br>0.06                | 29.5<br>1.16                      | 31.5<br>1.24             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.31        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 3.3<br>0.13                | 29.5<br>1.16                      | 35.0<br>1.38             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.30<br>0.01   | 1.40<br>0.06   | 7.6            | 7.07           | 0.0509         | 0.14<br>0.30        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 0.8<br>0.03                | 30.0<br>1.18                      | 30.5<br>1.20             | 0.8<br>0.03                         | 50.0<br>1.97   | 48.5<br>1.91   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.20<br>0.45        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 0.8<br>0.03                | 30.0<br>1.18                      | 30.5<br>1.20             | 1.3<br>0.05                         | 51.0<br>2.01   | 49.0<br>1.93   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.23<br>0.52        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 1.3<br>0.05                | 30.5<br>1.20                      | 32.5<br>1.28             | 1.5<br>0.06                         | 53.0<br>2.09   | 51.0<br>2.01   | 0.50<br>0.02   | 1.80<br>0.07   | 12.7           | 10.3           | 0.0577         | 0.22<br>0.48        |
| 19.431<br>0.7650 | 14.732<br>0.5800 | -3.0<br>-0.12    | 1.5<br>0.06                | 33.0<br>1.30                      | 37.5<br>1.48             | 1.5<br>0.06                         | 54.0<br>2.13   | 48.5<br>1.91   | 1.20<br>0.05   | 1.20<br>0.05   | 11.3           | 7.39           | 0.0644         | 0.24<br>0.53        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 30.5<br>1.20                      | 32.5<br>1.28             | 1.5<br>0.06                         | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.24<br>0.53        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 30.5<br>1.20                      | 37.0<br>1.46             | 1.5<br>0.06                         | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.24<br>0.52        |
| 19.837<br>0.7810 | 17.551<br>0.6910 | -6.9<br>-0.27    | 0.8<br>0.03                | 30.0<br>1.18                      | 30.5<br>1.20             | 2.3<br>0.09                         | 51.0<br>2.01   | 48.5<br>1.91   | 1.90<br>0.07   | 0.30<br>0.01   | 10.6           | 5.39           | 0.0521         | 0.25<br>0.54        |
| 19.355<br>0.7620 | 15.080<br>0.5937 | -5.8<br>-0.23    | 1.3<br>0.05                | 30.5<br>1.20                      | 32.5<br>1.28             | 1.3<br>0.05                         | 54.0<br>2.13   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.25<br>0.56        |
| 23.114<br>0.9100 | 18.288<br>0.7200 | -5.1<br>-0.20    | 0.8<br>0.03                | 32.5<br>1.27                      | 36.0<br>1.42             | 1.5<br>0.06                         | 56.0<br>2.20   | 49.5<br>1.95   | 1.30<br>0.05   | 1.60<br>0.06   | 12.7           | 7.56           | 0.0670         | 0.32<br>0.71        |
| 17.462<br>0.6875 | 15.875<br>0.6250 | -5.1<br>-0.20    | 1.3<br>0.05                | 30.5<br>1.20                      | 32.5<br>1.28             | 1.5<br>0.06                         | 54.0<br>2.13   | 51.0<br>2.01   | 0.50<br>0.02   | 1.80<br>0.07   | 12.7           | 10.3           | 0.0577         | 0.27<br>0.60        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 30.5<br>1.20                      | 32.5<br>1.28             | 1.3<br>0.05                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.28<br>0.61        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 30.5<br>1.20                      | 37.0<br>1.46             | 1.3<br>0.05                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.27<br>0.60        |
| 19.050<br>0.7500 | 14.288<br>0.5625 | -4.8<br>-0.19    | 1.3<br>0.05                | 32.5<br>1.28                      | 33.5<br>1.32             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 0.30<br>0.01   | 1.70<br>0.07   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.63        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 3.5<br>0.14                | 31.5<br>1.24                      | 38.0<br>1.50             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.65        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.30<br>0.65        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 1.5<br>0.06                | 31.5<br>1.24                      | 34.0<br>1.34             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.30<br>0.65        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 31.5<br>1.24                      | 38.0<br>1.50             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.31<br>0.67        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.31<br>0.68        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.3<br>0.05                | 31.5<br>1.24                      | 33.5<br>1.32             | 0.8<br>0.03                         | 59.0<br>2.32   | 57.0<br>2.24   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.39<br>0.86        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 31.5<br>1.24                      | 38.0<br>1.50             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.32<br>0.71        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.33<br>0.72        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 31.5<br>1.24                      | 34.0<br>1.34             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.33<br>0.72        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 31.5<br>1.24                      | 33.5<br>1.32             | 1.5<br>0.06                         | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.33<br>0.72        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.5<br>0.06                         | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.33<br>0.72        |
| 20.650<br>0.8130 | 14.681<br>0.5780 | -1.3<br>-0.05    | 2.3<br>0.09                | 34.5<br>1.36                      | 40.5<br>1.59             | 2.3<br>0.09                         | 60.0<br>2.36   | 52.0<br>2.05   | 2.70<br>0.11   | 1.80<br>0.07   | 11.3           | 6.57           | 0.0700         | 0.32<br>0.70        |
| 21.463<br>0.8450 | 15.875<br>0.6250 | -2.3<br>-0.09    | 1.5<br>0.06                | 34.5<br>1.36                      | 39.0<br>1.54             | 1.5<br>0.06                         | 63.0<br>2.48   | 53.0<br>2.09   | 3.80<br>0.15   | 2.00<br>0.08   | 11.3           | 6.57           | 0.0700         | 0.36<br>0.78        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

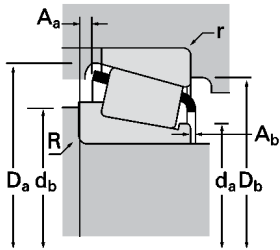
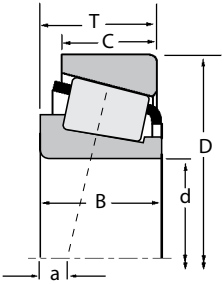
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 |         | Part Number |       |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|---------|-------------|-------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          |         |             | Inner | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>  |         |             |       |       |
| 25.400<br>1.0000        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2687    | 2631        |       |       |
| 25.400<br>1.0000        | 68.262<br>2.6875 | 22.225<br>0.8750 | 62600<br>14100         | 0.34 | 1.77 | 16200<br>3650          | 9420<br>2120     | 1.72 | 73300<br>16500  | 2473    | 2420        |       |       |
| 25.400<br>1.0000        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02473   | 02420       |       |       |
| 25.400<br>1.0000        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88036  | M88010      |       |       |
| 25.400<br>1.0000        | 69.723<br>2.7450 | 19.050<br>0.7500 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26100   | 26274       |       |       |
| 25.400<br>1.0000        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88630 | HM88610     |       |       |
| 25.400<br>1.0000        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88630 | HM88610A    |       |       |
| 25.400<br>1.0000        | 72.626<br>2.8593 | 24.608<br>0.9688 | 64600<br>14500         | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41100   | 41286       |       |       |
| 25.400<br>1.0000        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3189    | 3120        |       |       |
| 25.400<br>1.0000        | 73.025<br>2.8750 | 26.543<br>1.0450 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88630 | HM88612     |       |       |
| 25.987<br>1.0231        | 51.986<br>2.0467 | 15.011<br>0.5910 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400   | L44645  | L44613      |       |       |
| 25.987<br>1.0231        | 57.150<br>2.2500 | 17.462<br>0.6875 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15579X  | 15520       |       |       |
| 26.157<br>1.0298        | 61.912<br>2.4375 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15103   | 15243       |       |       |
| 26.157<br>1.0298        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15103   | 15245       |       |       |
| 26.162<br>1.0300        | 61.912<br>2.4375 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15103-S | 15243       |       |       |
| 26.162<br>1.0300        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2682    | 2631        |       |       |
| 26.975<br>1.0620        | 58.738<br>2.3125 | 19.050<br>0.7500 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1987    | 1932        |       |       |
| 26.975<br>1.0620        | 60.325<br>2.3750 | 19.355<br>0.7620 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1987    | 1931        |       |       |
| 26.987<br>1.0625        | 50.292<br>1.9800 | 14.224<br>0.5600 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400   | L44649  | L44610      |       |       |
| 26.987<br>1.0625        | 51.986<br>2.0467 | 15.011<br>0.5910 | 27800<br>6260          | 0.37 | 1.60 | 7210<br>1620           | 4620<br>1040     | 1.56 | 32900<br>7400   | L44649  | L44613      |       |       |
| 26.987<br>1.0625        | 57.150<br>2.2500 | 17.462<br>0.6875 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15580   | 15520       |       |       |
| 26.987<br>1.0625        | 57.150<br>2.2500 | 19.431<br>0.7650 | 44900<br>10100         | 0.55 | 1.10 | 11700<br>2620          | 10900<br>2450    | 1.07 | 52900<br>11900  | M84549  | M84510      |       |       |
| 26.988<br>1.0625        | 57.150<br>2.2500 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1997X   | 1922        |       |       |
| 26.987<br>1.0625        | 60.325<br>2.3750 | 19.842<br>0.7812 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15580   | 15523       |       |       |
| 26.987<br>1.0625        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15106   | 15245       |       |       |
| 26.987<br>1.0625        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15106   | 15250X      |       |       |
| 26.987<br>1.0625        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2688    | 2631        |       |       |
| 26.987<br>1.0625        | 72.626<br>2.8593 | 24.608<br>0.9688 | 64600<br>14500         | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41106   | 41286       |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.3<br>0.05                | 31.5<br>1.24                      | 33.5<br>1.32             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.44<br>0.97        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -6.6<br>-0.26    | 0.8<br>0.03                | 32.5<br>1.28                      | 33.5<br>1.32             | 1.5<br>0.06                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 0.30<br>0.01   | 18.8           | 10.5           | 0.0652         | 0.44<br>0.96        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 0.8<br>0.03                | 33.5<br>1.32                      | 34.5<br>1.36             | 1.5<br>0.06                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.43<br>0.94        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 1.5<br>0.06                         | 65.0<br>2.56   | 58.0<br>2.28   | 1.70<br>0.07   | 0.90<br>0.04   | 19.4           | 10             | 0.0771         | 0.44<br>0.97        |
| 18.923<br>0.7450 | 19.050<br>0.7500 | -4.1<br>-0.16    | 1.5<br>0.06                | 32.5<br>1.28                      | 34.5<br>1.36             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.40<br>0.88        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 0.8<br>0.03                | 39.5<br>1.56                      | 39.5<br>1.56             | 2.3<br>0.09                         | 69.0<br>2.72   | 60.0<br>2.36   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.58<br>1.28        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 0.8<br>0.03                | 39.5<br>1.56                      | 39.5<br>1.56             | 0.8<br>0.03                         | 69.0<br>2.72   | 61.0<br>2.40   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.58<br>1.29        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 2.3<br>0.09                | 36.5<br>1.44                      | 41.0<br>1.61             | 1.5<br>0.06                         | 68.0<br>2.68   | 61.0<br>2.40   | 3.00<br>0.12   | 2.30<br>0.09   | 13             | 5.83           | 0.0686         | 0.50<br>1.09        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                | 35.0<br>1.38                      | 35.5<br>1.40             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.65<br>1.43        |
| 25.400<br>1.0000 | 20.985<br>0.8262 | -4.6<br>-0.18    | 0.8<br>0.03                | 39.5<br>1.56                      | 39.5<br>1.56             | 2.3<br>0.09                         | 69.0<br>2.72   | 60.0<br>2.36   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.61<br>1.35        |
| 14.732<br>0.5800 | 12.700<br>0.5000 | -3.3<br>-0.13    | 3.5<br>0.14                | 30.0<br>1.18                      | 36.5<br>1.44             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.80<br>0.03   | 0.50<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.14<br>0.30        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 3.5<br>0.14                | 31.0<br>1.22                      | 37.5<br>1.48             | 1.5<br>0.06                         | 53.0<br>2.09   | 51.0<br>2.01   | *<br>*         | *<br>*         | 12.7           | 10.3           | 0.0577         | 0.21<br>0.46        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 32.5<br>1.28                      | 33.0<br>1.30             | 2.0<br>0.08                         | 58.0<br>2.28   | 54.0<br>2.13   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.64        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 32.5<br>1.28                      | 33.0<br>1.30             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.64        |
| 19.939<br>0.7850 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 33.5<br>1.32                      | 33.5<br>1.32             | 2.0<br>0.08                         | 58.0<br>2.28   | 54.0<br>2.13   | 1.20<br>0.05   | 1.70<br>0.07   | 14.6           | 9.98           | 0.0606         | 0.29<br>0.64        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.5<br>0.06                | 32.0<br>1.26                      | 34.5<br>1.36             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.43<br>0.95        |
| 19.355<br>0.7620 | 15.080<br>0.5937 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.3<br>0.05                         | 54.0<br>2.13   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.24<br>0.54        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 31.5<br>1.24                      | 32.5<br>1.28             | 1.3<br>0.05                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.27<br>0.59        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 3.5<br>0.14                | 31.0<br>1.22                      | 37.5<br>1.48             | 1.3<br>0.05                         | 47.0<br>1.85   | 44.5<br>1.75   | 0.80<br>0.03   | 0.60<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.12<br>0.26        |
| 14.732<br>0.5800 | 12.700<br>0.5000 | -3.3<br>-0.13    | 3.5<br>0.14                | 31.0<br>1.22                      | 37.5<br>1.48             | 2.0<br>0.08                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.80<br>0.03   | 0.60<br>0.02   | 8.9            | 8.93           | 0.0526         | 0.14<br>0.30        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 3.5<br>0.14                | 32.0<br>1.26                      | 38.5<br>1.52             | 1.5<br>0.06                         | 53.0<br>2.09   | 51.0<br>2.01   | 0.50<br>0.02   | 1.80<br>0.07   | 12.7           | 10.3           | 0.0577         | 0.20<br>0.45        |
| 19.431<br>0.7650 | 14.732<br>0.5800 | -3.0<br>-0.12    | 1.5<br>0.06                | 33.0<br>1.30                      | 38.5<br>1.52             | 1.5<br>0.06                         | 54.0<br>2.13   | 48.5<br>1.91   | 1.20<br>0.05   | 1.20<br>0.05   | 11.3           | 7.39           | 0.0644         | 0.23<br>0.51        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.3<br>0.13                | 31.5<br>1.24                      | 37.5<br>1.48             | 1.5<br>0.06                         | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.23<br>0.50        |
| 17.462<br>0.6875 | 15.875<br>0.6250 | -5.1<br>-0.20    | 3.5<br>0.14                | 32.0<br>1.26                      | 38.5<br>1.52             | 1.5<br>0.06                         | 54.0<br>2.13   | 51.0<br>2.01   | 0.50<br>0.02   | 1.80<br>0.07   | 12.7           | 10.3           | 0.0577         | 0.26<br>0.57        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 33.0<br>1.30                      | 33.5<br>1.32             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.63        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 33.0<br>1.30                      | 33.5<br>1.32             | 1.5<br>0.06                         | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.32<br>0.70        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.5<br>0.06                | 33.0<br>1.30                      | 35.0<br>1.38             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.43<br>0.94        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 2.3<br>0.09                | 36.5<br>1.44                      | 42.0<br>1.65             | 1.5<br>0.06                         | 68.0<br>2.68   | 61.0<br>2.40   | 3.00<br>0.12   | 2.30<br>0.09   | 13             | 5.83           | 0.0686         | 0.48<br>1.07        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

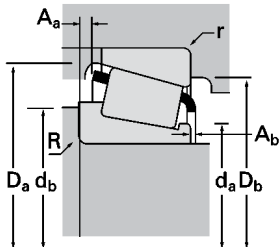
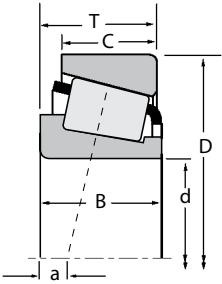




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer   |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |         |
| 27.000<br>1.0630        | 59.131<br>2.3280 | 15.880<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000  | JLM67042    | LM67010 |
| 27.987<br>1.1019        | 66.987<br>2.6373 | 20.500<br>0.8071 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02473X      | 02419   |
| 28.000<br>1.1024        | 57.150<br>2.2500 | 17.460<br>0.6875 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | J15585      | 15520   |
| 28.575<br>1.1250        | 56.896<br>2.2400 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1985        | 1930    |
| 28.575<br>1.1250        | 57.150<br>2.2500 | 17.462<br>0.6875 | 42600<br>9570          | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15590       | 15520   |
| 28.575<br>1.1250        | 57.150<br>2.2500 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1985        | 1922    |
| 28.575<br>1.1250        | 58.738<br>2.3125 | 19.050<br>0.7500 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1985        | 1932    |
| 28.575<br>1.1250        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000  | LM67043     | LM67010 |
| 28.575<br>1.1250        | 60.325<br>2.3750 | 19.845<br>0.7813 | 44800<br>10100         | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1985        | 1931    |
| 28.575<br>1.1250        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15112       | 15245   |
| 28.575<br>1.1250        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15113       | 15245   |
| 28.575<br>1.1250        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15112       | 15244   |
| 28.575<br>1.1250        | 63.100<br>2.4843 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2689        | 2630    |
| 28.575<br>1.1250        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15112       | 15250   |
| 28.575<br>1.1250        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15113       | 15250   |
| 28.575<br>1.1250        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15112       | 15250X  |
| 28.575<br>1.1250        | 64.292<br>2.5312 | 21.433<br>0.8438 | 55700<br>12500         | 0.55 | 1.10 | 14500<br>3250          | 13500<br>3040    | 1.07 | 71700<br>16100  | M86647      | M86610  |
| 28.575<br>1.1250        | 66.421<br>2.6150 | 19.050<br>0.7500 | 51700<br>11600         | 0.34 | 1.77 | 13400<br>3010          | 7790<br>1750     | 1.72 | 55200<br>12400  | 24112       | 24261   |
| 28.575<br>1.1250        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2689        | 2631    |
| 28.575<br>1.1250        | 68.262<br>2.6875 | 22.225<br>0.8750 | 62600<br>14100         | 0.34 | 1.77 | 16200<br>3650          | 9420<br>2120     | 1.72 | 73300<br>16500  | 2474        | 2420    |
| 28.575<br>1.1250        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02474       | 02420   |
| 28.575<br>1.1250        | 69.723<br>2.7450 | 19.050<br>0.7500 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26112       | 26274   |
| 28.575<br>1.1250        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2578        | 2523    |
| 28.575<br>1.1250        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2578        | 2523-S  |
| 28.575<br>1.1250        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26112       | 26283   |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 24.608<br>0.9688 | 64600<br>14500         | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41125       | 41286   |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 24.608<br>0.9688 | 64600<br>14500         | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41126       | 41286   |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3192        | 3120    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 0.5<br>0.02                                    | 33.0<br>1.30                               | 33.5<br>1.32                               | 1.3<br>0.05                                  | 56.0<br>2.20   | 52.0<br>2.05   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.21<br>0.47        |
| 20.500<br>0.8071 | 16.000<br>0.6299 | -5.1<br>-0.20    | 0.8<br>0.03                                    | 35.5<br>1.40                               | 36.5<br>1.44                               | 1.5<br>0.06                                  | 62.0<br>2.44   | 59.0<br>2.32   | 1.20<br>0.05   | 2.60<br>0.10   | 17.5           | 8.48           | 0.0681         | 0.36<br>0.80        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 32.5<br>1.28                               | 39.0<br>1.54                               | 1.5<br>0.06                                  | 53.0<br>2.09   | 51.0<br>2.01   | *<br>*         | *<br>*         | 12.7           | 10.3           | 0.0577         | 0.20<br>0.44        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 33.5<br>1.32                               | 34.0<br>1.34                               | 0.8<br>0.03                                  | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.22<br>0.48        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 33.5<br>1.32                               | 39.5<br>1.56                               | 1.5<br>0.06                                  | 53.0<br>2.09   | 51.0<br>2.01   | 0.50<br>0.02   | 1.80<br>0.07   | 12.7           | 10.3           | 0.0577         | 0.19<br>0.43        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 33.5<br>1.32                               | 34.0<br>1.34                               | 1.5<br>0.06                                  | 53.5<br>2.11   | 51.0<br>2.01   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.22<br>0.49        |
| 19.355<br>0.7620 | 15.080<br>0.5937 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 33.5<br>1.32                               | 34.0<br>1.34                               | 1.3<br>0.05                                  | 54.0<br>2.13   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.23<br>0.51        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 0.0<br>0.00                                    | 35.0<br>1.38                               | 41.5<br>1.63                               | 1.3<br>0.05                                  | 56.0<br>2.20   | 52.0<br>2.05   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.20<br>0.44        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 33.5<br>1.32                               | 34.0<br>1.34                               | 1.3<br>0.05                                  | 55.0<br>2.17   | 52.0<br>2.05   | 0.80<br>0.03   | 1.10<br>0.04   | 12.5           | 6.33           | 0.0565         | 0.26<br>0.57        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 34.0<br>1.34                               | 40.0<br>1.57                               | 1.3<br>0.05                                  | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.27<br>0.60        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 34.0<br>1.34                               | 34.5<br>1.36                               | 1.3<br>0.05                                  | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.61        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 34.0<br>1.34                               | 40.0<br>1.57                               | 1.3<br>0.05                                  | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.62        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.3<br>0.05                                    | 34.0<br>1.34                               | 36.0<br>1.42                               | 0.8<br>0.03                                  | 59.0<br>2.32   | 57.0<br>2.24   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.36<br>0.80        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 34.0<br>1.34                               | 40.0<br>1.57                               | 1.3<br>0.05                                  | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.30<br>0.66        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 34.0<br>1.34                               | 34.5<br>1.36                               | 1.3<br>0.05                                  | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.31<br>0.67        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 34.0<br>1.34                               | 40.0<br>1.57                               | 1.5<br>0.06                                  | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.30<br>0.66        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -3.3<br>-0.13    | 1.5<br>0.06                                    | 38.0<br>1.50                               | 40.0<br>1.57                               | 1.5<br>0.06                                  | 61.0<br>2.40   | 54.0<br>2.13   | 1.40<br>0.05   | 1.20<br>0.05   | 16.8           | 9.36           | 0.0736         | 0.35<br>0.77        |
| 18.974<br>0.7470 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                                    | 34.0<br>1.34                               | 36.0<br>1.42                               | 1.5<br>0.06                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.40<br>0.02   | 1.50<br>0.06   | 14             | 8.28           | 0.0589         | 0.31<br>0.69        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 1.3<br>0.05                                    | 34.0<br>1.34                               | 36.0<br>1.42                               | 1.3<br>0.05                                  | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.41<br>0.91        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -6.6<br>-0.26    | 0.8<br>0.03                                    | 35.0<br>1.38                               | 36.0<br>1.42                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 0.30<br>0.01   | 18.8           | 10.5           | 0.0652         | 0.41<br>0.90        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 0.8<br>0.03                                    | 36.0<br>1.42                               | 36.5<br>1.44                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.40<br>0.89        |
| 18.923<br>0.7450 | 19.050<br>0.7500 | -4.1<br>-0.16    | 1.5<br>0.06                                    | 35.0<br>1.38                               | 37.0<br>1.46                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 61.0<br>2.40   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.38<br>0.83        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                                    | 35.0<br>1.38                               | 39.0<br>1.54                               | 1.3<br>0.05                                  | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.48<br>1.06        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                                    | 35.0<br>1.38                               | 39.0<br>1.54                               | 1.5<br>0.06                                  | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.48<br>1.06        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                                    | 35.0<br>1.38                               | 37.0<br>1.46                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.39<br>0.87        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 4.8<br>0.19                                    | 36.5<br>1.44                               | 48.0<br>1.89                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 61.0<br>2.40   | 3.00<br>0.12   | 2.30<br>0.09   | 13             | 5.83           | 0.0686         | 0.46<br>1.02        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 1.5<br>0.06                                    | 36.5<br>1.44                               | 41.5<br>1.63                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 61.0<br>2.40   | 3.00<br>0.12   | 2.30<br>0.09   | 13             | 5.83           | 0.0686         | 0.47<br>1.04        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 37.0<br>1.46                               | 43.5<br>1.71                               | 3.3<br>0.13                                  | 67.0<br>2.64   | 61.0<br>2.40   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.61<br>1.35        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

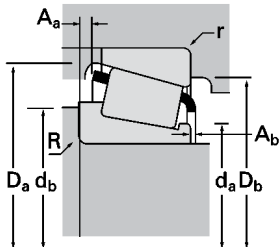
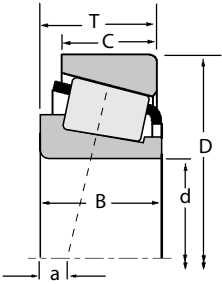
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |        |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|--------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer  |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |        |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3198        | 3120   |
| 28.575<br>1.1250        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02872       | 02820  |
| 28.575<br>1.1250        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02872       | 02830  |
| 28.575<br>1.1250        | 76.200<br>3.0000 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26112       | 26300  |
| 28.575<br>1.1250        | 76.200<br>3.0000 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3198        | 3129   |
| 28.575<br>1.1250        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43112       | 43312  |
| 29.000<br>1.1417        | 50.292<br>1.9800 | 14.224<br>0.5600 | 27700<br>6230          | 0.37 | 1.62 | 7190<br>1620           | 4550<br>1020     | 1.58 | 36200<br>8130   | L45449      | L45410 |
| 29.367<br>1.1562        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2690        | 2631   |
| 29.367<br>1.1562        | 66.421<br>2.6150 | 23.812<br>0.9375 | 71000<br>16000         | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2691        | 2631   |
| 29.987<br>1.1806        | 61.981<br>2.4402 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17118       | 17244A |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17118       | 17244  |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 18.161<br>0.7150 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15115       | 15245  |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15117       | 15245  |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15117       | 15244  |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15117       | 15244X |
| 29.987<br>1.1806        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15117       | 15250  |
| 29.987<br>1.1806        | 68.262<br>2.6875 | 21.000<br>0.8268 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02474A      | 02420A |
| 29.987<br>1.1806        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118AS     | 14276  |
| 29.987<br>1.1806        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26118       | 26283  |
| 29.987<br>1.1806        | 76.200<br>3.0000 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26118       | 26300  |
| 29.987<br>1.1806        | 76.200<br>3.0000 | 24.608<br>0.9688 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43117       | 43300  |
| 30.000<br>1.1811        | 62.000<br>2.4409 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17118-S     | 17244  |
| 30.000<br>1.1811        | 68.956<br>2.7148 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14117A      | 14274A |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118       | 14274  |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118       | 14276  |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14117A      | 14276  |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118A      | 14274  |
| 30.000<br>1.1811        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2586        | 2523   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 1.3<br>0.05                | 37.0<br>1.46                      | 39.0<br>1.54             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.62<br>1.36        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 0.8<br>0.03                | 37.0<br>1.46                      | 37.5<br>1.48             | 3.3<br>0.13                         | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.48<br>1.05        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 0.8<br>0.03                | 37.0<br>1.46                      | 37.5<br>1.48             | 0.8<br>0.03                         | 68.0<br>2.68   | 64.0<br>2.52   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.48<br>1.07        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                | 35.0<br>1.38                      | 37.0<br>1.46             | 1.5<br>0.06                         | 66.0<br>2.60   | 64.0<br>2.52   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.45<br>1.00        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 1.3<br>0.05                | 37.0<br>1.46                      | 39.0<br>1.54             | 0.8<br>0.03                         | 69.0<br>2.72   | 65.0<br>2.56   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.71<br>1.55        |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 0.8<br>0.03                | 41.5<br>1.63                      | 42.5<br>1.67             | 1.5<br>0.06                         | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.61<br>1.35        |
| 14.732<br>0.5800 | 10.668<br>0.4200 | -3.3<br>-0.13    | 3.5<br>0.14                | 33.5<br>1.32                      | 40.0<br>1.57             | 1.3<br>0.05                         | 48.0<br>1.89   | 44.5<br>1.75   | 0.50<br>0.02   | 0.80<br>0.03   | 10.8           | 12.4           | 0.0559         | 0.11<br>0.25        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 3.5<br>0.14                | 35.0<br>1.38                      | 41.0<br>1.61             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.40<br>0.88        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.5<br>1.48             | 1.3<br>0.05                         | 60.0<br>2.36   | 58.0<br>2.28   | 0.80<br>0.03   | 0.80<br>0.03   | 19.3           | 8              | 0.0598         | 0.41<br>0.89        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 34.5<br>1.36                      | 37.0<br>1.46             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.23<br>0.50        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 34.5<br>1.36                      | 37.0<br>1.46             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.23<br>0.50        |
| 19.050<br>0.7500 | 14.288<br>0.5625 | -4.8<br>-0.19    | 1.3<br>0.05                | 36.0<br>1.42                      | 37.5<br>1.48             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 0.30<br>0.01   | 1.70<br>0.07   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.56        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 1.3<br>0.05                | 35.0<br>1.38                      | 36.5<br>1.44             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.58        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 35.0<br>1.38                      | 36.5<br>1.44             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.61        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 35.0<br>1.38                      | 36.5<br>1.44             | 1.5<br>0.06                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.61        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.3<br>0.05                | 35.0<br>1.38                      | 36.5<br>1.44             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.65        |
| 22.225<br>0.8750 | 16.238<br>0.6393 | -5.1<br>-0.20    | 0.8<br>0.03                | 38.5<br>1.52                      | 39.5<br>1.56             | 1.5<br>0.06                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.38<br>0.84        |
| 19.202<br>0.7560 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 37.0<br>1.46                      | 37.5<br>1.48             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.80<br>0.07   | 18             | 9.4            | 0.0668         | 0.36<br>0.80        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                | 36.0<br>1.42                      | 38.0<br>1.50             | 1.5<br>0.06                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.38<br>0.85        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                | 36.0<br>1.42                      | 38.0<br>1.50             | 1.5<br>0.06                         | 66.0<br>2.60   | 64.0<br>2.52   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.44<br>0.98        |
| 24.074<br>0.9478 | 16.670<br>0.6563 | -2.0<br>-0.08    | 1.5<br>0.06                | 42.0<br>1.66                      | 44.5<br>1.75             | 3.3<br>0.13                         | 73.0<br>2.87   | 64.0<br>2.52   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.53<br>1.16        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 34.5<br>1.36                      | 37.0<br>1.46             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.23<br>0.50        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                | 40.0<br>1.57                      | 43.0<br>1.69             | 3.3<br>0.13                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.35<br>0.78        |
| 19.202<br>0.7560 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 3.3<br>0.13                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.80<br>0.07   | 18             | 9.4            | 0.0668         | 0.35<br>0.78        |
| 19.202<br>0.7560 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.80<br>0.07   | 18             | 9.4            | 0.0668         | 0.36<br>0.79        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                | 40.0<br>1.57                      | 43.0<br>1.69             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.36<br>0.80        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                | 37.0<br>1.46                      | 43.0<br>1.69             | 3.3<br>0.13                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.36<br>0.78        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                | 36.0<br>1.42                      | 42.5<br>1.67             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.02        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



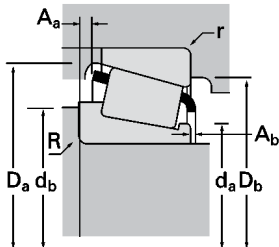
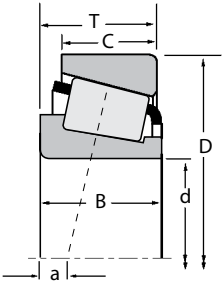




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 30.000<br>1.1811        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2560X       | 2523     |
| 30.000<br>1.1811        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2560X       | 2523-S   |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26118-S     | 26283-S  |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2560X       | 2526X    |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 29.370<br>1.1563 | 80600<br>18100         | 0.55 | 1.10 | 20900<br>4700          | 19500<br>4390    | 1.07 | 111000<br>24900 | JHM88540    | JHM88513 |
| 30.000<br>1.1811        | 72.022<br>2.8355 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2586        | 2525     |
| 30.000<br>1.1811        | 72.034<br>2.8360 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3190        | 3126     |
| 30.000<br>1.1811        | 72.085<br>2.8380 | 22.385<br>0.8813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118       | 14283    |
| 30.000<br>1.1811        | 72.085<br>2.8380 | 22.385<br>0.8813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14117A      | 14283    |
| 30.112<br>1.1855        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15116       | 15245    |
| 30.112<br>1.1855        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15116       | 15250    |
| 30.162<br>1.1875        | 58.738<br>2.3125 | 14.684<br>0.5781 | 29300<br>6600          | 0.47 | 1.27 | 7610<br>1710           | 6170<br>1390     | 1.23 | 35000<br>7880   | 08118       | 08231    |
| 30.162<br>1.1875        | 58.788<br>2.3145 | 14.684<br>0.5781 | 29300<br>6600          | 0.47 | 1.27 | 7610<br>1710           | 6170<br>1390     | 1.23 | 35000<br>7880   | 08118       | 08237    |
| 30.162<br>1.1875        | 62.000<br>2.4409 | 16.002<br>0.6300 | 40000<br>9000          | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17119       | 17244    |
| 30.162<br>1.1875        | 64.292<br>2.5312 | 21.433<br>0.8438 | 55700<br>12500         | 0.55 | 1.10 | 14500<br>3250          | 13500<br>3040    | 1.07 | 71700<br>16100  | M86649      | M86610   |
| 30.162<br>1.1875        | 64.292<br>2.5312 | 21.433<br>0.8438 | 55700<br>12500         | 0.55 | 1.10 | 14500<br>3250          | 13500<br>3040    | 1.07 | 71700<br>16100  | M86649P     | M86610P  |
| 30.162<br>1.1875        | 66.421<br>2.6150 | 19.050<br>0.7500 | 51700<br>11600         | 0.34 | 1.77 | 13400<br>3010          | 7790<br>1750     | 1.72 | 55200<br>12400  | 24118       | 24261    |
| 30.162<br>1.1875        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2558        | 2530     |
| 30.162<br>1.1875        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2558        | 2523     |
| 30.162<br>1.1875        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2558        | 2523-S   |
| 30.162<br>1.1875        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3187        | 3120     |
| 30.162<br>1.1875        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3191        | 3120     |
| 30.162<br>1.1875        | 76.200<br>3.0000 | 20.638<br>0.8125 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28118       | 28300    |
| 30.162<br>1.1875        | 76.200<br>3.0000 | 24.608<br>0.9688 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43118       | 43300    |
| 30.162<br>1.1875        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43118       | 43312    |
| 30.162<br>1.1875        | 80.000<br>3.1496 | 21.006<br>0.8270 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28118       | 28315    |
| 30.175<br>1.1880        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15120A      | 15245    |
| 30.213<br>1.1895        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15118       | 15244    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.0<br>0.08                | 36.0<br>1.42                      | 39.5<br>1.56             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.47<br>1.03        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.0<br>0.08                | 36.0<br>1.42                      | 39.5<br>1.56             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.47<br>1.03        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                | 36.0<br>1.42                      | 38.0<br>1.50             | 2.0<br>0.08                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.38<br>0.84        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.0<br>0.08                | 36.0<br>1.42                      | 39.5<br>1.56             | 2.0<br>0.08                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.50<br>1.11        |
| 27.783<br>1.0938 | 23.020<br>0.9063 | -5.6<br>-0.22    | 1.3<br>0.05                | 42.5<br>1.67                      | 44.5<br>1.75             | 3.3<br>0.13                         | 69.0<br>2.72   | 58.0<br>2.28   | 1.90<br>0.08   | 1.80<br>0.07   | 26.3           | 11.7           | 0.0857         | 0.61<br>1.34        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                | 36.0<br>1.42                      | 42.5<br>1.67             | 0.8<br>0.03                         | 65.0<br>2.56   | 63.0<br>2.48   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.50<br>1.10        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 38.0<br>1.50                      | 44.5<br>1.75             | 2.8<br>0.11                         | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.59<br>1.30        |
| 19.202<br>0.7560 | 18.415<br>0.7250 | -4.3<br>-0.17    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 2.3<br>0.09                         | 65.0<br>2.56   | 60.0<br>2.36   | 1.00<br>0.04   | 1.80<br>0.07   | 18             | 9.4            | 0.0668         | 0.44<br>0.96        |
| 19.583<br>0.7710 | 18.415<br>0.7250 | -4.3<br>-0.17    | 3.5<br>0.14                | 40.0<br>1.57                      | 43.0<br>1.69             | 2.3<br>0.09                         | 65.0<br>2.56   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.44<br>0.96        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 35.5<br>1.40                      | 36.0<br>1.42             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.58        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 35.5<br>1.40                      | 36.0<br>1.42             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.65        |
| 15.080<br>0.5937 | 10.716<br>0.4219 | -1.3<br>-0.05    | 3.5<br>0.14                | 35.0<br>1.38                      | 41.5<br>1.63             | 1.0<br>0.04                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.90<br>0.03   | 1.10<br>0.04   | 10.7           | 10.6           | 0.0601         | 0.17<br>0.38        |
| 15.080<br>0.5937 | 10.716<br>0.4219 | -1.3<br>-0.05    | 3.5<br>0.14                | 35.0<br>1.38                      | 41.5<br>1.63             | 1.0<br>0.04                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.90<br>0.03   | 1.10<br>0.04   | 10.7           | 10.6           | 0.0601         | 0.17<br>0.38        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 1.5<br>0.06                | 34.5<br>1.36                      | 37.0<br>1.46             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.30<br>0.01   | 1.80<br>0.07   | 11.8           | 7.49           | 0.0579         | 0.23<br>0.50        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -3.3<br>-0.13    | 1.5<br>0.06                | 38.0<br>1.50                      | 41.0<br>1.61             | 1.5<br>0.06                         | 61.0<br>2.40   | 54.0<br>2.13   | 1.40<br>0.05   | 1.20<br>0.05   | 16.8           | 9.36           | 0.0736         | 0.34<br>0.74        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -3.3<br>-0.13    | 1.5<br>0.06                | 38.0<br>1.50                      | 41.0<br>1.61             | 1.5<br>0.06                         | 61.0<br>2.40   | 54.0<br>2.13   | 1.40<br>0.06   | 1.20<br>0.05   | 16.8           | 9.36           | 0.0736         | 0.34<br>0.74        |
| 18.974<br>0.7470 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                | 35.0<br>1.38                      | 37.5<br>1.48             | 1.5<br>0.06                         | 61.0<br>2.40   | 58.0<br>2.28   | 0.40<br>0.02   | 1.50<br>0.06   | 14             | 8.28           | 0.0589         | 0.30<br>0.67        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 0.8<br>0.03                         | 62.5<br>2.46   | 60.0<br>2.36   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.43<br>0.94        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.02        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.02        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                | 38.5<br>1.52                      | 39.0<br>1.54             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.60<br>1.33        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 38.5<br>1.52                      | 44.5<br>1.75             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.60<br>1.32        |
| 20.940<br>0.8244 | 15.507<br>0.6105 | -4.8<br>-0.19    | 1.5<br>0.06                | 37.5<br>1.48                      | 40.0<br>1.57             | 1.3<br>0.05                         | 71.0<br>2.80   | 68.0<br>2.68   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.47<br>1.04        |
| 24.074<br>0.9478 | 16.670<br>0.6563 | -2.0<br>-0.08    | 1.5<br>0.06                | 42.0<br>1.65                      | 45.0<br>1.77             | 3.3<br>0.13                         | 73.0<br>2.87   | 64.0<br>2.52   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.52<br>1.16        |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 1.5<br>0.06                | 42.0<br>1.65                      | 45.0<br>1.77             | 1.5<br>0.06                         | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.60<br>1.31        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                | 37.5<br>1.48                      | 40.0<br>1.57             | 1.5<br>0.06                         | 73.0<br>2.87   | 69.0<br>2.72   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.53<br>1.17        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.5<br>0.02                | 35.5<br>1.40                      | 35.5<br>1.40             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.58        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 35.5<br>1.40                      | 41.5<br>1.63             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.27<br>0.60        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

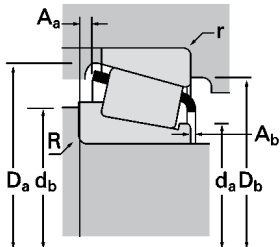
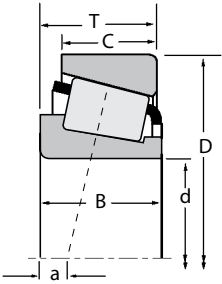
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 30.213<br>1.1895        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15120       | 15244                  |  |                |       |       |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15118       | 15250                  |  |                |       |       |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15119       | 15249                  |  |                |       |       |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15119       | 15250                  |  |                |       |       |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15120       | 15250                  |  |                |       |       |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15118       | 15250X                 |  |                |       |       |
| 30.213<br>1.1895        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200         | 2561X       | 2520                   |  |                |       |       |
| 30.213<br>1.1895        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200         | 2561X       | 2523                   |  |                |       |       |
| 30.213<br>1.1895        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200         | 2561X       | 2523-S                 |  |                |       |       |
| 30.226<br>1.1900        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14116       | 14276                  |  |                |       |       |
| 30.955<br>1.2187        | 64.292<br>2.5312 | 21.433<br>0.8438 | 55700<br>12500         | 0.55 | 1.10 | 14500<br>3250          | 13500<br>3040    | 1.07 | 71700<br>16100         | M86648A     | M86610                 |  |                |       |       |
| 31.623<br>1.2450        | 66.675<br>2.6250 | 20.638<br>0.8125 | 48600<br>10900         | 0.37 | 1.62 | 12600<br>2830          | 8010<br>1800     | 1.57 | 57900<br>13000         | 1674        | 1620                   |  |                |       |       |
| 31.750<br>1.2500        | 58.738<br>2.3125 | 14.684<br>0.5781 | 29300<br>6600          | 0.47 | 1.27 | 7610<br>1710           | 6170<br>1390     | 1.23 | 35000<br>7880          | 08125       | 08231                  |  |                |       |       |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67045     | LM67010                |  |                |       |       |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67047     | LM67010                |  |                |       |       |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67048     | LM67010                |  |                |       |       |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67049A    | LM67010                |  |                |       |       |
| 31.750<br>1.2500        | 61.986<br>2.4404 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67045     | LM67014                |  |                |       |       |
| 31.750<br>1.2500        | 61.986<br>2.4404 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67048     | LM67014                |  |                |       |       |
| 31.750<br>1.2500        | 61.986<br>2.4404 | 15.875<br>0.6250 | 36500<br>8210          | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000         | LM67049A    | LM67014                |  |                |       |       |
| 31.750<br>1.2500        | 62.000<br>2.4409 | 18.161<br>0.7150 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15123       | 15245                  |  |                |       |       |
| 31.750<br>1.2500        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15125       | 15245                  |  |                |       |       |
| 31.750<br>1.2500        | 62.000<br>2.4409 | 19.050<br>0.7500 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15126       | 15245                  |  |                |       |       |
| 31.750<br>1.2500        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15125       | 15244                  |  |                |       |       |
| 31.750<br>1.2500        | 62.000<br>2.4409 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15126       | 15244                  |  |                |       |       |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 19.748<br>0.7775 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15123       | 15250                  |  |                |       |       |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15125       | 15250                  |  |                |       |       |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100         | 15126       | 15250                  |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 35.5<br>1.40                      | 36.0<br>1.42             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.61        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 35.5<br>1.40                      | 41.5<br>1.63             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.64        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 35.5<br>1.40                      | 37.5<br>1.48             | 1.5<br>0.06                         | 59.0<br>2.32   | 55.0<br>2.17   | *<br>*         | *<br>*         | 14.6           | 7.58           | 0.0606         | 0.29<br>0.64        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 1.5<br>0.06                | 35.5<br>1.40                      | 37.5<br>1.48             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | *<br>*         | *<br>*         | 14.6           | 7.58           | 0.0606         | 0.29<br>0.64        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 35.5<br>1.40                      | 36.0<br>1.42             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.65        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 35.5<br>1.40                      | 41.5<br>1.63             | 1.5<br>0.06                         | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.63        |
| 24.714<br>0.9730 | 20.638<br>0.8125 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 3.3<br>0.13                         | 62.5<br>2.46   | 57.0<br>2.24   | 0.90<br>0.04   | 1.40<br>0.06   | 23.6           | 9.63           | 0.0656         | 0.41<br>0.91        |
| 24.714<br>0.9730 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 1.40<br>0.06   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.02        |
| 24.714<br>0.9730 | 19.050<br>0.7500 | -8.6<br>-0.34    | 2.3<br>0.09                | 36.5<br>1.44                      | 40.0<br>1.57             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 1.40<br>0.06   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.02        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 37.0<br>1.46                      | 38.0<br>1.50             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.36<br>0.80        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -3.3<br>-0.13    | 1.5<br>0.06                | 38.0<br>1.50                      | 42.0<br>1.65             | 1.5<br>0.06                         | 61.0<br>2.40   | 54.0<br>2.13   | 1.40<br>0.05   | 1.20<br>0.05   | 16.8           | 9.36           | 0.0736         | 0.33<br>0.73        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.3<br>-0.21    | 1.5<br>0.06                | 37.0<br>1.46                      | 39.5<br>1.56             | 1.5<br>0.06                         | 61.0<br>2.40   | 58.0<br>2.28   | 1.50<br>0.06   | 1.00<br>0.04   | 16.6           | 8.67           | 0.0644         | 0.33<br>0.72        |
| 15.080<br>0.5937 | 10.716<br>0.4219 | -1.3<br>-0.05    | 1.0<br>0.04                | 36.0<br>1.42                      | 37.5<br>1.48             | 1.0<br>0.04                         | 55.0<br>2.17   | 52.0<br>2.05   | 0.90<br>0.03   | 1.10<br>0.04   | 10.7           | 10.6           | 0.0601         | 0.17<br>0.37        |
| 18.500<br>0.7283 | 11.811<br>0.4650 | -3.0<br>-0.12    | 2.0<br>0.08                | 36.0<br>1.42                      | 39.5<br>1.56             | 1.3<br>0.05                         | 56.0<br>2.20   | 52.0<br>2.05   | 0.80<br>0.03   | -1.10<br>-0.04 | 12.8           | 9.93           | 0.0612         | 0.19<br>0.42        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 2.3<br>0.09                | 36.0<br>1.42                      | 40.0<br>1.57             | 1.3<br>0.05                         | 56.0<br>2.20   | 52.0<br>2.05   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.18<br>0.41        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 3.5<br>0.14                | 36.0<br>1.42                      | 42.5<br>1.67             | 1.3<br>0.05                         | 56.0<br>2.20   | 52.0<br>2.05   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.18<br>0.39        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 0.8<br>0.03                | 36.0<br>1.42                      | 37.0<br>1.46             | 1.3<br>0.05                         | 56.0<br>2.20   | 52.0<br>2.05   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.19<br>0.41        |
| 18.500<br>0.7283 | 11.811<br>0.4650 | -3.0<br>-0.12    | 2.0<br>0.08                | 36.0<br>1.42                      | 39.5<br>1.56             | 1.3<br>0.05                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.80<br>0.03   | -1.10<br>-0.04 | 12.8           | 9.93           | 0.0612         | 0.21<br>0.47        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 3.5<br>0.14                | 36.0<br>1.42                      | 42.5<br>1.67             | 1.3<br>0.05                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.20<br>0.44        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 0.8<br>0.03                | 36.0<br>1.42                      | 37.0<br>1.46             | 1.3<br>0.05                         | 57.0<br>2.24   | 54.0<br>2.13   | 0.70<br>0.03   | 0.80<br>0.03   | 12.8           | 9.93           | 0.0612         | 0.21<br>0.46        |
| 19.050<br>0.7500 | 14.288<br>0.5625 | -4.8<br>-0.19    | 0.0<br>0.00                | 36.5<br>1.44                      | 42.5<br>1.67             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 0.30<br>0.01   | 1.70<br>0.07   | 14.6           | 7.58           | 0.0606         | 0.23<br>0.51        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 3.5<br>0.14                | 36.5<br>1.44                      | 42.5<br>1.67             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.25<br>0.54        |
| 20.638<br>0.8125 | 14.288<br>0.5625 | -5.8<br>-0.23    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.25<br>0.55        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 36.5<br>1.44                      | 42.5<br>1.67             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.57        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 1.3<br>0.05                         | 58.0<br>2.28   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.58        |
| 19.050<br>0.7500 | 15.875<br>0.6250 | -4.8<br>-0.19    | 0.0<br>0.00                | 36.5<br>1.44                      | 42.5<br>1.67             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 0.30<br>0.01   | 1.70<br>0.07   | 14.6           | 7.58           | 0.0606         | 0.26<br>0.58        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                | 36.5<br>1.44                      | 42.5<br>1.67             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.00<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.61        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                | 36.5<br>1.44                      | 37.0<br>1.46             | 1.3<br>0.05                         | 59.0<br>2.32   | 56.0<br>2.20   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.62        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

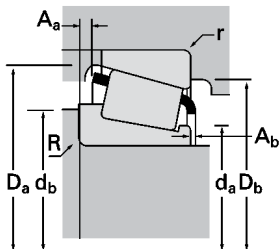
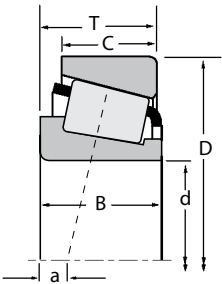
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer     |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |           |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 20.638<br>0.8125 | 46800<br>10500         | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15126       | 15250X    |
| 31.750<br>1.2500        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580        | 2520      |
| 31.750<br>1.2500        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580        | 2530      |
| 31.750<br>1.2500        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580        | 2520A     |
| 31.750<br>1.2500        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580A       | 2520A     |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 21.000<br>0.8268 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02476       | 02420A    |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 22.225<br>0.8750 | 62600<br>14100         | 0.34 | 1.77 | 16200<br>3650          | 9420<br>2120     | 1.72 | 73300<br>16500  | 2475        | 2420      |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02475       | 02420     |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02476       | 02420     |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 22.225<br>0.8750 | 61700<br>13900         | 0.28 | 2.18 | 16000<br>3600          | 7540<br>1700     | 2.12 | 77900<br>17500  | 16579       | 16522     |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88046      | M88010    |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 26.988<br>1.0625 | 74700<br>16800         | 0.35 | 1.71 | 19400<br>4360          | 11700<br>2620    | 1.66 | 91000<br>20500  | 23491       | 23420     |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14124       | 14274     |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14124       | 14276     |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14125A      | 14274     |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14125A      | 14276     |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 22.385<br>0.8813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14124       | 14277     |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580        | 2523      |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2582        | 2523      |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580        | 2523-S    |
| 31.750<br>1.2500        | 71.996<br>2.8345 | 19.002<br>0.7481 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14124       | 14282     |
| 31.750<br>1.2500        | 72.022<br>2.8355 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2582        | 2525      |
| 31.750<br>1.2500        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88644     | HM88610   |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88644     | HM88611AS |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3188        | 3120      |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3193        | 3120      |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3199        | 3120      |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2875        | 2820      |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 0.8<br>0.03                                    | 36.5<br>1.44                               | 37.0<br>1.46                               | 1.5<br>0.06                                  | 59.0<br>2.32   | 55.0<br>2.17   | 1.20<br>0.05   | 1.10<br>0.04   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.62        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 37.5<br>1.48                               | 38.5<br>1.52                               | 3.3<br>0.13                                  | 62.5<br>2.46   | 57.0<br>2.24   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.40<br>0.89        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 37.5<br>1.48                               | 38.5<br>1.52                               | 0.8<br>0.03                                  | 62.5<br>2.46   | 60.0<br>2.36   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.41<br>0.91        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 37.5<br>1.48                               | 38.5<br>1.52                               | 1.5<br>0.06                                  | 62.0<br>2.44   | 59.0<br>2.32   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.41<br>0.91        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 1.3<br>0.05                                    | 39.5<br>1.56                               | 41.5<br>1.63                               | 1.5<br>0.06                                  | 62.0<br>2.44   | 59.0<br>2.32   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.41<br>0.91        |
| 22.225<br>0.8750 | 16.238<br>0.6393 | -5.1<br>-0.20    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.37<br>0.81        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 37.5<br>1.48                               | 44.0<br>1.73                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 0.30<br>0.01   | 18.8           | 10.5           | 0.0652         | 0.38<br>0.83        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 38.5<br>1.52                               | 44.5<br>1.75                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.37<br>0.82        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 1.5<br>0.06                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.20<br>0.05   | 0.90<br>0.04   | 17.5           | 8.48           | 0.0681         | 0.38<br>0.83        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -7.4<br>-0.29    | 1.5<br>0.06                                    | 37.5<br>1.48                               | 39.5<br>1.56                               | 0.8<br>0.03                                  | 63.0<br>2.48   | 61.0<br>2.40   | 0.70<br>0.03   | 1.50<br>0.06   | 22.7           | 13             | 0.0650         | 0.39<br>0.85        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 1.5<br>0.06                                    | 40.5<br>1.59                               | 43.0<br>1.69                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 58.0<br>2.28   | 1.70<br>0.07   | 0.90<br>0.04   | 19.4           | 10             | 0.0771         | 0.39<br>0.87        |
| 26.988<br>1.0625 | 22.225<br>0.8750 | -8.6<br>-0.34    | 1.5<br>0.06                                    | 39.0<br>1.54                               | 41.0<br>1.61                               | 1.5<br>0.06                                  | 64.0<br>2.52   | 59.0<br>2.32   | 1.60<br>0.06   | 0.60<br>0.02   | 21.9           | 10.4           | 0.0697         | 0.46<br>1.02        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 3.3<br>0.13                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.34<br>0.76        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 1.3<br>0.05                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.35<br>0.78        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 38.5<br>1.52                               | 44.5<br>1.75                               | 3.3<br>0.13                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.34<br>0.75        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 38.5<br>1.52                               | 44.5<br>1.75                               | 1.3<br>0.05                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.35<br>0.77        |
| 19.583<br>0.7710 | 18.415<br>0.7250 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 2.3<br>0.09                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.38<br>0.84        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 37.5<br>1.48                               | 38.5<br>1.52                               | 1.3<br>0.05                                  | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.45<br>1.00        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 37.5<br>1.48                               | 44.0<br>1.73                               | 1.3<br>0.05                                  | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.45<br>0.98        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 37.5<br>1.48                               | 38.5<br>1.52                               | 1.5<br>0.06                                  | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.45<br>0.99        |
| 19.583<br>0.7710 | 15.032<br>0.5918 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.0<br>1.54                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 62.0<br>2.44   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.38<br>0.84        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 37.5<br>1.48                               | 44.0<br>1.73                               | 0.8<br>0.03                                  | 65.0<br>2.56   | 63.0<br>2.48   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.48<br>1.07        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 1.5<br>0.06                                    | 42.5<br>1.67                               | 44.5<br>1.75                               | 2.3<br>0.09                                  | 69.0<br>2.72   | 60.0<br>2.36   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.52<br>1.15        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 1.5<br>0.06                                    | 42.5<br>1.67                               | 44.5<br>1.75                               | 3.3<br>0.13                                  | 69.0<br>2.72   | 59.0<br>2.32   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.53<br>1.16        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                                    | 39.5<br>1.56                               | 40.0<br>1.57                               | 3.3<br>0.13                                  | 67.0<br>2.64   | 61.0<br>2.40   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.58<br>1.29        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 39.5<br>1.56                               | 45.5<br>1.79                               | 3.3<br>0.13                                  | 67.0<br>2.64   | 61.0<br>2.40   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.58<br>1.28        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 2.3<br>0.09                                    | 39.5<br>1.56                               | 43.0<br>1.69                               | 3.3<br>0.13                                  | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.58<br>1.28        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 38.5<br>1.52                               | 45.0<br>1.77                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 63.0<br>2.48   | 0.90<br>0.04   | 0.20<br>0.01   | 23.1           | 12.4           | 0.0718         | 0.46<br>1.01        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

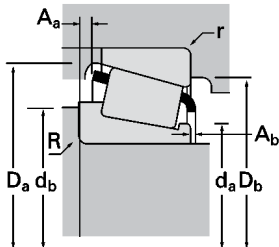
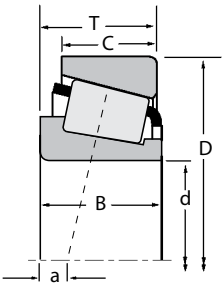
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer   |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |         |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2879        | 2820    |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02875       | 02820   |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02876       | 02820   |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 26.988<br>1.0625 | 82800<br>18600         | 0.37 | 1.62 | 21500<br>4830          | 13600<br>3050    | 1.58 | 102000<br>22900 | 23685       | 23620   |
| 31.750<br>1.2500        | 73.025<br>2.8750 | 29.370<br>1.1563 | 80600<br>18100         | 0.55 | 1.10 | 20900<br>4700          | 19500<br>4390    | 1.07 | 111000<br>24900 | HM88542     | HM88510 |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2783        | 2720    |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 24.608<br>0.9688 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43125       | 43300   |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89440     | HM89410 |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3188        | 3129    |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3193        | 3129    |
| 31.750<br>1.2500        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43125       | 43312   |
| 31.750<br>1.2500        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3476        | 3420    |
| 31.750<br>1.2500        | 80.000<br>3.1496 | 24.176<br>0.9518 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 346         | 332A    |
| 31.750<br>1.2500        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 346         | 3320    |
| 31.987<br>1.2593        | 66.987<br>2.6373 | 20.500<br>0.8071 | 59100<br>13300         | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02476X      | 02419   |
| 31.987<br>1.2593        | 71.973<br>2.8336 | 27.000<br>1.0630 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88638     | HM88611 |
| 32.000<br>1.2598        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26126X      | 26283   |
| 32.004<br>1.2600        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26126       | 26283   |
| 32.532<br>1.2808        | 69.850<br>2.7500 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2584        | 2523    |
| 33.338<br>1.3125        | 66.421<br>2.6150 | 25.400<br>1.0000 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2585        | 2520    |
| 33.338<br>1.3125        | 66.675<br>2.6250 | 20.638<br>0.8125 | 48600<br>10900         | 0.37 | 1.62 | 12600<br>2830          | 8010<br>1800     | 1.57 | 57900<br>13000  | 1680        | 1620    |
| 33.338<br>1.3125        | 66.675<br>2.6250 | 20.638<br>0.8125 | 57800<br>13000         | 0.35 | 1.70 | 15000<br>3370          | 9050<br>2030     | 1.66 | 72800<br>16400  | M38545      | M38510  |
| 33.338<br>1.3125        | 68.262<br>2.6875 | 22.225<br>0.8750 | 61700<br>13900         | 0.28 | 2.18 | 16000<br>3600          | 7540<br>1700     | 2.12 | 77900<br>17500  | 16582       | 16522   |
| 33.338<br>1.3125        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88048A     | M88010  |
| 33.338<br>1.3125        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88048      | M88010  |
| 33.338<br>1.3125        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88048      | M88012  |
| 33.338<br>1.3125        | 68.262<br>2.6875 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88048-S    | M88010  |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14130       | 14274   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -5.6<br>-0.22    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.5<br>1.56                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 63.0<br>2.48   | 0.90<br>0.04   | 0.20<br>0.01   | 23.1           | 12.4           | 0.0718         | 0.46<br>1.02        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 39.5<br>1.56                               | 45.5<br>1.79                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.44<br>0.97        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 0.8<br>0.03                                    | 39.5<br>1.56                               | 40.0<br>1.57                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.45<br>0.99        |
| 26.975<br>1.0620 | 22.225<br>0.8750 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 40.0<br>1.57                               | 46.0<br>1.81                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 63.0<br>2.48   | 1.80<br>0.07   | 0.70<br>0.03   | 24.4           | 10.7           | 0.0734         | 0.55<br>1.22        |
| 27.783<br>1.0938 | 23.020<br>0.9063 | -5.6<br>-0.22    | 1.3<br>0.05                                    | 42.5<br>1.68                               | 45.5<br>1.79                               | 3.3<br>0.13                                  | 70.0<br>2.76   | 59.0<br>2.32   | 1.90<br>0.08   | 1.80<br>0.07   | 26.3           | 11.7           | 0.0857         | 0.61<br>1.34        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                                    | 38.5<br>1.52                               | 41.0<br>1.61                               | 3.3<br>0.13                                  | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.57<br>1.25        |
| 24.074<br>0.9478 | 16.670<br>0.6563 | -2.0<br>-0.08    | 1.5<br>0.06                                    | 41.5<br>1.63                               | 44.0<br>1.73                               | 3.3<br>0.13                                  | 73.0<br>2.87   | 64.0<br>2.52   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.51<br>1.12        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.5<br>1.79                               | 3.3<br>0.13                                  | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.68<br>1.50        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                                    | 39.5<br>1.56                               | 40.0<br>1.57                               | 0.8<br>0.03                                  | 69.0<br>2.72   | 65.0<br>2.56   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.67<br>1.48        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 39.5<br>1.56                               | 45.5<br>1.79                               | 0.8<br>0.03                                  | 69.0<br>2.72   | 65.0<br>2.56   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.67<br>1.47        |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 1.5<br>0.06                                    | 41.5<br>1.63                               | 44.0<br>1.73                               | 1.5<br>0.06                                  | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.58<br>1.28        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 1.3<br>0.05                                    | 41.0<br>1.61                               | 43.0<br>1.69                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.74<br>1.64        |
| 22.403<br>0.8820 | 21.000<br>0.8268 | -6.4<br>-0.25    | 0.8<br>0.03                                    | 39.5<br>1.56                               | 40.0<br>1.57                               | 2.3<br>0.09                                  | 75.0<br>2.95   | 71.0<br>2.80   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.59<br>1.30        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 0.8<br>0.03                                    | 39.5<br>1.56                               | 40.0<br>1.57                               | 3.3<br>0.13                                  | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.63<br>1.38        |
| 20.500<br>0.8071 | 16.000<br>0.6299 | -5.1<br>-0.20    | 0.8<br>0.03                                    | 38.5<br>1.52                               | 39.5<br>1.56                               | 1.5<br>0.06                                  | 62.0<br>2.44   | 59.0<br>2.32   | 1.20<br>0.05   | 2.60<br>0.10   | 17.5           | 8.48           | 0.0681         | 0.33<br>0.73        |
| 25.400<br>1.0000 | 21.443<br>0.8442 | -4.6<br>-0.18    | 3.3<br>0.13                                    | 42.5<br>1.67                               | 48.5<br>1.91                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 61.0<br>2.40   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.55<br>1.21        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 2.0<br>0.08                                    | 37.5<br>1.48                               | 40.5<br>1.59                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.37<br>0.81        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 1.5<br>0.06                                    | 37.5<br>1.48                               | 39.5<br>1.56                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.37<br>0.81        |
| 26.944<br>1.0608 | 19.050<br>0.7500 | -10.2<br>-0.40   | 5.0<br>0.20                                    | 38.0<br>1.50                               | 47.5<br>1.87                               | 1.3<br>0.05                                  | 64.0<br>2.52   | 61.0<br>2.40   | 2.50<br>0.10   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.44<br>0.98        |
| 25.357<br>0.9983 | 20.638<br>0.8125 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 39.0<br>1.54                               | 45.0<br>1.77                               | 3.3<br>0.13                                  | 62.5<br>2.46   | 57.0<br>2.24   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.38<br>0.84        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.3<br>-0.21    | 3.5<br>0.14                                    | 38.5<br>1.52                               | 44.5<br>1.75                               | 1.5<br>0.06                                  | 61.0<br>2.40   | 58.0<br>2.28   | *<br>*         | *<br>*         | 16.6           | 8.67           | 0.0644         | 0.31<br>0.68        |
| 20.638<br>0.8125 | 16.670<br>0.6563 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 39.0<br>1.54                               | 45.0<br>1.77                               | 2.3<br>0.09                                  | 62.0<br>2.44   | 58.0<br>2.28   | 0.40<br>0.02   | 2.40<br>0.09   | 20.3           | 11.8           | 0.0680         | 0.32<br>0.71        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -7.4<br>-0.29    | 1.5<br>0.06                                    | 38.5<br>1.52                               | 41.0<br>1.61                               | 0.8<br>0.03                                  | 63.0<br>2.48   | 61.0<br>2.40   | 0.70<br>0.03   | 1.50<br>0.06   | 22.7           | 13             | 0.0650         | 0.37<br>0.82        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 1.3<br>0.05                                    | 41.0<br>1.62                               | 43.5<br>1.71                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 58.0<br>2.28   | 1.40<br>0.06   | 1.00<br>0.04   | 19.4           | 10             | 0.0771         | 0.38<br>0.84        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 0.8<br>0.03                                    | 41.0<br>1.62                               | 42.5<br>1.67                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 58.0<br>2.28   | 1.40<br>0.06   | 1.00<br>0.04   | 19.4           | 10             | 0.0771         | 0.38<br>0.84        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 0.8<br>0.03                                    | 41.0<br>1.62                               | 42.5<br>1.67                               | 0.8<br>0.03                                  | 64.0<br>2.52   | 59.0<br>2.32   | 1.40<br>0.06   | 1.00<br>0.04   | 19.4           | 10             | 0.0771         | 0.38<br>0.84        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 4.0<br>0.16                                    | 41.0<br>1.62                               | 49.5<br>1.95                               | 1.5<br>0.06                                  | 65.0<br>2.56   | 58.0<br>2.28   | 1.40<br>0.06   | 1.00<br>0.04   | 19.4           | 10             | 0.0771         | 0.38<br>0.83        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 39.5<br>1.56                               | 46.0<br>1.81                               | 3.3<br>0.13                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.33<br>0.73        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

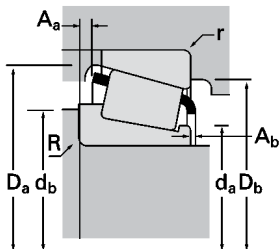
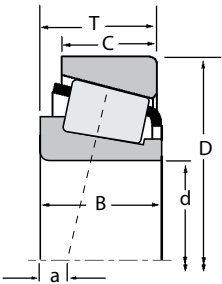
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          |             | Inner   | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>  |             |         |       |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14130       | 14276   |       |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14131       | 14274   |       |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14131       | 14276   |       |
| 33.338<br>1.3125        | 69.723<br>2.7450 | 19.050<br>0.7500 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26132       | 26274   |       |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2581        | 2523    |       |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2585        | 2523    |       |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2581        | 2523-S  |       |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 23.812<br>0.9375 | 77500<br>17400         | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2585        | 2523-S  |       |
| 33.338<br>1.3125        | 71.996<br>2.8345 | 19.002<br>0.7481 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14130       | 14282   |       |
| 33.338<br>1.3125        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26131       | 26283   |       |
| 33.338<br>1.3125        | 72.000<br>2.8346 | 19.000<br>0.7480 | 54400<br>12200         | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26131       | 26283-S |       |
| 33.338<br>1.3125        | 72.238<br>2.8440 | 20.638<br>0.8125 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16131       | 16284   |       |
| 33.338<br>1.3125        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3196        | 3120    |       |
| 33.338<br>1.3125        | 72.626<br>2.8593 | 30.162<br>1.1875 | 87700<br>19700         | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3197        | 3120    |       |
| 33.338<br>1.3125        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2790        | 2735X   |       |
| 33.338<br>1.3125        | 73.025<br>2.8750 | 29.370<br>1.1563 | 80600<br>18100         | 0.55 | 1.10 | 20900<br>4700          | 19500<br>4390    | 1.07 | 111000<br>24900 | HM88547     | HM88510 |       |
| 33.338<br>1.3125        | 73.025<br>2.8750 | 29.370<br>1.1563 | 80600<br>18100         | 0.55 | 1.10 | 20900<br>4700          | 19500<br>4390    | 1.07 | 111000<br>24900 | HM88547     | HM88511 |       |
| 33.338<br>1.3125        | 73.812<br>2.9060 | 29.370<br>1.1563 | 80600<br>18100         | 0.55 | 1.10 | 20900<br>4700          | 19500<br>4390    | 1.07 | 111000<br>24900 | HM88547     | HM88512 |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 22.225<br>0.8750 | 59600<br>13400         | 0.55 | 1.10 | 15500<br>3470          | 14400<br>3250    | 1.07 | 77400<br>17400  | M88048      | M88022  |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2785        | 2720    |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2785        | 2729    |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2790        | 2720    |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2790        | 2729    |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100 | 31590       | 31520   |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89443     | HM89410 |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89443     | HM89411 |       |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89444     | HM89410 |       |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100  | 43131       | 43312   |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                | 39.5<br>1.56                      | 46.0<br>1.81             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.34<br>0.74        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 39.5<br>1.56                      | 40.5<br>1.59             | 3.3<br>0.13                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.33<br>0.73        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 0.8<br>0.03                | 39.5<br>1.56                      | 40.5<br>1.59             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.34<br>0.75        |
| 18.923<br>0.7450 | 19.050<br>0.7500 | -4.1<br>-0.16    | 1.5<br>0.06                | 38.5<br>1.52                      | 40.5<br>1.59             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.34<br>0.76        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 0.8<br>0.03                | 39.0<br>1.54                      | 39.5<br>1.56             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.44<br>0.96        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                | 39.0<br>1.54                      | 45.0<br>1.77             | 1.3<br>0.05                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.43<br>0.95        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 0.8<br>0.03                | 39.0<br>1.54                      | 39.5<br>1.56             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.43<br>0.96        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 3.5<br>0.14                | 39.0<br>1.54                      | 45.0<br>1.77             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 0.90<br>0.04   | 0.80<br>0.03   | 23.6           | 9.63           | 0.0656         | 0.43<br>0.95        |
| 19.583<br>0.7710 | 15.032<br>0.5918 | -4.3<br>-0.17    | 3.5<br>0.14                | 39.5<br>1.56                      | 46.0<br>1.81             | 1.5<br>0.06                         | 65.0<br>2.56   | 62.0<br>2.44   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.37<br>0.81        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                | 38.5<br>1.52                      | 44.5<br>1.75             | 1.5<br>0.06                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.35<br>0.78        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                | 38.5<br>1.52                      | 44.5<br>1.75             | 2.0<br>0.08                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.60<br>0.02   | 1.10<br>0.04   | 16.1           | 10.1           | 0.0630         | 0.35<br>0.78        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                | 39.5<br>1.56                      | 46.0<br>1.81             | 1.3<br>0.05                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.40<br>0.87        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 40.5<br>1.59                      | 47.0<br>1.85             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | 1.50<br>0.06   | 0.50<br>0.02   | 23.4           | 8.76           | 0.0697         | 0.56<br>1.23        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                | 40.5<br>1.59                      | 41.5<br>1.63             | 3.3<br>0.13                         | 67.0<br>2.64   | 61.0<br>2.40   | *<br>*         | *<br>*         | 23.4           | 8.76           | 0.0697         | 0.56<br>1.25        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 40.0<br>1.57                      | 42.0<br>1.65             | 0.8<br>0.03                         | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.51<br>1.11        |
| 27.783<br>1.0938 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 42.5<br>1.68                      | 45.5<br>1.79             | 3.3<br>0.13                         | 70.0<br>2.76   | 59.0<br>2.32   | 1.90<br>0.08   | 1.80<br>0.07   | 26.3           | 11.7           | 0.0857         | 0.59<br>1.30        |
| 27.783<br>1.0938 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 42.5<br>1.68                      | 45.5<br>1.79             | 0.8<br>0.03                         | 70.0<br>2.76   | 62.0<br>2.44   | 1.90<br>0.08   | 1.80<br>0.07   | 26.3           | 11.7           | 0.0857         | 0.60<br>1.32        |
| 27.783<br>1.0938 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 42.5<br>1.68                      | 45.5<br>1.79             | 3.3<br>0.13                         | 70.0<br>2.76   | 60.0<br>2.36   | 1.90<br>0.08   | 1.80<br>0.07   | 26.3           | 11.7           | 0.0857         | 0.61<br>1.34        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -2.8<br>-0.11    | 0.8<br>0.03                | 41.0<br>1.62                      | 42.5<br>1.67             | 0.8<br>0.03                         | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 1.00<br>0.04   | 19.4           | 10             | 0.0771         | 0.50<br>1.11        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                | 40.0<br>1.57                      | 46.0<br>1.81             | 3.3<br>0.13                         | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.55<br>1.21        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                | 40.0<br>1.57                      | 46.0<br>1.81             | 0.8<br>0.03                         | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.56<br>1.23        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 40.0<br>1.57                      | 42.0<br>1.65             | 3.3<br>0.13                         | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.55<br>1.22        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 40.0<br>1.57                      | 42.0<br>1.65             | 0.8<br>0.03                         | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.56<br>1.24        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 0.8<br>0.03                | 42.5<br>1.67                      | 43.0<br>1.69             | 3.3<br>0.13                         | 72.0<br>2.83   | 64.0<br>2.52   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.64<br>1.41        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 44.5<br>1.75                      | 46.5<br>1.83             | 3.3<br>0.13                         | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.66<br>1.46        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 44.5<br>1.75                      | 46.5<br>1.83             | 0.8<br>0.03                         | 73.0<br>2.87   | 65.0<br>2.56   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.67<br>1.48        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 3.8<br>0.15                | 44.5<br>1.75                      | 53.0<br>2.09             | 3.3<br>0.13                         | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.66<br>1.45        |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 3.5<br>0.14                | 42.0<br>1.65                      | 51.0<br>2.01             | 1.5<br>0.06                         | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.56<br>1.24        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

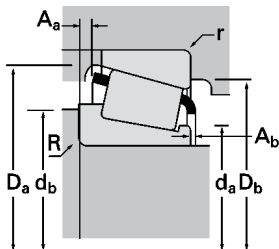
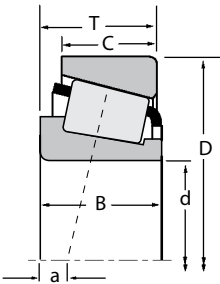




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 25.400<br>1.0000 | 71900<br>16200         | 0.67 | 0.90 | 18600<br>4190          | 21300<br>4790    | 0.87 | 76200<br>17100         | 43132       | 43312                  |  |        |  |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800        | 3477        | 3420                   |  |        |  |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800        | 3483        | 3420                   |  |        |  |
| 33.338<br>1.3125        | 80.000<br>3.1496 | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700         | 335-S       | 332                    |  |        |  |
| 33.338<br>1.3125        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700         | 335-S       | 3320                   |  |        |  |
| 33.338<br>1.3125        | 88.500<br>3.4843 | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900         | 44131       | 44348                  |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48548A    | LM48510                |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48548     | LM48510                |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48549     | LM48510                |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48549X    | LM48510                |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 21.082<br>0.8300 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48548A    | LM48511A               |  |        |  |
| 34.925<br>1.3750        | 65.088<br>2.5625 | 21.082<br>0.8300 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48548     | LM48511A               |  |        |  |
| 34.925<br>1.3750        | 65.987<br>2.5979 | 20.638<br>0.8125 | 57800<br>13000         | 0.35 | 1.70 | 15000<br>3370          | 9050<br>2030     | 1.66 | 72800<br>16400         | M38549      | M38511                 |  |        |  |
| 34.925<br>1.3750        | 66.675<br>2.6250 | 20.638<br>0.8125 | 57800<br>13000         | 0.35 | 1.70 | 15000<br>3370          | 9050<br>2030     | 1.66 | 72800<br>16400         | M38549      | M38510                 |  |        |  |
| 34.925<br>1.3750        | 68.262<br>2.6875 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200         | LM48548     | LM48514                |  |        |  |
| 34.925<br>1.3750        | 68.262<br>2.6875 | 20.638<br>0.8125 | 54800<br>12300         | 0.35 | 1.70 | 14200<br>3200          | 8590<br>1930     | 1.66 | 68100<br>15300         | 14585       | 14525                  |  |        |  |
| 34.925<br>1.3750        | 68.262<br>2.6875 | 20.638<br>0.8125 | 57800<br>13000         | 0.35 | 1.70 | 15000<br>3370          | 9050<br>2030     | 1.66 | 72800<br>16400         | M38549      | M38514                 |  |        |  |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14137A      | 14274                  |  |        |  |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14137A      | 14276                  |  |        |  |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14138A      | 14274                  |  |        |  |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14138A      | 14276                  |  |        |  |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 22.385<br>0.8813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14138A      | 14277                  |  |        |  |
| 34.925<br>1.3750        | 69.850<br>2.7500 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900         | 14137A      | 14275A                 |  |        |  |
| 34.925<br>1.3750        | 71.973<br>2.8336 | 27.000<br>1.0630 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200         | HM88649     | HM88611                |  |        |  |
| 34.925<br>1.3750        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200         | HM88649A    | HM88610                |  |        |  |
| 34.925<br>1.3750        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200         | HM88649     | HM88610                |  |        |  |
| 34.925<br>1.3750        | 72.238<br>2.8440 | 20.638<br>0.8125 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800         | 16137       | 16284                  |  |        |  |
| 34.925<br>1.3750        | 72.626<br>2.8593 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200         | HM88649     | HM88611AS              |  |        |  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 24.074<br>0.9478 | 17.462<br>0.6875 | -2.0<br>-0.08    | 2.0<br>0.08                                    | 42.0<br>1.65                               | 48.0<br>1.89                               | 1.5<br>0.06                                  | 74.0<br>2.91   | 67.0<br>2.64   | 3.40<br>0.13   | 2.30<br>0.09   | 16.8           | 7.57           | 0.0774         | 0.57<br>1.25        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 42.5<br>1.67                               | 49.0<br>1.93                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.72<br>1.58        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 42.5<br>1.67                               | 43.0<br>1.69                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.72<br>1.60        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 0.8<br>0.03                                    | 40.5<br>1.59                               | 41.0<br>1.61                               | 1.3<br>0.05                                  | 75.0<br>2.95   | 73.0<br>2.87   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.54<br>1.20        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 0.8<br>0.03                                    | 40.5<br>1.59                               | 41.0<br>1.61                               | 3.3<br>0.13                                  | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.61<br>1.35        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09      | 2.0<br>0.08                                    | 48.0<br>1.89                               | 51.0<br>2.01                               | 1.5<br>0.06                                  | 84.0<br>3.31   | 75.0<br>2.95   | 3.90<br>0.15   | 2.60<br>0.10   | 22.9           | 8.71           | 0.0899         | 0.76<br>1.67        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -3.6<br>-0.14    | 0.8<br>0.03                                    | 42.0<br>1.66                               | 40.5<br>1.59                               | 1.3<br>0.05                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.70<br>0.03   | 1.30<br>0.05   | 18             | 10.6           | 0.0666         | 0.25<br>0.56        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 41.5<br>1.63                               | 48.0<br>1.89                               | 1.3<br>0.05                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.70<br>0.03   | 1.30<br>0.05   | 18             | 10.6           | 0.0666         | 0.24<br>0.54        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -3.6<br>-0.14    | 1.5<br>0.06                                    | 40.0<br>1.57                               | 42.0<br>1.65                               | 1.3<br>0.05                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.80<br>0.03   | 1.10<br>0.04   | 18             | 10.6           | 0.0666         | 0.25<br>0.56        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -3.6<br>-0.14    | 2.3<br>0.09                                    | 40.0<br>1.57                               | 43.5<br>1.71                               | 1.3<br>0.05                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.80<br>0.03   | 1.10<br>0.04   | 18             | 10.6           | 0.0666         | 0.25<br>0.55        |
| 18.288<br>0.7200 | 17.018<br>0.6700 | -3.6<br>-0.14    | 0.8<br>0.03                                    | 42.0<br>1.66                               | 40.5<br>1.59                               | 1.5<br>0.06                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.70<br>0.03   | 1.30<br>0.05   | 18             | 10.6           | 0.0666         | 0.28<br>0.61        |
| 18.288<br>0.7200 | 17.018<br>0.6700 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 41.5<br>1.63                               | 48.0<br>1.89                               | 1.5<br>0.06                                  | 61.0<br>2.40   | 58.0<br>2.28   | 0.70<br>0.03   | 1.30<br>0.05   | 18             | 10.6           | 0.0666         | 0.27<br>0.59        |
| 20.638<br>0.8125 | 16.670<br>0.6563 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 40.0<br>1.57                               | 46.5<br>1.83                               | 2.3<br>0.09                                  | 62.0<br>2.44   | 58.0<br>2.28   | 0.40<br>0.02   | 2.40<br>0.09   | 20.3           | 11.8           | 0.0680         | 0.30<br>0.66        |
| 20.638<br>0.8125 | 16.670<br>0.6563 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 40.0<br>1.57                               | 46.5<br>1.83                               | 2.3<br>0.09                                  | 62.0<br>2.44   | 58.0<br>2.28   | 0.40<br>0.02   | 2.40<br>0.09   | 20.3           | 11.8           | 0.0680         | 0.31<br>0.68        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 41.5<br>1.63                               | 48.0<br>1.89                               | 1.3<br>0.05                                  | 63.0<br>2.48   | 59.0<br>2.32   | 0.70<br>0.03   | 1.30<br>0.05   | 18             | 10.6           | 0.0666         | 0.28<br>0.62        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 40.0<br>1.57                               | 46.0<br>1.81                               | 2.3<br>0.09                                  | 63.0<br>2.48   | 59.0<br>2.32   | 0.80<br>0.03   | 2.10<br>0.08   | 19.5           | 12.3           | 0.0670         | 0.32<br>0.71        |
| 20.638<br>0.8125 | 16.670<br>0.6563 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 40.0<br>1.57                               | 46.5<br>1.83                               | 2.3<br>0.09                                  | 63.0<br>2.48   | 59.0<br>2.32   | 0.40<br>0.02   | 2.40<br>0.09   | 20.3           | 11.8           | 0.0680         | 0.33<br>0.73        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 41.0<br>1.61                               | 43.0<br>1.69                               | 3.3<br>0.13                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.32<br>0.70        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 41.0<br>1.61                               | 43.0<br>1.69                               | 1.3<br>0.05                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.33<br>0.72        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 41.0<br>1.61                               | 47.0<br>1.85                               | 3.3<br>0.13                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.32<br>0.70        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 41.0<br>1.61                               | 47.0<br>1.85                               | 1.3<br>0.05                                  | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.32<br>0.71        |
| 19.583<br>0.7710 | 18.415<br>0.7250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 41.0<br>1.61                               | 47.0<br>1.85                               | 2.3<br>0.09                                  | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.35<br>0.77        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 41.0<br>1.61                               | 43.0<br>1.69                               | 1.5<br>0.06                                  | 64.0<br>2.52   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.34<br>0.74        |
| 25.400<br>1.0000 | 21.443<br>0.8442 | -4.6<br>-0.18    | 2.3<br>0.09                                    | 42.5<br>1.68                               | 48.5<br>1.91                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 61.0<br>2.40   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.52<br>1.14        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 3.5<br>0.14                                    | 43.0<br>1.69                               | 51.0<br>2.01                               | 2.3<br>0.09                                  | 69.0<br>2.72   | 60.0<br>2.36   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.49<br>1.07        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 2.3<br>0.09                                    | 42.5<br>1.68                               | 48.5<br>1.91                               | 2.3<br>0.09                                  | 69.0<br>2.72   | 60.0<br>2.36   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.49<br>1.08        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 40.5<br>1.59                               | 47.0<br>1.85                               | 1.3<br>0.05                                  | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.38<br>0.84        |
| 25.400<br>1.0000 | 19.842<br>0.7812 | -4.6<br>-0.18    | 2.3<br>0.09                                    | 42.5<br>1.68                               | 48.5<br>1.91                               | 3.3<br>0.13                                  | 69.0<br>2.72   | 59.0<br>2.32   | 1.70<br>0.07   | 1.70<br>0.07   | 23.4           | 10.9           | 0.0822         | 0.49<br>1.08        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

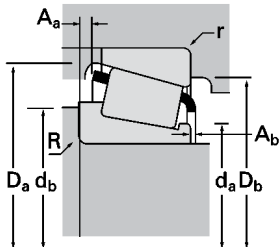
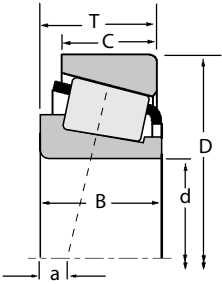
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer   |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |         |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2877        | 2820    |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2878        | 2820    |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2878        | 2821    |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02877       | 02820   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02878       | 02820   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02878       | 02830   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25877       | 25820   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25877       | 25821   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25878       | 25820   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25878       | 25821   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25877A      | 25821   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2786        | 2735X   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2793        | 2735X   |
| 34.925<br>1.3750        | 73.025<br>2.8750 | 26.988<br>1.0625 | 82800<br>18600         | 0.37 | 1.62 | 21500<br>4830          | 13600<br>3050    | 1.58 | 102000<br>22900 | 23690       | 23620   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2786        | 2720    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2786        | 2729    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2793        | 2720    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2793        | 2729    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2796        | 2729    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100 | 31593       | 31520   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100 | 31593       | 31521   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100 | 31594       | 31520   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 92500<br>20800         | 0.35 | 1.71 | 24000<br>5390          | 14400<br>3230    | 1.67 | 111000<br>24900 | 36137       | 36300   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89446A    | HM89410 |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89446     | HM89410 |
| 34.925<br>1.3750        | 79.324<br>3.1230 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3482        | 3426    |
| 34.925<br>1.3750        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3478        | 3420    |
| 34.925<br>1.3750        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3482        | 3420    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 41.0<br>1.61                               | 47.5<br>1.87                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 63.0<br>2.48   | 0.90<br>0.04   | 0.20<br>0.01   | 23.1           | 12.4           | 0.0718         | 0.43<br>0.94        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -5.6<br>-0.22    | 0.8<br>0.03                                    | 41.0<br>1.61                               | 42.0<br>1.65                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 63.0<br>2.48   | 0.90<br>0.04   | 0.20<br>0.01   | 23.1           | 12.4           | 0.0718         | 0.43<br>0.96        |
| 23.812<br>0.9375 | 17.462<br>0.6875 | -5.6<br>-0.22    | 0.8<br>0.03                                    | 41.0<br>1.61                               | 42.0<br>1.65                               | 0.8<br>0.03                                  | 68.0<br>2.68   | 65.0<br>2.56   | 0.90<br>0.04   | 0.20<br>0.01   | 23.1           | 12.4           | 0.0718         | 0.44<br>0.97        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 42.0<br>1.65                               | 48.5<br>1.91                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.41<br>0.91        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 0.8<br>0.03                                    | 42.0<br>1.65                               | 42.5<br>1.67                               | 3.3<br>0.13                                  | 68.0<br>2.68   | 62.0<br>2.44   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.42<br>0.92        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 0.8<br>0.03                                    | 42.0<br>1.65                               | 42.5<br>1.67                               | 0.8<br>0.03                                  | 68.0<br>2.68   | 64.0<br>2.52   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.43<br>0.94        |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                                    | 40.5<br>1.59                               | 43.0<br>1.69                               | 2.3<br>0.09                                  | 68.0<br>2.68   | 64.0<br>2.52   | 1.00<br>0.04   | 1.50<br>0.06   | 26.4           | 10.9           | 0.0695         | 0.47<br>1.03        |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                                    | 40.5<br>1.59                               | 43.0<br>1.69                               | 0.8<br>0.03                                  | 68.0<br>2.68   | 65.0<br>2.56   | 1.00<br>0.04   | 1.50<br>0.06   | 26.4           | 10.9           | 0.0695         | 0.47<br>1.04        |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 40.5<br>1.59                               | 47.0<br>1.85                               | 2.3<br>0.09                                  | 68.0<br>2.68   | 64.0<br>2.52   | 1.00<br>0.04   | 1.50<br>0.06   | 26.4           | 10.9           | 0.0695         | 0.46<br>1.02        |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 40.5<br>1.59                               | 47.0<br>1.85                               | 0.8<br>0.03                                  | 68.0<br>2.68   | 65.0<br>2.56   | 1.00<br>0.04   | 1.50<br>0.06   | 26.4           | 10.9           | 0.0695         | 0.47<br>1.03        |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 42.0<br>1.65                               | 42.5<br>1.67                               | 0.8<br>0.03                                  | 68.0<br>2.68   | 65.0<br>2.56   | *<br>*         | *<br>*         | 26.4           | 10.9           | 0.0695         | 0.47<br>1.04        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 5.0<br>0.20                                    | 41.0<br>1.61                               | 51.0<br>2.01                               | 0.8<br>0.03                                  | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.48<br>1.05        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 41.0<br>1.61                               | 42.0<br>1.65                               | 0.8<br>0.03                                  | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.49<br>1.08        |
| 26.975<br>1.0620 | 22.225<br>0.8750 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 42.0<br>1.65                               | 49.0<br>1.93                               | 1.5<br>0.06                                  | 68.0<br>2.68   | 63.0<br>2.48   | 1.80<br>0.07   | 0.70<br>0.03   | 24.4           | 10.7           | 0.0734         | 0.52<br>1.14        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 5.0<br>0.20                                    | 41.0<br>1.61                               | 51.0<br>2.01                               | 3.3<br>0.13                                  | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.52<br>1.15        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 5.0<br>0.20                                    | 41.0<br>1.61                               | 51.0<br>2.01                               | 0.8<br>0.03                                  | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.53<br>1.17        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 41.0<br>1.61                               | 42.0<br>1.65                               | 3.3<br>0.13                                  | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.54<br>1.18        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 41.0<br>1.61                               | 42.0<br>1.65                               | 0.8<br>0.03                                  | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.54<br>1.20        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 41.0<br>1.61                               | 47.5<br>1.87                               | 0.8<br>0.03                                  | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.54<br>1.19        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 3.3<br>0.13                                  | 72.0<br>2.83   | 64.0<br>2.52   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.61<br>1.35        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 1.3<br>0.05                                  | 72.0<br>2.83   | 66.0<br>2.60   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.62<br>1.37        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 1.5<br>0.06                                    | 43.5<br>1.71                               | 46.0<br>1.81                               | 3.3<br>0.13                                  | 72.0<br>2.83   | 64.0<br>2.52   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.62<br>1.36        |
| 29.845<br>1.1750 | 23.812<br>0.9375 | -9.1<br>-0.36    | 1.5<br>0.06                                    | 42.5<br>1.67                               | 45.0<br>1.77                               | 3.3<br>0.13                                  | 71.0<br>2.80   | 66.0<br>2.60   | *<br>*         | *<br>*         | 26.7           | 10.5           | 0.0741         | 0.62<br>1.37        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 47.5<br>1.87                               | 3.3<br>0.13                                  | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.64<br>1.42        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 3.5<br>0.14                                    | 44.5<br>1.75                               | 56.0<br>2.20                               | 3.3<br>0.13                                  | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.64<br>1.42        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 43.5<br>1.71                               | 44.0<br>1.73                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.70<br>1.55        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.70<br>1.54        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 0.8<br>0.03                                    | 43.5<br>1.71                               | 44.0<br>1.73                               | 3.3<br>0.13                                  | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.70<br>1.55        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

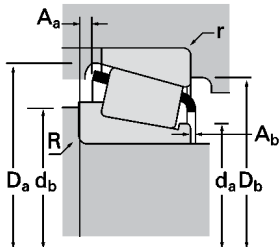
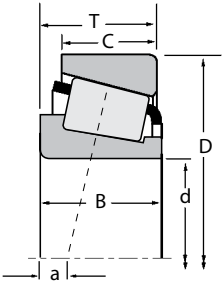




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |        |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|--------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer  |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |        |
| 34.925<br>1.3750        | 80.000<br>3.1496 | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 335         | 332    |
| 34.925<br>1.3750        | 80.000<br>3.1496 | 24.176<br>0.9518 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 335         | 332A   |
| 34.925<br>1.3750        | 80.035<br>3.1510 | 21.433<br>0.8438 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28137       | 28317  |
| 34.925<br>1.3750        | 80.035<br>3.1510 | 24.608<br>0.9688 | 72200<br>16200         | 0.56 | 1.07 | 18700<br>4210          | 18000<br>4040    | 1.04 | 91100<br>20500  | 27875       | 27820  |
| 34.925<br>1.3750        | 80.035<br>3.1510 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379        | 3339   |
| 34.925<br>1.3750        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 335         | 3320   |
| 34.925<br>1.3750        | 80.167<br>3.1562 | 29.367<br>1.1562 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379        | 3320   |
| 34.925<br>1.3750        | 80.962<br>3.1875 | 22.225<br>0.8750 | 60800<br>13700         | 0.45 | 1.32 | 15800<br>3550          | 12300<br>2750    | 1.29 | 74900<br>16800  | 02877       | 02831  |
| 34.925<br>1.3750        | 81.755<br>3.2187 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379        | 3329   |
| 34.925<br>1.3750        | 84.138<br>3.3125 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379        | 3328   |
| 34.925<br>1.3750        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3872        | 3820   |
| 34.925<br>1.3750        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3872        | 3821   |
| 34.925<br>1.3750        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3872A       | 3820   |
| 34.925<br>1.3750        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3581        | 3525   |
| 34.925<br>1.3750        | 88.500<br>3.4843 | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 417         | 414    |
| 34.925<br>1.3750        | 90.488<br>3.5625 | 39.688<br>1.5625 | 155000<br>34900        | 0.28 | 2.11 | 40200<br>9040          | 19600<br>4400    | 2.05 | 204000<br>45900 | 4368        | 4335   |
| 34.925<br>1.3750        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 449         | 432    |
| 34.976<br>1.3770        | 68.000<br>2.6772 | 16.020<br>0.6307 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138       | 19267X |
| 34.976<br>1.3770        | 68.262<br>2.6875 | 15.875<br>0.6250 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138       | 19268  |
| 34.975<br>1.3770        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139       | 14274  |
| 34.975<br>1.3770        | 69.012<br>2.7170 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139       | 14276  |
| 34.975<br>1.3770        | 71.996<br>2.8345 | 19.002<br>0.7481 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139       | 14282  |
| 34.976<br>1.3770        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138       | 19283  |
| 34.975<br>1.3770        | 72.085<br>2.8380 | 22.385<br>0.8813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139       | 14283  |
| 34.975<br>1.3770        | 76.200<br>3.0000 | 20.625<br>0.8120 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28138       | 28300X |
| 34.975<br>1.3770        | 80.000<br>3.1496 | 21.006<br>0.8270 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28138       | 28315  |
| 34.987<br>1.3775        | 59.131<br>2.3280 | 15.875<br>0.6250 | 35500<br>7990          | 0.42 | 1.44 | 9220<br>2070           | 6560<br>1480     | 1.40 | 48700<br>11000  | L68149      | L68110 |
| 34.987<br>1.3775        | 59.974<br>2.3612 | 15.875<br>0.6250 | 35500<br>7990          | 0.42 | 1.44 | 9220<br>2070           | 6560<br>1480     | 1.40 | 48700<br>11000  | L68149      | L68111 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                | Cage           |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 0.8<br>0.03                | 41.5<br>1.63                      | 42.5<br>1.67             | 1.3<br>0.05                         | 75.0<br>2.95   | 73.0<br>2.87   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.53<br>1.17        |
| 22.403<br>0.8820 | 21.000<br>0.8268 | -6.4<br>-0.25    | 0.8<br>0.03                | 41.5<br>1.63                      | 42.5<br>1.67             | 2.3<br>0.09                         | 75.0<br>2.95   | 71.0<br>2.80   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.56<br>1.24        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                | 41.0<br>1.61                      | 43.5<br>1.71             | 1.5<br>0.06                         | 73.0<br>2.87   | 69.0<br>2.72   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.49<br>1.09        |
| 23.698<br>0.9330 | 18.512<br>0.7288 | -2.5<br>-0.10    | 0.8<br>0.03                | 44.5<br>1.75                      | 45.5<br>1.79             | 1.5<br>0.06                         | 75.0<br>2.95   | 68.0<br>2.68   | 3.20<br>0.13   | 1.50<br>0.06   | 24.6           | 12.6           | 0.0839         | 0.59<br>1.31        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 41.5<br>1.63                      | 48.0<br>1.89             | 1.5<br>0.06                         | 74.5<br>2.94   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.72<br>1.59        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 0.8<br>0.03                | 41.5<br>1.63                      | 42.5<br>1.67             | 3.3<br>0.13                         | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.60<br>1.31        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 41.5<br>1.63                      | 48.0<br>1.89             | 3.3<br>0.13                         | 75.0<br>2.95   | 70.0<br>2.76   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.71<br>1.58        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -3.8<br>-0.15    | 3.5<br>0.14                | 42.0<br>1.65                      | 48.5<br>1.91             | 0.8<br>0.03                         | 72.0<br>2.83   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 20.6           | 10.1           | 0.0740         | 0.55<br>1.22        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 41.5<br>1.63                      | 48.0<br>1.89             | 3.3<br>0.13                         | 75.0<br>2.95   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.75<br>1.66        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 41.5<br>1.63                      | 48.0<br>1.89             | 3.3<br>0.13                         | 76.0<br>2.99   | 72.0<br>2.83   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.81<br>1.78        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 46.0<br>1.81                      | 53.0<br>2.09             | 3.3<br>0.13                         | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.89<br>1.95        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 46.0<br>1.81                      | 53.0<br>2.09             | 1.3<br>0.05                         | 81.0<br>3.19   | 75.0<br>2.95   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.89<br>1.97        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                | 46.0<br>1.81                      | 47.0<br>1.85             | 3.3<br>0.13                         | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.89<br>1.96        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.91<br>2.00        |
| 29.083<br>1.1450 | 22.225<br>0.8750 | -9.7<br>-0.38    | 0.8<br>0.03                | 42.0<br>1.65                      | 42.5<br>1.67             | 1.5<br>0.06                         | 80.0<br>3.15   | 77.0<br>3.03   | 1.20<br>0.05   | 0.80<br>0.03   | 34.4           | 9.87           | 0.0731         | 0.87<br>1.92        |
| 40.386<br>1.5900 | 33.338<br>1.3125 | -15.0<br>-0.59   | 3.5<br>0.14                | 49.0<br>1.93                      | 55.0<br>2.17             | 3.3<br>0.13                         | 85.0<br>3.35   | 77.0<br>3.03   | 2.30<br>0.09   | 0.60<br>0.02   | 52.9           | 16.7           | 0.0872         | 1.37<br>3.01        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 0.8<br>0.03                | 43.5<br>1.71                      | 44.0<br>1.73             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 1.08<br>2.38        |
| 16.520<br>0.6504 | 12.000<br>0.4724 | -1.5<br>-0.06    | 1.5<br>0.06                | 40.5<br>1.59                      | 42.5<br>1.67             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.26<br>0.57        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 1.5<br>0.06                | 40.5<br>1.59                      | 42.5<br>1.67             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.26<br>0.58        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.3<br>0.05                | 41.0<br>1.61                      | 42.5<br>1.67             | 3.3<br>0.13                         | 63.0<br>2.48   | 59.0<br>2.32   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.32<br>0.70        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.3<br>0.05                | 41.0<br>1.61                      | 42.5<br>1.67             | 1.3<br>0.05                         | 63.0<br>2.48   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.33<br>0.72        |
| 19.583<br>0.7710 | 15.032<br>0.5918 | -4.3<br>-0.17    | 1.3<br>0.05                | 41.0<br>1.61                      | 42.5<br>1.67             | 1.5<br>0.06                         | 65.0<br>2.56   | 62.0<br>2.44   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.35<br>0.78        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 1.5<br>0.06                | 40.5<br>1.59                      | 42.5<br>1.67             | 1.5<br>0.06                         | 66.0<br>2.60   | 63.0<br>2.48   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.32<br>0.70        |
| 19.583<br>0.7710 | 18.415<br>0.7250 | -4.3<br>-0.17    | 1.3<br>0.05                | 41.0<br>1.61                      | 42.5<br>1.67             | 2.3<br>0.09                         | 65.0<br>2.56   | 60.0<br>2.36   | 1.00<br>0.04   | 1.40<br>0.06   | 18             | 9.4            | 0.0668         | 0.40<br>0.88        |
| 20.940<br>0.8244 | 15.494<br>0.6100 | -4.8<br>-0.19    | 1.5<br>0.06                | 41.0<br>1.61                      | 43.5<br>1.71             | 1.5<br>0.06                         | 71.0<br>2.80   | 68.0<br>2.68   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.43<br>0.95        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                | 41.0<br>1.61                      | 43.5<br>1.71             | 1.5<br>0.06                         | 73.0<br>2.87   | 69.0<br>2.72   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.49<br>1.08        |
| 16.764<br>0.6600 | 11.938<br>0.4700 | -2.5<br>-0.10    | 0.0<br>0.00                | 39.0<br>1.54                      | 45.5<br>1.79             | 1.3<br>0.05                         | 56.0<br>2.20   | 53.0<br>2.09   | 0.80<br>0.03   | 0.70<br>0.03   | 15.7           | 13.9           | 0.0657         | 0.17<br>0.37        |
| 16.764<br>0.6600 | 11.938<br>0.4700 | -2.5<br>-0.10    | 0.0<br>0.00                | 39.0<br>1.54                      | 45.5<br>1.79             | 1.3<br>0.05                         | 56.0<br>2.20   | 53.0<br>2.09   | 0.80<br>0.03   | 0.70<br>0.03   | 15.7           | 13.9           | 0.0657         | 0.17<br>0.38        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

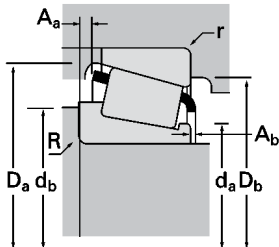
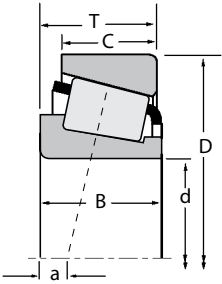




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>  | Inner Outer |          |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 34.987<br>1.3775        | 61.973<br>2.4399 | 16.700<br>0.6575 | 39400<br>8850          | 0.44 | 1.35 | 10200<br>2290          | 7760<br>1750     | 1.31 | 52400<br>11800  | LM78349A    | LM78310A |
| 34.987<br>1.3775        | 61.973<br>2.4399 | 16.700<br>0.6575 | 39400<br>8850          | 0.44 | 1.35 | 10200<br>2290          | 7760<br>1750     | 1.31 | 52400<br>11800  | LM78349     | LM78310A |
| 34.987<br>1.3775        | 61.973<br>2.4399 | 18.000<br>0.7087 | 39400<br>8850          | 0.44 | 1.35 | 10200<br>2290          | 7760<br>1750     | 1.31 | 52400<br>11800  | LM78349A    | LM78310C |
| 34.987<br>1.3775        | 61.973<br>2.4399 | 18.000<br>0.7087 | 39400<br>8850          | 0.44 | 1.35 | 10200<br>2290          | 7760<br>1750     | 1.31 | 52400<br>11800  | LM78349     | LM78310C |
| 34.987<br>1.3775        | 65.987<br>2.5979 | 20.638<br>0.8125 | 57800<br>13000         | 0.35 | 1.70 | 15000<br>3370          | 9050<br>2030     | 1.66 | 72800<br>16400  | M38547      | M38511   |
| 35.000<br>1.3780        | 70.000<br>2.7559 | 25.270<br>0.9949 | 66600<br>15000         | 0.55 | 1.10 | 17300<br>3880          | 16100<br>3630    | 1.07 | 84900<br>19100  | JS-3549A    | JS-3510  |
| 35.000<br>1.3780        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138X      | 19283    |
| 35.000<br>1.3780        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138X      | 19283X   |
| 35.000<br>1.3780        | 73.025<br>2.8750 | 26.988<br>1.0625 | 82800<br>18600         | 0.37 | 1.62 | 21500<br>4830          | 13600<br>3050    | 1.58 | 102000<br>22900 | 23691       | 23620    |
| 35.000<br>1.3780        | 73.025<br>2.8750 | 26.988<br>1.0625 | 82800<br>18600         | 0.37 | 1.62 | 21500<br>4830          | 13600<br>3050    | 1.58 | 102000<br>22900 | 23691       | 23621    |
| 35.000<br>1.3780        | 75.311<br>2.9650 | 19.845<br>0.7813 | 50600<br>11400         | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139X      | 14274-S  |
| 35.000<br>1.3780        | 79.375<br>3.1250 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26883       | 26822    |
| 35.000<br>1.3780        | 80.000<br>3.1496 | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 339         | 332      |
| 35.000<br>1.3780        | 80.000<br>3.1496 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26883       | 26824    |
| 35.000<br>1.3780        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26883       | 26820    |
| 35.000<br>1.3780        | 80.167<br>3.1562 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3480        | 3422     |
| 35.000<br>1.3780        | 82.550<br>3.2500 | 28.575<br>1.1250 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 421         | 412A     |
| 35.000<br>1.3780        | 88.500<br>3.4843 | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 421         | 414      |
| 35.128<br>1.3830        | 65.088<br>2.5625 | 18.034<br>0.7100 | 50500<br>11300         | 0.38 | 1.59 | 13100<br>2940          | 8430<br>1890     | 1.55 | 63100<br>14200  | LM48545     | LM48510  |
| 35.306<br>1.3900        | 73.025<br>2.8750 | 22.225<br>0.8750 | 67700<br>15200         | 0.37 | 1.63 | 17600<br>3950          | 11100<br>2490    | 1.59 | 83800<br>18800  | 2880        | 2820     |
| 35.717<br>1.4062        | 72.233<br>2.8438 | 25.400<br>1.0000 | 71100<br>16000         | 0.55 | 1.10 | 18400<br>4140          | 17200<br>3870    | 1.07 | 94200<br>21200  | HM88648     | HM88610  |
| 36.487<br>1.4365        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25880       | 25820    |
| 36.487<br>1.4365        | 73.025<br>2.8750 | 23.812<br>0.9375 | 78800<br>17700         | 0.29 | 2.07 | 20400<br>4590          | 10200<br>2280    | 2.01 | 97400<br>21900  | 25880       | 25821    |
| 36.487<br>1.4365        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2780        | 2735X    |
| 36.487<br>1.4365        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2794        | 2735X    |
| 36.487<br>1.4365        | 74.612<br>2.9375 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2780        | 2736     |
| 36.487<br>1.4365        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2780        | 2720     |
| 36.487<br>1.4365        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2780        | 2729     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)    |                          |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 17.000  | 13.600 | -2.5             | 1.5                        | 39.5                     | 42.0                     | 1.5                                 | 59.0           | 54.0           | 0.70           | 1.20           | 16.1           | 13.8           | 0.0678         | 0.21                |
| 0.6693  | 0.5354 | -0.10            | 0.06                       | 1.56                     | 1.65                     | 0.06                                | 2.32           | 2.13           | 0.03           | 0.05           |                |                |                | 0.46                |
| 17.000  | 13.600 | -2.5             | 3.5                        | 40.0                     | 46.0                     | 1.5                                 | 59.0           | 54.0           | *              | *              | 16.1           | 16.2           | 0.0678         | 0.20                |
| 0.6693  | 0.5354 | -0.10            | 0.14                       | 1.57                     | 1.81                     | 0.06                                | 2.32           | 2.13           | *              | *              |                |                |                | 0.44                |
| 17.000  | 15.000 | -2.5             | 1.5                        | 39.5                     | 42.0                     | 1.5                                 | 59.0           | 56.0           | 0.70           | 1.20           | 16.1           | 13.8           | 0.0678         | 0.22                |
| 0.6693  | 0.5906 | -0.10            | 0.06                       | 1.56                     | 1.65                     | 0.06                                | 2.32           | 2.20           | 0.03           | 0.05           |                |                |                | 0.48                |
| 17.000  | 15.000 | -2.5             | 3.5                        | 40.0                     | 46.0                     | 1.5                                 | 59.0           | 56.0           | *              | *              | 16.1           | 16.2           | 0.0678         | 0.21                |
| 0.6693  | 0.5906 | -0.10            | 0.14                       | 1.57                     | 1.81                     | 0.06                                | 2.32           | 2.20           | *              | *              |                |                |                | 0.46                |
| 20.638  | 16.670 | -5.6             | 3.5                        | 40.5                     | 46.5                     | 2.3                                 | 62.0           | 58.0           | 0.40           | 2.40           | 20.3           | 11.8           | 0.0680         | 0.30                |
| 0.8125  | 0.6563 | -0.22            | 0.14                       | 1.59                     | 1.83                     | 0.09                                | 2.44           | 2.28           | 0.02           | 0.09           |                |                |                | 0.66                |
| 23.500  | 19.000 | -3.6             | 2.0                        | 42.0                     | 47.0                     | 1.5                                 | 66.5           | 60.0           | 1.60           | 1.60           | 20.7           | 11             | 0.0789         | 0.41                |
| 0.9252  | 0.7480 | -0.14            | 0.08                       | 1.65                     | 1.85                     | 0.06                                | 2.62           | 2.36           | 0.06           | 0.06           |                |                |                | 0.91                |
| 16.520  | 14.288 | -1.5             | 2.0                        | 40.5                     | 43.5                     | 1.5                                 | 66.0           | 63.0           | 1.20           | 1.50           | 17.5           | 11.5           | 0.0694         | 0.32                |
| 0.6504  | 0.5625 | -0.06            | 0.08                       | 1.59                     | 1.71                     | 0.06                                | 2.60           | 2.48           | 0.05           | 0.06           |                |                |                | 0.70                |
| 16.520  | 14.288 | -1.5             | 2.0                        | 40.5                     | 43.5                     | 2.0                                 | 66.0           | 62.0           | 1.20           | 1.50           | 17.5           | 11.5           | 0.0694         | 0.32                |
| 0.6504  | 0.5625 | -0.06            | 0.08                       | 1.59                     | 1.71                     | 0.08                                | 2.60           | 2.44           | 0.05           | 0.06           |                |                |                | 0.70                |
| 26.975  | 22.225 | -8.1             | 3.5                        | 42.0                     | 49.0                     | 1.5                                 | 68.0           | 63.0           | 1.80           | 0.70           | 24.4           | 10.7           | 0.0734         | 0.52                |
| 1.0620  | 0.8750 | -0.32            | 0.14                       | 1.65                     | 1.93                     | 0.06                                | 2.68           | 2.48           | 0.07           | 0.03           |                |                |                | 1.14                |
| 26.975  | 22.225 | -8.1             | 3.5                        | 42.0                     | 49.0                     | 0.8                                 | 68.0           | 63.0           | 1.80           | 0.70           | 24.4           | 10.7           | 0.0734         | 0.52                |
| 1.0620  | 0.8750 | -0.32            | 0.14                       | 1.65                     | 1.93                     | 0.03                                | 2.68           | 2.48           | 0.07           | 0.03           |                |                |                | 1.14                |
| 19.583  | 15.875 | -4.3             | 3.5                        | 41.0                     | 47.0                     | 3.3                                 | 66.0           | 61.0           | 1.00           | 1.40           | 18             | 9.4            | 0.0668         | 0.40                |
| 0.7710  | 0.6250 | -0.17            | 0.14                       | 1.61                     | 1.85                     | 0.13                                | 2.60           | 2.40           | 0.04           | 0.06           |                |                |                | 0.89                |
| 25.400  | 19.050 | -7.4             | 0.8                        | 42.0                     | 42.5                     | 0.8                                 | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.60                |
| 1.0000  | 0.7500 | -0.29            | 0.03                       | 1.65                     | 1.67                     | 0.03                                | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.33                |
| 22.403  | 17.826 | -6.4             | 0.8                        | 41.5                     | 42.5                     | 1.3                                 | 75.0           | 73.0           | 0.70           | 1.10           | 26.5           | 13             | 0.0676         | 0.53                |
| 0.8820  | 0.7018 | -0.25            | 0.03                       | 1.63                     | 1.67                     | 0.05                                | 2.95           | 2.87           | 0.03           | 0.04           |                |                |                | 1.17                |
| 25.400  | 19.050 | -7.4             | 0.8                        | 42.0                     | 42.5                     | 1.3                                 | 74.0           | 70.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.62                |
| 1.0000  | 0.7500 | -0.29            | 0.03                       | 1.65                     | 1.67                     | 0.05                                | 2.91           | 2.76           | 0.06           | 0.05           |                |                |                | 1.36                |
| 25.400  | 20.638 | -7.4             | 0.8                        | 42.0                     | 42.5                     | 3.3                                 | 74.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.63                |
| 1.0000  | 0.8125 | -0.29            | 0.03                       | 1.65                     | 1.67                     | 0.13                                | 2.91           | 2.72           | 0.06           | 0.05           |                |                |                | 1.39                |
| 29.771  | 23.812 | -8.6             | 1.5                        | 43.5                     | 46.0                     | 3.3                                 | 74.0           | 68.0           | 1.40           | 0.90           | 29.9           | 11.2           | 0.0781         | 0.72                |
| 1.1721  | 0.9375 | -0.34            | 0.06                       | 1.71                     | 1.81                     | 0.13                                | 2.91           | 2.68           | 0.06           | 0.04           |                |                |                | 1.59                |
| 29.083  | 23.812 | -9.7             | 0.8                        | 42.0                     | 42.5                     | 1.5                                 | 77.5           | 74.0           | 1.20           | 0.80           | 34.4           | 9.87           | 0.0731         | 0.75                |
| 1.1450  | 0.9375 | -0.38            | 0.03                       | 1.65                     | 1.67                     | 0.06                                | 3.06           | 2.91           | 0.05           | 0.03           |                |                |                | 1.65                |
| 29.083  | 22.225 | -9.7             | 0.8                        | 42.0                     | 42.5                     | 1.5                                 | 80.0           | 77.0           | 1.20           | 0.80           | 34.4           | 9.87           | 0.0731         | 0.87                |
| 1.1450  | 0.8750 | -0.38            | 0.03                       | 1.65                     | 1.67                     | 0.06                                | 3.15           | 3.03           | 0.05           | 0.03           |                |                |                | 1.92                |
| 18.288  | 13.970 | -3.6             | 0.8                        | 41.0                     | 41.5                     | 1.3                                 | 61.0           | 58.0           | 0.80           | 1.10           | 18             | 10.6           | 0.0666         | 0.25                |
| 0.7200  | 0.5500 | -0.14            | 0.03                       | 1.61                     | 1.63                     | 0.05                                | 2.40           | 2.28           | 0.03           | 0.04           |                |                |                | 0.56                |
| 23.812  | 17.462 | -5.6             | 3.5                        | 41.5                     | 48.0                     | 3.3                                 | 68.0           | 63.0           | 0.90           | 0.20           | 23.1           | 12.4           | 0.0718         | 0.42                |
| 0.9375  | 0.6875 | -0.22            | 0.14                       | 1.63                     | 1.89                     | 0.13                                | 2.68           | 2.48           | 0.04           | 0.01           |                |                |                | 0.93                |
| 25.400  | 19.842 | -4.6             | 3.5                        | 42.5                     | 54.0                     | 2.3                                 | 69.0           | 60.0           | 1.70           | 1.80           | 23.4           | 10.9           | 0.0822         | 0.48                |
| 1.0000  | 0.7812 | -0.18            | 0.14                       | 1.67                     | 2.13                     | 0.09                                | 2.72           | 2.36           | 0.06           | 0.07           |                |                |                | 1.05                |
| 24.608  | 19.050 | -8.1             | 1.5                        | 42.0                     | 44.0                     | 2.3                                 | 68.0           | 64.0           | 1.00           | 1.50           | 26.4           | 10.9           | 0.0695         | 0.45                |
| 0.9688  | 0.7500 | -0.32            | 0.06                       | 1.65                     | 1.73                     | 0.09                                | 2.68           | 2.52           | 0.04           | 0.06           |                |                |                | 0.99                |
| 24.608  | 19.050 | -8.1             | 1.5                        | 42.0                     | 44.0                     | 0.8                                 | 68.0           | 65.0           | 1.00           | 1.50           | 26.4           | 10.9           | 0.0695         | 0.45                |
| 0.9688  | 0.7500 | -0.32            | 0.06                       | 1.65                     | 1.73                     | 0.03                                | 2.68           | 2.56           | 0.04           | 0.06           |                |                |                | 1.00                |
| 25.654  | 19.050 | -8.1             | 1.5                        | 42.5                     | 44.5                     | 0.8                                 | 69.0           | 66.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.47                |
| 1.0100  | 0.7500 | -0.32            | 0.06                       | 1.67                     | 1.75                     | 0.03                                | 2.72           | 2.60           | 0.06           | 0.04           |                |                |                | 1.04                |
| 25.654  | 19.050 | -8.1             | 3.5                        | 42.5                     | 49.0                     | 0.8                                 | 69.0           | 66.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.47                |
| 1.0100  | 0.7500 | -0.32            | 0.14                       | 1.67                     | 1.93                     | 0.03                                | 2.72           | 2.60           | 0.06           | 0.04           |                |                |                | 1.03                |
| 25.654  | 19.050 | -8.1             | 1.5                        | 42.5                     | 44.5                     | 0.8                                 | 70.0           | 67.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.50                |
| 1.0100  | 0.7500 | -0.32            | 0.06                       | 1.67                     | 1.75                     | 0.03                                | 2.76           | 2.64           | 0.06           | 0.04           |                |                |                | 1.10                |
| 25.654  | 19.050 | -8.1             | 1.5                        | 42.5                     | 44.5                     | 3.3                                 | 70.0           | 66.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.52                |
| 1.0100  | 0.7500 | -0.32            | 0.06                       | 1.67                     | 1.75                     | 0.13                                | 2.76           | 2.60           | 0.06           | 0.04           |                |                |                | 1.14                |
| 25.654  | 19.050 | -8.1             | 1.5                        | 42.5                     | 44.5                     | 0.8                                 | 70.0           | 68.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.53                |
| 1.0100  | 0.7500 | -0.32            | 0.06                       | 1.67                     | 1.75                     | 0.03                                | 2.76           | 2.68           | 0.06           | 0.04           |                |                |                | 1.16                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

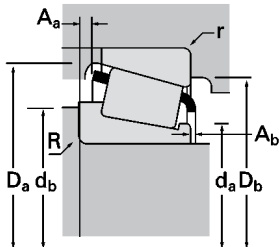
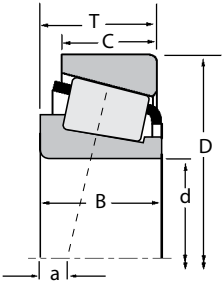
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 36.487<br>1.4365        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000        | 2794        | 2720                   |  |                |       |       |
| 36.487<br>1.4365        | 79.375<br>3.1250 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000        | 2780        | 2731                   |  |                |       |       |
| 36.512<br>1.4375        | 68.262<br>2.6875 | 15.875<br>0.6250 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000         | 19143       | 19268                  |  |                |       |       |
| 36.512<br>1.4375        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300         | 13682       | 13621                  |  |                |       |       |
| 36.512<br>1.4375        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000         | 19143       | 19283                  |  |                |       |       |
| 36.512<br>1.4375        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000         | 19143       | 19283X                 |  |                |       |       |
| 36.512<br>1.4375        | 72.000<br>2.8346 | 19.000<br>0.7480 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800         | 16143       | 16282                  |  |                |       |       |
| 36.512<br>1.4375        | 72.238<br>2.8440 | 20.638<br>0.8125 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800         | 16143       | 16284                  |  |                |       |       |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100        | 31597       | 31520                  |  |                |       |       |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 29.370<br>1.1563 | 87700<br>19700         | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100        | 31597       | 31521                  |  |                |       |       |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700        | HM89448     | HM89410                |  |                |       |       |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700        | HM89449     | HM89410                |  |                |       |       |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 29.370<br>1.1563 | 86200<br>19400         | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700        | HM89449     | HM89411                |  |                |       |       |
| 36.512<br>1.4375        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800        | 3479        | 3420                   |  |                |       |       |
| 36.512<br>1.4375        | 79.375<br>3.1250 | 29.370<br>1.1563 | 98100<br>22100         | 0.55 | 1.10 | 25400<br>5720          | 23800<br>5350    | 1.07 | 121000<br>27200        | HM89249     | HM89210                |  |                |       |       |
| 36.512<br>1.4375        | 80.000<br>3.1496 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26877       | 26824                  |  |                |       |       |
| 36.512<br>1.4375        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26877       | 26820                  |  |                |       |       |
| 36.512<br>1.4375        | 80.167<br>3.1562 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800        | 3479        | 3422                   |  |                |       |       |
| 36.512<br>1.4375        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        | 25570       | 25520                  |  |                |       |       |
| 36.512<br>1.4375        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3878        | 3820                   |  |                |       |       |
| 36.512<br>1.4375        | 88.500<br>3.4843 | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900         | 44143       | 44348                  |  |                |       |       |
| 36.512<br>1.4375        | 93.662<br>3.6875 | 31.750<br>1.2500 | 120000<br>26900        | 0.40 | 1.49 | 31000<br>6980          | 21400<br>4800    | 1.45 | 158000<br>35500        | 46143       | 46368                  |  |                |       |       |
| 38.000<br>1.4961        | 63.000<br>2.4803 | 17.000<br>0.6693 | 39800<br>8960          | 0.42 | 1.44 | 10300<br>2320          | 7360<br>1650     | 1.40 | 55000<br>12400         | JL69348     | JL69310                |  |                |       |       |
| 38.000<br>1.4961        | 63.000<br>2.4803 | 17.000<br>0.6693 | 39800<br>8960          | 0.42 | 1.44 | 10300<br>2320          | 7360<br>1650     | 1.40 | 55000<br>12400         | JL69349A    | JL69310                |  |                |       |       |
| 38.000<br>1.4961        | 63.000<br>2.4803 | 17.000<br>0.6693 | 39800<br>8960          | 0.42 | 1.44 | 10300<br>2320          | 7360<br>1650     | 1.40 | 55000<br>12400         | JL69349     | JL69310                |  |                |       |       |
| 38.000<br>1.4961        | 63.000<br>2.4803 | 17.000<br>0.6693 | 39800<br>8960          | 0.42 | 1.44 | 10300<br>2320          | 7360<br>1650     | 1.40 | 55000<br>12400         | JL69349X    | JL69310                |  |                |       |       |
| 38.000<br>1.4961        | 68.000<br>2.6772 | 16.020<br>0.6307 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000         | 19149X      | 19267X                 |  |                |       |       |
| 38.100<br>1.5000        | 63.500<br>2.5000 | 12.700<br>0.5000 | 25100<br>5650          | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430          | 13889       | 13830                  |  |                |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                | 42.5<br>1.67                      | 49.0<br>1.93             | 3.3<br>0.13                         | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.51<br>1.13        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 42.5<br>1.67                      | 44.5<br>1.75             | 3.3<br>0.13                         | 72.0<br>2.83   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.57<br>1.27        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 1.5<br>0.06                | 41.5<br>1.63                      | 44.0<br>1.73             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.25<br>0.55        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 3.5<br>0.14                | 41.5<br>1.63                      | 48.0<br>1.89             | 2.3<br>0.09                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 12.2           | 0.0713         | 0.30<br>0.65        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 1.5<br>0.06                | 41.5<br>1.63                      | 44.0<br>1.73             | 1.5<br>0.06                         | 66.0<br>2.60   | 63.0<br>2.48   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.31<br>0.68        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 1.5<br>0.06                | 41.5<br>1.63                      | 44.0<br>1.73             | 2.0<br>0.08                         | 66.0<br>2.60   | 62.0<br>2.44   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.31<br>0.68        |
| 20.638<br>0.8125 | 14.237<br>0.5605 | -4.1<br>-0.16    | 3.5<br>0.14                | 42.0<br>1.65                      | 48.5<br>1.91             | 1.5<br>0.06                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.35<br>0.76        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                | 42.0<br>1.65                      | 48.5<br>1.91             | 1.3<br>0.05                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.37<br>0.81        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 3.5<br>0.14                | 44.5<br>1.75                      | 51.0<br>2.01             | 3.3<br>0.13                         | 72.0<br>2.83   | 64.0<br>2.52   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.59<br>1.31        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 3.5<br>0.14                | 44.5<br>1.75                      | 51.0<br>2.01             | 1.3<br>0.05                         | 72.0<br>2.83   | 66.0<br>2.60   | 1.60<br>0.06   | 1.20<br>0.05   | 26.3           | 9.08           | 0.0773         | 0.60<br>1.33        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 0.8<br>0.03                | 44.5<br>1.75                      | 48.5<br>1.91             | 3.3<br>0.13                         | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.62<br>1.38        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 3.5<br>0.14                | 44.5<br>1.75                      | 57.0<br>2.24             | 3.3<br>0.13                         | 73.0<br>2.87   | 62.0<br>2.44   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.62<br>1.37        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 3.5<br>0.14                | 44.5<br>1.75                      | 57.0<br>2.24             | 0.8<br>0.03                         | 73.0<br>2.87   | 65.0<br>2.56   | 2.00<br>0.08   | 1.40<br>0.05   | 28.9           | 13.1           | 0.0883         | 0.63<br>1.39        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 0.8<br>0.03                | 44.5<br>1.75                      | 45.5<br>1.79             | 3.3<br>0.13                         | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.68<br>1.51        |
| 28.829<br>1.1350 | 22.664<br>0.8923 | -5.8<br>-0.23    | 3.5<br>0.14                | 44.0<br>1.73                      | 55.0<br>2.17             | 3.3<br>0.13                         | 75.0<br>2.95   | 66.0<br>2.60   | 2.40<br>0.09   | 2.50<br>0.10   | 27             | 11.1           | 0.0861         | 0.69<br>1.53        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 0.8<br>0.03                | 43.0<br>1.69                      | 44.0<br>1.73             | 1.3<br>0.05                         | 74.0<br>2.91   | 70.0<br>2.76   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.60<br>1.32        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 0.8<br>0.03                | 43.0<br>1.69                      | 44.0<br>1.73             | 3.3<br>0.13                         | 74.0<br>2.91   | 69.0<br>2.72   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.61<br>1.36        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 0.8<br>0.03                | 44.5<br>1.75                      | 45.5<br>1.79             | 3.3<br>0.13                         | 74.0<br>2.91   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.70<br>1.55        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 45.0<br>1.77                      | 51.0<br>2.01             | 0.8<br>0.03                         | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.66<br>1.45        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                | 47.0<br>1.85                      | 48.0<br>1.89             | 3.3<br>0.13                         | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.87<br>1.92        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09      | 2.3<br>0.09                | 50.0<br>1.97                      | 54.0<br>2.13             | 1.5<br>0.06                         | 84.0<br>3.31   | 75.0<br>2.95   | 3.90<br>0.15   | 2.60<br>0.10   | 22.9           | 8.71           | 0.0899         | 0.73<br>1.60        |
| 31.750<br>1.2500 | 26.195<br>1.0313 | -7.9<br>-0.31    | 1.5<br>0.06                | 48.0<br>1.89                      | 50.0<br>1.97             | 3.3<br>0.13                         | 87.0<br>3.43   | 79.0<br>3.11   | 2.20<br>0.08   | 1.10<br>0.04   | 44.4           | 13.4           | 0.0920         | 1.15<br>2.53        |
| 17.000<br>0.6693 | 13.500<br>0.5315 | -2.3<br>-0.09    | 3.3<br>0.13                | 42.5<br>1.67                      | 46.5<br>1.83             | 1.3<br>0.05                         | 60.0<br>2.36   | 56.0<br>2.20   | 0.50<br>0.02   | 1.30<br>0.05   | 18.4           | 14.5           | 0.0692         | 0.20<br>0.45        |
| 17.000<br>0.6693 | 13.500<br>0.5315 | -2.3<br>-0.09    | 1.3<br>0.05                | 42.5<br>1.67                      | 44.5<br>1.75             | 1.3<br>0.05                         | 60.0<br>2.36   | 56.0<br>2.20   | 0.60<br>0.02   | 1.30<br>0.05   | 18.4           | 14.5           | 0.0692         | 0.20<br>0.45        |
| 17.000<br>0.6693 | 13.500<br>0.5315 | -2.3<br>-0.09    | 0.0<br>0.00                | 42.5<br>1.67                      | 46.5<br>1.83             | 1.3<br>0.05                         | 60.0<br>2.36   | 56.0<br>2.20   | 0.50<br>0.02   | 1.30<br>0.05   | 18.4           | 14.5           | 0.0692         | 0.20<br>0.45        |
| 17.000<br>0.6693 | 13.500<br>0.5315 | -2.3<br>-0.09    | 2.3<br>0.09                | 43.0<br>1.69                      | 47.0<br>1.85             | 1.3<br>0.05                         | 60.0<br>2.36   | 56.0<br>2.20   | 0.60<br>0.02   | 1.30<br>0.05   | 18.4           | 15             | 0.0692         | 0.20<br>0.45        |
| 16.520<br>0.6504 | 12.000<br>0.4724 | -1.5<br>-0.06    | 2.0<br>0.08                | 43.0<br>1.69                      | 46.0<br>1.81             | 1.5<br>0.06                         | 64.0<br>2.52   | 61.0<br>2.40   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.23<br>0.52        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03    | 1.5<br>0.06                | 42.5<br>1.67                      | 45.0<br>1.77             | 0.8<br>0.03                         | 60.0<br>2.36   | 59.0<br>2.32   | 0.20<br>0.01   | 1.40<br>0.05   | 14.8           | 23.3           | 0.0601         | 0.15<br>0.33        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

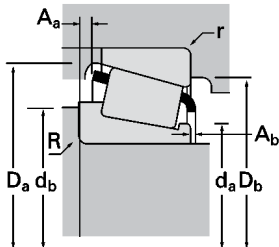
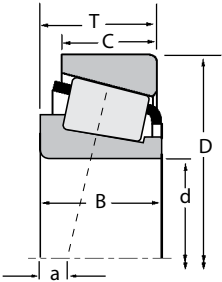




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer   |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |         |
| 38.100<br>1.5000        | 65.088<br>2.5625 | 12.700<br>0.5000 | 25100<br>5650          | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430   | 13889       | 13836   |
| 38.100<br>1.5000        | 65.088<br>2.5625 | 18.034<br>0.7100 | 45000<br>10100         | 0.33 | 1.80 | 11700<br>2620          | 6640<br>1490     | 1.76 | 60300<br>13600  | LM29748     | LM29710 |
| 38.100<br>1.5000        | 65.088<br>2.5625 | 18.034<br>0.7100 | 45000<br>10100         | 0.33 | 1.80 | 11700<br>2620          | 6640<br>1490     | 1.76 | 60300<br>13600  | LM29749     | LM29710 |
| 38.100<br>1.5000        | 65.088<br>2.5625 | 19.812<br>0.7800 | 45000<br>10100         | 0.33 | 1.80 | 11700<br>2620          | 6640<br>1490     | 1.76 | 60300<br>13600  | LM29749     | LM29711 |
| 38.100<br>1.5000        | 68.262<br>2.6875 | 15.875<br>0.6250 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150       | 19268   |
| 38.100<br>1.5000        | 68.262<br>2.6875 | 19.997<br>0.7873 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150       | 19269   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13685       | 13620   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13685       | 13621   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13687       | 13620   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13687       | 13621   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13685A      | 13620   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 19.050<br>0.7500 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13685A      | 13621   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 26.195<br>1.0313 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13686       | 13620   |
| 38.100<br>1.5000        | 69.012<br>2.7170 | 26.195<br>1.0313 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13686       | 13621   |
| 38.100<br>1.5000        | 69.969<br>2.7547 | 21.996<br>0.8660 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13685       | 13624   |
| 38.100<br>1.5000        | 69.969<br>2.7547 | 21.996<br>0.8660 | 52500<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9370<br>2110     | 1.45 | 67900<br>15300  | 13687       | 13624   |
| 38.100<br>1.5000        | 71.438<br>2.8125 | 15.875<br>0.6250 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150       | 19281   |
| 38.100<br>1.5000        | 72.000<br>2.8346 | 17.018<br>0.6700 | 46900<br>10600         | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150       | 19283   |
| 38.100<br>1.5000        | 72.000<br>2.8346 | 19.000<br>0.7480 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16150       | 16282   |
| 38.100<br>1.5000        | 72.238<br>2.8440 | 20.638<br>0.8125 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16150       | 16284   |
| 38.100<br>1.5000        | 72.238<br>2.8440 | 23.812<br>0.9375 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16150       | 16283   |
| 38.100<br>1.5000        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2776        | 2735X   |
| 38.100<br>1.5000        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788        | 2735X   |
| 38.100<br>1.5000        | 73.025<br>2.8750 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788A       | 2735X   |
| 38.100<br>1.5000        | 74.612<br>2.9375 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788A       | 2736    |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 20.625<br>0.8120 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28150       | 28300X  |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 20.638<br>0.8125 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28150       | 28300   |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 20.638<br>0.8125 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28151       | 28300   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                | Cage           |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03    | 1.5<br>0.06                | 42.5<br>1.67                      | 45.0<br>1.77             | 0.8<br>0.03                         | 61.0<br>2.40   | 59.0<br>2.32   | 0.20<br>0.01   | 1.40<br>0.05   | 14.8           | 23.3           | 0.0601         | 0.16<br>0.35        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -4.1<br>-0.16    | 3.5<br>0.14                | 42.5<br>1.67                      | 49.0<br>1.93             | 1.3<br>0.05                         | 62.0<br>2.44   | 59.0<br>2.32   | 0.70<br>0.03   | 1.10<br>0.04   | 20.4           | 15             | 0.0666         | 0.22<br>0.50        |
| 18.288<br>0.7200 | 13.970<br>0.5500 | -4.1<br>-0.16    | 2.3<br>0.09                | 42.5<br>1.67                      | 46.5<br>1.83             | 1.3<br>0.05                         | 62.0<br>2.44   | 59.0<br>2.32   | 0.70<br>0.03   | 1.10<br>0.04   | 20.4           | 15             | 0.0666         | 0.23<br>0.51        |
| 18.288<br>0.7200 | 15.748<br>0.6200 | -4.1<br>-0.16    | 2.3<br>0.09                | 42.5<br>1.67                      | 46.5<br>1.83             | 1.3<br>0.05                         | 62.0<br>2.44   | 58.0<br>2.28   | 0.70<br>0.03   | 1.10<br>0.04   | 20.4           | 15             | 0.0666         | 0.25<br>0.55        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 1.5<br>0.06                | 43.0<br>1.69                      | 45.0<br>1.77             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.24<br>0.53        |
| 16.520<br>0.6504 | 16.030<br>0.6311 | -1.5<br>-0.06    | 1.5<br>0.06                | 43.0<br>1.69                      | 45.0<br>1.77             | 1.5<br>0.06                         | 65.0<br>2.56   | 60.0<br>2.36   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.28<br>0.61        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 0.8<br>0.03                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.29<br>0.63        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 2.3<br>0.09                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.28<br>0.62        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 2.0<br>0.08                | 43.0<br>1.69                      | 46.5<br>1.83             | 0.8<br>0.03                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.29<br>0.64        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 2.0<br>0.08                | 43.0<br>1.69                      | 46.5<br>1.83             | 2.3<br>0.09                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.29<br>0.63        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 0.8<br>0.03                | 43.0<br>1.69                      | 44.0<br>1.73             | 0.8<br>0.03                         | 65.0<br>2.56   | 62.0<br>2.44   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 12.2           | 0.0713         | 0.29<br>0.64        |
| 19.050<br>0.7500 | 15.083<br>0.5938 | -3.0<br>-0.12    | 0.8<br>0.03                | 43.0<br>1.69                      | 44.0<br>1.73             | 2.3<br>0.09                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 12.2           | 0.0713         | 0.29<br>0.63        |
| 26.195<br>1.0313 | 15.083<br>0.5938 | -10.2<br>-0.40   | 1.5<br>0.06                | 43.0<br>1.69                      | 45.5<br>1.79             | 0.8<br>0.03                         | 65.0<br>2.56   | 62.0<br>2.44   | 8.00<br>0.32   | 0.60<br>0.02   | 20.7           | 12.2           | 0.0713         | 0.35<br>0.77        |
| 26.195<br>1.0313 | 15.083<br>0.5938 | -10.2<br>-0.40   | 1.5<br>0.06                | 43.0<br>1.69                      | 45.5<br>1.79             | 2.3<br>0.09                         | 65.0<br>2.56   | 61.0<br>2.40   | 8.00<br>0.32   | 0.60<br>0.02   | 20.7           | 12.2           | 0.0713         | 0.35<br>0.76        |
| 19.050<br>0.7500 | 18.029<br>0.7098 | -3.0<br>-0.12    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.33<br>0.73        |
| 19.050<br>0.7500 | 18.029<br>0.7098 | -3.0<br>-0.12    | 2.0<br>0.08                | 43.0<br>1.69                      | 46.5<br>1.83             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 0.60<br>0.02   | 20.7           | 10.9           | 0.0713         | 0.33<br>0.73        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 1.5<br>0.06                | 43.0<br>1.69                      | 45.0<br>1.77             | 1.0<br>0.04                         | 66.0<br>2.60   | 63.0<br>2.48   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.27<br>0.60        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 1.5<br>0.06                | 43.0<br>1.69                      | 45.0<br>1.77             | 1.5<br>0.06                         | 66.0<br>2.60   | 63.0<br>2.48   | 1.20<br>0.05   | 1.50<br>0.06   | 17.5           | 11.5           | 0.0694         | 0.30<br>0.66        |
| 20.638<br>0.8125 | 14.237<br>0.5605 | -4.1<br>-0.16    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 1.5<br>0.06                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.33<br>0.73        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 1.3<br>0.05                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.35<br>0.78        |
| 20.638<br>0.8125 | 19.050<br>0.7500 | -4.1<br>-0.16    | 3.5<br>0.14                | 43.0<br>1.69                      | 49.5<br>1.95             | 2.3<br>0.09                         | 67.0<br>2.64   | 61.0<br>2.40   | 1.20<br>0.05   | 1.10<br>0.04   | 20.3           | 10.6           | 0.0707         | 0.39<br>0.86        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 4.3<br>0.17                | 43.5<br>1.71                      | 52.0<br>2.05             | 0.8<br>0.03                         | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.44<br>0.98        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                | 43.5<br>1.71                      | 50.0<br>1.97             | 0.8<br>0.03                         | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.45<br>0.98        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 43.5<br>1.71                      | 46.0<br>1.81             | 0.8<br>0.03                         | 69.0<br>2.72   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.45<br>1.00        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                | 43.5<br>1.71                      | 46.0<br>1.81             | 0.8<br>0.03                         | 70.0<br>2.76   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.48<br>1.06        |
| 20.940<br>0.8244 | 15.494<br>0.6100 | -4.8<br>-0.19    | 1.5<br>0.06                | 43.5<br>1.71                      | 45.5<br>1.79             | 1.5<br>0.06                         | 71.0<br>2.80   | 68.0<br>2.68   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.40<br>0.89        |
| 20.940<br>0.8244 | 15.507<br>0.6105 | -4.8<br>-0.19    | 1.5<br>0.06                | 43.5<br>1.71                      | 45.5<br>1.79             | 1.3<br>0.05                         | 71.0<br>2.80   | 68.0<br>2.68   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.40<br>0.88        |
| 20.940<br>0.8244 | 15.507<br>0.6105 | -4.8<br>-0.19    | 3.5<br>0.14                | 43.5<br>1.71                      | 50.0<br>1.97             | 1.3<br>0.05                         | 71.0<br>2.80   | 68.0<br>2.68   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.39<br>0.87        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

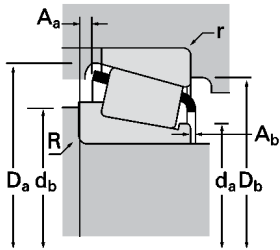
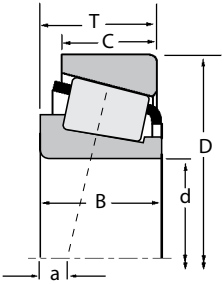




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>  | Inner       | Outer    |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2776        | 2720     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2777        | 2720     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788        | 2720     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788        | 2729     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788        | 2729X    |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788A       | 2720     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788A       | 2729     |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26878       | 26823    |
| 38.100<br>1.5000        | 79.375<br>3.1250 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26878       | 26822    |
| 38.100<br>1.5000        | 79.375<br>3.1250 | 25.400<br>1.0000 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2776        | 2734     |
| 38.100<br>1.5000        | 79.375<br>3.1250 | 25.400<br>1.0000 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788        | 2734     |
| 38.100<br>1.5000        | 79.375<br>3.1250 | 29.370<br>1.1563 | 96900<br>21800         | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3490        | 3420     |
| 38.100<br>1.5000        | 79.974<br>3.1486 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387        | 3325     |
| 38.100<br>1.5000        | 80.000<br>3.1496 | 21.006<br>0.8270 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28150       | 28315A   |
| 38.100<br>1.5000        | 80.000<br>3.1496 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26878       | 26824    |
| 38.100<br>1.5000        | 80.035<br>3.1510 | 24.608<br>0.9688 | 72200<br>16200         | 0.56 | 1.07 | 18700<br>4210          | 18000<br>4040    | 1.04 | 91100<br>20500  | 27880       | 27820    |
| 38.100<br>1.5000        | 80.035<br>3.1510 | 24.608<br>0.9688 | 72200<br>16200         | 0.56 | 1.07 | 18700<br>4210          | 18000<br>4040    | 1.04 | 91100<br>20500  | 27881       | 27820    |
| 38.100<br>1.5000        | 80.035<br>3.1510 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387        | 3339     |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26878       | 26820    |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26878       | 26830    |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 347         | 3320     |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3381        | 3320     |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3381        | 3331     |
| 38.100<br>1.5000        | 80.167<br>3.1562 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387        | 3320     |
| 38.100<br>1.5000        | 81.755<br>3.2187 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3381        | 3329     |
| 38.100<br>1.5000        | 81.755<br>3.2187 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387        | 3329     |
| 38.100<br>1.5000        | 82.550<br>3.2500 | 29.370<br>1.1563 | 95100<br>21400         | 0.55 | 1.10 | 24600<br>5540          | 23000<br>5180    | 1.07 | 130000<br>29300 | HM801346    | HM801310 |
| 38.100<br>1.5000        | 82.550<br>3.2500 | 29.370<br>1.1563 | 95100<br>21400         | 0.55 | 1.10 | 24600<br>5540          | 23000<br>5180    | 1.07 | 130000<br>29300 | HM801346    | HM801311 |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                  |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 4.3<br>0.17                                    | 43.5<br>1.71                               | 52.0<br>2.05                               | 3.3<br>0.13      | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.49<br>1.08        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 5.5<br>0.22                                    | 43.5<br>1.71                               | 54.0<br>2.13                               | 3.3<br>0.13      | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.48<br>1.07        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 3.3<br>0.13      | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.49<br>1.09        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 0.8<br>0.03      | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.50<br>1.11        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 1.5<br>0.06      | 70.0<br>2.76   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.50<br>1.10        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                                    | 43.5<br>1.71                               | 46.0<br>1.81                               | 3.3<br>0.13      | 70.0<br>2.76   | 66.0<br>2.60   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.50<br>1.10        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 1.5<br>0.06                                    | 43.5<br>1.71                               | 46.0<br>1.81                               | 0.8<br>0.03      | 70.0<br>2.76   | 68.0<br>2.68   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.51<br>1.12        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 1.5<br>0.06      | 73.0<br>2.87   | 69.0<br>2.72   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.53<br>1.16        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 0.8<br>0.03      | 74.0<br>2.91   | 71.0<br>2.80   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.57<br>1.26        |
| 25.654<br>1.0100 | 20.638<br>0.8125 | -8.1<br>-0.32    | 4.3<br>0.17                                    | 43.5<br>1.71                               | 52.0<br>2.05                               | 3.3<br>0.13      | 72.0<br>2.83   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.57<br>1.26        |
| 25.654<br>1.0100 | 20.638<br>0.8125 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 43.5<br>1.71                               | 50.0<br>1.97                               | 3.3<br>0.13      | 72.0<br>2.83   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 28.7           | 12.2           | 0.0725         | 0.58<br>1.27        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 45.5<br>1.80                               | 52.0<br>2.05                               | 3.3<br>0.13      | 74.0<br>2.91   | 67.0<br>2.64   | 1.40<br>0.06   | 0.90<br>0.04   | 29.9           | 11.2           | 0.0781         | 0.66<br>1.45        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 3.3<br>0.13      | 74.5<br>2.94   | 70.0<br>2.76   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.67<br>1.48        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 1.5<br>0.06                                    | 43.5<br>1.71                               | 45.5<br>1.79                               | 2.0<br>0.08      | 73.0<br>2.87   | 69.0<br>2.72   | 2.40<br>0.09   | 1.10<br>0.04   | 20.7           | 12.5           | 0.0709         | 0.46<br>1.01        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 1.3<br>0.05      | 74.0<br>2.91   | 70.0<br>2.76   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.58<br>1.28        |
| 23.698<br>0.9330 | 18.512<br>0.7288 | -2.5<br>-0.10    | 0.8<br>0.03                                    | 47.0<br>1.85                               | 48.0<br>1.89                               | 1.5<br>0.06      | 75.0<br>2.95   | 68.0<br>2.68   | 3.20<br>0.13   | 1.50<br>0.06   | 24.6           | 12.6           | 0.0839         | 0.56<br>1.23        |
| 23.698<br>0.9330 | 18.512<br>0.7288 | -2.5<br>-0.10    | 3.5<br>0.14                                    | 47.0<br>1.85                               | 53.0<br>2.09                               | 1.5<br>0.06      | 75.0<br>2.95   | 68.0<br>2.68   | 3.20<br>0.13   | 1.50<br>0.06   | 24.6           | 12.6           | 0.0839         | 0.55<br>1.22        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 1.5<br>0.06      | 74.5<br>2.94   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.68<br>1.50        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 3.3<br>0.13      | 74.0<br>2.91   | 69.0<br>2.72   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.60<br>1.32        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 0.8<br>0.03      | 74.0<br>2.91   | 71.0<br>2.80   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.61<br>1.34        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 44.0<br>1.73                               | 50.0<br>1.97                               | 3.3<br>0.13      | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.56<br>1.23        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                                    | 44.5<br>1.75                               | 51.0<br>2.01                               | 3.3<br>0.13      | 75.0<br>2.95   | 70.0<br>2.76   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.67<br>1.48        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                                    | 44.5<br>1.75                               | 51.0<br>2.01                               | 0.8<br>0.03      | 74.5<br>2.94   | 72.0<br>2.83   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.68<br>1.50        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 3.3<br>0.13      | 75.0<br>2.95   | 70.0<br>2.76   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.68<br>1.49        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                                    | 44.5<br>1.75                               | 51.0<br>2.01                               | 3.3<br>0.13      | 75.0<br>2.95   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.71<br>1.56        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 0.8<br>0.03                                    | 44.5<br>1.75                               | 45.0<br>1.77                               | 3.3<br>0.13      | 75.0<br>2.95   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.71<br>1.57        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -4.8<br>-0.19    | 0.8<br>0.03                                    | 49.0<br>1.93                               | 51.0<br>2.01                               | 3.3<br>0.13      | 78.0<br>3.07   | 68.0<br>2.68   | 2.10<br>0.08   | 1.80<br>0.07   | 33.7           | 14             | 0.0928         | 0.76<br>1.68        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -4.8<br>-0.19    | 0.8<br>0.03                                    | 49.0<br>1.93                               | 51.0<br>2.01                               | 0.8<br>0.03      | 78.0<br>3.07   | 70.0<br>2.76   | 2.10<br>0.08   | 1.80<br>0.07   | 33.7           | 14             | 0.0928         | 0.77<br>1.71        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

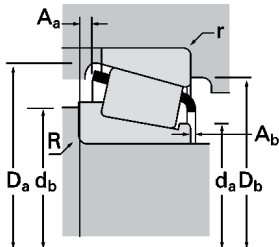
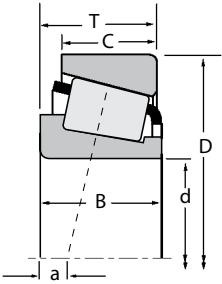




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 38.100<br>1.5000        | 82.550<br>3.2500  | 29.370<br>1.1563 | 95100<br>21400         | 0.55 | 1.10 | 24600<br>5540          | 23000<br>5180    | 1.07 | 130000<br>29300 | HM801346X   | HM801310 |
| 38.100<br>1.5000        | 82.931<br>3.2650  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25572       | 25520    |
| 38.100<br>1.5000        | 85.000<br>3.3465  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25572       | 25526    |
| 38.100<br>1.5000        | 85.725<br>3.3750  | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3875        | 3820     |
| 38.100<br>1.5000        | 85.725<br>3.3750  | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3876        | 3820     |
| 38.100<br>1.5000        | 85.725<br>3.3750  | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3876        | 3821     |
| 38.100<br>1.5000        | 87.312<br>3.4375  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3580        | 3525     |
| 38.100<br>1.5000        | 87.312<br>3.4375  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3583        | 3525     |
| 38.100<br>1.5000        | 88.500<br>3.4843  | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44150       | 44348    |
| 38.100<br>1.5000        | 88.500<br>3.4843  | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 418         | 414      |
| 38.100<br>1.5000        | 88.500<br>3.4843  | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 418         | 414A     |
| 38.100<br>1.5000        | 88.900<br>3.5000  | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 418         | 414X     |
| 38.100<br>1.5000        | 90.488<br>3.5625  | 39.688<br>1.5625 | 155000<br>34900        | 0.28 | 2.11 | 40200<br>9040          | 19600<br>4400    | 2.05 | 204000<br>45900 | 4375        | 4335     |
| 38.100<br>1.5000        | 93.662<br>3.6875  | 31.750<br>1.2500 | 126000<br>28200        | 0.36 | 1.67 | 32600<br>7320          | 20100<br>4510    | 1.62 | 156000<br>35000 | 49151       | 49368    |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 440         | 432      |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 444         | 432      |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33880       | 33821    |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53150       | 53375    |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903241    | HM903210 |
| 38.100<br>1.5000        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53150       | 53387    |
| 38.100<br>1.5000        | 98.425<br>3.8750  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903241    | HM903216 |
| 38.100<br>1.5000        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 525         | 522      |
| 38.100<br>1.5000        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 525X        | 522      |
| 38.100<br>1.5000        | 103.188<br>4.0625 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 542         | 533A     |
| 38.100<br>1.5000        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455A        | 453A     |
| 38.100<br>1.5000        | 111.125<br>4.3750 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 542         | 532A     |
| 38.481<br>1.5150        | 63.500<br>2.5000  | 12.700<br>0.5000 | 25100<br>5650          | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430   | 13890       | 13830    |
| 38.481<br>1.5150        | 65.088<br>2.5625  | 12.700<br>0.5000 | 25100<br>5650          | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430   | 13890       | 13836    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -4.8<br>-0.19    | 2.3<br>0.09                | 49.0<br>1.93                      | 54.0<br>2.13             | 3.3<br>0.13                         | 78.0<br>3.07   | 68.0<br>2.68   | 2.10<br>0.08   | 1.80<br>0.07   | 33.7           | 14             | 0.0928         | 0.76<br>1.68        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 0.8<br>0.03                | 46.0<br>1.81                      | 46.0<br>1.81             | 0.8<br>0.03                         | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.64<br>1.42        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 0.8<br>0.03                | 46.0<br>1.81                      | 46.0<br>1.81             | 2.3<br>0.09                         | 78.0<br>3.07   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.68<br>1.50        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                | 48.5<br>1.91                      | 49.5<br>1.95             | 3.3<br>0.13                         | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.85<br>1.87        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 48.5<br>1.91                      | 55.0<br>2.17             | 3.3<br>0.13                         | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.84<br>1.86        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 48.5<br>1.91                      | 55.0<br>2.17             | 1.3<br>0.05                         | 81.0<br>3.19   | 75.0<br>2.95   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.85<br>1.88        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 1.5<br>0.06                | 45.5<br>1.79                      | 48.0<br>1.89             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.87<br>1.91        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 45.5<br>1.79                      | 52.0<br>2.05             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.86<br>1.90        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09      | 2.3<br>0.09                | 51.0<br>2.00                      | 55.0<br>2.17             | 1.5<br>0.06                         | 84.0<br>3.31   | 75.0<br>2.95   | 3.90<br>0.15   | 2.60<br>0.10   | 22.9           | 8.71           | 0.0899         | 0.71<br>1.56        |
| 29.083<br>1.1450 | 22.225<br>0.8750 | -9.7<br>-0.38    | 3.5<br>0.14                | 44.5<br>1.75                      | 51.0<br>2.01             | 1.5<br>0.06                         | 80.0<br>3.15   | 77.0<br>3.03   | 1.20<br>0.05   | 0.80<br>0.03   | 34.4           | 9.87           | 0.0731         | 0.82<br>1.81        |
| 29.083<br>1.1450 | 22.225<br>0.8750 | -9.7<br>-0.38    | 3.5<br>0.14                | 44.5<br>1.75                      | 51.0<br>2.01             | 3.3<br>0.13                         | 80.0<br>3.15   | 76.0<br>2.99   | 1.20<br>0.05   | 0.80<br>0.03   | 34.4           | 9.87           | 0.0731         | 0.81<br>1.80        |
| 29.083<br>1.1450 | 22.225<br>0.8750 | -9.7<br>-0.38    | 3.5<br>0.14                | 44.5<br>1.75                      | 51.0<br>2.01             | 0.8<br>0.03                         | 80.0<br>3.15   | 78.0<br>3.07   | 1.20<br>0.05   | 0.80<br>0.03   | 34.4           | 9.87           | 0.0731         | 0.84<br>1.84        |
| 40.386<br>1.5900 | 33.338<br>1.3125 | -15.0<br>-0.59   | 1.5<br>0.06                | 51.0<br>2.01                      | 53.0<br>2.09             | 3.3<br>0.13                         | 85.0<br>3.35   | 77.0<br>3.03   | 2.30<br>0.09   | 0.60<br>0.02   | 52.9           | 16.7           | 0.0872         | 1.31<br>2.89        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -9.1<br>-0.36    | 0.8<br>0.03                | 48.0<br>1.89                      | 48.5<br>1.91             | 3.3<br>0.13                         | 87.0<br>3.43   | 82.0<br>3.23   | 3.00<br>0.12   | 0.80<br>0.03   | 42.4           | 13.6           | 0.0872         | 1.08<br>2.39        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 0.8<br>0.03                | 45.5<br>1.79                      | 46.5<br>1.83             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 1.04<br>2.29        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 3.5<br>0.14                | 45.5<br>1.79                      | 52.0<br>2.05             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 1.03<br>2.27        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | -7.6<br>-0.30    | 3.5<br>0.14                | 48.0<br>1.89                      | 54.0<br>2.13             | 2.3<br>0.09                         | 90.0<br>3.54   | 85.0<br>3.35   | 1.30<br>0.05   | 2.20<br>0.09   | 52.5           | 18.5           | 0.0910         | 1.05<br>2.31        |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01    | 1.5<br>0.06                | 52.5<br>2.07                      | 55.0<br>2.17             | 0.8<br>0.03                         | 89.0<br>3.50   | 81.0<br>3.19   | 5.70<br>0.22   | 2.20<br>0.08   | 26.7           | 9.63           | 0.0930         | 1.02<br>2.25        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | 0.5<br>0.02      | 3.5<br>0.14                | 54.0<br>2.13                      | 61.0<br>2.40             | 0.8<br>0.03                         | 91.0<br>3.58   | 81.0<br>3.19   | 3.90<br>0.16   | 2.00<br>0.08   | 33.7           | 9.91           | 0.1010         | 1.09<br>2.40        |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01    | 1.5<br>0.06                | 52.5<br>2.07                      | 55.0<br>2.17             | 0.8<br>0.03                         | 91.0<br>3.58   | 82.0<br>3.23   | 5.70<br>0.22   | 2.20<br>0.08   | 26.7           | 9.63           | 0.0930         | 1.10<br>2.42        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | 0.5<br>0.02      | 3.5<br>0.14                | 54.0<br>2.13                      | 61.0<br>2.40             | 0.8<br>0.03                         | 92.0<br>3.62   | 82.0<br>3.23   | 3.90<br>0.16   | 2.00<br>0.08   | 33.7           | 9.91           | 0.1010         | 1.17<br>2.58        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 3.5<br>0.14                | 48.0<br>1.89                      | 54.0<br>2.13             | 3.3<br>0.13                         | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.48<br>3.26        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 0.8<br>0.03                | 48.0<br>1.89                      | 49.0<br>1.93             | 3.3<br>0.13                         | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.49<br>3.28        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48   | 3.5<br>0.14                | 49.0<br>1.93                      | 55.0<br>2.17             | 1.5<br>0.06                         | 98.0<br>3.86   | 93.0<br>3.66   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3           | 16.1           | 0.0938         | 1.65<br>3.63        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 3.5<br>0.14                | 49.5<br>1.95                      | 56.0<br>2.20             | 0.8<br>0.03                         | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.43<br>3.15        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48   | 3.5<br>0.14                | 49.0<br>1.93                      | 55.0<br>2.17             | 3.3<br>0.13                         | 100.0<br>3.94  | 95.0<br>3.74   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3           | 16.1           | 0.0938         | 1.95<br>4.30        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03    | 0.4<br>0.02                | 43.0<br>1.69                      | 43.0<br>1.69             | 0.8<br>0.03                         | 60.0<br>2.36   | 59.0<br>2.32   | 0.20<br>0.01   | 1.40<br>0.05   | 14.8           | 23.3           | 0.0601         | 0.15<br>0.32        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03    | 0.4<br>0.02                | 43.0<br>1.69                      | 43.0<br>1.69             | 0.8<br>0.03                         | 61.0<br>2.40   | 59.0<br>2.32   | 0.20<br>0.01   | 1.40<br>0.05   | 14.8           | 23.3           | 0.0601         | 0.16<br>0.35        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

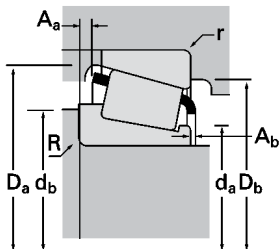
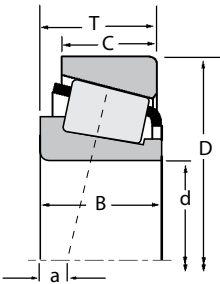
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 39.000<br>1.5354        | 72.014<br>2.8352  | 21.400<br>0.8425 | 52400<br>11800         | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800         | J16154      | J16285                 |  |                |       |       |
| 39.688<br>1.5625        | 73.025<br>2.8750  | 16.667<br>0.6562 | 47000<br>10600         | 0.35 | 1.71 | 12200<br>2740          | 7310<br>1640     | 1.67 | 58100<br>13100         | 18587       | 18520                  |  |                |       |       |
| 39.688<br>1.5625        | 73.025<br>2.8750  | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000        | 2789        | 2735X                  |  |                |       |       |
| 39.688<br>1.5625        | 73.025<br>2.8750  | 25.654<br>1.0100 | 68000<br>15300         | 0.33 | 1.80 | 17600<br>3960          | 10000<br>2260    | 1.76 | 89100<br>20000         | M201047     | M201011                |  |                |       |       |
| 39.688<br>1.5625        | 76.200<br>3.0000  | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000        | 2789        | 2720                   |  |                |       |       |
| 39.688<br>1.5625        | 76.200<br>3.0000  | 23.812<br>0.9375 | 80400<br>18100         | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000        | 2789        | 2729                   |  |                |       |       |
| 39.688<br>1.5625        | 76.200<br>3.0000  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26881       | 26823                  |  |                |       |       |
| 39.688<br>1.5625        | 79.375<br>3.1250  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26880       | 26822                  |  |                |       |       |
| 39.688<br>1.5625        | 79.375<br>3.1250  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26881       | 26822                  |  |                |       |       |
| 39.688<br>1.5625        | 79.375<br>3.1250  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26880       | 26822A                 |  |                |       |       |
| 39.688<br>1.5625        | 79.974<br>3.1486  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3382        | 3325                   |  |                |       |       |
| 39.688<br>1.5625        | 79.974<br>3.1486  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3325                   |  |                |       |       |
| 39.688<br>1.5625        | 80.000<br>3.1496  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26881       | 26824                  |  |                |       |       |
| 39.688<br>1.5625        | 80.035<br>3.1510  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3339                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26880       | 26820                  |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26880       | 26830                  |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26881       | 26820                  |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26881       | 26830                  |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3382        | 3320                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3382        | 3331                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3320                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3331                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3331                   |  |                |       |       |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 29.370<br>1.1563 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        | 26880       | 26821                  |  |                |       |       |
| 39.688<br>1.5625        | 84.138<br>3.3125  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3382        | 3328                   |  |                |       |       |
| 39.688<br>1.5625        | 84.138<br>3.3125  | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3386        | 3328                   |  |                |       |       |
| 39.688<br>1.5625        | 88.500<br>3.4843  | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900         | 44156       | 44348                  |  |                |       |       |
| 39.688<br>1.5625        | 88.500<br>3.4843  | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900         | 44158       | 44348                  |  |                |       |       |
| 39.688<br>1.5625        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800        | 620         | 612                    |  |                |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 20.638  | 16.637 | -4.1             | 3.5                                            | 44.5                                       | 51.0                                       | 0.4                                          | 67.0           | 63.0           | 1.20           | 1.10           | 20.3           | 10.6           | 0.0707         | 0.36                |
| 0.8125  | 0.6550 | -0.16            | 0.14                                           | 1.75                                       | 2.01                                       | 0.02                                         | 2.64           | 2.48           | 0.05           | 0.04           |                |                |                | 0.79                |
| 17.462  | 12.700 | -2.8             | 0.8                                            | 45.0                                       | 45.5                                       | 1.5                                          | 69.0           | 66.0           | 0.50           | 1.20           | 21             | 15.4           | 0.0681         | 0.30                |
| 0.6875  | 0.5000 | -0.11            | 0.03                                           | 1.77                                       | 1.79                                       | 0.06                                         | 2.72           | 2.60           | 0.02           | 0.05           |                |                |                | 0.65                |
| 25.654  | 19.050 | -8.1             | 3.5                                            | 45.0                                       | 52.0                                       | 0.8                                          | 69.0           | 66.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.43                |
| 1.0100  | 0.7500 | -0.32            | 0.14                                           | 1.77                                       | 2.05                                       | 0.03                                         | 2.72           | 2.60           | 0.06           | 0.04           |                |                |                | 0.94                |
| 22.098  | 21.336 | -5.8             | 0.8                                            | 48.0                                       | 45.5                                       | 2.3                                          | 69.0           | 64.0           | 0.50           | 2.00           | 27.5           | 15             | 0.0736         | 0.43                |
| 0.8700  | 0.8400 | -0.23            | 0.03                                           | 1.89                                       | 1.79                                       | 0.09                                         | 2.72           | 2.52           | 0.02           | 0.08           |                |                |                | 0.94                |
| 25.654  | 19.050 | -8.1             | 3.5                                            | 45.0                                       | 52.0                                       | 3.3                                          | 70.0           | 66.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.47                |
| 1.0100  | 0.7500 | -0.32            | 0.14                                           | 1.77                                       | 2.05                                       | 0.13                                         | 2.76           | 2.60           | 0.06           | 0.04           |                |                |                | 1.04                |
| 25.654  | 19.050 | -8.1             | 3.5                                            | 45.0                                       | 52.0                                       | 0.8                                          | 70.0           | 68.0           | 1.40           | 0.90           | 28.7           | 12.2           | 0.0725         | 0.48                |
| 1.0100  | 0.7500 | -0.32            | 0.14                                           | 1.77                                       | 2.05                                       | 0.03                                         | 2.76           | 2.68           | 0.06           | 0.04           |                |                |                | 1.06                |
| 25.400  | 20.638 | -7.4             | 3.5                                            | 45.5                                       | 52.0                                       | 1.5                                          | 73.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.50                |
| 1.0000  | 0.8125 | -0.29            | 0.14                                           | 1.79                                       | 2.05                                       | 0.06                                         | 2.87           | 2.72           | 0.06           | 0.05           |                |                |                | 1.10                |
| 25.400  | 19.050 | -7.4             | 1.5                                            | 45.5                                       | 48.0                                       | 0.8                                          | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.55                |
| 1.0000  | 0.7500 | -0.29            | 0.06                                           | 1.79                                       | 1.89                                       | 0.03                                         | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.21                |
| 25.400  | 19.050 | -7.4             | 3.5                                            | 45.5                                       | 52.0                                       | 0.8                                          | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.54                |
| 1.0000  | 0.7500 | -0.29            | 0.14                                           | 1.79                                       | 2.05                                       | 0.03                                         | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.20                |
| 25.400  | 19.050 | -7.4             | 1.5                                            | 45.5                                       | 48.0                                       | 2.3                                          | 74.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.54                |
| 1.0000  | 0.7500 | -0.29            | 0.06                                           | 1.79                                       | 1.89                                       | 0.09                                         | 2.91           | 2.72           | 0.06           | 0.05           |                |                |                | 1.20                |
| 30.391  | 23.812 | -10.9            | 3.5                                            | 45.5                                       | 52.0                                       | 3.3                                          | 74.5           | 70.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.64                |
| 1.1965  | 0.9375 | -0.43            | 0.14                                           | 1.79                                       | 2.05                                       | 0.13                                         | 2.94           | 2.76           | 0.07           | 0.04           |                |                |                | 1.42                |
| 30.391  | 23.812 | -10.9            | 0.8                                            | 45.5                                       | 46.5                                       | 3.3                                          | 74.5           | 70.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.65                |
| 1.1965  | 0.9375 | -0.43            | 0.03                                           | 1.79                                       | 1.83                                       | 0.13                                         | 2.94           | 2.76           | 0.07           | 0.04           |                |                |                | 1.43                |
| 25.400  | 19.050 | -7.4             | 3.5                                            | 45.5                                       | 52.0                                       | 1.3                                          | 74.0           | 70.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.55                |
| 1.0000  | 0.7500 | -0.29            | 0.14                                           | 1.79                                       | 2.05                                       | 0.05                                         | 2.91           | 2.76           | 0.06           | 0.05           |                |                |                | 1.22                |
| 30.391  | 23.812 | -10.9            | 0.8                                            | 45.5                                       | 46.5                                       | 1.5                                          | 74.5           | 71.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.66                |
| 1.1965  | 0.9375 | -0.43            | 0.03                                           | 1.79                                       | 1.83                                       | 0.06                                         | 2.94           | 2.80           | 0.07           | 0.04           |                |                |                | 1.45                |
| 25.400  | 20.638 | -7.4             | 1.5                                            | 45.5                                       | 48.0                                       | 3.3                                          | 74.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.58                |
| 1.0000  | 0.8125 | -0.29            | 0.06                                           | 1.79                                       | 1.89                                       | 0.13                                         | 2.91           | 2.72           | 0.06           | 0.05           |                |                |                | 1.27                |
| 25.400  | 20.638 | -7.4             | 1.5                                            | 45.5                                       | 48.0                                       | 0.8                                          | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.59                |
| 1.0000  | 0.8125 | -0.29            | 0.06                                           | 1.79                                       | 1.89                                       | 0.03                                         | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.29                |
| 25.400  | 20.638 | -7.4             | 3.5                                            | 45.5                                       | 52.0                                       | 3.3                                          | 74.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.57                |
| 1.0000  | 0.8125 | -0.29            | 0.14                                           | 1.79                                       | 2.05                                       | 0.13                                         | 2.91           | 2.72           | 0.06           | 0.05           |                |                |                | 1.26                |
| 25.400  | 20.638 | -7.4             | 3.5                                            | 45.5                                       | 52.0                                       | 0.8                                          | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.58                |
| 1.0000  | 0.8125 | -0.29            | 0.14                                           | 1.79                                       | 2.05                                       | 0.03                                         | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.28                |
| 30.391  | 23.812 | -10.9            | 3.5                                            | 45.5                                       | 52.0                                       | 3.3                                          | 75.0           | 70.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.65                |
| 1.1965  | 0.9375 | -0.43            | 0.14                                           | 1.79                                       | 2.05                                       | 0.13                                         | 2.95           | 2.76           | 0.07           | 0.04           |                |                |                | 1.43                |
| 30.391  | 23.812 | -10.9            | 3.5                                            | 45.5                                       | 52.0                                       | 0.8                                          | 74.5           | 72.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.66                |
| 1.1965  | 0.9375 | -0.43            | 0.14                                           | 1.79                                       | 2.05                                       | 0.03                                         | 2.94           | 2.83           | 0.07           | 0.04           |                |                |                | 1.45                |
| 30.391  | 23.812 | -10.9            | 0.8                                            | 45.5                                       | 46.5                                       | 3.3                                          | 75.0           | 70.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.65                |
| 1.1965  | 0.9375 | -0.43            | 0.03                                           | 1.79                                       | 1.83                                       | 0.13                                         | 2.95           | 2.76           | 0.07           | 0.04           |                |                |                | 1.44                |
| 30.391  | 23.812 | -10.9            | 0.8                                            | 45.5                                       | 46.5                                       | 0.8                                          | 74.5           | 72.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.66                |
| 1.1965  | 0.9375 | -0.43            | 0.03                                           | 1.79                                       | 1.83                                       | 0.03                                         | 2.94           | 2.83           | 0.07           | 0.04           |                |                |                | 1.46                |
| 25.400  | 24.608 | -7.4             | 1.5                                            | 45.5                                       | 48.0                                       | 3.3                                          | 74.0           | 68.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.64                |
| 1.0000  | 0.9688 | -0.29            | 0.06                                           | 1.79                                       | 1.89                                       | 0.13                                         | 2.91           | 2.68           | 0.06           | 0.05           |                |                |                | 1.40                |
| 30.391  | 23.812 | -10.9            | 3.5                                            | 45.5                                       | 52.0                                       | 3.3                                          | 76.0           | 72.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.74                |
| 1.1965  | 0.9375 | -0.43            | 0.14                                           | 1.79                                       | 2.05                                       | 0.13                                         | 2.99           | 2.83           | 0.07           | 0.04           |                |                |                | 1.64                |
| 30.391  | 23.812 | -10.9            | 0.8                                            | 45.5                                       | 46.5                                       | 3.3                                          | 76.0           | 72.0           | 1.80           | 1.10           | 34.6           | 12.1           | 0.0744         | 0.75                |
| 1.1965  | 0.9375 | -0.43            | 0.03                                           | 1.79                                       | 1.83                                       | 0.13                                         | 2.99           | 2.83           | 0.07           | 0.04           |                |                |                | 1.65                |
| 23.698  | 17.462 | 2.3              | 2.3                                            | 51.0                                       | 56.0                                       | 1.5                                          | 84.0           | 75.0           | 3.90           | 2.60           | 22.9           | 8.71           | 0.0899         | 0.69                |
| 0.9330  | 0.6875 | 0.09             | 0.09                                           | 2.00                                       | 2.20                                       | 0.06                                         | 3.31           | 2.95           | 0.15           | 0.10           |                |                |                | 1.52                |
| 23.698  | 17.462 | 2.3              | 3.5                                            | 51.0                                       | 58.0                                       | 1.5                                          | 84.0           | 75.0           | 3.90           | 2.60           | 22.9           | 8.71           | 0.0899         | 0.69                |
| 0.9330  | 0.6875 | 0.09             | 0.14                                           | 2.00                                       | 2.28                                       | 0.06                                         | 3.31           | 2.95           | 0.15           | 0.10           |                |                |                | 1.51                |
| 41.275  | 31.750 | -14.0            | 0.8                                            | 52.0                                       | 53.0                                       | 3.3                                          | 110.0          | 105.0          | 3.90           | 1.90           | 75.9           | 16.2           | 0.0694         | 2.53                |
| 1.6250  | 1.2500 | -0.55            | 0.03                                           | 2.05                                       | 2.09                                       | 0.13                                         | 4.33           | 4.13           | 0.15           | 0.07           |                |                |                | 5.58                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

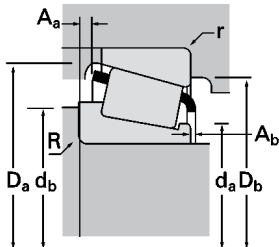
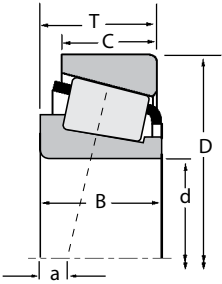






# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 39.980<br>1.5740        | 76.200<br>3.0000  | 19.347<br>0.7617 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28156       | 28300    |
| 39.980<br>1.5740        | 76.200<br>3.0000  | 20.638<br>0.8125 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28159       | 28300    |
| 39.980<br>1.5740        | 80.035<br>3.1510  | 20.142<br>0.7930 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28156       | 28317    |
| 39.987<br>1.5743        | 90.975<br>3.5817  | 32.000<br>1.2598 | 133000<br>29900        | 0.33 | 1.80 | 34500<br>7760          | 19700<br>4420    | 1.76 | 172000<br>38600 | HM204043    | HM204010 |
| 40.000<br>1.5748        | 68.000<br>2.6772  | 19.000<br>0.7480 | 51400<br>11600         | 0.38 | 1.58 | 13300<br>3000          | 8640<br>1940     | 1.54 | 71600<br>16100  | XAA32008X   | Y32008X  |
| 40.000<br>1.5748        | 75.000<br>2.9528  | 26.000<br>1.0236 | 81500<br>18300         | 0.36 | 1.69 | 21100<br>4750          | 12900<br>2890    | 1.64 | 105000<br>23600 | XAA33108    | Y33108   |
| 40.000<br>1.5748        | 76.200<br>3.0000  | 20.625<br>0.8120 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28158       | 28300X   |
| 40.000<br>1.5748        | 80.000<br>3.1496  | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 344A        | 332      |
| 40.000<br>1.5748        | 80.000<br>3.1496  | 21.006<br>0.8270 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28158       | 28315    |
| 40.000<br>1.5748        | 80.000<br>3.1496  | 21.006<br>0.8270 | 58800<br>13200         | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28158       | 28315A   |
| 40.000<br>1.5748        | 84.138<br>3.3125  | 26.988<br>1.0625 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350         | 3520     |
| 40.000<br>1.5748        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350         | 354A     |
| 40.000<br>1.5748        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350         | 354X     |
| 40.000<br>1.5748        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 357         | 354A     |
| 40.000<br>1.5748        | 85.000<br>3.3465  | 33.000<br>1.2992 | 127000<br>28500        | 0.34 | 1.74 | 32900<br>7400          | 19400<br>4360    | 1.70 | 160000<br>35900 | JF4049      | JF4010   |
| 40.000<br>1.5748        | 85.725<br>3.3750  | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3879        | 3820     |
| 40.000<br>1.5748        | 87.312<br>3.4375  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3582        | 3525     |
| 40.000<br>1.5748        | 88.500<br>3.4843  | 24.765<br>0.9750 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44157X      | 44348    |
| 40.000<br>1.5748        | 88.500<br>3.4843  | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 420         | 414      |
| 40.000<br>1.5748        | 88.900<br>3.5000  | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000 | 420         | 414X     |
| 40.000<br>1.5748        | 90.000<br>3.5433  | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350         | 352X     |
| 40.000<br>1.5748        | 90.000<br>3.5433  | 35.250<br>1.3878 | 123000<br>27500        | 0.55 | 1.10 | 31800<br>7140          | 29700<br>6670    | 1.07 | 160000<br>36100 | XBA32308-B  | Y32308-B |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350         | 352      |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 357         | 352      |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 350A        | 352      |
| 40.000<br>1.5748        | 95.250<br>3.7500  | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 442-S       | 432      |
| 40.000<br>1.5748        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 543         | 532X     |
| 40.000<br>1.5748        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 543X        | 532X     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 19.650  | 15.507 | -3.6             | 2.3                                            | 45.0                                       | 49.0                                       | 1.3                                          | 71.0           | 68.0           | 1.10           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.37                |
| 0.7736  | 0.6105 | -0.14            | 0.09                                           | 1.77                                       | 1.93                                       | 0.05                                         | 2.80           | 2.68           | 0.04           | 0.04           |                |                |                | 0.81                |
| 20.940  | 15.507 | -4.8             | 3.5                                            | 45.0                                       | 52.0                                       | 1.3                                          | 71.0           | 68.0           | 2.40           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.38                |
| 0.8244  | 0.6105 | -0.19            | 0.14                                           | 1.77                                       | 2.05                                       | 0.05                                         | 2.80           | 2.68           | 0.09           | 0.04           |                |                |                | 0.83                |
| 19.650  | 15.875 | -3.6             | 2.3                                            | 45.0                                       | 49.0                                       | 1.5                                          | 73.0           | 69.0           | 1.10           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.43                |
| 0.7736  | 0.6250 | -0.14            | 0.09                                           | 1.77                                       | 1.93                                       | 0.06                                         | 2.87           | 2.72           | 0.04           | 0.04           |                |                |                | 0.95                |
| 32.000  | 26.500 | -9.7             | 1.0                                            | 53.0                                       | 54.0                                       | 3.5                                          | 86.0           | 79.0           | 1.50           | 1.80           | 47.7           | 13.4           | 0.0885         | 1.03                |
| 1.2598  | 1.0433 | -0.38            | 0.04                                           | 2.09                                       | 2.13                                       | 0.14                                         | 3.39           | 3.11           | 0.06           | 0.07           |                |                |                | 2.26                |
| 19.000  | 14.500 | -3.8             | 3.5                                            | 45.5                                       | 52.0                                       | 1.0                                          | 65.0           | 61.0           | 0.90           | 1.70           | 23.8           | 16.1           | 0.0732         | 0.27                |
| 0.7480  | 0.5709 | -0.15            | 0.14                                           | 1.79                                       | 2.05                                       | 0.04                                         | 2.56           | 2.40           | 0.04           | 0.07           |                |                |                | 0.61                |
| 26.000  | 20.500 | -7.6             | 3.5                                            | 47.0                                       | 55.0                                       | 1.5                                          | 71.0           | 67.0           | 1.80           | 1.70           | 29.4           | 14.9           | 0.0771         | 0.50                |
| 1.0236  | 0.8071 | -0.30            | 0.14                                           | 1.85                                       | 2.17                                       | 0.06                                         | 2.80           | 2.64           | 0.07           | 0.07           |                |                |                | 1.09                |
| 20.940  | 15.494 | -4.8             | 1.5                                            | 45.0                                       | 47.5                                       | 1.5                                          | 71.0           | 68.0           | 2.40           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.38                |
| 0.8244  | 0.6100 | -0.19            | 0.06                                           | 1.77                                       | 1.87                                       | 0.06                                         | 2.80           | 2.68           | 0.09           | 0.04           |                |                |                | 0.85                |
| 22.403  | 17.826 | -6.4             | 0.8                                            | 45.5                                       | 46.0                                       | 1.3                                          | 75.0           | 73.0           | 0.70           | 1.10           | 26.5           | 13             | 0.0676         | 0.48                |
| 0.8820  | 0.7018 | -0.25            | 0.03                                           | 1.79                                       | 1.81                                       | 0.05                                         | 2.95           | 2.87           | 0.03           | 0.04           |                |                |                | 1.05                |
| 20.940  | 15.875 | -4.8             | 1.5                                            | 45.0                                       | 47.5                                       | 1.5                                          | 73.0           | 69.0           | 2.40           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.44                |
| 0.8244  | 0.6250 | -0.19            | 0.06                                           | 1.77                                       | 1.87                                       | 0.06                                         | 2.87           | 2.72           | 0.09           | 0.04           |                |                |                | 0.98                |
| 20.940  | 15.875 | -4.8             | 1.5                                            | 45.0                                       | 47.5                                       | 2.0                                          | 73.0           | 69.0           | 2.40           | 1.10           | 20.7           | 12.5           | 0.0709         | 0.44                |
| 0.8244  | 0.6250 | -0.19            | 0.06                                           | 1.77                                       | 1.87                                       | 0.08                                         | 2.87           | 2.72           | 0.09           | 0.04           |                |                |                | 0.97                |
| 21.692  | 23.812 | -4.8             | 4.0                                            | 46.5                                       | 54.0                                       | 3.3                                          | 79.5           | 74.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.61                |
| 0.8540  | 0.9375 | -0.19            | 0.16                                           | 1.83                                       | 2.13                                       | 0.13                                         | 3.13           | 2.91           | 0.02           | 0.07           |                |                |                | 1.36                |
| 21.692  | 17.462 | -4.8             | 4.0                                            | 46.5                                       | 54.0                                       | 1.3                                          | 80.0           | 77.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.56                |
| 0.8540  | 0.6875 | -0.19            | 0.16                                           | 1.83                                       | 2.13                                       | 0.05                                         | 3.15           | 3.03           | 0.02           | 0.07           |                |                |                | 1.23                |
| 21.692  | 17.462 | -4.8             | 4.0                                            | 46.5                                       | 54.0                                       | 1.5                                          | 80.0           | 77.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.56                |
| 0.8540  | 0.6875 | -0.19            | 0.16                                           | 1.83                                       | 2.13                                       | 0.06                                         | 3.15           | 3.03           | 0.02           | 0.07           |                |                |                | 1.23                |
| 21.692  | 17.462 | -4.8             | 2.3                                            | 46.5                                       | 51.0                                       | 1.3                                          | 80.0           | 77.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.56                |
| 0.8540  | 0.6875 | -0.19            | 0.09                                           | 1.83                                       | 2.01                                       | 0.05                                         | 3.15           | 3.03           | 0.02           | 0.07           |                |                |                | 1.24                |
| 32.500  | 28.000 | -10.2            | 2.5                                            | 49.0                                       | 55.0                                       | 2.0                                          | 80.0           | 75.0           | 1.10           | 2.00           | 39.5           | 13.5           | 0.0841         | 0.90                |
| 1.2795  | 1.1024 | -0.40            | 0.10                                           | 1.93                                       | 2.17                                       | 0.08                                         | 3.15           | 2.95           | 0.04           | 0.08           |                |                |                | 1.99                |
| 30.162  | 23.812 | -8.1             | 0.8                                            | 50.0                                       | 51.0                                       | 3.3                                          | 81.0           | 73.0           | 1.50           | 2.10           | 37.8           | 13.5           | 0.0873         | 0.82                |
| 1.1875  | 0.9375 | -0.32            | 0.03                                           | 1.97                                       | 2.01                                       | 0.13                                         | 3.19           | 2.87           | 0.06           | 0.08           |                |                |                | 1.81                |
| 30.886  | 23.812 | -10.2            | 3.5                                            | 47.0                                       | 53.0                                       | 3.3                                          | 81.0           | 75.0           | 2.30           | 0.70           | 39.5           | 10.5           | 0.0808         | 0.83                |
| 1.2160  | 0.9375 | -0.40            | 0.14                                           | 1.85                                       | 2.09                                       | 0.13                                         | 3.19           | 2.95           | 0.09           | 0.03           |                |                |                | 1.84                |
| 23.063  | 17.462 | 3.0              | 2.3                                            | 51.0                                       | 56.0                                       | 1.5                                          | 84.0           | 75.0           | 3.30           | 3.00           | 22.9           | 8.71           | 0.0899         | 0.68                |
| 0.9080  | 0.6875 | 0.12             | 0.09                                           | 2.00                                       | 2.20                                       | 0.06                                         | 3.31           | 2.95           | 0.13           | 0.12           |                |                |                | 1.50                |
| 29.083  | 22.225 | -9.7             | 3.5                                            | 46.0                                       | 52.0                                       | 1.5                                          | 80.0           | 77.0           | 1.20           | 0.80           | 34.4           | 9.87           | 0.0731         | 0.80                |
| 1.1450  | 0.8750 | -0.38            | 0.14                                           | 1.81                                       | 2.05                                       | 0.06                                         | 3.15           | 3.03           | 0.05           | 0.03           |                |                |                | 1.76                |
| 29.083  | 22.225 | -9.7             | 3.5                                            | 46.0                                       | 52.0                                       | 0.8                                          | 80.0           | 78.0           | 1.20           | 0.80           | 34.4           | 9.87           | 0.0731         | 0.81                |
| 1.1450  | 0.8750 | -0.38            | 0.14                                           | 1.81                                       | 2.05                                       | 0.03                                         | 3.15           | 3.07           | 0.05           | 0.03           |                |                |                | 1.78                |
| 21.692  | 21.808 | -4.8             | 4.0                                            | 46.5                                       | 54.0                                       | 2.3                                          | 82.0           | 78.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.71                |
| 0.8540  | 0.8586 | -0.19            | 0.16                                           | 1.83                                       | 2.13                                       | 0.09                                         | 3.23           | 3.07           | 0.02           | 0.07           |                |                |                | 1.57                |
| 33.500  | 27.000 | -7.4             | 2.0                                            | 49.0                                       | 58.0                                       | 1.5                                          | 84.0           | 76.0           | 3.50           | 2.90           | 38.1           | 14             | 0.0966         | 1.10                |
| 1.3189  | 1.0630 | -0.29            | 0.08                                           | 1.93                                       | 2.28                                       | 0.06                                         | 3.31           | 2.99           | 0.14           | 0.11           |                |                |                | 2.43                |
| 21.692  | 21.808 | -4.8             | 4.0                                            | 46.5                                       | 54.0                                       | 2.3                                          | 82.0           | 78.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.72                |
| 0.8540  | 0.8586 | -0.19            | 0.16                                           | 1.83                                       | 2.13                                       | 0.09                                         | 3.23           | 3.07           | 0.02           | 0.07           |                |                |                | 1.58                |
| 21.692  | 21.808 | -4.8             | 2.3                                            | 46.5                                       | 51.0                                       | 2.3                                          | 82.0           | 78.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.72                |
| 0.8540  | 0.8586 | -0.19            | 0.09                                           | 1.83                                       | 2.01                                       | 0.09                                         | 3.23           | 3.07           | 0.02           | 0.07           |                |                |                | 1.59                |
| 21.692  | 21.808 | -4.8             | 0.8                                            | 46.5                                       | 47.5                                       | 2.3                                          | 82.0           | 78.0           | 0.50           | 1.70           | 30             | 12.2           | 0.0732         | 0.72                |
| 0.8540  | 0.8586 | -0.19            | 0.03                                           | 1.83                                       | 1.87                                       | 0.09                                         | 3.23           | 3.07           | 0.02           | 0.07           |                |                |                | 1.59                |
| 29.900  | 22.225 | -9.1             | 3.5                                            | 47.0                                       | 54.0                                       | 2.3                                          | 87.0           | 83.0           | 1.60           | 0.40           | 42.5           | 11.3           | 0.0805         | 1.00                |
| 1.1772  | 0.8750 | -0.36            | 0.14                                           | 1.85                                       | 2.13                                       | 0.09                                         | 3.43           | 3.27           | 0.06           | 0.02           |                |                |                | 2.21                |
| 36.957  | 28.575 | -12.2            | 3.5                                            | 50.0                                       | 57.0                                       | 3.3                                          | 100.0          | 94.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.75                |
| 1.4550  | 1.1250 | -0.48            | 0.14                                           | 1.97                                       | 2.24                                       | 0.13                                         | 3.94           | 3.70           | 0.11           | 0.04           |                |                |                | 3.85                |
| 36.957  | 28.575 | -12.2            | 3.0                                            | 50.0                                       | 56.0                                       | 3.3                                          | 100.0          | 94.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.75                |
| 1.4550  | 1.1250 | -0.48            | 0.12                                           | 1.97                                       | 2.20                                       | 0.13                                         | 3.94           | 3.70           | 0.11           | 0.04           |                |                |                | 3.85                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

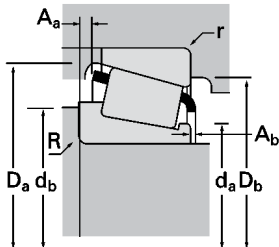
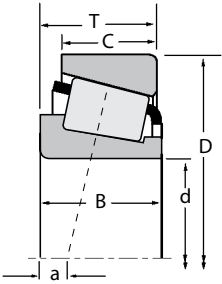
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 40.483<br>1.5938        | 82.550<br>3.2500 | 29.370<br>1.1563 | 95100<br>21400         | 0.55 | 1.10 | 24600<br>5540          | 23000<br>5180    | 1.07 | 130000<br>29300 | HM801349    | HM801310 |
| 40.987<br>1.6137        | 67.975<br>2.6762 | 17.500<br>0.6890 | 46100<br>10400         | 0.35 | 1.72 | 12000<br>2690          | 7140<br>1600     | 1.68 | 63500<br>14300  | LM300849    | LM300811 |
| 41.000<br>1.6142        | 68.000<br>2.6772 | 19.000<br>0.7480 | 53100<br>11900         | 0.38 | 1.58 | 13800<br>3090          | 8920<br>2010     | 1.54 | 74900<br>16800  | XKA32008XF  | Y32008XZ |
| 41.275<br>1.6250        | 67.975<br>2.6762 | 17.500<br>0.6890 | 46100<br>10400         | 0.35 | 1.72 | 12000<br>2690          | 7140<br>1600     | 1.68 | 63500<br>14300  | LM300848    | LM300811 |
| 41.275<br>1.6250        | 73.025<br>2.8750 | 16.667<br>0.6562 | 47000<br>10600         | 0.35 | 1.71 | 12200<br>2740          | 7310<br>1640     | 1.67 | 58100<br>13100  | 18590       | 18520    |
| 41.275<br>1.6250        | 73.431<br>2.8910 | 19.558<br>0.7700 | 58400<br>13100         | 0.40 | 1.50 | 15100<br>3410          | 10400<br>2330    | 1.46 | 74200<br>16700  | LM501349A   | LM501310 |
| 41.275<br>1.6250        | 73.431<br>2.8910 | 19.558<br>0.7700 | 58400<br>13100         | 0.40 | 1.50 | 15100<br>3410          | 10400<br>2330    | 1.46 | 74200<br>16700  | LM501349    | LM501310 |
| 41.275<br>1.6250        | 73.431<br>2.8910 | 21.430<br>0.8437 | 58400<br>13100         | 0.40 | 1.50 | 15100<br>3410          | 10400<br>2330    | 1.46 | 74200<br>16700  | LM501349    | LM501314 |
| 41.275<br>1.6250        | 73.431<br>2.8910 | 23.012<br>0.9060 | 58400<br>13100         | 0.40 | 1.50 | 15100<br>3410          | 10400<br>2330    | 1.46 | 74200<br>16700  | LM501349    | LM501311 |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 18.009<br>0.7090 | 44500<br>10000         | 0.49 | 1.23 | 11500<br>2600          | 9630<br>2170     | 1.20 | 55100<br>12400  | 11162       | 11300    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 18.009<br>0.7090 | 44500<br>10000         | 0.49 | 1.23 | 11500<br>2600          | 9630<br>2170     | 1.20 | 55100<br>12400  | 11163       | 11300    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 22.225<br>0.8750 | 69900<br>15700         | 0.39 | 1.53 | 18100<br>4080          | 12200<br>2740    | 1.49 | 89200<br>20100  | 24780       | 24720    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 22.225<br>0.8750 | 69900<br>15700         | 0.39 | 1.53 | 18100<br>4080          | 12200<br>2740    | 1.49 | 89200<br>20100  | 24780       | 24722    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 22.225<br>0.8750 | 69900<br>15700         | 0.39 | 1.53 | 18100<br>4080          | 12200<br>2740    | 1.49 | 89200<br>20100  | 24781       | 24720    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 25.400<br>1.0000 | 69900<br>15700         | 0.39 | 1.53 | 18100<br>4080          | 12200<br>2740    | 1.49 | 89200<br>20100  | 24780       | 24721    |
| 41.275<br>1.6250        | 76.200<br>3.0000 | 25.400<br>1.0000 | 69900<br>15700         | 0.39 | 1.53 | 18100<br>4080          | 12200<br>2740    | 1.49 | 89200<br>20100  | 24781       | 24721    |
| 41.275<br>1.6250        | 79.375<br>3.1250 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26882       | 26822    |
| 41.275<br>1.6250        | 79.375<br>3.1250 | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26885       | 26822    |
| 41.275<br>1.6250        | 80.000<br>3.1496 | 18.009<br>0.7090 | 44500<br>10000         | 0.49 | 1.23 | 11500<br>2600          | 9630<br>2170     | 1.20 | 55100<br>12400  | 11162       | 11315    |
| 41.275<br>1.6250        | 80.000<br>3.1496 | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 336         | 332      |
| 41.275<br>1.6250        | 80.000<br>3.1496 | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342         | 332      |
| 41.275<br>1.6250        | 80.035<br>3.1510 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3383        | 3339     |
| 41.275<br>1.6250        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26882       | 26820    |
| 41.275<br>1.6250        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 336         | 3320     |
| 41.275<br>1.6250        | 80.167<br>3.1562 | 26.988<br>1.0625 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342         | 3320     |
| 41.275<br>1.6250        | 80.167<br>3.1562 | 29.370<br>1.1563 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26882       | 26821    |
| 41.275<br>1.6250        | 81.755<br>3.2187 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3383        | 3329     |
| 41.275<br>1.6250        | 82.550<br>3.2500 | 26.195<br>1.0313 | 86000<br>19300         | 0.40 | 1.49 | 22300<br>5010          | 15300<br>3450    | 1.45 | 115000<br>25800 | 22778       | 22721    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -4.8<br>-0.19    | 3.5<br>0.14                | 49.0<br>1.93                      | 58.0<br>2.28             | 3.3<br>0.13                         | 78.0<br>3.07   | 68.0<br>2.68   | 2.10<br>0.08   | 1.80<br>0.07   | 33.7           | 14             | 0.0928         | 0.72<br>1.60        |
| 18.000<br>0.7087 | 13.500<br>0.5315 | -3.6<br>-0.14    | 3.5<br>0.14                | 45.5<br>1.79                      | 52.0<br>2.05             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.60<br>0.02   | 1.30<br>0.05   | 22.5           | 18.1           | 0.0698         | 0.24<br>0.53        |
| 21.000<br>0.8268 | 14.500<br>0.5709 | -3.8<br>-0.15    | 2.0<br>0.08                | 46.0<br>1.81                      | 50.0<br>1.97             | 1.0<br>0.04                         | 65.0<br>2.56   | 61.0<br>2.40   | *<br>*         | *<br>*         | 24.5           | 20.5           | 0.0740         | 0.27<br>0.59        |
| 18.000<br>0.7087 | 13.500<br>0.5315 | -3.6<br>-0.14    | 3.5<br>0.14                | 45.5<br>1.79                      | 52.0<br>2.05             | 1.5<br>0.06                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.60<br>0.02   | 1.30<br>0.05   | 22.5           | 16.6           | 0.0698         | 0.24<br>0.53        |
| 17.462<br>0.6875 | 12.700<br>0.5000 | -2.8<br>-0.11    | 3.5<br>0.14                | 46.0<br>1.81                      | 53.0<br>2.09             | 1.5<br>0.06                         | 69.0<br>2.72   | 66.0<br>2.60   | 0.50<br>0.02   | 1.20<br>0.05   | 21             | 15.4           | 0.0681         | 0.28<br>0.61        |
| 19.812<br>0.7800 | 14.732<br>0.5800 | -3.3<br>-0.13    | 0.8<br>0.03                | 46.5<br>1.83                      | 47.0<br>1.85             | 0.8<br>0.03                         | 70.0<br>2.76   | 67.0<br>2.64   | 1.00<br>0.04   | 0.90<br>0.04   | 23.3           | 13.3           | 0.0739         | 0.33<br>0.73        |
| 19.812<br>0.7800 | 14.732<br>0.5800 | -3.3<br>-0.13    | 3.5<br>0.14                | 48.0<br>1.89                      | 54.0<br>2.13             | 0.8<br>0.03                         | 70.0<br>2.76   | 67.0<br>2.64   | 1.00<br>0.04   | 1.00<br>0.04   | 23.3           | 13.3           | 0.0739         | 0.33<br>0.74        |
| 19.812<br>0.7800 | 16.604<br>0.6537 | -3.3<br>-0.13    | 3.5<br>0.14                | 48.0<br>1.89                      | 54.0<br>2.13             | 0.8<br>0.03                         | 70.0<br>2.76   | 65.0<br>2.56   | 1.00<br>0.04   | 1.00<br>0.04   | 23.3           | 13.3           | 0.0739         | 0.36<br>0.78        |
| 19.812<br>0.7800 | 18.186<br>0.7160 | -3.3<br>-0.13    | 3.5<br>0.14                | 48.0<br>1.89                      | 54.0<br>2.13             | 2.3<br>0.09                         | 70.0<br>2.76   | 64.0<br>2.52   | 1.00<br>0.04   | 1.00<br>0.04   | 23.3           | 13.3           | 0.0739         | 0.37<br>0.81        |
| 17.384<br>0.6844 | 14.288<br>0.5625 | -0.8<br>-0.03    | 1.5<br>0.06                | 46.5<br>1.83                      | 49.0<br>1.93             | 1.5<br>0.06                         | 71.0<br>2.80   | 67.0<br>2.64   | 1.70<br>0.06   | 1.50<br>0.06   | 19.2           | 12.8           | 0.0735         | 0.34<br>0.75        |
| 17.384<br>0.6844 | 14.288<br>0.5625 | -0.8<br>-0.03    | 0.8<br>0.03                | 46.5<br>1.83                      | 47.0<br>1.85             | 1.5<br>0.06                         | 71.0<br>2.80   | 67.0<br>2.64   | *<br>*         | *<br>*         | 19.2           | 12.8           | 0.0735         | 0.34<br>0.75        |
| 23.020<br>0.9063 | 17.462<br>0.6875 | -4.8<br>-0.19    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 0.8<br>0.03                         | 72.0<br>2.83   | 68.0<br>2.68   | 1.20<br>0.05   | 1.10<br>0.04   | 26.4           | 12.5           | 0.0767         | 0.42<br>0.94        |
| 23.020<br>0.9063 | 17.462<br>0.6875 | -4.8<br>-0.19    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 3.3<br>0.13                         | 72.0<br>2.83   | 66.0<br>2.60   | 1.20<br>0.05   | 1.10<br>0.04   | 26.4           | 12.5           | 0.0767         | 0.42<br>0.92        |
| 23.020<br>0.9063 | 17.462<br>0.6875 | -4.8<br>-0.19    | 0.8<br>0.03                | 47.0<br>1.85                      | 48.0<br>1.89             | 0.8<br>0.03                         | 72.0<br>2.83   | 68.0<br>2.68   | 1.20<br>0.05   | 1.10<br>0.04   | 26.4           | 12.5           | 0.0767         | 0.43<br>0.95        |
| 23.020<br>0.9063 | 20.638<br>0.8125 | -4.8<br>-0.19    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 2.3<br>0.09                         | 72.0<br>2.83   | 66.0<br>2.60   | 1.20<br>0.05   | 1.10<br>0.04   | 26.4           | 12.5           | 0.0767         | 0.46<br>1.02        |
| 23.020<br>0.9063 | 20.638<br>0.8125 | -4.8<br>-0.19    | 0.8<br>0.03                | 47.0<br>1.85                      | 48.0<br>1.89             | 2.3<br>0.09                         | 72.0<br>2.83   | 66.0<br>2.60   | 1.20<br>0.05   | 1.10<br>0.04   | 26.4           | 12.5           | 0.0767         | 0.47<br>1.03        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 0.8<br>0.03                         | 74.0<br>2.91   | 71.0<br>2.80   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.52<br>1.15        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 0.8<br>0.03                | 47.0<br>1.85                      | 48.0<br>1.89             | 0.8<br>0.03                         | 74.0<br>2.91   | 71.0<br>2.80   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.53<br>1.17        |
| 17.384<br>0.6844 | 14.288<br>0.5625 | -0.8<br>-0.03    | 1.5<br>0.06                | 46.5<br>1.83                      | 49.0<br>1.93             | 1.5<br>0.06                         | 73.0<br>2.87   | 69.0<br>2.72   | 1.70<br>0.06   | 1.50<br>0.06   | 19.2           | 12.8           | 0.0735         | 0.39<br>0.86        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 0.8<br>0.03                | 46.0<br>1.81                      | 47.0<br>1.85             | 1.3<br>0.05                         | 75.0<br>2.95   | 73.0<br>2.87   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.46<br>1.02        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 3.5<br>0.14                | 46.0<br>1.81                      | 53.0<br>2.09             | 1.3<br>0.05                         | 75.0<br>2.95   | 73.0<br>2.87   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.46<br>1.01        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 1.5<br>0.06                         | 74.5<br>2.94   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.63<br>1.39        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 3.3<br>0.13                         | 74.0<br>2.91   | 69.0<br>2.72   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.55<br>1.21        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 0.8<br>0.03                | 46.0<br>1.81                      | 47.0<br>1.85             | 3.3<br>0.13                         | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.53<br>1.17        |
| 22.403<br>0.8820 | 23.812<br>0.9375 | -6.4<br>-0.25    | 3.5<br>0.14                | 46.0<br>1.81                      | 53.0<br>2.09             | 3.3<br>0.13                         | 75.0<br>2.95   | 70.0<br>2.76   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.52<br>1.15        |
| 25.400<br>1.0000 | 24.608<br>0.9688 | -7.4<br>-0.29    | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 3.3<br>0.13                         | 74.0<br>2.91   | 68.0<br>2.68   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.61<br>1.35        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                | 47.0<br>1.85                      | 54.0<br>2.13             | 3.3<br>0.13                         | 75.0<br>2.95   | 71.0<br>2.80   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.66<br>1.46        |
| 26.988<br>1.0625 | 20.638<br>0.8125 | -6.4<br>-0.25    | 3.5<br>0.14                | 49.0<br>1.93                      | 55.0<br>2.17             | 0.8<br>0.03                         | 77.0<br>3.03   | 73.0<br>2.87   | 1.90<br>0.07   | 1.10<br>0.04   | 33.9           | 15.3           | 0.0841         | 0.63<br>1.40        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

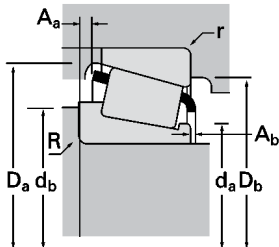
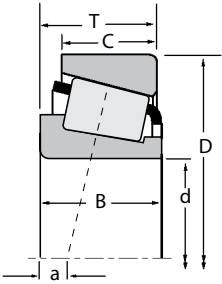
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# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |
| 41.275<br>1.6250        | 82.550<br>3.2500 | 26.543<br>1.0450 | 84900<br>19100         | 0.55 | 1.10 | 22000<br>4950          | 20600<br>4620    | 1.07 | 112000<br>25300        | M802047     | M802011                |  |        |  |
| 41.275<br>1.6250        | 82.550<br>3.2500 | 26.543<br>1.0450 | 84900<br>19100         | 0.55 | 1.10 | 22000<br>4950          | 20600<br>4620    | 1.07 | 112000<br>25300        | M802048     | M802011                |  |        |  |
| 41.275<br>1.6250        | 84.138<br>3.3125 | 29.370<br>1.1563 | 106000<br>23900        | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100        | 3383        | 3328                   |  |        |  |
| 41.275<br>1.6250        | 84.138<br>3.3125 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3576        | 3520                   |  |        |  |
| 41.275<br>1.6250        | 84.138<br>3.3125 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3576        | 3530                   |  |        |  |
| 41.275<br>1.6250        | 84.138<br>3.3125 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3577        | 3530                   |  |        |  |
| 41.275<br>1.6250        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3877        | 3820                   |  |        |  |
| 41.275<br>1.6250        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3877        | 3821                   |  |        |  |
| 41.275<br>1.6250        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3880        | 3820                   |  |        |  |
| 41.275<br>1.6250        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3880        | 3821                   |  |        |  |
| 41.275<br>1.6250        | 85.725<br>3.3750 | 30.162<br>1.1875 | 115000<br>25900        | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200        | 3877A       | 3820                   |  |        |  |
| 41.275<br>1.6250        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3576        | 3525                   |  |        |  |
| 41.275<br>1.6250        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3577        | 3525                   |  |        |  |
| 41.275<br>1.6250        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100        | 3585        | 3525                   |  |        |  |
| 41.275<br>1.6250        | 88.500<br>3.4843 | 25.400<br>1.0000 | 77900<br>17500         | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900         | 44162       | 44348                  |  |        |  |
| 41.275<br>1.6250        | 88.500<br>3.4843 | 26.988<br>1.0625 | 107000<br>24100        | 0.26 | 2.28 | 27800<br>6240          | 12500<br>2820    | 2.22 | 124000<br>28000        | 419         | 414                    |  |        |  |
| 41.275<br>1.6250        | 88.900<br>3.5000 | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 365A        | 362A                   |  |        |  |
| 41.275<br>1.6250        | 88.900<br>3.5000 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400        | HM803145    | HM803110               |  |        |  |
| 41.275<br>1.6250        | 88.900<br>3.5000 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400        | HM803146    | HM803110               |  |        |  |
| 41.275<br>1.6250        | 90.000<br>3.5433 | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 365A        | 362                    |  |        |  |
| 41.275<br>1.6250        | 90.488<br>3.5625 | 39.688<br>1.5625 | 155000<br>34900        | 0.28 | 2.11 | 40200<br>9040          | 19600<br>4400    | 2.05 | 204000<br>45900        | 4388        | 4335                   |  |        |  |
| 41.275<br>1.6250        | 92.075<br>3.6250 | 26.195<br>1.0313 | 79200<br>17800         | 0.83 | 0.72 | 20500<br>4620          | 29200<br>6570    | 0.70 | 92500<br>20800         | M903345     | M903310                |  |        |  |
| 41.275<br>1.6250        | 92.075<br>3.6250 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400        | HM803145    | HM803112               |  |        |  |
| 41.275<br>1.6250        | 92.075<br>3.6250 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400        | HM803146    | HM803112               |  |        |  |
| 41.275<br>1.6250        | 93.662<br>3.6875 | 31.750<br>1.2500 | 126000<br>28200        | 0.36 | 1.67 | 32600<br>7320          | 20100<br>4510    | 1.62 | 156000<br>35000        | 49162       | 49368                  |  |        |  |
| 41.275<br>1.6250        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400        | 447         | 432                    |  |        |  |
| 41.275<br>1.6250        | 95.250<br>3.7500 | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400        | HM804840    | HM804810               |  |        |  |
| 41.275<br>1.6250        | 95.250<br>3.7500 | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400        | 53162       | 53375                  |  |        |  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.654<br>1.0100 | 20.193<br>0.7950 | -3.0<br>-0.12    | 0.8<br>0.03                                    | 50.5<br>1.99                               | 52.0<br>2.05                               | 3.3<br>0.13                                  | 79.0<br>3.11   | 70.0<br>2.76   | 2.30<br>0.09   | 1.70<br>0.07   | 30.9           | 11.9           | 0.0899         | 0.63<br>1.39        |
| 25.654<br>1.0100 | 20.193<br>0.7950 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 50.5<br>1.99                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 79.0<br>3.11   | 70.0<br>2.76   | 2.30<br>0.09   | 1.70<br>0.07   | 30.9           | 11.9           | 0.0899         | 0.62<br>1.37        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 3.5<br>0.14                                    | 47.0<br>1.85                               | 54.0<br>2.13                               | 3.3<br>0.13                                  | 76.0<br>2.99   | 72.0<br>2.83   | 1.80<br>0.07   | 1.10<br>0.04   | 34.6           | 12.1           | 0.0744         | 0.72<br>1.58        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                                    | 48.0<br>1.89                               | 49.0<br>1.93                               | 3.3<br>0.13                                  | 79.5<br>3.13   | 74.0<br>2.91   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.74<br>1.64        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                                    | 48.0<br>1.89                               | 49.0<br>1.93                               | 0.8<br>0.03                                  | 79.5<br>3.13   | 76.0<br>2.99   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.75<br>1.66        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 48.0<br>1.89                               | 54.0<br>2.13                               | 0.8<br>0.03                                  | 79.5<br>3.13   | 76.0<br>2.99   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.75<br>1.65        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 50.5<br>1.98                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.79<br>1.75        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 50.5<br>1.98                               | 57.0<br>2.24                               | 1.3<br>0.05                                  | 81.0<br>3.19   | 75.0<br>2.95   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.80<br>1.77        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 50.5<br>1.98                               | 52.0<br>2.05                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.80<br>1.77        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 50.5<br>1.98                               | 52.0<br>2.05                               | 1.3<br>0.05                                  | 81.0<br>3.19   | 75.0<br>2.95   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.81<br>1.79        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32    | 2.3<br>0.09                                    | 50.5<br>1.98                               | 55.0<br>2.17                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 73.0<br>2.87   | 1.50<br>0.06   | 2.10<br>0.08   | 37.8           | 13.5           | 0.0873         | 0.80<br>1.76        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 0.8<br>0.03                                    | 48.0<br>1.89                               | 49.0<br>1.93                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.82<br>1.81        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 48.0<br>1.89                               | 54.0<br>2.13                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.82<br>1.80        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 1.5<br>0.06                                    | 48.0<br>1.89                               | 50.0<br>1.97                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.82<br>1.81        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09      | 2.3<br>0.09                                    | 51.0<br>2.00                               | 57.0<br>2.24                               | 1.5<br>0.06                                  | 84.0<br>3.31   | 75.0<br>2.95   | 3.90<br>0.15   | 2.60<br>0.10   | 22.9           | 8.71           | 0.0899         | 0.67<br>1.48        |
| 29.083<br>1.1450 | 22.225<br>0.8750 | -9.7<br>-0.38    | 3.5<br>0.14                                    | 47.0<br>1.85                               | 54.0<br>2.13                               | 1.5<br>0.06                                  | 80.0<br>3.15   | 77.0<br>3.03   | 1.20<br>0.05   | 0.80<br>0.03   | 34.4           | 9.87           | 0.0731         | 0.78<br>1.71        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.63<br>1.38        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 53.0<br>2.09                               | 54.0<br>2.13                               | 3.3<br>0.13                                  | 85.0<br>3.35   | 74.0<br>2.91   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.90<br>1.98        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 53.0<br>2.09                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 85.0<br>3.35   | 74.0<br>2.91   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.89<br>1.96        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.63<br>1.40        |
| 40.386<br>1.5900 | 33.338<br>1.3125 | -15.0<br>-0.59   | 3.5<br>0.14                                    | 52.0<br>2.05                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 85.0<br>3.35   | 77.0<br>3.03   | 2.30<br>0.09   | 0.60<br>0.02   | 52.9           | 16.7           | 0.0872         | 1.24<br>2.74        |
| 23.812<br>0.9375 | 16.670<br>0.6563 | 3.6<br>0.14      | 3.5<br>0.14                                    | 54.0<br>2.13                               | 60.0<br>2.36                               | 1.5<br>0.06                                  | 88.0<br>3.46   | 78.0<br>3.07   | 4.80<br>0.19   | 3.40<br>0.13   | 25.6           | 13.1           | 0.0948         | 0.77<br>1.69        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 0.8<br>0.03                                    | 53.0<br>2.09                               | 54.0<br>2.13                               | 3.3<br>0.13                                  | 86.0<br>3.39   | 76.0<br>2.99   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.98<br>2.15        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 53.0<br>2.09                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 86.0<br>3.39   | 76.0<br>2.99   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.97<br>2.14        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -9.1<br>-0.36    | 3.5<br>0.14                                    | 50.0<br>1.97                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 87.0<br>3.43   | 82.0<br>3.23   | 3.00<br>0.12   | 0.80<br>0.03   | 42.4           | 13.6           | 0.0872         | 1.03<br>2.27        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 2.3<br>0.09                                  | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.98<br>2.17        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 54.0<br>2.13                               | 61.0<br>2.40                               | 3.3<br>0.13                                  | 91.0<br>3.58   | 81.0<br>3.19   | 2.30<br>0.09   | 2.80<br>0.11   | 44.8           | 13.8           | 0.1017         | 1.06<br>2.35        |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01    | 1.5<br>0.06                                    | 52.5<br>2.07                               | 57.0<br>2.24                               | 0.8<br>0.03                                  | 89.0<br>3.50   | 81.0<br>3.19   | 5.70<br>0.22   | 2.20<br>0.08   | 26.7           | 9.63           | 0.0930         | 0.98<br>2.15        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

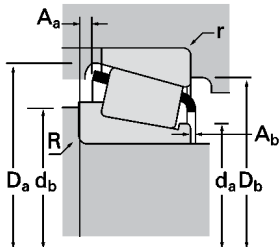
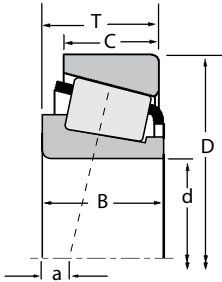
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903244    | HM903210 |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903245    | HM903210 |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 31.753<br>1.2501 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 447         | 432X     |
| 41.275<br>1.6250        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53162       | 53387    |
| 41.275<br>1.6250        | 98.425<br>3.8750  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903244    | HM903216 |
| 41.275<br>1.6250        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 526         | 522      |
| 41.275<br>1.6250        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807035    | HM807010 |
| 41.275<br>1.6250        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 464         | 453A     |
| 41.275<br>1.6250        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 464A        | 453A     |
| 41.275<br>1.6250        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 541         | 532X     |
| 42.000<br>1.6535        | 80.000<br>3.1496  | 18.009<br>0.7090 | 44500<br>10000         | 0.49 | 1.23 | 11500<br>2600          | 9630<br>2170     | 1.20 | 55100<br>12400  | 11165X      | 11315    |
| 42.850<br>1.6870        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 461         | 453X     |
| 42.850<br>1.6870        | 107.950<br>4.2500 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 461         | 453      |
| 42.850<br>1.6870        | 110.000<br>4.3307 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 461         | 454      |
| 42.862<br>1.6875        | 76.992<br>3.0312  | 17.462<br>0.6875 | 45900<br>10300         | 0.51 | 1.19 | 11900<br>2670          | 10300<br>2320    | 1.15 | 58100<br>13100  | 12168       | 12303    |
| 42.862<br>1.6875        | 82.550<br>3.2500  | 19.842<br>0.7812 | 60500<br>13600         | 0.43 | 1.39 | 15700<br>3530          | 11500<br>2600    | 1.36 | 73200<br>16500  | 22168       | 22325    |
| 42.862<br>1.6875        | 82.550<br>3.2500  | 26.195<br>1.0313 | 86000<br>19300         | 0.40 | 1.49 | 22300<br>5010          | 15300<br>3450    | 1.45 | 115000<br>25800 | 22780       | 22720    |
| 42.862<br>1.6875        | 82.931<br>3.2650  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25578       | 25520    |
| 42.862<br>1.6875        | 82.931<br>3.2650  | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25578       | 25523    |
| 42.862<br>1.6875        | 83.058<br>3.2700  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25576       | 25521    |
| 42.862<br>1.6875        | 83.058<br>3.2700  | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25578       | 25522    |
| 42.862<br>1.6875        | 87.312<br>3.4375  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3579        | 3525     |
| 42.862<br>1.6875        | 114.300<br>4.5000 | 44.450<br>1.7500 | 207000<br>46500        | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65383       | 65320    |
| 42.875<br>1.6880        | 76.200<br>3.0000  | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26884       | 26823    |
| 42.875<br>1.6880        | 79.375<br>3.1250  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26884       | 26822    |
| 42.875<br>1.6880        | 80.000<br>3.1496  | 21.000<br>0.8268 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342-S       | 332      |
| 42.875<br>1.6880        | 80.000<br>3.1496  | 23.812<br>0.9375 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26884       | 26824    |
| 42.875<br>1.6880        | 80.000<br>3.1496  | 24.176<br>0.9518 | 73600<br>16600         | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342-S       | 332A     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 28.300<br>1.1142 | 22.225<br>0.8750 | 0.5<br>0.02      | 1.5<br>0.06                                    | 54.0<br>2.13                               | 59.0<br>2.32                               | 0.8<br>0.03                                  | 91.0<br>3.58   | 81.0<br>3.19   | 3.90<br>0.16   | 2.30<br>0.09   | 33.7           | 9.91           | 0.1010         | 1.04<br>2.30        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | 0.5<br>0.02      | 3.5<br>0.14                                    | 54.0<br>2.13                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 91.0<br>3.58   | 81.0<br>3.19   | 3.90<br>0.16   | 2.00<br>0.08   | 33.7           | 9.91           | 0.1010         | 1.04<br>2.30        |
| 29.900<br>1.1772 | 26.195<br>1.0313 | -9.1<br>-0.36    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 3.3<br>0.13                                  | 87.0<br>3.43   | 81.0<br>3.19   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 1.07<br>2.35        |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01    | 1.5<br>0.06                                    | 52.5<br>2.07                               | 57.0<br>2.24                               | 0.8<br>0.03                                  | 91.0<br>3.58   | 82.0<br>3.23   | 5.70<br>0.22   | 2.20<br>0.08   | 26.7           | 9.63           | 0.0930         | 1.05<br>2.33        |
| 28.300<br>1.1142 | 22.225<br>0.8750 | 0.5<br>0.02      | 1.5<br>0.06                                    | 54.0<br>2.13                               | 59.0<br>2.32                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 82.0<br>3.23   | 3.90<br>0.16   | 2.30<br>0.09   | 33.7           | 9.91           | 0.1010         | 1.13<br>2.48        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 3.5<br>0.14                                    | 50.0<br>1.97                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.42<br>3.14        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -7.4<br>-0.29    | 1.5<br>0.06                                    | 57.0<br>2.24                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 100.0<br>3.94  | 89.0<br>3.50   | 3.40<br>0.14   | 1.90<br>0.08   | 63.9           | 17.1           | 0.0760         | 1.66<br>3.66        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 52.0<br>2.05                               | 56.0<br>2.20                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.39<br>3.06        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 1.5<br>0.06                                    | 52.0<br>2.05                               | 54.0<br>2.13                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.39<br>3.06        |
| 36.957<br>1.4550 | 28.575<br>1.1250 | -12.2<br>-0.48   | 3.5<br>0.14                                    | 51.0<br>2.01                               | 58.0<br>2.28                               | 3.3<br>0.13                                  | 100.0<br>3.94  | 94.0<br>3.70   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3           | 16.1           | 0.0938         | 1.72<br>3.80        |
| 17.384<br>0.6844 | 14.288<br>0.5625 | -0.8<br>-0.03    | 1.8<br>0.07                                    | 47.0<br>1.85                               | 50.0<br>1.97                               | 1.5<br>0.06                                  | 73.0<br>2.87   | 69.0<br>2.72   | *<br>*         | *<br>*         | 19.2           | 12.8           | 0.0735         | 0.38<br>0.84        |
| 29.317<br>1.1542 | 24.605<br>0.9687 | -7.1<br>-0.28    | 0.8<br>0.03                                    | 53.0<br>2.09                               | 54.0<br>2.13                               | 3.3<br>0.13                                  | 98.0<br>3.86   | 92.0<br>3.62   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.31<br>2.89        |
| 29.317<br>1.1542 | 27.000<br>1.0630 | -7.1<br>-0.28    | 0.8<br>0.03                                    | 53.0<br>2.09                               | 54.0<br>2.13                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.42<br>3.13        |
| 29.317<br>1.1542 | 27.000<br>1.0630 | -7.1<br>-0.28    | 0.8<br>0.03                                    | 53.0<br>2.09                               | 54.0<br>2.13                               | 2.0<br>0.08                                  | 100.0<br>3.94  | 96.0<br>3.78   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.49<br>3.29        |
| 17.145<br>0.6750 | 11.908<br>0.4688 | 0.0<br>0.00      | 1.5<br>0.06                                    | 48.5<br>1.91                               | 51.0<br>2.01                               | 1.5<br>0.06                                  | 73.0<br>2.87   | 68.0<br>2.68   | 1.40<br>0.06   | 2.20<br>0.09   | 21             | 15.8           | 0.0766         | 0.32<br>0.71        |
| 19.837<br>0.7810 | 15.080<br>0.5937 | -2.5<br>-0.10    | 2.3<br>0.09                                    | 48.5<br>1.91                               | 52.0<br>2.05                               | 1.5<br>0.06                                  | 76.0<br>2.99   | 73.0<br>2.87   | 1.20<br>0.05   | 1.70<br>0.07   | 23.7           | 14.4           | 0.0758         | 0.44<br>0.98        |
| 26.988<br>1.0625 | 20.638<br>0.8125 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 50.0<br>1.97                               | 56.0<br>2.20                               | 3.3<br>0.13                                  | 77.0<br>3.03   | 71.0<br>2.80   | 1.90<br>0.07   | 1.10<br>0.04   | 33.9           | 15.3           | 0.0841         | 0.60<br>1.32        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 2.3<br>0.09                                    | 49.5<br>1.95                               | 53.0<br>2.09                               | 0.8<br>0.03                                  | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.58<br>1.28        |
| 25.400<br>1.0000 | 22.225<br>0.8750 | -6.4<br>-0.25    | 2.3<br>0.09                                    | 49.5<br>1.95                               | 53.0<br>2.09                               | 2.3<br>0.09                                  | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.62<br>1.37        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 49.0<br>1.93                               | 55.0<br>2.17                               | 3.3<br>0.13                                  | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.57<br>1.26        |
| 25.400<br>1.0000 | 19.114<br>0.7525 | -6.4<br>-0.25    | 2.3<br>0.09                                    | 49.5<br>1.95                               | 53.0<br>2.09                               | 2.0<br>0.08                                  | 77.0<br>3.03   | 73.0<br>2.87   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.58<br>1.28        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                                    | 49.5<br>1.95                               | 56.0<br>2.20                               | 3.3<br>0.13                                  | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.79<br>1.74        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -12.4<br>-0.49   | 2.0<br>0.08                                    | 60.0<br>2.36                               | 63.0<br>2.48                               | 3.3<br>0.13                                  | 107.0<br>4.21  | 97.0<br>3.82   | 3.70<br>0.14   | 1.00<br>0.04   | 63.1           | 13             | 0.1053         | 2.35<br>5.17        |
| 25.400<br>1.0000 | 20.638<br>0.8125 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 1.5<br>0.06                                  | 73.0<br>2.87   | 69.0<br>2.72   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.46<br>1.01        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 0.8<br>0.03                                  | 74.0<br>2.91   | 71.0<br>2.80   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.50<br>1.11        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 47.5<br>1.87                               | 54.0<br>2.13                               | 1.3<br>0.05                                  | 75.0<br>2.95   | 73.0<br>2.87   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.44<br>0.97        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 48.5<br>1.91                               | 55.0<br>2.17                               | 1.3<br>0.05                                  | 74.0<br>2.91   | 70.0<br>2.76   | 1.40<br>0.06   | 1.20<br>0.05   | 32.8           | 13.3           | 0.0770         | 0.51<br>1.13        |
| 22.403<br>0.8820 | 21.000<br>0.8268 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 47.5<br>1.87                               | 54.0<br>2.13                               | 2.3<br>0.09                                  | 75.0<br>2.95   | 71.0<br>2.80   | 0.70<br>0.03   | 1.10<br>0.04   | 26.5           | 13             | 0.0676         | 0.47<br>1.04        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

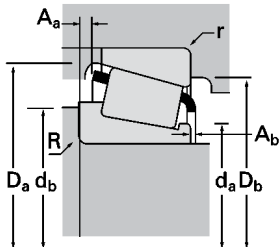
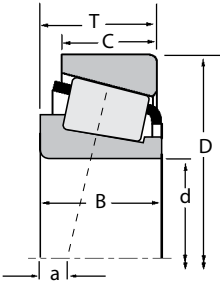
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |          |          |       |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|----------|----------|-------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> | Static   | Inner    | Outer |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |          |          |       |
| 42.875<br>1.6880        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        |             |                        | 26886    | 26820    |       |
| 42.875<br>1.6880        | 80.167<br>3.1562 | 25.400<br>1.0000 | 84300<br>19000         | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800        |             |                        | 26886    | 26830    |       |
| 42.875<br>1.6880        | 81.973<br>3.2273 | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25577    | 25518    |       |
| 42.875<br>1.6880        | 82.550<br>3.2500 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25577    | 25519    |       |
| 42.875<br>1.6880        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25577    | 25520    |       |
| 42.875<br>1.6880        | 82.931<br>3.2650 | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25577    | 25523    |       |
| 42.875<br>1.6880        | 83.058<br>3.2700 | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25577    | 25522    |       |
| 42.987<br>1.6924        | 74.988<br>2.9523 | 19.368<br>0.7625 | 55100<br>12400         | 0.44 | 1.35 | 14300<br>3210          | 10900<br>2440    | 1.31 | 73500<br>16500         |             |                        | 16986    | 16929    |       |
| 42.987<br>1.6924        | 79.375<br>3.1250 | 20.638<br>0.8125 | 63800<br>14300         | 0.37 | 1.64 | 16500<br>3720          | 10400<br>2330    | 1.60 | 83300<br>18700         |             |                        | 17886    | 17830    |       |
| 42.987<br>1.6924        | 79.985<br>3.1490 | 19.842<br>0.7812 | 63800<br>14300         | 0.37 | 1.64 | 16500<br>3720          | 10400<br>2330    | 1.60 | 83300<br>18700         |             |                        | 17886    | 17831    |       |
| 44.450<br>1.7500        | 71.438<br>2.8125 | 12.700<br>0.5000 | 33400<br>7510          | 0.31 | 1.97 | 8660<br>1950           | 4530<br>1020     | 1.91 | 43600<br>9790          |             |                        | LL103049 | LL103010 |       |
| 44.450<br>1.7500        | 73.025<br>2.8750 | 18.258<br>0.7188 | 52800<br>11900         | 0.32 | 1.88 | 13700<br>3080          | 7460<br>1680     | 1.83 | 78300<br>17600         |             |                        | L102849  | L102810  |       |
| 44.450<br>1.7500        | 76.992<br>3.0312 | 17.462<br>0.6875 | 45900<br>10300         | 0.51 | 1.19 | 11900<br>2670          | 10300<br>2320    | 1.15 | 58100<br>13100         |             |                        | 12175    | 12303    |       |
| 44.450<br>1.7500        | 79.375<br>3.1250 | 17.462<br>0.6875 | 48200<br>10800         | 0.37 | 1.60 | 12500<br>2810          | 7990<br>1800     | 1.56 | 61300<br>13800         |             |                        | 18685    | 18620    |       |
| 44.450<br>1.7500        | 80.962<br>3.1875 | 19.050<br>0.7500 | 47000<br>10600         | 0.53 | 1.14 | 12200<br>2740          | 11000<br>2480    | 1.11 | 61100<br>13700         |             |                        | 13175    | 13318    |       |
| 44.450<br>1.7500        | 82.550<br>3.2500 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25580    | 25519    |       |
| 44.450<br>1.7500        | 82.550<br>3.2500 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25582    | 25519    |       |
| 44.450<br>1.7500        | 82.550<br>3.2500 | 34.290<br>1.3500 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25583    | 25519    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 22.225<br>0.8750 | 76600<br>17200         | 0.30 | 2.02 | 19900<br>4470          | 10100<br>2270    | 1.96 | 89200<br>20100         |             |                        | 35175    | 35326    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 22.225<br>0.8750 | 76600<br>17200         | 0.30 | 2.02 | 19900<br>4470          | 10100<br>2270    | 1.96 | 89200<br>20100         |             |                        | 35176    | 35326    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25580    | 25520    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25580    | 25524    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25581    | 25520    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25582    | 25520    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25580    | 25523    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 34.290<br>1.3500 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25583    | 25520    |       |
| 44.450<br>1.7500        | 82.931<br>3.2650 | 34.290<br>1.3500 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25583    | 25524    |       |
| 44.450<br>1.7500        | 83.058<br>3.2700 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900        |             |                        | 25580    | 25521    |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                |                |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                | Cage           |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |
| B       | C      | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> |                |                |                | G <sub>1</sub> | G <sub>2</sub>      |
| 25.400  | 20.638 | -7.4             | 1.5                        | 48.5                              | 51.0                     | 3.3                                 | 74.0           | 69.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.54           |                     |
| 1.0000  | 0.8125 | -0.29            | 0.06                       | 1.91                              | 2.01                     | 0.13                                | 2.91           | 2.72           | 0.06           | 0.05           |                |                |                | 1.18           |                     |
| 25.400  | 20.638 | -7.4             | 1.5                        | 48.5                              | 51.0                     | 0.8                                 | 74.0           | 71.0           | 1.40           | 1.20           | 32.8           | 13.3           | 0.0770         | 0.54           |                     |
| 1.0000  | 0.8125 | -0.29            | 0.06                       | 1.91                              | 2.01                     | 0.03                                | 2.91           | 2.80           | 0.06           | 0.05           |                |                |                | 1.20           |                     |
| 25.400  | 19.114 | -6.4             | 3.5                        | 49.0                              | 55.0                     | 1.0                                 | 77.0           | 74.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.56           |                     |
| 1.0000  | 0.7525 | -0.25            | 0.14                       | 1.93                              | 2.17                     | 0.04                                | 3.03           | 2.91           | 0.04           | 0.03           |                |                |                | 1.23           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 49.0                              | 55.0                     | 2.0                                 | 77.0           | 73.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.57           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.93                              | 2.17                     | 0.08                                | 3.03           | 2.87           | 0.04           | 0.03           |                |                |                | 1.25           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 49.0                              | 55.0                     | 0.8                                 | 77.0           | 74.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.58           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.93                              | 2.17                     | 0.03                                | 3.03           | 2.91           | 0.04           | 0.03           |                |                |                | 1.27           |                     |
| 25.400  | 22.225 | -6.4             | 3.5                        | 49.0                              | 55.0                     | 2.3                                 | 77.0           | 72.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.62           |                     |
| 1.0000  | 0.8750 | -0.25            | 0.14                       | 1.93                              | 2.17                     | 0.09                                | 3.03           | 2.83           | 0.04           | 0.03           |                |                |                | 1.37           |                     |
| 25.400  | 19.114 | -6.4             | 3.5                        | 49.0                              | 55.0                     | 2.0                                 | 77.0           | 73.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.58           |                     |
| 1.0000  | 0.7525 | -0.25            | 0.14                       | 1.93                              | 2.17                     | 0.08                                | 3.03           | 2.87           | 0.04           | 0.03           |                |                |                | 1.27           |                     |
| 19.837  | 14.288 | -2.0             | 1.5                        | 48.5                              | 51.0                     | 1.3                                 | 71.0           | 68.0           | *              | *              | 25.1           | 17.4           | 0.0783         | 0.36           |                     |
| 0.7810  | 0.5625 | -0.08            | 0.06                       | 1.91                              | 2.01                     | 0.05                                | 2.80           | 2.68           | *              | *              |                |                |                | 0.79           |                     |
| 20.638  | 15.875 | -3.8             | 1.5                        | 49.0                              | 51.0                     | 2.0                                 | 75.0           | 71.0           | 1.10           | 1.30           | 28.9           | 17.9           | 0.0770         | 0.42           |                     |
| 0.8125  | 0.6250 | -0.15            | 0.06                       | 1.93                              | 2.01                     | 0.08                                | 2.95           | 2.80           | 0.04           | 0.05           |                |                |                | 0.94           |                     |
| 20.638  | 15.080 | -3.8             | 1.5                        | 49.0                              | 51.0                     | 1.3                                 | 75.0           | 72.0           | 1.10           | 1.30           | 28.9           | 17.9           | 0.0770         | 0.43           |                     |
| 0.8125  | 0.5937 | -0.15            | 0.06                       | 1.93                              | 2.01                     | 0.05                                | 2.95           | 2.83           | 0.04           | 0.05           |                |                |                | 0.94           |                     |
| 12.700  | 9.525  | -1.3             | 1.5                        | 48.5                              | 51.0                     | 1.5                                 | 68.0           | 65.0           | 0.10           | 1.50           | 20             | 23.6           | 0.0637         | 0.18           |                     |
| 0.5000  | 0.3750 | -0.05            | 0.06                       | 1.91                              | 2.01                     | 0.06                                | 2.68           | 2.56           | 0.00           | 0.06           |                |                |                | 0.40           |                     |
| 18.258  | 15.083 | -3.8             | 1.5                        | 49.0                              | 51.0                     | 1.5                                 | 69.0           | 66.0           | 0.00           | 1.70           | 30.6           | 23.7           | 0.0751         | 0.30           |                     |
| 0.7188  | 0.5938 | -0.15            | 0.06                       | 1.93                              | 2.01                     | 0.06                                | 2.72           | 2.60           | 0.00           | 0.07           |                |                |                | 0.65           |                     |
| 17.145  | 11.908 | 0.0              | 1.5                        | 49.5                              | 52.0                     | 1.5                                 | 73.0           | 68.0           | 1.40           | 2.20           | 21             | 15.8           | 0.0766         | 0.31           |                     |
| 0.6750  | 0.4688 | 0.00             | 0.06                       | 1.95                              | 2.05                     | 0.06                                | 2.87           | 2.68           | 0.06           | 0.09           |                |                |                | 0.68           |                     |
| 17.462  | 13.495 | -2.0             | 2.8                        | 49.5                              | 54.0                     | 1.5                                 | 74.0           | 71.0           | 0.70           | 1.50           | 23.9           | 17.7           | 0.0725         | 0.35           |                     |
| 0.6875  | 0.5313 | -0.08            | 0.11                       | 1.95                              | 2.13                     | 0.06                                | 2.91           | 2.80           | 0.03           | 0.06           |                |                |                | 0.76           |                     |
| 17.462  | 14.288 | 0.8              | 0.1                        | 50.0                              | 50.0                     | 1.5                                 | 76.0           | 72.0           | 1.60           | 1.90           | 23             | 15.4           | 0.0799         | 0.39           |                     |
| 0.6875  | 0.5625 | 0.03             | 0.01                       | 1.97                              | 1.97                     | 0.06                                | 2.99           | 2.83           | 0.06           | 0.08           |                |                |                | 0.86           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 50.0                              | 57.0                     | 2.0                                 | 77.0           | 73.0           | 1.00           | 0.70           | 35.2           | 14.3           | 0.0801         | 0.54           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.97                              | 2.24                     | 0.08                                | 3.03           | 2.87           | 0.04           | 0.03           |                |                |                | 1.20           |                     |
| 25.400  | 19.050 | -6.4             | 5.0                        | 50.0                              | 60.0                     | 2.0                                 | 77.0           | 73.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.54           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.20                       | 1.97                              | 2.36                     | 0.08                                | 3.03           | 2.87           | 0.04           | 0.03           |                |                |                | 1.18           |                     |
| 35.878  | 19.050 | -16.8            | 3.8                        | 50.0                              | 65.0                     | 2.0                                 | 77.0           | 73.0           | 11.50          | 0.60           | 35.2           | 14.3           | 0.0801         | 0.66           |                     |
| 1.4125  | 0.7500 | -0.66            | 0.15                       | 1.97                              | 2.56                     | 0.08                                | 3.03           | 2.87           | 0.45           | 0.03           |                |                |                | 1.46           |                     |
| 23.012  | 17.462 | -6.1             | 3.5                        | 49.5                              | 56.0                     | 0.8                                 | 78.0           | 76.0           | 1.20           | 1.10           | 29.1           | 12             | 0.0718         | 0.49           |                     |
| 0.9060  | 0.6875 | -0.24            | 0.14                       | 1.95                              | 2.20                     | 0.03                                | 3.07           | 2.99           | 0.05           | 0.04           |                |                |                | 1.07           |                     |
| 23.012  | 17.462 | -6.1             | 0.8                        | 49.5                              | 50.0                     | 0.8                                 | 78.0           | 76.0           | 1.20           | 1.10           | 29.1           | 12             | 0.0718         | 0.49           |                     |
| 0.9060  | 0.6875 | -0.24            | 0.03                       | 1.95                              | 1.97                     | 0.03                                | 3.07           | 2.99           | 0.05           | 0.04           |                |                |                | 1.09           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 50.0                              | 57.0                     | 0.8                                 | 77.0           | 74.0           | 1.00           | 0.70           | 35.2           | 14.3           | 0.0801         | 0.55           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.97                              | 2.24                     | 0.03                                | 3.03           | 2.91           | 0.04           | 0.03           |                |                |                | 1.22           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 50.0                              | 57.0                     | 2.3                                 | 77.0           | 73.0           | 1.00           | 0.70           | 35.2           | 14.3           | 0.0801         | 0.55           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.97                              | 2.24                     | 0.09                                | 3.03           | 2.87           | 0.04           | 0.03           |                |                |                | 1.21           |                     |
| 25.400  | 19.050 | -6.4             | 0.5                        | 50.0                              | 51.0                     | 0.8                                 | 77.0           | 74.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.56           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.02                       | 1.97                              | 2.01                     | 0.03                                | 3.03           | 2.91           | 0.04           | 0.03           |                |                |                | 1.24           |                     |
| 25.400  | 19.050 | -6.4             | 5.0                        | 50.0                              | 60.0                     | 0.8                                 | 77.0           | 74.0           | 1.00           | 0.60           | 35.2           | 14.3           | 0.0801         | 0.55           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.20                       | 1.97                              | 2.36                     | 0.03                                | 3.03           | 2.91           | 0.04           | 0.03           |                |                |                | 1.21           |                     |
| 25.400  | 22.225 | -6.4             | 3.5                        | 50.0                              | 57.0                     | 2.3                                 | 77.0           | 72.0           | 1.00           | 0.70           | 35.2           | 14.3           | 0.0801         | 0.60           |                     |
| 1.0000  | 0.8750 | -0.25            | 0.14                       | 1.97                              | 2.24                     | 0.09                                | 3.03           | 2.83           | 0.04           | 0.03           |                |                |                | 1.32           |                     |
| 35.878  | 19.050 | -16.8            | 3.8                        | 50.0                              | 65.0                     | 0.8                                 | 77.0           | 74.0           | 11.50          | 0.60           | 35.2           | 14.3           | 0.0801         | 0.67           |                     |
| 1.4125  | 0.7500 | -0.66            | 0.15                       | 1.97                              | 2.56                     | 0.03                                | 3.03           | 2.91           | 0.45           | 0.03           |                |                |                | 1.49           |                     |
| 35.878  | 19.050 | -16.8            | 3.8                        | 50.0                              | 65.0                     | 2.3                                 | 77.0           | 73.0           | 11.50          | 0.60           | 35.2           | 14.3           | 0.0801         | 0.67           |                     |
| 1.4125  | 0.7500 | -0.66            | 0.15                       | 1.97                              | 2.56                     | 0.09                                | 3.03           | 2.87           | 0.45           | 0.03           |                |                |                | 1.48           |                     |
| 25.400  | 19.050 | -6.4             | 3.5                        | 50.0                              | 57.0                     | 3.3                                 | 77.0           | 72.0           | 1.00           | 0.70           | 35.2           | 14.3           | 0.0801         | 0.55           |                     |
| 1.0000  | 0.7500 | -0.25            | 0.14                       | 1.97                              | 2.24                     | 0.13                                | 3.03           | 2.83           | 0.04           | 0.03           |                |                |                | 1.21           |                     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

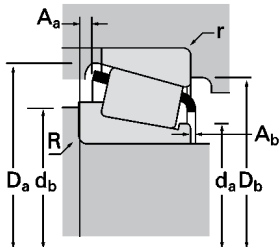
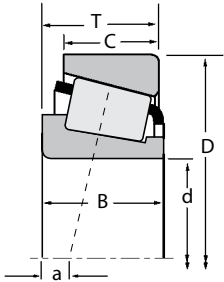
<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 44.450<br>1.7500        | 83.058<br>3.2700 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25581       | 25521    |
| 44.450<br>1.7500        | 83.058<br>3.2700 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25582       | 25521    |
| 44.450<br>1.7500        | 83.058<br>3.2700 | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25580       | 25522    |
| 44.450<br>1.7500        | 84.138<br>3.3125 | 26.988<br>1.0625 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355         | 3520     |
| 44.450<br>1.7500        | 84.138<br>3.3125 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3578        | 3520     |
| 44.450<br>1.7500        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355         | 354A     |
| 44.450<br>1.7500        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355A        | 354A     |
| 44.450<br>1.7500        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355X        | 354A     |
| 44.450<br>1.7500        | 85.000<br>3.3465 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25580       | 25526    |
| 44.450<br>1.7500        | 85.000<br>3.3465 | 25.400<br>1.0000 | 86400<br>19400         | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2975        | 2924     |
| 44.450<br>1.7500        | 87.312<br>3.4375 | 26.988<br>1.0625 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355         | 3525     |
| 44.450<br>1.7500        | 87.312<br>3.4375 | 26.988<br>1.0625 | 86400<br>19400         | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2975        | 2925     |
| 44.450<br>1.7500        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3578        | 3525     |
| 44.450<br>1.7500        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3578        | 3526     |
| 44.450<br>1.7500        | 87.312<br>3.4375 | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3578A       | 3525     |
| 44.450<br>1.7500        | 88.900<br>3.5000 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400 | HM803149    | HM803110 |
| 44.450<br>1.7500        | 88.900<br>3.5000 | 30.162<br>1.1875 | 105000<br>23700        | 0.55 | 1.10 | 27300<br>6140          | 25500<br>5740    | 1.07 | 144000<br>32400 | HM803149    | HM803111 |
| 44.450<br>1.7500        | 90.119<br>3.5480 | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355X        | 352      |
| 44.450<br>1.7500        | 93.264<br>3.6718 | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3782        | 3720     |
| 44.450<br>1.7500        | 93.662<br>3.6875 | 31.750<br>1.2500 | 120000<br>26900        | 0.40 | 1.49 | 31000<br>6980          | 21400<br>4800    | 1.45 | 158000<br>35500 | 46175       | 46368    |
| 44.450<br>1.7500        | 93.662<br>3.6875 | 31.750<br>1.2500 | 120000<br>26900        | 0.40 | 1.49 | 31000<br>6980          | 21400<br>4800    | 1.45 | 158000<br>35500 | 46176       | 46368    |
| 44.450<br>1.7500        | 93.662<br>3.6875 | 31.750<br>1.2500 | 126000<br>28200        | 0.36 | 1.67 | 32600<br>7320          | 20100<br>4510    | 1.62 | 156000<br>35000 | 49175       | 49368    |
| 44.450<br>1.7500        | 93.662<br>3.6875 | 31.750<br>1.2500 | 126000<br>28200        | 0.36 | 1.67 | 32600<br>7320          | 20100<br>4510    | 1.62 | 156000<br>35000 | 49176       | 49368    |
| 44.450<br>1.7500        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 435         | 432      |
| 44.450<br>1.7500        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 438         | 432      |
| 44.450<br>1.7500        | 95.250<br>3.7500 | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33885       | 33821    |
| 44.450<br>1.7500        | 95.250<br>3.7500 | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33885       | 33822    |
| 44.450<br>1.7500        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 438         | 432A     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 0.5<br>0.02                | 50.0<br>1.97                      | 51.0<br>2.01             | 3.3<br>0.13                         | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.55<br>1.22        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 5.0<br>0.20                | 50.0<br>1.97                      | 60.0<br>2.36             | 3.3<br>0.13                         | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.54<br>1.19        |
| 25.400<br>1.0000 | 19.114<br>0.7525 | -6.4<br>-0.25    | 3.5<br>0.14                | 50.0<br>1.97                      | 57.0<br>2.24             | 2.0<br>0.08                         | 77.0<br>3.03   | 73.0<br>2.87   | 1.00<br>0.04   | 0.70<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.55<br>1.22        |
| 21.692<br>0.8540 | 23.812<br>0.9375 | -4.8<br>-0.19    | 2.3<br>0.09                | 50.0<br>1.97                      | 54.0<br>2.13             | 3.3<br>0.13                         | 79.5<br>3.13   | 74.0<br>2.91   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.57<br>1.26        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 3.3<br>0.13                         | 79.5<br>3.13   | 74.0<br>2.91   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.68<br>1.51        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 2.3<br>0.09                | 50.0<br>1.97                      | 54.0<br>2.13             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.51<br>1.13        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 0.8<br>0.03                | 50.0<br>1.97                      | 51.0<br>2.01             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.52<br>1.14        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 3.5<br>0.14                | 50.0<br>1.97                      | 56.0<br>2.20             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.51<br>1.12        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 50.0<br>1.97                      | 57.0<br>2.24             | 2.3<br>0.09                         | 78.0<br>3.07   | 74.0<br>2.91   | 1.00<br>0.04   | 0.70<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.59<br>1.30        |
| 25.608<br>1.0082 | 20.638<br>0.8125 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 1.3<br>0.05                         | 80.0<br>3.15   | 76.0<br>2.99   | 1.80<br>0.07   | 1.10<br>0.04   | 38.2           | 15.7           | 0.0832         | 0.63<br>1.39        |
| 21.692<br>0.8540 | 23.812<br>0.9375 | -4.8<br>-0.19    | 2.3<br>0.09                | 50.0<br>1.97                      | 54.0<br>2.13             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.65<br>1.43        |
| 25.608<br>1.0082 | 22.225<br>0.8750 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 2.3<br>0.09                         | 81.0<br>3.19   | 75.0<br>2.95   | 1.80<br>0.07   | 1.10<br>0.04   | 38.2           | 15.7           | 0.0832         | 0.70<br>1.55        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.76<br>1.68        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 0.8<br>0.03                         | 81.0<br>3.19   | 77.0<br>3.03   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.77<br>1.71        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 5.5<br>0.22                | 51.0<br>2.01                      | 61.0<br>2.40             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.75<br>1.66        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 3.5<br>0.14                | 53.5<br>2.10                      | 62.0<br>2.44             | 3.3<br>0.13                         | 85.0<br>3.35   | 74.0<br>2.91   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.84<br>1.85        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -4.3<br>-0.17    | 3.5<br>0.14                | 53.5<br>2.10                      | 62.0<br>2.44             | 0.8<br>0.03                         | 85.0<br>3.35   | 76.0<br>2.99   | 1.50<br>0.06   | 2.10<br>0.08   | 39.2           | 13.7           | 0.0974         | 0.85<br>1.88        |
| 21.692<br>0.8540 | 21.808<br>0.8586 | -4.8<br>-0.19    | 3.5<br>0.14                | 50.0<br>1.97                      | 56.0<br>2.20             | 2.3<br>0.09                         | 82.0<br>3.23   | 78.0<br>3.07   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.67<br>1.47        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 3.3<br>0.13                         | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.96<br>2.11        |
| 31.750<br>1.2500 | 26.195<br>1.0313 | -7.9<br>-0.31    | 0.8<br>0.03                | 54.0<br>2.13                      | 55.0<br>2.17             | 3.3<br>0.13                         | 87.0<br>3.43   | 79.0<br>3.11   | 2.20<br>0.08   | 1.10<br>0.04   | 44.4           | 13.4           | 0.0920         | 1.02<br>2.25        |
| 31.750<br>1.2500 | 26.195<br>1.0313 | -7.9<br>-0.31    | 3.5<br>0.14                | 54.0<br>2.13                      | 60.0<br>2.36             | 3.3<br>0.13                         | 87.0<br>3.43   | 79.0<br>3.11   | 2.20<br>0.08   | 1.10<br>0.04   | 44.4           | 13.4           | 0.0920         | 1.02<br>2.24        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -9.1<br>-0.36    | 3.5<br>0.14                | 53.0<br>2.09                      | 59.0<br>2.32             | 3.3<br>0.13                         | 87.0<br>3.43   | 82.0<br>3.23   | 3.00<br>0.12   | 0.80<br>0.03   | 42.4           | 13.6           | 0.0872         | 0.97<br>2.15        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -9.1<br>-0.36    | 0.8<br>0.03                | 53.0<br>2.09                      | 54.0<br>2.13             | 3.3<br>0.13                         | 87.0<br>3.43   | 82.0<br>3.23   | 3.00<br>0.12   | 0.80<br>0.03   | 42.4           | 13.6           | 0.0872         | 0.98<br>2.16        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 0.8<br>0.03                | 51.0<br>2.01                      | 52.0<br>2.05             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.94<br>2.07        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.93<br>2.06        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | -7.6<br>-0.30    | 0.8<br>0.03                | 53.0<br>2.09                      | 53.0<br>2.09             | 2.3<br>0.09                         | 90.0<br>3.54   | 85.0<br>3.35   | 1.30<br>0.05   | 2.20<br>0.09   | 52.5           | 18.5           | 0.0910         | 0.96<br>2.12        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | -7.6<br>-0.30    | 0.8<br>0.03                | 53.0<br>2.09                      | 53.0<br>2.09             | 0.8<br>0.03                         | 90.0<br>3.54   | 86.0<br>3.39   | 1.30<br>0.05   | 2.20<br>0.09   | 52.5           | 18.5           | 0.0910         | 0.97<br>2.13        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 0.8<br>0.03                         | 87.0<br>3.43   | 84.0<br>3.31   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.94<br>2.07        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

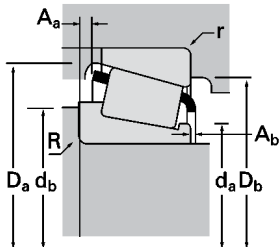
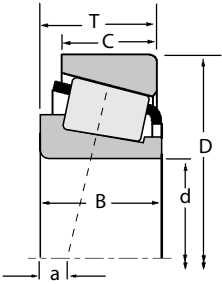
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          |             | Inner    | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>  |             |          |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3782        | 3726     |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804842    | HM804810 |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804842    | HM804811 |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804843    | HM804810 |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176       | 53375    |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176       | 53377    |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53177       | 53375    |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53178       | 53375    |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903247    | HM903210 |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903249A   | HM903210 |       |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903249    | HM903210 |       |
| 44.450<br>1.7500        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 386AS       | 382A     |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3782        | 3732     |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176       | 53387    |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53177       | 53387    |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176       | 53387X   |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53177       | 53387X   |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903247    | HM903216 |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903249A   | HM903216 |       |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903249    | HM903216 |       |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176       | 53398    |       |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 30.958<br>1.2188 | 92800<br>20900         | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53177       | 53398    |       |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 31.750<br>1.2500 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49576       | 49520    |       |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 31.750<br>1.2500 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49577       | 49520    |       |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 527         | 522      |       |
| 44.450<br>1.7500        | 103.188<br>4.0625 | 43.658<br>1.7188 | 197000<br>44200        | 0.30 | 2.02 | 51000<br>11500         | 25900<br>5820    | 1.97 | 267000<br>60100 | 5356        | 5335     |       |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45280       | 45220    |       |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 460         | 453X     |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                          |                          |                                     |                     |                     | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------------|-------------------------|-----------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|
|                         |                         |                       | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                     | G <sub>1</sub>      |                     |                     | G <sub>2</sub> | C <sub>g</sub> |                |                     |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>      | D <sub>b</sub>      | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>52.0</b><br>2.05      | <b>58.0</b><br>2.28      | <b>3.3</b><br>0.13                  | <b>89.0</b><br>3.50 | <b>83.0</b><br>3.27 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>1.01</b><br>2.23 |
| <b>29.370</b><br>1.1563 | <b>23.020</b><br>0.9063 | <b>-3.8</b><br>-0.15  | <b>0.8</b><br>0.03         | <b>57.0</b><br>2.24      | <b>57.0</b><br>2.24      | <b>3.3</b><br>0.13                  | <b>91.0</b><br>3.58 | <b>81.0</b><br>3.19 | <b>2.30</b><br>0.09 | <b>2.80</b><br>0.11 | <b>44.8</b>    | <b>13.8</b>    | <b>0.1017</b>  | <b>1.02</b><br>2.25 |
| <b>29.370</b><br>1.1563 | <b>23.020</b><br>0.9063 | <b>-3.8</b><br>-0.15  | <b>0.8</b><br>0.03         | <b>57.0</b><br>2.24      | <b>57.0</b><br>2.24      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>83.0</b><br>3.27 | <b>2.30</b><br>0.09 | <b>2.80</b><br>0.11 | <b>44.8</b>    | <b>13.8</b>    | <b>0.1017</b>  | <b>1.03</b><br>2.28 |
| <b>29.370</b><br>1.1563 | <b>23.020</b><br>0.9063 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>57.0</b><br>2.24      | <b>63.0</b><br>2.48      | <b>3.3</b><br>0.13                  | <b>91.0</b><br>3.58 | <b>81.0</b><br>3.19 | <b>2.30</b><br>0.09 | <b>2.80</b><br>0.11 | <b>44.8</b>    | <b>13.8</b>    | <b>0.1017</b>  | <b>1.01</b><br>2.24 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>1.3</b><br>0.05         | <b>52.5</b><br>2.07      | <b>59.0</b><br>2.32      | <b>0.8</b><br>0.03                  | <b>89.0</b><br>3.50 | <b>81.0</b><br>3.19 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>0.93</b><br>2.05 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>1.3</b><br>0.05         | <b>52.5</b><br>2.07      | <b>59.0</b><br>2.32      | <b>2.3</b><br>0.09                  | <b>89.0</b><br>3.50 | <b>80.0</b><br>3.15 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>0.93</b><br>2.04 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>52.5</b><br>2.07      | <b>63.0</b><br>2.48      | <b>0.8</b><br>0.03                  | <b>89.0</b><br>3.50 | <b>81.0</b><br>3.19 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>0.92</b><br>2.04 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>2.0</b><br>0.08         | <b>52.5</b><br>2.07      | <b>60.0</b><br>2.36      | <b>0.8</b><br>0.03                  | <b>89.0</b><br>3.50 | <b>81.0</b><br>3.19 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>0.93</b><br>2.05 |
| <b>28.300</b><br>1.1142 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>1.3</b><br>0.05         | <b>54.0</b><br>2.13      | <b>61.0</b><br>2.40      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>81.0</b><br>3.19 | <b>3.90</b><br>0.16 | <b>2.30</b><br>0.09 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>1.00</b><br>2.20 |
| <b>28.300</b><br>1.1142 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>81.0</b><br>3.19 | <b>3.90</b><br>0.16 | <b>2.30</b><br>0.09 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>0.99</b><br>2.19 |
| <b>28.575</b><br>1.1250 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>81.0</b><br>3.19 | <b>3.90</b><br>0.16 | <b>2.00</b><br>0.08 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>1.00</b><br>2.19 |
| <b>21.946</b><br>0.8640 | <b>15.875</b><br>0.6250 | <b>-3.0</b><br>-0.12  | <b>3.5</b><br>0.14         | <b>53.0</b><br>2.09      | <b>59.0</b><br>2.32      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>89.0</b><br>3.50 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.76</b><br>1.67 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>52.0</b><br>2.05      | <b>58.0</b><br>2.28      | <b>3.3</b><br>0.13                  | <b>90.0</b><br>3.54 | <b>84.0</b><br>3.31 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>1.10</b><br>2.42 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>1.3</b><br>0.05         | <b>52.5</b><br>2.07      | <b>59.0</b><br>2.32      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>82.0</b><br>3.23 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.01</b><br>2.22 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>52.5</b><br>2.07      | <b>63.0</b><br>2.48      | <b>0.8</b><br>0.03                  | <b>91.0</b><br>3.58 | <b>82.0</b><br>3.23 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.00</b><br>2.21 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>1.3</b><br>0.05         | <b>52.5</b><br>2.07      | <b>59.0</b><br>2.32      | <b>1.5</b><br>0.06                  | <b>91.0</b><br>3.58 | <b>82.0</b><br>3.23 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.01</b><br>2.22 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>52.5</b><br>2.07      | <b>63.0</b><br>2.48      | <b>1.5</b><br>0.06                  | <b>91.0</b><br>3.58 | <b>82.0</b><br>3.23 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.00</b><br>2.20 |
| <b>28.300</b><br>1.1142 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>1.3</b><br>0.05         | <b>54.0</b><br>2.13      | <b>61.0</b><br>2.40      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>82.0</b><br>3.23 | <b>3.90</b><br>0.16 | <b>2.30</b><br>0.09 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>1.08</b><br>2.38 |
| <b>28.300</b><br>1.1142 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>82.0</b><br>3.23 | <b>3.90</b><br>0.16 | <b>2.30</b><br>0.09 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>1.08</b><br>2.37 |
| <b>28.575</b><br>1.1250 | <b>22.225</b><br>0.8750 | <b>0.5</b><br>0.02    | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>82.0</b><br>3.23 | <b>3.90</b><br>0.16 | <b>2.00</b><br>0.08 | <b>33.7</b>    | <b>9.91</b>    | <b>0.1010</b>  | <b>1.08</b><br>2.38 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>1.3</b><br>0.05         | <b>52.5</b><br>2.07      | <b>59.0</b><br>2.32      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>84.0</b><br>3.31 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.09</b><br>2.40 |
| <b>28.301</b><br>1.1142 | <b>20.638</b><br>0.8125 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>52.5</b><br>2.07      | <b>63.0</b><br>2.48      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>84.0</b><br>3.31 | <b>5.70</b><br>0.22 | <b>2.20</b><br>0.08 | <b>26.7</b>    | <b>9.63</b>    | <b>0.0930</b>  | <b>1.08</b><br>2.39 |
| <b>31.750</b><br>1.2500 | <b>25.400</b><br>1.0000 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>54.0</b><br>2.13      | <b>55.0</b><br>2.17      | <b>3.3</b><br>0.13                  | <b>96.0</b><br>3.78 | <b>88.0</b><br>3.46 | <b>2.30</b><br>0.09 | <b>1.30</b><br>0.05 | <b>49.1</b>    | <b>14.2</b>    | <b>0.0946</b>  | <b>1.24</b><br>2.74 |
| <b>31.750</b><br>1.2500 | <b>25.400</b><br>1.0000 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>60.0</b><br>2.36      | <b>3.3</b><br>0.13                  | <b>96.0</b><br>3.78 | <b>88.0</b><br>3.46 | <b>2.30</b><br>0.09 | <b>1.30</b><br>0.05 | <b>49.1</b>    | <b>16.8</b>    | <b>0.0946</b>  | <b>1.24</b><br>2.73 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>3.5</b><br>0.14         | <b>53.0</b><br>2.09      | <b>59.0</b><br>2.32      | <b>3.3</b><br>0.13                  | <b>95.0</b><br>3.74 | <b>89.0</b><br>3.50 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.36</b><br>3.01 |
| <b>44.475</b><br>1.7510 | <b>36.512</b><br>1.4375 | <b>-16.0</b><br>-0.63 | <b>1.3</b><br>0.05         | <b>56.0</b><br>2.20      | <b>58.0</b><br>2.28      | <b>3.3</b><br>0.13                  | <b>97.0</b><br>3.82 | <b>89.0</b><br>3.50 | <b>2.60</b><br>0.10 | <b>0.90</b><br>0.04 | <b>73.4</b>    | <b>15.5</b>    | <b>0.0985</b>  | <b>1.85</b><br>4.07 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>0.8</b><br>0.03         | <b>54.0</b><br>2.13      | <b>55.0</b><br>2.17      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90 | <b>93.0</b><br>3.66 | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.33</b><br>2.93 |
| <b>29.317</b><br>1.1542 | <b>24.605</b><br>0.9687 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>54.0</b><br>2.13      | <b>60.0</b><br>2.36      | <b>3.3</b><br>0.13                  | <b>98.0</b><br>3.86 | <b>92.0</b><br>3.62 | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.28</b><br>2.82 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

B



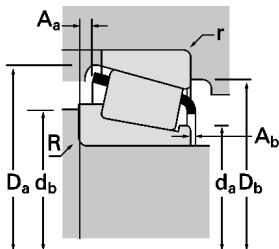
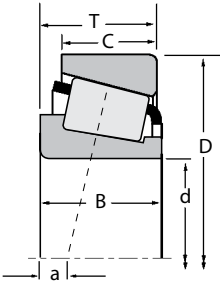




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |           |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59175       | 59412     |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59175       | 59413     |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59176       | 59412     |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59176       | 59413     |
| 44.450<br>1.7500        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807040    | HM807010  |
| 44.450<br>1.7500        | 105.000<br>4.1339 | 36.873<br>1.4517 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807040    | JHM807012 |
| 44.450<br>1.7500        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 460         | 453A      |
| 44.450<br>1.7500        | 107.950<br>4.2500 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59176       | 59425     |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55175       | 55437     |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55175C      | 55437     |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55176C      | 55437     |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 30.162<br>1.1875 | 114000<br>25600        | 0.88 | 0.68 | 29500<br>6640          | 44700<br>10000   | 0.66 | 153000<br>34400 | HM907635    | HM907614  |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 535         | 532A      |
| 44.450<br>1.7500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55175       | 55443     |
| 44.450<br>1.7500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55176C      | 55443     |
| 44.450<br>1.7500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 114000<br>25600        | 0.88 | 0.68 | 29500<br>6640          | 44700<br>10000   | 0.66 | 153000<br>34400 | HM907635    | HM907616  |
| 44.450<br>1.7500        | 114.300<br>4.5000 | 44.450<br>1.7500 | 207000<br>46500        | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65384       | 65320     |
| 44.450<br>1.7500        | 114.300<br>4.5000 | 44.450<br>1.7500 | 207000<br>46500        | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65385       | 65320     |
| 44.450<br>1.7500        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 615         | 612       |
| 44.450<br>1.7500        | 127.000<br>5.0000 | 50.800<br>2.0000 | 283000<br>63700        | 0.30 | 2.01 | 73500<br>16500         | 37500<br>8440    | 1.96 | 370000<br>83300 | 6277        | 6220      |
| 44.983<br>1.7710        | 82.931<br>3.2650  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584       | 25520     |
| 44.983<br>1.7710        | 82.931<br>3.2650  | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584       | 25523     |
| 44.983<br>1.7710        | 83.058<br>3.2700  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584       | 25521     |
| 44.983<br>1.7710        | 84.988<br>3.3460  | 19.000<br>0.7480 | 57800<br>13000         | 0.44 | 1.35 | 15000<br>3370          | 11400<br>2560    | 1.31 | 69200<br>15600  | 29177       | 29334     |
| 44.983<br>1.7710        | 85.000<br>3.3465  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584       | 25526     |
| 44.983<br>1.7710        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3776        | 3720      |
| 44.987<br>1.7712        | 81.973<br>3.2273  | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584A      | 25518     |
| 44.987<br>1.7712        | 82.931<br>3.2650  | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584A      | 25520     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 3.3<br>0.13                                  | 99.0<br>3.90   | 92.0<br>3.62   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.54<br>3.39        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 102.0<br>4.02  | 87.0<br>3.43   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.55<br>3.42        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 0.8<br>0.03                                    | 56.0<br>2.20                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 99.0<br>3.90   | 92.0<br>3.62   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.55<br>3.41        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 0.8<br>0.03                                    | 56.0<br>2.20                               | 57.0<br>2.24                               | 0.8<br>0.03                                  | 102.0<br>4.02  | 87.0<br>3.43   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.56<br>3.44        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 59.0<br>2.32                               | 66.0<br>2.60                               | 3.3<br>0.13                                  | 100.0<br>3.94  | 89.0<br>3.50   | 3.40<br>0.14   | 1.90<br>0.08   | 63.9           | 17.1           | 0.0760         | 1.59<br>3.52        |
| 36.512<br>1.4375 | 29.000<br>1.1417 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 59.0<br>2.32                               | 66.0<br>2.60                               | 2.5<br>0.10                                  | 100.0<br>3.94  | 90.0<br>3.54   | 3.40<br>0.14   | 1.90<br>0.08   | 63.9           | 17.1           | 0.0760         | 1.61<br>3.55        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 3.5<br>0.14                                    | 54.0<br>2.13                               | 60.0<br>2.36                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.33<br>2.94        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 0.8<br>0.03                                    | 56.0<br>2.20                               | 57.0<br>2.24                               | 3.3<br>0.13                                  | 101.0<br>3.98  | 93.0<br>3.66   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.66<br>3.67        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 3.5<br>0.14                                    | 60.0<br>2.36                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 105.0<br>4.13  | 92.0<br>3.62   | 4.80<br>0.19   | 3.20<br>0.13   | 36.8           | 13.2           | 0.1085         | 1.36<br>2.99        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.6<br>0.30      | 3.5<br>0.14                                    | 64.0<br>2.52                               | 70.0<br>2.76                               | 3.3<br>0.13                                  | 105.0<br>4.13  | 92.0<br>3.62   | 5.00<br>0.20   | 3.60<br>0.14   | 48.7           | 15.4           | 0.1198         | 1.44<br>3.18        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.6<br>0.30      | 0.8<br>0.03                                    | 65.0<br>2.56                               | 71.0<br>2.80                               | 3.3<br>0.13                                  | 105.0<br>4.13  | 92.0<br>3.62   | 5.00<br>0.20   | 3.60<br>0.14   | 48.7           | 15.4           | 0.1198         | 1.44<br>3.18        |
| 28.575<br>1.1250 | 20.638<br>0.8125 | 7.6<br>0.30      | 0.8<br>0.03                                    | 65.0<br>2.56                               | 64.0<br>2.52                               | 3.3<br>0.13                                  | 105.0<br>4.13  | 91.0<br>3.58   | 4.60<br>0.18   | 2.00<br>0.08   | 46.9           | 13.7           | 0.1183         | 1.46<br>3.21        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48   | 3.5<br>0.14                                    | 54.0<br>2.13                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 100.0<br>3.94  | 95.0<br>3.74   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3           | 16.1           | 0.0938         | 1.83<br>4.04        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 3.5<br>0.14                                    | 60.0<br>2.36                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 106.0<br>4.17  | 92.0<br>3.62   | 4.80<br>0.19   | 3.20<br>0.13   | 36.8           | 13.2           | 0.1085         | 1.40<br>3.09        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.6<br>0.30      | 0.8<br>0.03                                    | 65.0<br>2.56                               | 71.0<br>2.80                               | 3.3<br>0.13                                  | 106.0<br>4.17  | 92.0<br>3.62   | 5.00<br>0.20   | 3.60<br>0.14   | 48.7           | 15.4           | 0.1198         | 1.49<br>3.28        |
| 28.575<br>1.1250 | 20.638<br>0.8125 | 7.6<br>0.30      | 0.8<br>0.03                                    | 65.0<br>2.56                               | 64.0<br>2.52                               | 3.3<br>0.13                                  | 106.0<br>4.17  | 91.0<br>3.58   | 4.60<br>0.18   | 2.00<br>0.08   | 46.9           | 13.7           | 0.1183         | 1.52<br>3.35        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -12.4<br>-0.49   | 2.0<br>0.08                                    | 60.0<br>2.36                               | 64.0<br>2.52                               | 3.3<br>0.13                                  | 107.0<br>4.21  | 97.0<br>3.82   | 3.70<br>0.14   | 1.00<br>0.04   | 63.1           | 13             | 0.1053         | 2.31<br>5.09        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -12.4<br>-0.49   | 3.5<br>0.14                                    | 60.0<br>2.36                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 107.0<br>4.21  | 97.0<br>3.82   | 3.70<br>0.14   | 1.00<br>0.04   | 63.1           | 13             | 0.1053         | 2.30<br>5.08        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 3.3<br>0.13                                  | 110.0<br>4.33  | 105.0<br>4.13  | 3.90<br>0.15   | 1.90<br>0.07   | 75.9           | 16.2           | 0.0694         | 2.42<br>5.34        |
| 52.388<br>2.0625 | 41.275<br>1.6250 | -19.6<br>-0.77   | 3.5<br>0.14                                    | 60.0<br>2.36                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 117.0<br>4.61  | 108.0<br>4.25  | 2.40<br>0.09   | 2.60<br>0.10   | 103            | 18.7           | 0.0757         | 3.55<br>7.82        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 1.5<br>0.06                                    | 51.0<br>2.01                               | 53.0<br>2.09                               | 0.8<br>0.03                                  | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.55<br>1.22        |
| 25.400<br>1.0000 | 22.225<br>0.8750 | -6.4<br>-0.25    | 1.5<br>0.06                                    | 51.0<br>2.01                               | 53.0<br>2.09                               | 2.3<br>0.09                                  | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.60<br>1.31        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 1.5<br>0.06                                    | 51.0<br>2.01                               | 53.0<br>2.09                               | 3.3<br>0.13                                  | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.55<br>1.20        |
| 19.164<br>0.7545 | 15.875<br>0.6250 | -1.3<br>-0.05    | 2.0<br>0.08                                    | 50.0<br>1.97                               | 54.0<br>2.13                               | 1.5<br>0.06                                  | 78.0<br>3.07   | 74.0<br>2.91   | *<br>*         | *<br>*         | 23.8           | 15.3           | 0.0766         | 0.46<br>1.01        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 1.5<br>0.06                                    | 51.0<br>2.01                               | 53.0<br>2.09                               | 2.3<br>0.09                                  | 78.0<br>3.07   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.59<br>1.30        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 53.0<br>2.09                               | 59.0<br>2.32                               | 3.3<br>0.13                                  | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.95<br>2.09        |
| 25.400<br>1.0000 | 19.114<br>0.7525 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 51.0<br>2.01                               | 57.0<br>2.24                               | 1.0<br>0.04                                  | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.53<br>1.17        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 51.0<br>2.01                               | 57.0<br>2.24                               | 0.8<br>0.03                                  | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.55<br>1.21        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

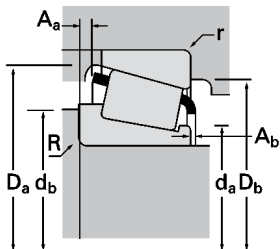
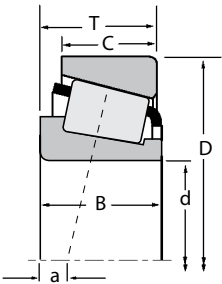
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 44.987<br>1.7712        | 90.000<br>3.5433  | 25.000<br>0.9843 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 367X        | 362X     |
| 44.987<br>1.7712        | 95.250<br>3.7500  | 30.958<br>1.2188 | 107000<br>24000        | 0.74 | 0.81 | 27600<br>6210          | 35000<br>7870    | 0.79 | 132000<br>29700 | HM903248    | HM903210 |
| 45.000<br>1.7717        | 75.000<br>2.9528  | 20.000<br>0.7874 | 61500<br>13800         | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | XAA32009X   | Y32009X  |
| 45.000<br>1.7717        | 75.000<br>2.9528  | 20.000<br>0.7874 | 61500<br>13800         | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | XAB-32009X  | Y32009X  |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358         | 354A     |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358         | 354X     |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358A        | 354A     |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358X        | 354X     |
| 45.000<br>1.7717        | 87.312<br>3.4375  | 26.988<br>1.0625 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358         | 3525     |
| 45.000<br>1.7717        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 367         | 362A     |
| 45.000<br>1.7717        | 89.980<br>3.5425  | 24.750<br>0.9744 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | J28577      | 28520    |
| 45.000<br>1.7717        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 367         | 362      |
| 45.000<br>1.7717        | 90.000<br>3.5433  | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 435-S       | 430X     |
| 45.000<br>1.7717        | 90.119<br>3.5480  | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358         | 352      |
| 45.000<br>1.7717        | 93.264<br>3.6718  | 20.638<br>0.8125 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 376         | 374      |
| 45.000<br>1.7717        | 95.000<br>3.7402  | 29.000<br>1.1417 | 92500<br>20800         | 0.87 | 0.69 | 24000<br>5390          | 35500<br>7990    | 0.67 | 114000<br>25600 | JW4549      | JW4510   |
| 45.000<br>1.7717        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 376         | 372A     |
| 45.000<br>1.7717        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 376X        | 372A     |
| 45.000<br>1.7717        | 100.000<br>3.9370 | 25.000<br>0.9842 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 376         | 372      |
| 45.000<br>1.7717        | 104.775<br>4.1250 | 39.688<br>1.5625 | 167000<br>37500        | 0.34 | 1.79 | 43300<br>9730          | 24900<br>5590    | 1.74 | 237000<br>53200 | 4559        | 4535     |
| 45.000<br>1.7717        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 458-S       | 453A     |
| 45.230<br>1.7807        | 79.985<br>3.1490  | 19.842<br>0.7812 | 63800<br>14300         | 0.37 | 1.64 | 16500<br>3720          | 10400<br>2330    | 1.60 | 83300<br>18700  | 17887       | 17831    |
| 45.237<br>1.7810        | 84.138<br>3.3125  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3586        | 3520     |
| 45.237<br>1.7810        | 87.312<br>3.4375  | 30.162<br>1.1875 | 105000<br>23600        | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3586        | 3525     |
| 45.242<br>1.7812        | 73.431<br>2.8910  | 19.558<br>0.7700 | 56900<br>12800         | 0.31 | 1.97 | 14800<br>3320          | 7710<br>1730     | 1.91 | 81800<br>18400  | LM102949    | LM102910 |
| 45.242<br>1.7812        | 73.431<br>2.8910  | 21.430<br>0.8437 | 56900<br>12800         | 0.31 | 1.97 | 14800<br>3320          | 7710<br>1730     | 1.91 | 81800<br>18400  | LM102949    | LM102911 |
| 45.242<br>1.7812        | 77.788<br>3.0625  | 19.842<br>0.7812 | 59600<br>13400         | 0.43 | 1.41 | 15500<br>3470          | 11300<br>2540    | 1.37 | 77900<br>17500  | LM603049AS  | LM603011 |
| 45.242<br>1.7812        | 77.788<br>3.0625  | 19.842<br>0.7812 | 59600<br>13400         | 0.43 | 1.41 | 15500<br>3470          | 11300<br>2540    | 1.37 | 77900<br>17500  | LM603049    | LM603011 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                          |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 22.225<br>0.8750 | 20.000<br>0.7874 | -4.3<br>-0.17    | 1.5<br>0.06                | 51.0<br>2.01             | 54.0<br>2.13             | 2.0<br>0.08                         | 84.0<br>3.31   | 80.0<br>3.15   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.67<br>1.47        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | 0.5<br>0.02      | 3.5<br>0.14                | 54.0<br>2.13             | 66.0<br>2.60             | 0.8<br>0.03                         | 91.0<br>3.58   | 81.0<br>3.19   | *<br>*         | *<br>*         | 33.7           | 9.91           | 0.1010         | 0.99<br>2.18        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 3.0<br>0.12                | 51.0<br>2.01             | 57.0<br>2.24             | 1.0<br>0.04                         | 72.0<br>2.83   | 68.0<br>2.68   | 0.60<br>0.02   | 2.10<br>0.08   | 28.7           | 16.2           | 0.0788         | 0.34<br>0.76        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 0.0<br>0.00                | 51.0<br>2.01             | 58.0<br>2.28             | 1.0<br>0.04                         | 72.0<br>2.83   | 68.0<br>2.68   | 0.60<br>0.02   | 2.10<br>0.08   | 28.7           | 16.2           | 0.0788         | 0.34<br>0.75        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 1.5<br>0.06                | 50.0<br>1.97             | 53.0<br>2.09             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.51<br>1.12        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 1.5<br>0.06                | 50.0<br>1.97             | 53.0<br>2.09             | 1.5<br>0.06                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.51<br>1.12        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 3.5<br>0.14                | 50.0<br>1.97             | 57.0<br>2.24             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.50<br>1.11        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 2.0<br>0.08                | 50.0<br>1.97             | 54.0<br>2.13             | 1.5<br>0.06                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.51<br>1.12        |
| 21.692<br>0.8540 | 23.812<br>0.9375 | -4.8<br>-0.19    | 1.5<br>0.06                | 50.0<br>1.97             | 53.0<br>2.09             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.64<br>1.42        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 2.0<br>0.08                | 51.0<br>2.01             | 55.0<br>2.17             | 1.3<br>0.05                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.58<br>1.29        |
| 25.400<br>1.0000 | 19.987<br>0.7869 | -4.8<br>-0.19    | 0.8<br>0.03                | 57.0<br>2.24             | 55.0<br>2.17             | 2.3<br>0.09                         | 86.0<br>3.39   | 81.0<br>3.19   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 22.6           | 0.0912         | 0.75<br>1.65        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 2.0<br>0.08                | 51.0<br>2.01             | 55.0<br>2.17             | 2.0<br>0.08                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.59<br>1.31        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 2.0<br>0.08                | 51.0<br>2.01             | 55.0<br>2.17             | 2.0<br>0.08                         | 84.0<br>3.31   | 81.0<br>3.19   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.80<br>1.76        |
| 21.692<br>0.8540 | 21.808<br>0.8586 | -4.8<br>-0.19    | 1.5<br>0.06                | 50.0<br>1.97             | 53.0<br>2.09             | 2.3<br>0.09                         | 82.0<br>3.23   | 78.0<br>3.07   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.67<br>1.47        |
| 22.225<br>0.8750 | 15.083<br>0.5938 | -3.8<br>-0.15    | 0.8<br>0.03                | 52.0<br>2.05             | 53.0<br>2.09             | 1.3<br>0.05                         | 88.0<br>3.46   | 85.0<br>3.35   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.67<br>1.48        |
| 26.500<br>1.0433 | 20.000<br>0.7874 | 4.1<br>0.16      | 2.5<br>0.10                | 54.0<br>2.13             | 64.0<br>2.52             | 2.5<br>0.10                         | 90.5<br>3.56   | 78.0<br>3.07   | 4.60<br>0.18   | 3.00<br>0.12   | 30.7           | 12.9           | 0.1021         | 0.91<br>2.00        |
| 22.225<br>0.8750 | 19.050<br>0.7500 | -3.8<br>-0.15    | 0.8<br>0.03                | 52.0<br>2.05             | 53.0<br>2.09             | 1.5<br>0.06                         | 90.0<br>3.54   | 86.0<br>3.39   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.79<br>1.75        |
| 22.225<br>0.8750 | 19.050<br>0.7500 | -3.8<br>-0.15    | 2.0<br>0.08                | 52.0<br>2.05             | 56.0<br>2.20             | 1.5<br>0.06                         | 90.0<br>3.54   | 86.0<br>3.39   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.79<br>1.74        |
| 22.225<br>0.8750 | 21.824<br>0.8592 | -3.8<br>-0.15    | 0.8<br>0.03                | 52.0<br>2.05             | 53.0<br>2.09             | 2.0<br>0.08                         | 90.0<br>3.54   | 86.0<br>3.39   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.93<br>2.05        |
| 40.157<br>1.5810 | 33.338<br>1.3125 | -12.4<br>-0.49   | 3.5<br>0.14                | 56.0<br>2.20             | 62.0<br>2.44             | 3.3<br>0.13                         | 99.0<br>3.90   | 90.0<br>3.54   | 1.70<br>0.07   | 1.30<br>0.05   | 73.6           | 18.5           | 0.1027         | 1.76<br>3.88        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 2.3<br>0.09                | 55.0<br>2.17             | 58.0<br>2.28             | 0.8<br>0.03                         | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.33<br>2.93        |
| 20.638<br>0.8125 | 15.080<br>0.5937 | -3.8<br>-0.15    | 2.0<br>0.08                | 50.0<br>1.97             | 54.0<br>2.13             | 1.3<br>0.05                         | 75.0<br>2.95   | 72.0<br>2.83   | 1.10<br>0.04   | 1.30<br>0.05   | 28.9           | 17.9           | 0.0770         | 0.40<br>0.88        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 52.0<br>2.05             | 58.0<br>2.28             | 3.3<br>0.13                         | 79.5<br>3.13   | 74.0<br>2.91   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.67<br>1.48        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 3.5<br>0.14                | 52.0<br>2.05             | 58.0<br>2.28             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 2.30<br>0.09   | 0.70<br>0.03   | 39.5           | 10.5           | 0.0808         | 0.75<br>1.65        |
| 19.812<br>0.7800 | 15.748<br>0.6200 | -4.6<br>-0.18    | 3.5<br>0.14                | 50.0<br>1.97             | 56.0<br>2.20             | 0.8<br>0.03                         | 70.0<br>2.76   | 68.0<br>2.68   | 0.70<br>0.03   | 1.10<br>0.04   | 31.1           | 18             | 0.0744         | 0.32<br>0.70        |
| 19.812<br>0.7800 | 17.620<br>0.6937 | -4.6<br>-0.18    | 3.5<br>0.14                | 50.0<br>1.97             | 56.0<br>2.20             | 0.8<br>0.03                         | 70.0<br>2.76   | 67.0<br>2.64   | 0.70<br>0.03   | 1.10<br>0.04   | 31.1           | 18             | 0.0744         | 0.33<br>0.74        |
| 19.842<br>0.7812 | 15.080<br>0.5937 | -2.3<br>-0.09    | 0.8<br>0.03                | 52.0<br>2.05             | 53.0<br>2.09             | 0.8<br>0.03                         | 74.0<br>2.91   | 71.0<br>2.80   | 1.30<br>0.05   | 1.50<br>0.06   | 26.4           | 14.4           | 0.0785         | 0.37<br>0.81        |
| 19.842<br>0.7812 | 15.080<br>0.5937 | -2.3<br>-0.09    | 3.5<br>0.14                | 52.0<br>2.05             | 58.0<br>2.28             | 0.8<br>0.03                         | 74.0<br>2.91   | 71.0<br>2.80   | 1.30<br>0.05   | 1.40<br>0.06   | 26.4           | 14.4           | 0.0785         | 0.37<br>0.81        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

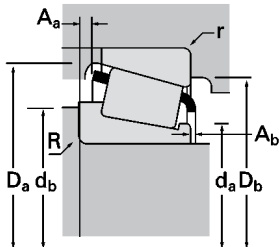
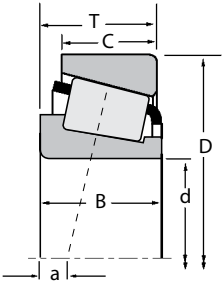




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>  | Inner       | Outer    |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 45.242<br>1.7812        | 77.788<br>3.0625 | 21.430<br>0.8437 | 59600<br>13400         | 0.43 | 1.41 | 15500<br>3470          | 11300<br>2540    | 1.37 | 77900<br>17500  | LM603049    | LM603012 |
| 45.242<br>1.7812        | 79.974<br>3.1486 | 19.842<br>0.7812 | 59600<br>13400         | 0.43 | 1.41 | 15500<br>3470          | 11300<br>2540    | 1.37 | 77900<br>17500  | LM603049    | LM603014 |
| 45.242<br>1.7812        | 79.974<br>3.1486 | 21.430<br>0.8437 | 59600<br>13400         | 0.43 | 1.41 | 15500<br>3470          | 11300<br>2540    | 1.37 | 77900<br>17500  | LM603049    | LM603015 |
| 45.618<br>1.7960        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25520    |
| 45.618<br>1.7960        | 82.931<br>3.2650 | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25523    |
| 45.618<br>1.7960        | 83.058<br>3.2700 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25521    |
| 45.618<br>1.7960        | 83.058<br>3.2700 | 23.876<br>0.9400 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25522    |
| 45.618<br>1.7960        | 85.000<br>3.3465 | 26.988<br>1.0625 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25527    |
| 45.618<br>1.7960        | 92.075<br>3.6250 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590       | 25528    |
| 45.987<br>1.8105        | 74.976<br>2.9518 | 18.000<br>0.7087 | 52600<br>11800         | 0.40 | 1.49 | 13600<br>3070          | 9390<br>2110     | 1.45 | 75400<br>17000  | LM503349A   | LM503310 |
| 45.987<br>1.8105        | 74.976<br>2.9518 | 18.000<br>0.7087 | 52600<br>11800         | 0.40 | 1.49 | 13600<br>3070          | 9390<br>2110     | 1.45 | 75400<br>17000  | LM503349    | LM503310 |
| 45.987<br>1.8105        | 90.975<br>3.5817 | 32.000<br>1.2598 | 133000<br>29900        | 0.33 | 1.80 | 34500<br>7760          | 19700<br>4420    | 1.76 | 172000<br>38600 | HM204049    | HM204010 |
| 46.038<br>1.8125        | 77.788<br>3.0625 | 12.700<br>0.5000 | 34600<br>7770          | 0.34 | 1.78 | 8960<br>2010           | 5160<br>1160     | 1.74 | 47200<br>10600  | LL205442    | LL205410 |
| 46.038<br>1.8125        | 79.375<br>3.1250 | 17.462<br>0.6875 | 48200<br>10800         | 0.37 | 1.60 | 12500<br>2810          | 7990<br>1800     | 1.56 | 61300<br>13800  | 18690       | 18620    |
| 46.038<br>1.8125        | 80.962<br>3.1875 | 19.050<br>0.7500 | 47000<br>10600         | 0.53 | 1.14 | 12200<br>2740          | 11000<br>2480    | 1.11 | 61100<br>13700  | 13181       | 13318    |
| 46.038<br>1.8125        | 82.931<br>3.2650 | 23.812<br>0.9375 | 83800<br>18800         | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25592       | 25520    |
| 46.038<br>1.8125        | 84.138<br>3.3125 | 26.995<br>1.0628 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 3520     |
| 46.038<br>1.8125        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359A        | 354A     |
| 46.038<br>1.8125        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 354A     |
| 46.038<br>1.8125        | 85.000<br>3.3465 | 20.638<br>0.8125 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 354X     |
| 46.038<br>1.8125        | 85.000<br>3.3465 | 25.400<br>1.0000 | 86400<br>19400         | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2984        | 2924     |
| 46.038<br>1.8125        | 85.000<br>3.3465 | 25.400<br>1.0000 | 86400<br>19400         | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2984A       | 2924     |
| 46.038<br>1.8125        | 87.312<br>3.4375 | 26.988<br>1.0625 | 86400<br>19400         | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2984        | 2925     |
| 46.038<br>1.8125        | 87.312<br>3.4375 | 26.988<br>1.0625 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 3525     |
| 46.038<br>1.8125        | 88.875<br>3.4990 | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 352A     |
| 46.038<br>1.8125        | 90.119<br>3.5480 | 23.000<br>0.9055 | 75800<br>17000         | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 359-S       | 352      |
| 46.038<br>1.8125        | 93.264<br>3.6718 | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3777        | 3720     |
| 46.038<br>1.8125        | 95.250<br>3.7500 | 27.783<br>1.0938 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 436         | 432      |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 19.842<br>0.7812 | 16.667<br>0.6562 | -2.3<br>-0.09    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 0.8<br>0.03                         | 74.0<br>2.91   | 70.0<br>2.76   | 1.30<br>0.05   | 1.40<br>0.06   | 26.4           | 14.4           | 0.0785         | 0.38<br>0.85        |
| 19.842<br>0.7812 | 15.080<br>0.5937 | -2.3<br>-0.09    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 0.8<br>0.03                         | 75.0<br>2.95   | 71.0<br>2.80   | 1.30<br>0.05   | 1.40<br>0.06   | 26.4           | 14.4           | 0.0785         | 0.40<br>0.88        |
| 19.842<br>0.7812 | 16.667<br>0.6562 | -2.3<br>-0.09    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 0.8<br>0.03                         | 75.0<br>2.95   | 71.0<br>2.80   | 1.30<br>0.05   | 1.40<br>0.06   | 26.4           | 14.4           | 0.0785         | 0.42<br>0.92        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 0.8<br>0.03                         | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.54<br>1.19        |
| 25.400<br>1.0000 | 22.225<br>0.8750 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 2.3<br>0.09                         | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.58<br>1.28        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 3.3<br>0.13                         | 77.0<br>3.03   | 72.0<br>2.83   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.53<br>1.17        |
| 25.400<br>1.0000 | 19.114<br>0.7525 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 2.0<br>0.08                         | 77.0<br>3.03   | 73.0<br>2.87   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.54<br>1.19        |
| 25.400<br>1.0000 | 22.225<br>0.8750 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 2.3<br>0.09                         | 78.0<br>3.07   | 73.0<br>2.87   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.63<br>1.39        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 51.0<br>2.01                      | 58.0<br>2.28             | 0.8<br>0.03                         | 80.0<br>3.15   | 78.0<br>3.07   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.73<br>1.60        |
| 18.000<br>0.7087 | 14.000<br>0.5512 | -2.0<br>-0.08    | 0.0<br>0.00                | 51.0<br>2.01                      | 57.0<br>2.24             | 1.5<br>0.06                         | 71.0<br>2.80   | 67.0<br>2.64   | 0.90<br>0.04   | 1.50<br>0.06   | 28.3           | 18.2           | 0.0789         | 0.30<br>0.65        |
| 18.000<br>0.7087 | 14.000<br>0.5512 | -2.0<br>-0.08    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 1.5<br>0.06                         | 71.0<br>2.80   | 67.0<br>2.64   | 0.90<br>0.04   | 1.50<br>0.06   | 28.3           | 18.2           | 0.0789         | 0.30<br>0.67        |
| 32.000<br>1.2598 | 26.500<br>1.0433 | -9.7<br>-0.38    | 3.5<br>0.14                | 55.0<br>2.17                      | 63.0<br>2.48             | 3.5<br>0.14                         | 86.0<br>3.39   | 79.0<br>3.11   | 1.50<br>0.06   | 1.80<br>0.07   | 47.7           | 13.4           | 0.0885         | 0.92<br>2.02        |
| 12.700<br>0.5000 | 9.525<br>0.3750  | 0.0<br>0.00      | 1.5<br>0.06                | 52.0<br>2.05                      | 54.0<br>2.13             | 1.5<br>0.06                         | 74.0<br>2.91   | 71.0<br>2.80   | 0.20<br>0.01   | 1.70<br>0.07   | 24.2           | 29.1           | 0.0699         | 0.24<br>0.52        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -2.0<br>-0.08    | 2.8<br>0.11                | 51.0<br>2.01                      | 56.0<br>2.20             | 1.5<br>0.06                         | 74.0<br>2.91   | 71.0<br>2.80   | 0.70<br>0.03   | 1.60<br>0.06   | 23.9           | 17.7           | 0.0725         | 0.33<br>0.73        |
| 17.462<br>0.6875 | 14.288<br>0.5625 | 0.8<br>0.03      | 0.8<br>0.03                | 52.0<br>2.05                      | 52.0<br>2.05             | 1.5<br>0.06                         | 76.0<br>2.99   | 72.0<br>2.83   | 1.60<br>0.06   | 1.90<br>0.08   | 23             | 15.4           | 0.0799         | 0.37<br>0.83        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 0.8<br>0.03                         | 77.0<br>3.03   | 74.0<br>2.91   | 1.00<br>0.04   | 0.60<br>0.03   | 35.2           | 14.3           | 0.0801         | 0.53<br>1.17        |
| 21.692<br>0.8540 | 23.812<br>0.9375 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 3.3<br>0.13                         | 79.5<br>3.13   | 74.0<br>2.91   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.55<br>1.21        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 3.5<br>0.14                | 51.0<br>2.01                      | 57.0<br>2.24             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.49<br>1.08        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 1.3<br>0.05                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.49<br>1.09        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 1.5<br>0.06                         | 80.0<br>3.15   | 77.0<br>3.03   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.49<br>1.09        |
| 25.608<br>1.0082 | 20.638<br>0.8125 | -6.4<br>-0.25    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 1.3<br>0.05                         | 80.0<br>3.15   | 76.0<br>2.99   | 1.80<br>0.07   | 1.10<br>0.04   | 38.2           | 15.7           | 0.0832         | 0.61<br>1.34        |
| 25.608<br>1.0082 | 20.638<br>0.8125 | -6.4<br>-0.25    | 0.8<br>0.03                | 52.0<br>2.05                      | 53.0<br>2.09             | 1.3<br>0.05                         | 80.0<br>3.15   | 76.0<br>2.99   | 1.80<br>0.07   | 1.10<br>0.04   | 38.2           | 15.7           | 0.0832         | 0.61<br>1.35        |
| 25.608<br>1.0082 | 22.225<br>0.8750 | -6.4<br>-0.25    | 3.5<br>0.14                | 52.0<br>2.05                      | 58.0<br>2.28             | 2.3<br>0.09                         | 81.0<br>3.19   | 75.0<br>2.95   | 1.80<br>0.07   | 1.10<br>0.04   | 38.2           | 15.7           | 0.0832         | 0.68<br>1.50        |
| 21.692<br>0.8540 | 23.812<br>0.9375 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 3.3<br>0.13                         | 81.0<br>3.19   | 75.0<br>2.95   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.63<br>1.39        |
| 21.692<br>0.8540 | 21.808<br>0.8586 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 2.3<br>0.09                         | 81.0<br>3.19   | 78.0<br>3.07   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.62<br>1.37        |
| 21.692<br>0.8540 | 21.808<br>0.8586 | -4.8<br>-0.19    | 2.3<br>0.09                | 51.0<br>2.01                      | 55.0<br>2.17             | 2.3<br>0.09                         | 82.0<br>3.23   | 78.0<br>3.07   | 0.50<br>0.02   | 1.70<br>0.07   | 30             | 12.2           | 0.0732         | 0.65<br>1.44        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 53.0<br>2.09                      | 60.0<br>2.36             | 3.3<br>0.13                         | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.93<br>2.05        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 3.5<br>0.14                | 52.0<br>2.05                      | 59.0<br>2.32             | 2.3<br>0.09                         | 87.0<br>3.43   | 83.0<br>3.27   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.91<br>2.00        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

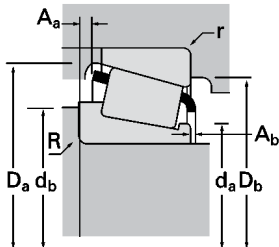
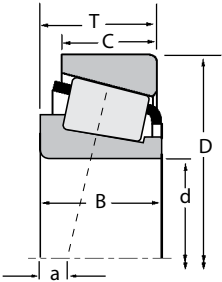




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |       |       |
| 46.038<br>1.8125        | 95.250<br>3.7500  | 31.753<br>1.2501 | 118000<br>26400        | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400        | 436         | 432X                   |  |        |  |       |       |
| 47.625<br>1.8750        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 369A        | 362A                   |  |        |  |       |       |
| 47.625<br>1.8750        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 369-S       | 362A                   |  |        |  |       |       |
| 47.625<br>1.8750        | 88.900<br>3.5000  | 25.400<br>1.0000 | 91300<br>20500         | 0.55 | 1.10 | 23700<br>5320          | 22100<br>4970    | 1.07 | 116000<br>26100        | M804048     | M804010                |  |        |  |       |       |
| 47.625<br>1.8750        | 88.900<br>3.5000  | 25.400<br>1.0000 | 91300<br>20500         | 0.55 | 1.10 | 23700<br>5320          | 22100<br>4970    | 1.07 | 116000<br>26100        | M804049     | M804010                |  |        |  |       |       |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 369A        | 362                    |  |        |  |       |       |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 369-S       | 362                    |  |        |  |       |       |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3778        | 3720                   |  |        |  |       |       |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3779        | 3720                   |  |        |  |       |       |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3779        | 3730                   |  |        |  |       |       |
| 47.625<br>1.8750        | 95.250<br>3.7500  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3779        | 3726                   |  |        |  |       |       |
| 47.625<br>1.8750        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400        | HM804846    | HM804810               |  |        |  |       |       |
| 47.625<br>1.8750        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 386A        | 382A                   |  |        |  |       |       |
| 47.625<br>1.8750        | 98.425<br>3.8750  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3779        | 3732                   |  |        |  |       |       |
| 47.625<br>1.8750        | 100.000<br>3.9370 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000        | 528         | 520X                   |  |        |  |       |       |
| 47.625<br>1.8750        | 101.600<br>4.0000 | 31.750<br>1.2500 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000        | 49580       | 49520                  |  |        |  |       |       |
| 47.625<br>1.8750        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000        | 528         | 522                    |  |        |  |       |       |
| 47.625<br>1.8750        | 101.600<br>4.0000 | 34.925<br>1.3750 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000        | 49580       | 49521                  |  |        |  |       |       |
| 47.625<br>1.8750        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000        | 528A        | 522                    |  |        |  |       |       |
| 47.625<br>1.8750        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000        | 528R        | 522                    |  |        |  |       |       |
| 47.625<br>1.8750        | 103.188<br>4.0625 | 43.658<br>1.7188 | 197000<br>44200        | 0.30 | 2.02 | 51000<br>11500         | 25900<br>5820    | 1.97 | 267000<br>60100        | 5358        | 5335                   |  |        |  |       |       |
| 47.625<br>1.8750        | 103.188<br>4.0625 | 43.658<br>1.7188 | 197000<br>44200        | 0.30 | 2.02 | 51000<br>11500         | 25900<br>5820    | 1.97 | 267000<br>60100        | 5361        | 5335                   |  |        |  |       |       |
| 47.625<br>1.8750        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600        | 45282       | 45220                  |  |        |  |       |       |
| 47.625<br>1.8750        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600        | 45282       | 45221                  |  |        |  |       |       |
| 47.625<br>1.8750        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400        | 59187       | 59412                  |  |        |  |       |       |
| 47.625<br>1.8750        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400        | 59188       | 59412                  |  |        |  |       |       |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 467         | 453A                   |  |        |  |       |       |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 536         | 532X                   |  |        |  |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.900<br>1.1772 | 26.195<br>1.0313 | -9.1<br>-0.36    | 3.5<br>0.14                | 52.0<br>2.05                      | 59.0<br>2.32             | 3.3<br>0.13                         | 87.0<br>3.43   | 81.0<br>3.19   | 1.60<br>0.06   | 0.40<br>0.02   | 42.5           | 11.3           | 0.0805         | 0.99<br>2.18        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 3.5<br>0.14                | 53.0<br>2.09                      | 60.0<br>2.36             | 1.3<br>0.05                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.55<br>1.21        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 2.3<br>0.09                | 53.0<br>2.09                      | 57.0<br>2.24             | 1.3<br>0.05                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.55<br>1.21        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -1.8<br>-0.07    | 0.8<br>0.03                | 56.0<br>2.20                      | 59.0<br>2.32             | 3.3<br>0.13                         | 85.0<br>3.35   | 77.0<br>3.03   | 1.70<br>0.07   | 2.00<br>0.08   | 33.9           | 12.5           | 0.0924         | 0.66<br>1.46        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -1.8<br>-0.07    | 3.5<br>0.14                | 56.0<br>2.20                      | 65.0<br>2.56             | 3.3<br>0.13                         | 85.0<br>3.35   | 77.0<br>3.03   | 1.70<br>0.07   | 2.00<br>0.08   | 33.9           | 12.5           | 0.0924         | 0.66<br>1.45        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                | 53.0<br>2.09                      | 60.0<br>2.36             | 2.0<br>0.08                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.56<br>1.23        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 2.3<br>0.09                | 53.0<br>2.09                      | 57.0<br>2.24             | 2.0<br>0.08                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.56<br>1.23        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 6.4<br>0.25                | 55.0<br>2.17                      | 67.0<br>2.64             | 3.3<br>0.13                         | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.88<br>1.95        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 55.0<br>2.17                      | 61.0<br>2.40             | 3.3<br>0.13                         | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.90<br>1.98        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 55.0<br>2.17                      | 61.0<br>2.40             | 0.8<br>0.03                         | 88.0<br>3.46   | 84.0<br>3.31   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.91<br>2.01        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 55.0<br>2.17                      | 61.0<br>2.40             | 3.3<br>0.13                         | 89.0<br>3.50   | 83.0<br>3.27   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 0.95<br>2.10        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -3.8<br>-0.15    | 3.5<br>0.14                | 57.5<br>2.26                      | 66.0<br>2.60             | 3.3<br>0.13                         | 91.0<br>3.58   | 81.0<br>3.19   | 2.30<br>0.09   | 2.80<br>0.11   | 44.8           | 14.6           | 0.1017         | 0.96<br>2.12        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 0.8<br>0.03                | 55.0<br>2.17                      | 56.0<br>2.20             | 0.8<br>0.03                         | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.73<br>1.60        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 55.0<br>2.17                      | 61.0<br>2.40             | 3.3<br>0.13                         | 90.0<br>3.54   | 84.0<br>3.31   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9           | 14.5           | 0.0903         | 1.04<br>2.30        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 3.5<br>0.14                | 55.0<br>2.17                      | 62.0<br>2.44             | 3.3<br>0.13                         | 94.0<br>3.70   | 88.0<br>3.46   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.25<br>2.75        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -7.1<br>-0.28    | 3.5<br>0.14                | 56.0<br>2.20                      | 63.0<br>2.48             | 3.3<br>0.13                         | 96.0<br>3.78   | 88.0<br>3.46   | 2.30<br>0.09   | 1.30<br>0.05   | 49.1           | 16.8           | 0.0946         | 1.18<br>2.60        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 3.5<br>0.14                | 55.0<br>2.17                      | 62.0<br>2.44             | 3.3<br>0.13                         | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.30<br>2.86        |
| 31.750<br>1.2500 | 28.575<br>1.1250 | -7.1<br>-0.28    | 3.5<br>0.14                | 56.0<br>2.20                      | 63.0<br>2.48             | 3.3<br>0.13                         | 96.0<br>3.78   | 87.0<br>3.43   | 2.30<br>0.09   | 1.30<br>0.05   | 49.1           | 16.8           | 0.0946         | 1.25<br>2.76        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 1.5<br>0.06                | 55.0<br>2.17                      | 58.0<br>2.28             | 3.3<br>0.13                         | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.30<br>2.88        |
| 36.068<br>1.4200 | 26.988<br>1.0625 | -12.7<br>-0.50   | 8.0<br>0.31                | 55.0<br>2.17                      | 70.0<br>2.76             | 3.3<br>0.13                         | 95.0<br>3.74   | 89.0<br>3.50   | 2.70<br>0.11   | 1.80<br>0.07   | 57.9           | 13.4           | 0.0894         | 1.27<br>2.79        |
| 44.475<br>1.7510 | 36.512<br>1.4375 | -16.0<br>-0.63   | 1.3<br>0.05                | 58.0<br>2.28                      | 60.0<br>2.36             | 3.3<br>0.13                         | 97.0<br>3.82   | 89.0<br>3.50   | 2.60<br>0.10   | 0.90<br>0.04   | 73.4           | 15.5           | 0.0985         | 1.77<br>3.89        |
| 44.475<br>1.7510 | 36.512<br>1.4375 | -16.0<br>-0.63   | 3.5<br>0.14                | 58.0<br>2.28                      | 65.0<br>2.56             | 3.3<br>0.13                         | 97.0<br>3.82   | 89.0<br>3.50   | 2.60<br>0.10   | 0.90<br>0.04   | 73.4           | 15.5           | 0.0985         | 1.76<br>3.88        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 57.0<br>2.24                      | 63.0<br>2.48             | 3.3<br>0.13                         | 99.0<br>3.90   | 93.0<br>3.66   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.27<br>2.79        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 57.0<br>2.24                      | 63.0<br>2.48             | 0.8<br>0.03                         | 99.0<br>3.90   | 95.0<br>3.74   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.27<br>2.80        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 3.5<br>0.14                | 59.0<br>2.32                      | 65.0<br>2.56             | 3.3<br>0.13                         | 99.0<br>3.90   | 92.0<br>3.62   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.47<br>3.25        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38    | 1.5<br>0.06                | 59.0<br>2.32                      | 61.0<br>2.40             | 3.3<br>0.13                         | 99.0<br>3.90   | 92.0<br>3.62   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3           | 14.7           | 0.0999         | 1.48<br>3.26        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 0.8<br>0.03                | 56.0<br>2.20                      | 57.0<br>2.24             | 0.8<br>0.03                         | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.29<br>2.84        |
| 36.957<br>1.4550 | 28.575<br>1.1250 | -12.2<br>-0.48   | 3.5<br>0.14                | 56.0<br>2.20                      | 62.0<br>2.44             | 3.3<br>0.13                         | 100.0<br>3.94  | 94.0<br>3.70   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3           | 16.1           | 0.0938         | 1.59<br>3.51        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

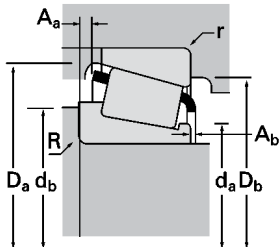
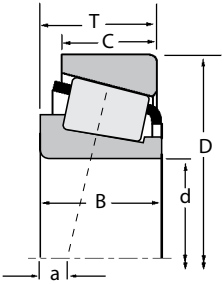
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |           |
| 47.625<br>1.8750        | 108.966<br>4.2900 | 34.925<br>1.3750 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59187       | 59429     |
| 47.625<br>1.8750        | 108.966<br>4.2900 | 34.925<br>1.3750 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59188       | 59429     |
| 47.625<br>1.8750        | 111.125<br>4.3750 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55187C      | 55437     |
| 47.625<br>1.8750        | 111.125<br>4.3750 | 30.162<br>1.1875 | 114000<br>25600        | 0.88 | 0.68 | 29500<br>6640          | 44700<br>10000   | 0.66 | 153000<br>34400 | HM907639    | HM907614  |
| 47.625<br>1.8750        | 111.125<br>4.3750 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 536         | 532       |
| 47.625<br>1.8750        | 112.712<br>4.4375 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55187       | 55443     |
| 47.625<br>1.8750        | 112.712<br>4.4375 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55187C      | 55443     |
| 47.625<br>1.8750        | 112.712<br>4.4375 | 30.162<br>1.1875 | 114000<br>25600        | 0.88 | 0.68 | 29500<br>6640          | 44700<br>10000   | 0.66 | 153000<br>34400 | HM907639    | HM907616  |
| 47.625<br>1.8750        | 117.475<br>4.6250 | 33.338<br>1.3125 | 138000<br>31000        | 0.63 | 0.96 | 35800<br>8040          | 38300<br>8620    | 0.93 | 166000<br>37300 | 66187       | 66462     |
| 47.625<br>1.8750        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 617         | 612       |
| 47.625<br>1.8750        | 123.825<br>4.8750 | 36.512<br>1.4375 | 153000<br>34400        | 0.74 | 0.81 | 39600<br>8910          | 50000<br>11200   | 0.79 | 175000<br>39400 | 72187       | 72487     |
| 47.625<br>1.8750        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72187C      | 72487     |
| 47.625<br>1.8750        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72188C      | 72487     |
| 48.412<br>1.9060        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804848A   | HM804810  |
| 48.412<br>1.9060        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804848    | HM804810  |
| 48.412<br>1.9060        | 95.250<br>3.7500  | 30.162<br>1.1875 | 115000<br>25900        | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804849    | HM804810  |
| 48.600<br>1.9134        | 88.000<br>3.4646  | 21.500<br>0.8465 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400 | JLM104942A  | JLM104914 |
| 49.212<br>1.9375        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 365-S       | 362A      |
| 49.212<br>1.9375        | 90.000<br>3.5433  | 25.000<br>0.9843 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 365-S       | 362X      |
| 49.212<br>1.9375        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3781        | 3720      |
| 49.212<br>1.9375        | 103.188<br>4.0625 | 43.658<br>1.7188 | 197000<br>44200        | 0.30 | 2.02 | 51000<br>11500         | 25900<br>5820    | 1.97 | 267000<br>60100 | 5395        | 5335      |
| 49.212<br>1.9375        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807044    | HM807010  |
| 49.212<br>1.9375        | 114.300<br>4.5000 | 44.450<br>1.7500 | 207000<br>46500        | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65390       | 65320     |
| 49.212<br>1.9375        | 114.300<br>4.5000 | 44.450<br>1.7500 | 228000<br>51200        | 0.40 | 1.49 | 59000<br>13300         | 40600<br>9130    | 1.45 | 290000<br>65100 | HH506348    | HH506310  |
| 49.212<br>1.9375        | 114.300<br>4.5000 | 44.450<br>1.7500 | 228000<br>51200        | 0.40 | 1.49 | 59000<br>13300         | 40600<br>9130    | 1.45 | 290000<br>65100 | HH506348    | HH506311  |
| 49.213<br>1.9375        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5562        | 5535      |
| 49.975<br>1.9675        | 111.125<br>4.3750 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55196       | 55437     |
| 49.982<br>1.9678        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 546         | 532X      |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -9.7<br>-0.38    | 3.5<br>0.14                | 59.0<br>2.32                      | 65.0<br>2.56             | 3.3<br>0.13                         | 101.0<br>3.98  | 93.0<br>3.66   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3<br>14.7   | 14.7           | 0.0999         | 1.58<br>3.49        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -9.7<br>-0.38    | 1.5<br>0.06                | 59.0<br>2.32                      | 61.0<br>2.40             | 3.3<br>0.13                         | 101.0<br>3.98  | 93.0<br>3.66   | 3.40<br>0.14   | 1.30<br>0.05   | 57.3<br>14.7   | 14.7           | 0.0999         | 1.59<br>3.51        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.6<br>0.30      | 3.5<br>0.14                | 62.0<br>2.44                      | 69.0<br>2.72             | 3.3<br>0.13                         | 105.0<br>4.13  | 92.0<br>3.62   | 5.00<br>0.20   | 3.60<br>0.14   | 48.7<br>15.4   | 15.4           | 0.1198         | 1.39<br>3.07        |
| 28.575<br>1.1250 | 20.638<br>0.8125 | 7.6<br>0.30      | 3.5<br>0.14                | 65.0<br>2.56                      | 72.0<br>2.83             | 3.3<br>0.13                         | 105.0<br>4.13  | 91.0<br>3.58   | 4.60<br>0.18   | 2.00<br>0.08   | 46.9<br>13.7   | 13.7           | 0.1183         | 1.40<br>3.08        |
| 36.957<br>1.4550 | 33.338<br>1.3125 | -12.2<br>-0.48   | 3.5<br>0.14                | 56.0<br>2.20                      | 62.0<br>2.44             | 3.3<br>0.13                         | 100.0<br>3.94  | 95.0<br>3.74   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3<br>16.1   | 16.1           | 0.0938         | 1.82<br>4.01        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 3.5<br>0.14                | 62.0<br>2.44                      | 69.0<br>2.72             | 3.3<br>0.13                         | 106.0<br>4.17  | 92.0<br>3.62   | 4.80<br>0.19   | 3.20<br>0.13   | 36.8<br>13.2   | 13.2           | 0.1085         | 1.35<br>2.98        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.6<br>0.30      | 3.5<br>0.14                | 62.0<br>2.44                      | 69.0<br>2.72             | 3.3<br>0.13                         | 106.0<br>4.17  | 92.0<br>3.62   | 5.00<br>0.20   | 3.60<br>0.14   | 48.7<br>15.4   | 15.4           | 0.1198         | 1.44<br>3.17        |
| 28.575<br>1.1250 | 20.638<br>0.8125 | 7.6<br>0.30      | 3.5<br>0.14                | 65.0<br>2.56                      | 72.0<br>2.83             | 3.3<br>0.13                         | 106.0<br>4.17  | 91.0<br>3.58   | 4.60<br>0.18   | 2.00<br>0.08   | 46.9<br>13.7   | 13.7           | 0.1183         | 1.46<br>3.22        |
| 31.750<br>1.2500 | 23.812<br>0.9375 | -0.3<br>-0.01    | 3.5<br>0.14                | 62.0<br>2.44                      | 69.0<br>2.72             | 3.3<br>0.13                         | 111.0<br>4.37  | 100.0<br>3.94  | 5.00<br>0.20   | 2.00<br>0.08   | 50.2<br>16.4   | 16.4           | 0.0751         | 1.70<br>3.74        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 3.5<br>0.14                | 58.0<br>2.28                      | 65.0<br>2.56             | 3.3<br>0.13                         | 110.0<br>4.33  | 105.0<br>4.13  | 3.90<br>0.15   | 1.90<br>0.07   | 75.9<br>16.2   | 16.2           | 0.0694         | 2.35<br>5.18        |
| 32.791<br>1.2910 | 25.400<br>1.0000 | 1.3<br>0.05      | 3.5<br>0.14                | 66.0<br>2.59                      | 72.0<br>2.83             | 3.3<br>0.13                         | 116.0<br>4.57  | 102.0<br>4.02  | 5.40<br>0.21   | 4.00<br>0.16   | 47.7<br>14.1   | 14.1           | 0.0772         | 2.05<br>4.52        |
| 32.791<br>1.2910 | 25.400<br>1.0000 | 2.0<br>0.08      | 3.5<br>0.14                | 66.0<br>2.60                      | 75.0<br>2.95             | 3.3<br>0.13                         | 116.0<br>4.57  | 102.0<br>4.02  | 4.70<br>0.19   | 4.40<br>0.17   | 57.4<br>13.5   | 13.5           | 0.0825         | 2.15<br>4.74        |
| 32.791<br>1.2910 | 25.400<br>1.0000 | 2.0<br>0.08      | 0.8<br>0.03                | 67.0<br>2.64                      | 69.0<br>2.72             | 3.3<br>0.13                         | 116.0<br>4.57  | 102.0<br>4.02  | 4.70<br>0.19   | 4.40<br>0.17   | 57.4<br>13.5   | 13.5           | 0.0825         | 2.18<br>4.80        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -3.8<br>-0.15    | 2.3<br>0.09                | 57.5<br>2.26                      | 63.0<br>2.48             | 3.3<br>0.13                         | 91.0<br>3.58   | 81.0<br>3.19   | 2.30<br>0.09   | 2.80<br>0.11   | 44.8<br>13.8   | 13.8           | 0.1017         | 0.95<br>2.10        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -3.8<br>-0.15    | 2.3<br>0.09                | 57.5<br>2.26                      | 63.0<br>2.48             | 3.3<br>0.13                         | 91.0<br>3.58   | 81.0<br>3.19   | 2.30<br>0.09   | 2.80<br>0.11   | 44.8<br>13.8   | 13.8           | 0.1017         | 0.95<br>2.10        |
| 29.370<br>1.1563 | 23.020<br>0.9063 | -3.8<br>-0.15    | 3.5<br>0.14                | 57.5<br>2.26                      | 66.0<br>2.60             | 3.3<br>0.13                         | 91.0<br>3.58   | 81.0<br>3.19   | 2.30<br>0.09   | 2.80<br>0.11   | 44.8<br>13.8   | 13.8           | 0.1017         | 0.95<br>2.09        |
| 21.500<br>0.8465 | 17.000<br>0.6693 | -5.3<br>-0.21    | 0.4<br>0.02                | 55.0<br>2.17                      | 54.0<br>2.13             | 0.8<br>0.03                         | 81.0<br>3.19   | 78.0<br>3.07   | 0.80<br>0.03   | 2.10<br>0.08   | 38.8<br>10.8   | 23.2           | 0.0801         | 0.56<br>1.23        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 0.8<br>0.03                | 54.0<br>2.13                      | 55.0<br>2.17             | 1.3<br>0.05                         | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8<br>14     | 14             | 0.0773         | 0.53<br>1.17        |
| 22.225<br>0.8750 | 20.000<br>0.7874 | -4.3<br>-0.17    | 0.8<br>0.03                | 54.0<br>2.13                      | 55.0<br>2.17             | 2.0<br>0.08                         | 84.0<br>3.31   | 80.0<br>3.15   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8<br>14     | 14             | 0.0773         | 0.62<br>1.36        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 3.5<br>0.14                | 56.0<br>2.20                      | 62.0<br>2.44             | 3.3<br>0.13                         | 88.0<br>3.46   | 82.0<br>3.23   | 1.80<br>0.07   | 0.90<br>0.04   | 49.9<br>14.5   | 14.5           | 0.0903         | 0.87<br>1.92        |
| 44.475<br>1.7510 | 36.512<br>1.4375 | -16.0<br>-0.63   | 3.5<br>0.14                | 60.0<br>2.36                      | 66.0<br>2.60             | 3.3<br>0.13                         | 97.0<br>3.82   | 89.0<br>3.50   | 2.60<br>0.10   | 0.90<br>0.04   | 73.4<br>15.5   | 15.5           | 0.0985         | 1.72<br>3.78        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -7.4<br>-0.29    | 3.5<br>0.14                | 63.0<br>2.48                      | 69.0<br>2.72             | 3.3<br>0.13                         | 100.0<br>3.94  | 89.0<br>3.50   | 3.40<br>0.14   | 1.90<br>0.08   | 63.9<br>17.1   | 17.1           | 0.0760         | 1.49<br>3.29        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -12.4<br>-0.49   | 3.5<br>0.14                | 60.0<br>2.36                      | 70.0<br>2.76             | 3.3<br>0.13                         | 107.0<br>4.21  | 97.0<br>3.82   | 3.70<br>0.14   | 1.00<br>0.04   | 63.1<br>13     | 13             | 0.1053         | 2.18<br>4.81        |
| 44.450<br>1.7500 | 36.068<br>1.4200 | -13.5<br>-0.53   | 3.5<br>0.14                | 61.0<br>2.40                      | 71.0<br>2.80             | 3.3<br>0.13                         | 107.0<br>4.21  | 97.0<br>3.82   | 2.70<br>0.11   | 3.20<br>0.13   | 72<br>15.6     | 15.6           | 0.1078         | 2.26<br>4.97        |
| 44.450<br>1.7500 | 36.068<br>1.4200 | -13.5<br>-0.53   | 3.5<br>0.14                | 61.0<br>2.40                      | 71.0<br>2.80             | 0.8<br>0.03                         | 107.0<br>4.21  | 99.0<br>3.90   | 2.70<br>0.11   | 3.20<br>0.13   | 72<br>15.6     | 15.6           | 0.1078         | 2.27<br>5.00        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 1.3<br>0.05                | 63.0<br>2.48                      | 65.0<br>2.56             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110<br>24.2    | 24.2           | 0.0825         | 2.73<br>6.02        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 3.5<br>0.14                | 64.0<br>2.51                      | 71.0<br>2.80             | 3.3<br>0.13                         | 105.0<br>4.13  | 92.0<br>3.62   | 4.80<br>0.19   | 3.20<br>0.13   | 36.8<br>13.2   | 13.2           | 0.1085         | 1.27<br>2.80        |
| 36.957<br>1.4550 | 28.575<br>1.1250 | -12.2<br>-0.48   | 3.5<br>0.14                | 58.0<br>2.28                      | 65.0<br>2.56             | 3.3<br>0.13                         | 100.0<br>3.94  | 94.0<br>3.70   | 2.80<br>0.11   | 0.90<br>0.04   | 64.3<br>16.1   | 16.1           | 0.0938         | 1.54<br>3.40        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

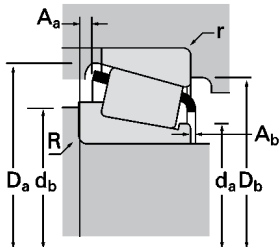
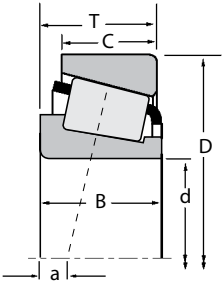
<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 49.987<br>1.9680        | 79.974<br>3.1486  | 18.258<br>0.7188 | 56300<br>12700         | 0.36 | 1.69 | 14600<br>3280          | 8880<br>2000     | 1.64 | 88800<br>20000         | L305648     | L305611                |  |                |       |       |
| 49.987<br>1.9680        | 80.962<br>3.1875  | 18.258<br>0.7188 | 56300<br>12700         | 0.36 | 1.69 | 14600<br>3280          | 8880<br>2000     | 1.64 | 88800<br>20000         | L305648     | L305610                |  |                |       |       |
| 49.987<br>1.9680        | 82.000<br>3.2283  | 21.976<br>0.8652 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400        | LM104947A   | JLM104910              |  |                |       |       |
| 49.987<br>1.9680        | 89.980<br>3.5425  | 24.750<br>0.9744 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200        | 28579       | 28520                  |  |                |       |       |
| 49.987<br>1.9680        | 92.075<br>3.6250  | 24.608<br>0.9688 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200        | 28579       | 28521                  |  |                |       |       |
| 49.987<br>1.9680        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 378A        | 372A                   |  |                |       |       |
| 49.987<br>1.9680        | 114.300<br>4.5000 | 44.450<br>1.7500 | 228000<br>51200        | 0.40 | 1.49 | 59000<br>13300         | 40600<br>9130    | 1.45 | 290000<br>65100        | HH506349    | HH506311               |  |                |       |       |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800         | XAA32010X   | Y32010X                |  |                |       |       |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800         | XAB-32010X  | Y32010X                |  |                |       |       |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800         | XAD32010X   | Y32010X                |  |                |       |       |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800         | XAE32010X   | Y32010X                |  |                |       |       |
| 50.000<br>1.9685        | 82.000<br>3.2283  | 21.500<br>0.8465 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400        | JLM104948   | JLM104910              |  |                |       |       |
| 50.000<br>1.9685        | 82.000<br>3.2283  | 21.500<br>0.8465 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800         | XAB-32010X  | YKB-32010X             |  |                |       |       |
| 50.000<br>1.9685        | 82.550<br>3.2500  | 21.120<br>0.8313 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400        | JLM104948   | LM104911               |  |                |       |       |
| 50.000<br>1.9685        | 82.550<br>3.2500  | 23.150<br>0.9113 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400        | JLM104948   | LM104911A              |  |                |       |       |
| 50.000<br>1.9685        | 82.931<br>3.2650  | 21.120<br>0.8313 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400        | JLM104948   | LM104912               |  |                |       |       |
| 50.000<br>1.9685        | 84.000<br>3.3071  | 22.000<br>0.8661 | 75400<br>16900         | 0.44 | 1.37 | 19500<br>4390          | 14600<br>3290    | 1.34 | 104000<br>23500        | JLM704649   | JLM704610              |  |                |       |       |
| 50.000<br>1.9685        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 365         | 362A                   |  |                |       |       |
| 50.000<br>1.9685        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 366         | 362A                   |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 365         | 362                    |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 365         | 363                    |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 366         | 362                    |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 366         | 363                    |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 28.000<br>1.1024 | 115000<br>25700        | 0.33 | 1.82 | 29700<br>6670          | 16700<br>3760    | 1.78 | 154000<br>34600        | JM205149A   | JM205110               |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 28.000<br>1.1024 | 115000<br>25700        | 0.33 | 1.82 | 29700<br>6670          | 16700<br>3760    | 1.78 | 154000<br>34600        | JM205149AS  | JM205110               |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 28.000<br>1.1024 | 115000<br>25700        | 0.33 | 1.82 | 29700<br>6670          | 16700<br>3760    | 1.78 | 154000<br>34600        | JM205149    | JM205110               |  |                |       |       |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 28.000<br>1.1024 | 115000<br>25700        | 0.33 | 1.82 | 29700<br>6670          | 16700<br>3760    | 1.78 | 154000<br>34600        | JM205149    | JM205110A              |  |                |       |       |
| 50.000<br>1.9685        | 100.000<br>3.9370 | 33.500<br>1.3189 | 150000<br>33700        | 0.40 | 1.50 | 38900<br>8750          | 26600<br>5980    | 1.46 | 202000<br>45300        | XLA33211    | Y33211                 |  |                |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -2.5<br>-0.10    | 1.5<br>0.06                                    | 55.0<br>2.17                               | 57.0<br>2.24                               | 1.5<br>0.06                                  | 76.0<br>2.99   | 73.0<br>2.87   | 0.20<br>0.01   | 1.90<br>0.08   | 38.8           | 27.8           | 0.0841         | 0.34<br>0.76        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -2.5<br>-0.10    | 1.5<br>0.06                                    | 55.0<br>2.17                               | 57.0<br>2.24                               | 1.5<br>0.06                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.20<br>0.01   | 1.90<br>0.08   | 38.8           | 27.8           | 0.0841         | 0.36<br>0.79        |
| 22.225<br>0.8750 | 17.000<br>0.6693 | -5.8<br>-0.23    | 0.5<br>0.02                                    | 55.0<br>2.17                               | 55.0<br>2.17                               | 0.5<br>0.02                                  | 78.0<br>3.07   | 76.0<br>2.99   | 1.20<br>0.05   | 2.00<br>0.08   | 38.8           | 23.2           | 0.0801         | 0.44<br>0.97        |
| 25.400<br>1.0000 | 19.987<br>0.7869 | -4.8<br>-0.19    | 2.3<br>0.09                                    | 56.0<br>2.20                               | 60.0<br>2.36                               | 2.3<br>0.09                                  | 86.0<br>3.39   | 81.0<br>3.19   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 18.9           | 0.0912         | 0.66<br>1.47        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -4.8<br>-0.19    | 2.3<br>0.09                                    | 56.0<br>2.20                               | 60.0<br>2.36                               | 0.8<br>0.03                                  | 87.0<br>3.43   | 83.0<br>3.27   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 18.9           | 0.0912         | 0.71<br>1.57        |
| 22.225<br>0.8750 | 19.050<br>0.7500 | -3.8<br>-0.15    | 2.3<br>0.09                                    | 56.0<br>2.20                               | 60.0<br>2.36                               | 1.5<br>0.06                                  | 90.0<br>3.54   | 86.0<br>3.39   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.72<br>1.60        |
| 44.450<br>1.7500 | 36.068<br>1.4200 | -13.5<br>-0.53   | 3.5<br>0.14                                    | 61.0<br>2.40                               | 72.0<br>2.83                               | 0.8<br>0.03                                  | 107.0<br>4.21  | 99.0<br>3.90   | 2.70<br>0.11   | 3.20<br>0.13   | 72             | 15.6           | 0.1078         | 2.25<br>4.96        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 2.3<br>0.09                                    | 56.0<br>2.20                               | 60.0<br>2.36                               | 1.0<br>0.04                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 62.0<br>2.44                               | 1.0<br>0.04                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 1.5<br>0.06                                    | 56.0<br>2.20                               | 59.0<br>2.32                               | 1.0<br>0.04                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 0.3<br>0.01                                    | 55.0<br>2.17                               | 56.0<br>2.20                               | 1.0<br>0.04                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 21.500<br>0.8465 | 17.000<br>0.6693 | -5.3<br>-0.21    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 60.0<br>2.36                               | 0.5<br>0.02                                  | 78.0<br>3.07   | 76.0<br>2.99   | 0.80<br>0.03   | 2.10<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.43<br>0.94        |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -2.0<br>-0.08    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 62.0<br>2.44                               | 0.5<br>0.02                                  | 77.0<br>3.03   | 76.0<br>2.99   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.42<br>0.93        |
| 21.500<br>0.8465 | 16.510<br>0.6500 | -5.3<br>-0.21    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 60.0<br>2.36                               | 1.3<br>0.05                                  | 78.0<br>3.07   | 75.0<br>2.95   | 0.80<br>0.03   | 2.10<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.43<br>0.95        |
| 21.500<br>0.8465 | 18.542<br>0.7300 | -5.3<br>-0.21    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 60.0<br>2.36                               | 0.8<br>0.03                                  | 78.0<br>3.07   | 75.0<br>2.95   | 0.80<br>0.03   | 2.10<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.45<br>1.00        |
| 21.500<br>0.8465 | 16.510<br>0.6500 | -5.3<br>-0.21    | 3.0<br>0.12                                    | 55.0<br>2.17                               | 60.0<br>2.36                               | 1.3<br>0.05                                  | 77.5<br>3.06   | 75.0<br>2.95   | 0.80<br>0.03   | 2.10<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.44<br>0.96        |
| 22.000<br>0.8661 | 17.500<br>0.6890 | -2.3<br>-0.09    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 64.0<br>2.52                               | 1.5<br>0.06                                  | 80.0<br>3.15   | 76.0<br>2.99   | 1.10<br>0.04   | 1.60<br>0.06   | 35.6           | 16.7           | 0.0876         | 0.47<br>1.03        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 2.0<br>0.08                                    | 55.0<br>2.17                               | 58.0<br>2.28                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.52<br>1.14        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 2.3<br>0.09                                    | 55.0<br>2.17                               | 59.0<br>2.32                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.52<br>1.14        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 2.0<br>0.08                                    | 55.0<br>2.17                               | 58.0<br>2.28                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.53<br>1.16        |
| 22.225<br>0.8750 | 20.000<br>0.7874 | -4.3<br>-0.17    | 2.0<br>0.08                                    | 55.0<br>2.17                               | 58.0<br>2.28                               | 0.8<br>0.03                                  | 85.0<br>3.34   | 82.0<br>3.23   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.56<br>1.24        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 2.3<br>0.09                                    | 55.0<br>2.17                               | 59.0<br>2.32                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.53<br>1.16        |
| 22.225<br>0.8750 | 20.000<br>0.7874 | -4.3<br>-0.17    | 2.3<br>0.09                                    | 55.0<br>2.17                               | 59.0<br>2.32                               | 0.8<br>0.03                                  | 85.0<br>3.34   | 82.0<br>3.23   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.56<br>1.24        |
| 28.000<br>1.1024 | 23.000<br>0.9055 | -7.6<br>-0.30    | 5.0<br>0.20                                    | 57.0<br>2.24                               | 67.0<br>2.64                               | 2.5<br>0.10                                  | 85.0<br>3.35   | 80.0<br>3.15   | 0.80<br>0.03   | 2.30<br>0.09   | 48.2           | 14.1           | 0.0885         | 0.74<br>1.63        |
| 28.000<br>1.1024 | 23.000<br>0.9055 | -7.6<br>-0.30    | 2.5<br>0.10                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 2.5<br>0.10                                  | 85.0<br>3.35   | 80.0<br>3.15   | 0.80<br>0.03   | 2.30<br>0.09   | 48.2           | 14.1           | 0.0885         | 0.74<br>1.64        |
| 28.000<br>1.1024 | 23.000<br>0.9055 | -7.6<br>-0.30    | 3.0<br>0.12                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 2.5<br>0.10                                  | 85.0<br>3.35   | 80.0<br>3.15   | 0.80<br>0.03   | 2.30<br>0.09   | 48.2           | 14.1           | 0.0885         | 0.74<br>1.64        |
| 28.000<br>1.1024 | 23.000<br>0.9055 | -7.6<br>-0.30    | 3.0<br>0.12                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 85.0<br>3.35   | 81.0<br>3.19   | 0.80<br>0.03   | 2.30<br>0.09   | 48.2           | 14.1           | 0.0885         | 0.74<br>1.64        |
| 33.500<br>1.3189 | 27.000<br>1.0630 | -8.1<br>-0.32    | 2.0<br>0.08                                    | 62.0<br>2.44                               | 67.0<br>2.64                               | 1.5<br>0.06                                  | 96.0<br>3.78   | 89.0<br>3.50   | 1.40<br>0.05   | 2.80<br>0.11   | 59.3           | 15.3           | 0.1010         | 1.24<br>2.73        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

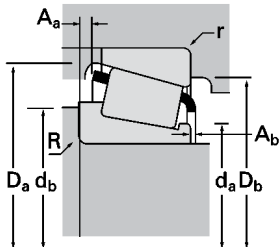
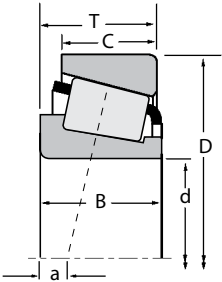




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          |             | Inner     | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>  |             |           |       |
| 50.000<br>1.9685        | 105.000<br>4.1339 | 32.000<br>1.2598 | 111000<br>24900        | 0.87 | 0.69 | 28700<br>6440          | 42500<br>9560    | 0.67 | 138000<br>31000 | JW5049      | JW5010    |       |
| 50.000<br>1.9685        | 105.000<br>4.1339 | 37.000<br>1.4567 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | JHM807045   | JHM807012 |       |
| 50.800<br>2.0000        | 77.788<br>3.0625  | 12.700<br>0.5000 | 34600<br>7770          | 0.34 | 1.78 | 8960<br>2010           | 5160<br>1160     | 1.74 | 47200<br>10600  | LL205449    | LL205410  |       |
| 50.800<br>2.0000        | 80.962<br>3.1875  | 18.258<br>0.7188 | 56300<br>12700         | 0.36 | 1.69 | 14600<br>3280          | 8880<br>2000     | 1.64 | 88800<br>20000  | L305649     | L305610   |       |
| 50.800<br>2.0000        | 82.000<br>3.2283  | 21.976<br>0.8652 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400 | LM104949    | JLM104910 |       |
| 50.800<br>2.0000        | 82.550<br>3.2500  | 21.590<br>0.8500 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400 | LM104949    | LM104911  |       |
| 50.800<br>2.0000        | 82.550<br>3.2500  | 23.622<br>0.9300 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400 | LM104949    | LM104911A |       |
| 50.800<br>2.0000        | 82.931<br>3.2650  | 21.590<br>0.8500 | 75200<br>16900         | 0.31 | 1.97 | 19500<br>4390          | 10200<br>2290    | 1.91 | 104000<br>23400 | LM104949    | LM104912  |       |
| 50.800<br>2.0000        | 83.312<br>3.2800  | 17.462<br>0.6875 | 50600<br>11400         | 0.41 | 1.48 | 13100<br>2950          | 9110<br>2050     | 1.44 | 67500<br>15200  | 18790       | 18721     |       |
| 50.800<br>2.0000        | 85.000<br>3.3465  | 17.462<br>0.6875 | 50600<br>11400         | 0.41 | 1.48 | 13100<br>2950          | 9110<br>2050     | 1.44 | 67500<br>15200  | 18790       | 18720     |       |
| 50.800<br>2.0000        | 85.725<br>3.3750  | 19.050<br>0.7500 | 47800<br>10700         | 0.57 | 1.06 | 12400<br>2780          | 12000<br>2710    | 1.03 | 63900<br>14400  | 18200       | 18337     |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 17.462<br>0.6875 | 50600<br>11400         | 0.41 | 1.48 | 13100<br>2950          | 9110<br>2050     | 1.44 | 67500<br>15200  | 18790       | 18724     |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 20.638<br>0.8125 | 50600<br>11400         | 0.41 | 1.48 | 13100<br>2950          | 9110<br>2050     | 1.44 | 67500<br>15200  | 18790       | 18723     |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368         | 362A      |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368A        | 362A      |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 370A        | 362A      |       |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 23.812<br>0.9375 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368A        | 362AX     |       |
| 50.800<br>2.0000        | 89.980<br>3.5425  | 24.750<br>0.9744 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | 28580       | 28520     |       |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368         | 362       |       |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368         | 363       |       |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368A        | 362       |       |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 370A        | 362       |       |
| 50.800<br>2.0000        | 92.075<br>3.6250  | 24.608<br>0.9688 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | 28580       | 28521     |       |
| 50.800<br>2.0000        | 92.075<br>3.6250  | 27.780<br>1.0937 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | 28580       | 28523     |       |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 20.638<br>0.8125 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375         | 374       |       |
| 50.400<br>2.0000        | 93.264<br>3.6718  | 20.638<br>0.8125 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375-S       | 374       |       |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 26.988<br>1.0625 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375         | 3720      |       |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 26.988<br>1.0625 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375         | 3730      |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.000<br>1.1417 | 22.000<br>0.8661 | 4.3<br>0.17      | 3.0<br>0.12                                    | 60.0<br>2.36                               | 76.0<br>2.99                               | 3.0<br>0.12                                  | 100.0<br>3.94  | 86.0<br>3.39   | 4.90<br>0.19   | 3.60<br>0.14   | 39             | 14.6           | 0.1105         | 1.23<br>2.72        |
| 36.000<br>1.4173 | 29.000<br>1.1417 | -7.6<br>-0.30    | 3.0<br>0.12                                    | 63.0<br>2.48                               | 69.0<br>2.72                               | 2.5<br>0.10                                  | 100.0<br>3.94  | 90.0<br>3.54   | 3.60<br>0.14   | 2.60<br>0.10   | 63.9           | 17.1           | 0.0760         | 1.49<br>3.28        |
| 12.700<br>0.5000 | 9.525<br>0.3750  | 0.0<br>0.00      | 1.5<br>0.06                                    | 55.0<br>2.17                               | 57.0<br>2.24                               | 1.5<br>0.06                                  | 74.0<br>2.91   | 71.0<br>2.80   | 0.20<br>0.01   | 1.70<br>0.07   | 24.2           | 29.1           | 0.0699         | 0.20<br>0.45        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -2.5<br>-0.10    | 1.5<br>0.06                                    | 56.0<br>2.20                               | 58.0<br>2.28                               | 1.5<br>0.06                                  | 77.0<br>3.03   | 73.0<br>2.87   | 0.30<br>0.01   | 1.90<br>0.08   | 38.8           | 27.8           | 0.0841         | 0.35<br>0.77        |
| 22.225<br>0.8750 | 17.000<br>0.6693 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 0.5<br>0.02                                  | 78.0<br>3.07   | 76.0<br>2.99   | 1.20<br>0.05   | 2.00<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.42<br>0.93        |
| 22.225<br>0.8750 | 16.510<br>0.6500 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 1.3<br>0.05                                  | 78.0<br>3.07   | 75.0<br>2.95   | 1.20<br>0.05   | 2.00<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.42<br>0.93        |
| 22.225<br>0.8750 | 18.542<br>0.7300 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 78.0<br>3.07   | 75.0<br>2.95   | 1.20<br>0.05   | 2.00<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.45<br>0.99        |
| 22.225<br>0.8750 | 16.510<br>0.6500 | -5.8<br>-0.23    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 63.0<br>2.48                               | 1.3<br>0.05                                  | 77.5<br>3.06   | 75.0<br>2.95   | 1.20<br>0.05   | 2.00<br>0.08   | 38.8           | 19.3           | 0.0801         | 0.43<br>0.95        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 0.8<br>0.03                                  | 79.0<br>3.11   | 77.0<br>3.03   | 0.80<br>0.03   | 1.50<br>0.06   | 28.6           | 21.5           | 0.0789         | 0.34<br>0.76        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 1.5<br>0.06                                  | 80.0<br>3.15   | 77.0<br>3.03   | 0.80<br>0.03   | 1.50<br>0.06   | 28.6           | 21.5           | 0.0789         | 0.37<br>0.81        |
| 18.263<br>0.7190 | 12.700<br>0.5000 | 2.0<br>0.08      | 1.5<br>0.06                                    | 56.0<br>2.20                               | 59.0<br>2.32                               | 1.5<br>0.06                                  | 81.0<br>3.19   | 76.0<br>2.99   | *<br>*         | *              | 26.1           | 20.3           | 0.0852         | 0.40<br>0.88        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 1.3<br>0.05                                  | 82.0<br>3.23   | 78.0<br>3.07   | 0.80<br>0.03   | 1.50<br>0.06   | 28.6           | 21.5           | 0.0789         | 0.42<br>0.93        |
| 17.462<br>0.6875 | 16.670<br>0.6563 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 1.3<br>0.05                                  | 82.0<br>3.23   | 78.0<br>3.07   | 0.80<br>0.03   | 1.50<br>0.06   | 28.6           | 21.5           | 0.0789         | 0.48<br>1.06        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 56.0<br>2.20                               | 58.0<br>2.28                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.51<br>1.12        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.40<br>0.02   | 1.10<br>0.04   | 33.8           | 12.7           | 0.0773         | 0.50<br>1.10        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 5.0<br>0.20                                    | 56.0<br>2.20                               | 65.0<br>2.56                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.49<br>1.08        |
| 22.225<br>0.8750 | 19.688<br>0.7751 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 1.3<br>0.05                                  | 84.0<br>3.31   | 80.0<br>3.15   | 0.40<br>0.02   | 1.10<br>0.04   | 33.8           | 12.7           | 0.0773         | 0.55<br>1.21        |
| 25.400<br>1.0000 | 19.987<br>0.7869 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 2.3<br>0.09                                  | 86.0<br>3.39   | 81.0<br>3.19   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 22.6           | 0.0912         | 0.66<br>1.45        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 56.0<br>2.20                               | 58.0<br>2.28                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.52<br>1.14        |
| 22.225<br>0.8750 | 20.000<br>0.7874 | -4.3<br>-0.17    | 1.5<br>0.06                                    | 56.0<br>2.20                               | 58.0<br>2.28                               | 0.8<br>0.03                                  | 85.0<br>3.34   | 82.0<br>3.23   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.55<br>1.21        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 56.0<br>2.20                               | 62.0<br>2.44                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.40<br>0.02   | 1.10<br>0.04   | 33.8           | 12.7           | 0.0773         | 0.51<br>1.12        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 5.0<br>0.20                                    | 56.0<br>2.20                               | 65.0<br>2.56                               | 2.0<br>0.08                                  | 84.0<br>3.31   | 81.0<br>3.19   | 0.50<br>0.02   | 1.00<br>0.04   | 33.8           | 14             | 0.0773         | 0.50<br>1.10        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 87.0<br>3.43   | 83.0<br>3.27   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 22.6           | 0.0912         | 0.71<br>1.56        |
| 25.400<br>1.0000 | 23.017<br>0.9062 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 2.3<br>0.09                                  | 87.0<br>3.43   | 81.0<br>3.19   | 1.40<br>0.06   | 1.00<br>0.04   | 46.4           | 22.6           | 0.0912         | 0.76<br>1.67        |
| 22.225<br>0.8750 | 15.083<br>0.5938 | -3.8<br>-0.15    | 2.3<br>0.09                                    | 57.0<br>2.24                               | 60.0<br>2.36                               | 1.3<br>0.05                                  | 88.0<br>3.46   | 85.0<br>3.35   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.59<br>1.31        |
| 22.225<br>0.8750 | 15.083<br>0.5938 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 57.0<br>2.24                               | 63.0<br>2.48                               | 1.3<br>0.05                                  | 88.0<br>3.46   | 85.0<br>3.35   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.59<br>1.30        |
| 22.225<br>0.8750 | 23.812<br>0.9375 | -3.8<br>-0.15    | 2.3<br>0.09                                    | 57.0<br>2.24                               | 60.0<br>2.36                               | 3.3<br>0.13                                  | 88.0<br>3.46   | 82.0<br>3.23   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.70<br>1.55        |
| 22.225<br>0.8750 | 23.812<br>0.9375 | -3.8<br>-0.15    | 2.3<br>0.09                                    | 57.0<br>2.24                               | 60.0<br>2.36                               | 0.8<br>0.03                                  | 88.0<br>3.46   | 84.0<br>3.31   | 0.80<br>0.03   | 1.40<br>0.06   | 37.6           | 15.4           | 0.0816         | 0.72<br>1.58        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

B



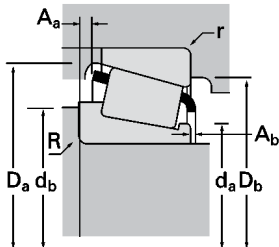
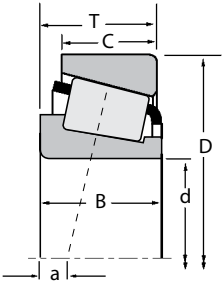




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>  | Inner       | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |       |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3775        | 3720  |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3780        | 3720  |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3780        | 3730  |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3784        | 3720  |
| 50.800<br>2.0000        | 93.662<br>3.6875  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3784        | 3727  |
| 50.800<br>2.0000        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33889       | 33821 |
| 50.800<br>2.0000        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33889       | 33822 |
| 50.800<br>2.0000        | 95.250<br>3.7500  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3780        | 3726  |
| 50.800<br>2.0000        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385A        | 382A  |
| 50.800<br>2.0000        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375         | 372A  |
| 50.800<br>2.0000        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375-S       | 372A  |
| 50.800<br>2.0000        | 96.838<br>3.8125  | 25.400<br>1.0000 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385A        | 382-S |
| 50.800<br>2.0000        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385A        | 382   |
| 50.800<br>2.0000        | 98.425<br>3.8750  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3780        | 3732  |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385A        | 383A  |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 25.000<br>0.9842 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700 | 375         | 372   |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 25.400<br>1.0000 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385A        | 383X  |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 529         | 520X  |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 529X        | 520X  |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 529X        | J520  |
| 50.800<br>2.0000        | 101.600<br>4.0000 | 31.750<br>1.2500 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49585       | 49520 |
| 50.800<br>2.0000        | 101.600<br>4.0000 | 31.750<br>1.2500 | 123000<br>27600        | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49585       | 49522 |
| 50.800<br>2.0000        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 529         | 522   |
| 50.800<br>2.0000        | 101.600<br>4.0000 | 34.925<br>1.3750 | 152000<br>34300        | 0.29 | 2.10 | 39500<br>8880          | 19300<br>4340    | 2.05 | 191000<br>43000 | 529X        | 522   |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45284       | 45220 |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45284       | 45221 |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285       | 45220 |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285       | 45221 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                     |                     | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                     |                     |                     |                     | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>      | D <sub>b</sub>      | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>0.8</b><br>0.03         | <b>58.0</b><br>2.28               | <b>58.0</b><br>2.28      | <b>3.3</b><br>0.13                  | <b>88.0</b><br>3.46 | <b>82.0</b><br>3.23 | <b>1.90</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.85</b><br>1.87 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>3.3</b><br>0.13                  | <b>88.0</b><br>3.46 | <b>82.0</b><br>3.23 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.84</b><br>1.86 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>0.8</b><br>0.03                  | <b>88.0</b><br>3.46 | <b>84.0</b><br>3.31 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.85</b><br>1.88 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>6.4</b><br>0.25         | <b>58.0</b><br>2.28               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>88.0</b><br>3.46 | <b>82.0</b><br>3.23 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.82</b><br>1.81 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>6.4</b><br>0.25         | <b>58.0</b><br>2.28               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>88.0</b><br>3.46 | <b>82.0</b><br>3.23 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.83</b><br>1.84 |
| <b>28.575</b><br>1.1250 | <b>22.225</b><br>0.8750 | <b>-7.6</b><br>-0.30  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>2.3</b><br>0.09                  | <b>90.0</b><br>3.54 | <b>85.0</b><br>3.35 | <b>1.30</b><br>0.05 | <b>2.20</b><br>0.09 | <b>52.5</b>    | <b>18.5</b>    | <b>0.0910</b>  | <b>0.85</b><br>1.87 |
| <b>28.575</b><br>1.1250 | <b>22.225</b><br>0.8750 | <b>-7.6</b><br>-0.30  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>0.8</b><br>0.03                  | <b>90.0</b><br>3.54 | <b>86.0</b><br>3.39 | <b>1.30</b><br>0.05 | <b>2.20</b><br>0.09 | <b>52.5</b>    | <b>18.5</b>    | <b>0.0910</b>  | <b>0.85</b><br>1.88 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>3.3</b><br>0.13                  | <b>89.0</b><br>3.50 | <b>83.0</b><br>3.27 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.90</b><br>1.98 |
| <b>21.946</b><br>0.8640 | <b>15.875</b><br>0.6250 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>60.0</b><br>2.36               | <b>61.0</b><br>2.40      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>89.0</b><br>3.50 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.68</b><br>1.50 |
| <b>22.225</b><br>0.8750 | <b>19.050</b><br>0.7500 | <b>-3.8</b><br>-0.15  | <b>2.3</b><br>0.09         | <b>57.0</b><br>2.24               | <b>60.0</b><br>2.36      | <b>1.5</b><br>0.06                  | <b>90.0</b><br>3.54 | <b>86.0</b><br>3.39 | <b>0.80</b><br>0.03 | <b>1.40</b><br>0.06 | <b>37.6</b>    | <b>15.4</b>    | <b>0.0816</b>  | <b>0.71</b><br>1.57 |
| <b>22.225</b><br>0.8750 | <b>19.050</b><br>0.7500 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>57.0</b><br>2.24               | <b>63.0</b><br>2.48      | <b>1.5</b><br>0.06                  | <b>90.0</b><br>3.54 | <b>86.0</b><br>3.39 | <b>0.80</b><br>0.03 | <b>1.40</b><br>0.06 | <b>37.6</b>    | <b>15.4</b>    | <b>0.0816</b>  | <b>0.71</b><br>1.56 |
| <b>21.946</b><br>0.8640 | <b>20.274</b><br>0.7982 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>60.0</b><br>2.36               | <b>61.0</b><br>2.40      | <b>2.3</b><br>0.09                  | <b>91.0</b><br>3.58 | <b>87.0</b><br>3.43 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.74</b><br>1.64 |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>60.0</b><br>2.36               | <b>61.0</b><br>2.40      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62 | <b>90.0</b><br>3.54 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.73</b><br>1.60 |
| <b>30.302</b><br>1.1930 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>64.0</b><br>2.52      | <b>3.3</b><br>0.13                  | <b>90.0</b><br>3.54 | <b>84.0</b><br>3.31 | <b>1.80</b><br>0.07 | <b>0.90</b><br>0.04 | <b>49.9</b>    | <b>14.5</b>    | <b>0.0903</b>  | <b>0.99</b><br>2.17 |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>60.0</b><br>2.36               | <b>61.0</b><br>2.40      | <b>2.0</b><br>0.08                  | <b>93.0</b><br>3.66 | <b>89.0</b><br>3.50 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.76</b><br>1.67 |
| <b>22.225</b><br>0.8750 | <b>21.824</b><br>0.8592 | <b>-3.8</b><br>-0.15  | <b>2.3</b><br>0.09         | <b>57.0</b><br>2.24               | <b>60.0</b><br>2.36      | <b>2.0</b><br>0.08                  | <b>90.0</b><br>3.54 | <b>86.0</b><br>3.39 | <b>0.80</b><br>0.03 | <b>1.40</b><br>0.06 | <b>37.6</b>    | <b>15.4</b>    | <b>0.0816</b>  | <b>0.85</b><br>1.88 |
| <b>21.946</b><br>0.8640 | <b>22.225</b><br>0.8750 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>60.0</b><br>2.36               | <b>61.0</b><br>2.40      | <b>1.3</b><br>0.05                  | <b>93.0</b><br>3.66 | <b>89.0</b><br>3.50 | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.85</b><br>1.87 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>0.8</b><br>0.03         | <b>58.0</b><br>2.28               | <b>59.0</b><br>2.32      | <b>3.3</b><br>0.13                  | <b>94.0</b><br>3.70 | <b>88.0</b><br>3.46 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.18</b><br>2.61 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>94.0</b><br>3.70 | <b>88.0</b><br>3.46 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.18</b><br>2.59 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>94.0</b><br>3.70 | <b>88.0</b><br>3.46 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.19</b><br>2.63 |
| <b>31.750</b><br>1.2500 | <b>25.400</b><br>1.0000 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>59.0</b><br>2.32               | <b>66.0</b><br>2.60      | <b>3.3</b><br>0.13                  | <b>96.0</b><br>3.78 | <b>88.0</b><br>3.46 | <b>2.30</b><br>0.09 | <b>1.30</b><br>0.05 | <b>49.1</b>    | <b>14.2</b>    | <b>0.0946</b>  | <b>1.12</b><br>2.46 |
| <b>31.750</b><br>1.2500 | <b>25.400</b><br>1.0000 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>59.0</b><br>2.32               | <b>66.0</b><br>2.60      | <b>0.8</b><br>0.03                  | <b>96.0</b><br>3.78 | <b>90.0</b><br>3.54 | <b>2.30</b><br>0.09 | <b>1.30</b><br>0.05 | <b>49.1</b>    | <b>14.2</b>    | <b>0.0946</b>  | <b>1.13</b><br>2.49 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>0.8</b><br>0.03         | <b>58.0</b><br>2.28               | <b>59.0</b><br>2.32      | <b>3.3</b><br>0.13                  | <b>95.0</b><br>3.74 | <b>89.0</b><br>3.50 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.24</b><br>2.73 |
| <b>36.068</b><br>1.4200 | <b>26.988</b><br>1.0625 | <b>-12.7</b><br>-0.50 | <b>3.5</b><br>0.14         | <b>58.0</b><br>2.28               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>95.0</b><br>3.74 | <b>89.0</b><br>3.50 | <b>2.70</b><br>0.11 | <b>1.80</b><br>0.07 | <b>57.9</b>    | <b>13.4</b>    | <b>0.0894</b>  | <b>1.23</b><br>2.71 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>6.4</b><br>0.25         | <b>59.0</b><br>2.32               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90 | <b>93.0</b><br>3.66 | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.19</b><br>2.62 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>6.4</b><br>0.25         | <b>59.0</b><br>2.32               | <b>71.0</b><br>2.80      | <b>0.8</b><br>0.03                  | <b>99.0</b><br>3.90 | <b>95.0</b><br>3.74 | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.19</b><br>2.62 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>2.3</b><br>0.09         | <b>59.0</b><br>2.32               | <b>63.0</b><br>2.48      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90 | <b>93.0</b><br>3.66 | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.21</b><br>2.68 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>2.3</b><br>0.09         | <b>59.0</b><br>2.32               | <b>63.0</b><br>2.48      | <b>0.8</b><br>0.03                  | <b>99.0</b><br>3.90 | <b>95.0</b><br>3.74 | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.22</b><br>2.69 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

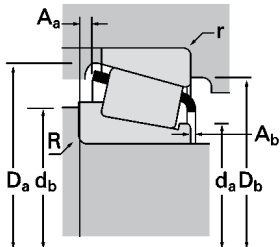
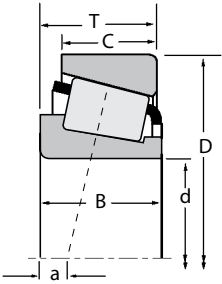




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |           |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285A      | 45220     |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285A      | 45221     |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455         | 453X      |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455-S       | 453X      |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59200       | 59412     |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59200       | 59413     |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59201       | 59412     |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807046    | HM807010  |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807046    | HM807011  |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 39.688<br>1.5625 | 167000<br>37500        | 0.34 | 1.79 | 43300<br>9730          | 24900<br>5590    | 1.74 | 237000<br>53200 | 4580        | 4535      |
| 50.800<br>2.0000        | 105.000<br>4.1339 | 36.873<br>1.4517 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807046    | JHM807012 |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455         | 453A      |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455-S       | 453A      |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455         | 453       |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 36.512<br>1.4375 | 158000<br>35500        | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59200       | 59425     |
| 50.800<br>2.0000        | 110.000<br>4.3307 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455         | 454       |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55200       | 55437     |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200 | 55200C      | 55437     |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 30.162<br>1.1875 | 114000<br>25600        | 0.88 | 0.68 | 29500<br>6640          | 44700<br>10000   | 0.66 | 153000<br>34400 | HM907643    | HM907614  |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 38.108<br>1.5003 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455         | 4536      |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 38.108<br>1.5003 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455-S       | 4536      |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39573       | 39520     |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39573       | 39521     |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39575       | 39520     |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39575       | 39521     |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55200       | 55443     |
| 50.800<br>2.0000        | 114.300<br>4.5000 | 44.450<br>1.7500 | 207000<br>46500        | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65395       | 65320     |
| 50.800<br>2.0000        | 117.475<br>4.6250 | 33.338<br>1.3125 | 138000<br>31000        | 0.63 | 0.96 | 35800<br>8040          | 38300<br>8620    | 0.93 | 166000<br>37300 | 66200       | 66462     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                     |                |                |                |                     |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90  | <b>93.0</b><br>3.66  | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.21</b><br>2.68 |
| <b>30.958</b><br>1.2188 | <b>23.812</b><br>0.9375 | <b>-8.1</b><br>-0.32  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>0.8</b><br>0.03                  | <b>99.0</b><br>3.90  | <b>95.0</b><br>3.74  | <b>2.10</b><br>0.08 | <b>1.80</b><br>0.07 | <b>63.5</b>    | <b>16.9</b>    | <b>0.0971</b>  | <b>1.22</b><br>2.68 |
| <b>29.317</b><br>1.1542 | <b>24.605</b><br>0.9687 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>3.3</b><br>0.13                  | <b>98.0</b><br>3.86  | <b>92.0</b><br>3.62  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.18</b><br>2.59 |
| <b>29.317</b><br>1.1542 | <b>24.605</b><br>0.9687 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>59.0</b><br>2.32               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>98.0</b><br>3.86  | <b>92.0</b><br>3.62  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.17</b><br>2.57 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-9.7</b><br>-0.38  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90  | <b>92.0</b><br>3.62  | <b>3.40</b><br>0.14 | <b>1.30</b><br>0.05 | <b>57.3</b>    | <b>14.7</b>    | <b>0.0999</b>  | <b>1.40</b><br>3.09 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-9.7</b><br>-0.38  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>0.8</b><br>0.03                  | <b>102.0</b><br>4.02 | <b>87.0</b><br>3.43  | <b>3.40</b><br>0.14 | <b>1.30</b><br>0.05 | <b>57.3</b>    | <b>14.7</b>    | <b>0.0999</b>  | <b>1.42</b><br>3.12 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-9.7</b><br>-0.38  | <b>0.8</b><br>0.03         | <b>61.0</b><br>2.40               | <b>62.0</b><br>2.44      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90  | <b>92.0</b><br>3.62  | <b>3.40</b><br>0.14 | <b>1.30</b><br>0.05 | <b>57.3</b>    | <b>14.7</b>    | <b>0.0999</b>  | <b>1.41</b><br>3.11 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-7.4</b><br>-0.29  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>89.0</b><br>3.50  | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.08 | <b>63.9</b>    | <b>17.1</b>    | <b>0.0760</b>  | <b>1.47</b><br>3.24 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-7.4</b><br>-0.29  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>0.8</b><br>0.03                  | <b>100.0</b><br>3.94 | <b>91.0</b><br>3.58  | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.08 | <b>63.9</b>    | <b>17.1</b>    | <b>0.0760</b>  | <b>1.47</b><br>3.25 |
| <b>40.157</b><br>1.5810 | <b>33.338</b><br>1.3125 | <b>-12.4</b><br>-0.49 | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>67.0</b><br>2.64      | <b>3.3</b><br>0.13                  | <b>99.0</b><br>3.90  | <b>90.0</b><br>3.54  | <b>1.70</b><br>0.07 | <b>1.30</b><br>0.05 | <b>73.6</b>    | <b>18.5</b>    | <b>0.1027</b>  | <b>1.62</b><br>3.58 |
| <b>36.512</b><br>1.4375 | <b>29.000</b><br>1.1417 | <b>-7.4</b><br>-0.29  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>2.5</b><br>0.10                  | <b>100.0</b><br>3.94 | <b>90.0</b><br>3.54  | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.08 | <b>63.9</b>    | <b>17.1</b>    | <b>0.0760</b>  | <b>1.49</b><br>3.28 |
| <b>29.317</b><br>1.1542 | <b>22.225</b><br>0.8750 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>0.8</b><br>0.03                  | <b>100.0</b><br>3.94 | <b>97.0</b><br>3.82  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.23</b><br>2.71 |
| <b>29.317</b><br>1.1542 | <b>22.225</b><br>0.8750 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>59.0</b><br>2.32               | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>100.0</b><br>3.94 | <b>97.0</b><br>3.82  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.22</b><br>2.70 |
| <b>29.317</b><br>1.1542 | <b>27.000</b><br>1.0630 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>0.8</b><br>0.03                  | <b>100.0</b><br>3.94 | <b>97.0</b><br>3.82  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.29</b><br>2.84 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-9.7</b><br>-0.38  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>3.3</b><br>0.13                  | <b>101.0</b><br>3.98 | <b>93.0</b><br>3.66  | <b>3.40</b><br>0.14 | <b>1.30</b><br>0.05 | <b>57.3</b>    | <b>14.7</b>    | <b>0.0999</b>  | <b>1.52</b><br>3.35 |
| <b>29.317</b><br>1.1542 | <b>27.000</b><br>1.0630 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>2.0</b><br>0.08                  | <b>100.0</b><br>3.94 | <b>96.0</b><br>3.78  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.36</b><br>2.99 |
| <b>26.909</b><br>1.0594 | <b>20.638</b><br>0.8125 | <b>7.1</b><br>0.28    | <b>3.5</b><br>0.14         | <b>64.0</b><br>2.51               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>105.0</b><br>4.13 | <b>92.0</b><br>3.62  | <b>4.80</b><br>0.19 | <b>3.20</b><br>0.13 | <b>36.8</b>    | <b>13.2</b>    | <b>0.1085</b>  | <b>1.26</b><br>2.77 |
| <b>26.909</b><br>1.0594 | <b>20.638</b><br>0.8125 | <b>7.6</b><br>0.30    | <b>3.5</b><br>0.14         | <b>64.5</b><br>2.54               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>105.0</b><br>4.13 | <b>92.0</b><br>3.62  | <b>5.00</b><br>0.20 | <b>3.60</b><br>0.14 | <b>48.7</b>    | <b>15.4</b>    | <b>0.1198</b>  | <b>1.34</b><br>2.96 |
| <b>28.575</b><br>1.1250 | <b>20.638</b><br>0.8125 | <b>7.6</b><br>0.30    | <b>3.5</b><br>0.14         | <b>65.0</b><br>2.56               | <b>74.0</b><br>2.91      | <b>3.3</b><br>0.13                  | <b>105.0</b><br>4.13 | <b>91.0</b><br>3.58  | <b>4.60</b><br>0.18 | <b>2.00</b><br>0.08 | <b>46.9</b>    | <b>13.7</b>    | <b>0.1183</b>  | <b>1.34</b><br>2.96 |
| <b>29.317</b><br>1.1542 | <b>32.545</b><br>1.2813 | <b>-7.1</b><br>-0.28  | <b>0.8</b><br>0.03         | <b>59.0</b><br>2.32               | <b>60.0</b><br>2.36      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>93.0</b><br>3.66  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.63</b><br>3.60 |
| <b>29.317</b><br>1.1542 | <b>32.545</b><br>1.2813 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>59.0</b><br>2.32               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>93.0</b><br>3.66  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.63</b><br>3.59 |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>0.8</b><br>0.03         | <b>61.0</b><br>2.40               | <b>62.0</b><br>2.44      | <b>3.3</b><br>0.13                  | <b>107.0</b><br>4.21 | <b>101.0</b><br>3.98 | <b>1.60</b><br>0.06 | <b>2.60</b><br>0.10 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.51</b><br>3.33 |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>0.8</b><br>0.03         | <b>61.0</b><br>2.40               | <b>62.0</b><br>2.44      | <b>0.8</b><br>0.03                  | <b>107.0</b><br>4.21 | <b>103.0</b><br>4.06 | <b>1.60</b><br>0.06 | <b>2.60</b><br>0.10 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.52</b><br>3.34 |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>3.3</b><br>0.13                  | <b>107.0</b><br>4.21 | <b>101.0</b><br>3.98 | <b>1.60</b><br>0.06 | <b>2.60</b><br>0.10 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.50</b><br>3.32 |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>0.8</b><br>0.03                  | <b>107.0</b><br>4.21 | <b>103.0</b><br>4.06 | <b>1.60</b><br>0.06 | <b>2.60</b><br>0.10 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.51</b><br>3.32 |
| <b>26.909</b><br>1.0594 | <b>20.638</b><br>0.8125 | <b>7.1</b><br>0.28    | <b>3.5</b><br>0.14         | <b>64.0</b><br>2.51               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>92.0</b><br>3.62  | <b>4.80</b><br>0.19 | <b>3.20</b><br>0.13 | <b>36.8</b>    | <b>13.2</b>    | <b>0.1085</b>  | <b>1.30</b><br>2.87 |
| <b>44.450</b><br>1.7500 | <b>34.925</b><br>1.3750 | <b>-12.4</b><br>-0.49 | <b>3.5</b><br>0.14         | <b>60.0</b><br>2.36               | <b>72.0</b><br>2.83      | <b>3.3</b><br>0.13                  | <b>107.0</b><br>4.21 | <b>97.0</b><br>3.82  | <b>3.70</b><br>0.14 | <b>1.00</b><br>0.04 | <b>63.1</b>    | <b>13</b>      | <b>0.1053</b>  | <b>2.14</b><br>4.71 |
| <b>31.750</b><br>1.2500 | <b>23.812</b><br>0.9375 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>65.0</b><br>2.56               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>111.0</b><br>4.37 | <b>100.0</b><br>3.94 | <b>5.00</b><br>0.20 | <b>2.00</b><br>0.08 | <b>50.2</b>    | <b>16.4</b>    | <b>0.0751</b>  | <b>1.64</b><br>3.61 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

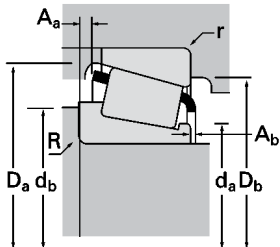
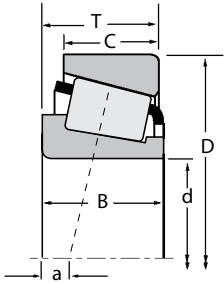
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# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |
| 50.800<br>2.0000        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800        | 619         | 612                    |  |        |  |
| 50.800<br>2.0000        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500        | 5565        | 5535                   |  |        |  |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800        | 72200C      | 72487                  |  |        |  |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800        | 72201C      | 72487                  |  |        |  |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700        | 555         | 552                    |  |        |  |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700        | 555         | 552A                   |  |        |  |
| 50.800<br>2.0000        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600        | HM813836    | HM813810               |  |        |  |
| 50.800<br>2.0000        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700        | 65200       | 65500                  |  |        |  |
| 50.800<br>2.0000        | 127.000<br>5.0000 | 50.800<br>2.0000 | 283000<br>63700        | 0.30 | 2.01 | 73500<br>16500         | 37500<br>8440    | 1.96 | 370000<br>83300        | 6279        | 6220                   |  |        |  |
| 50.815<br>2.0006        | 100.000<br>3.9370 | 35.000<br>1.3780 | 150000<br>33700        | 0.40 | 1.50 | 38900<br>8750          | 26600<br>5980    | 1.46 | 202000<br>45300        | XGA33211    | Y33211                 |  |        |  |
| 51.592<br>2.0312        | 88.900<br>3.5000  | 20.638<br>0.8125 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 368-S       | 362A                   |  |        |  |
| 51.592<br>2.0312        | 90.000<br>3.5433  | 20.000<br>0.7874 | 79500<br>17900         | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500         | 368-S       | 362                    |  |        |  |
| 52.000<br>2.0472        | 85.000<br>3.3465  | 19.050<br>0.7500 | 47800<br>10700         | 0.57 | 1.06 | 12400<br>2780          | 12000<br>2710    | 1.03 | 63900<br>14400         | 18204X      | 18335X                 |  |        |  |
| 52.000<br>2.0472        | 90.000<br>3.5433  | 21.750<br>0.8563 | 73600<br>16500         | 0.42 | 1.43 | 19100<br>4290          | 13700<br>3080    | 1.39 | 87400<br>19700         | XGA30210    | Y30210                 |  |        |  |
| 52.388<br>2.0625        | 89.980<br>3.5425  | 24.750<br>0.9744 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200        | 28584       | 28520                  |  |        |  |
| 52.388<br>2.0625        | 92.075<br>3.6250  | 24.608<br>0.9688 | 91600<br>20600         | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200        | 28584       | 28521                  |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 20.638<br>0.8125 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377         | 374                    |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 20.638<br>0.8125 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377A        | 374                    |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 26.988<br>1.0625 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377         | 3720                   |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 26.988<br>1.0625 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377         | 3730                   |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 26.988<br>1.0625 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377A        | 3720                   |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3767        | 3720                   |  |        |  |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3767        | 3730                   |  |        |  |
| 52.388<br>2.0625        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200        | 33890       | 33821                  |  |        |  |
| 52.388<br>2.0625        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200        | 33891       | 33821                  |  |        |  |
| 52.388<br>2.0625        | 96.838<br>3.8125  | 22.225<br>0.8750 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377         | 372A                   |  |        |  |
| 52.388<br>2.0625        | 98.425<br>3.8750  | 30.162<br>1.1875 | 113000<br>25400        | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300        | 3767        | 3732                   |  |        |  |
| 52.388<br>2.0625        | 100.000<br>3.9370 | 25.000<br>0.9842 | 81400<br>18300         | 0.34 | 1.77 | 21100<br>4750          | 12200<br>2750    | 1.73 | 101000<br>22700        | 377         | 372                    |  |        |  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 41.275  | 31.750 | -14.0            | 3.5                                            | 61.0                                       | 67.0                                       | 3.3                                          | 110.0          | 105.0          | 3.90           | 1.90           | 75.9           | 16.2           | 0.0694         | 2.27                |
| 1.6250  | 1.2500 | -0.55            | 0.14                                           | 2.40                                       | 2.64                                       | 0.13                                         | 4.33           | 4.13           | 0.15           | 0.07           |                |                |                | 5.00                |
| 43.764  | 36.512 | -12.2            | 1.3                                            | 65.0                                       | 67.0                                       | 3.3                                          | 116.0          | 106.0          | 2.50           | 1.20           | 110            | 24.2           | 0.0825         | 2.69                |
| 1.7230  | 1.4375 | -0.48            | 0.05                                           | 2.56                                       | 2.64                                       | 0.13                                         | 4.57           | 4.17           | 0.10           | 0.05           |                |                |                | 5.92                |
| 32.791  | 25.400 | 2.0              | 3.5                                            | 67.0                                       | 77.0                                       | 3.3                                          | 116.0          | 102.0          | 4.70           | 4.40           | 57.4           | 13.5           | 0.0825         | 2.11                |
| 1.2910  | 1.0000 | 0.08             | 0.14                                           | 2.64                                       | 3.03                                       | 0.13                                         | 4.57           | 4.02           | 0.19           | 0.17           |                |                |                | 4.66                |
| 32.791  | 25.400 | 2.0              | 0.8                                            | 67.0                                       | 77.0                                       | 3.3                                          | 116.0          | 102.0          | 4.70           | 4.40           | 57.4           | 13.5           | 0.0825         | 2.11                |
| 1.2910  | 1.0000 | 0.08             | 0.03                                           | 2.64                                       | 3.03                                       | 0.13                                         | 4.57           | 4.02           | 0.19           | 0.17           |                |                |                | 4.66                |
| 36.678  | 33.338 | -9.4             | 2.3                                            | 62.0                                       | 66.0                                       | 3.3                                          | 116.0          | 109.0          | 2.30           | 1.20           | 91             | 21.1           | 0.1108         | 2.36                |
| 1.4440  | 1.3125 | -0.37            | 0.09                                           | 2.44                                       | 2.60                                       | 0.13                                         | 4.57           | 4.29           | 0.09           | 0.05           |                |                |                | 5.20                |
| 36.678  | 30.162 | -9.4             | 2.3                                            | 62.0                                       | 66.0                                       | 3.3                                          | 116.0          | 109.0          | 2.30           | 1.20           | 91             | 21.1           | 0.1108         | 2.31                |
| 1.4440  | 1.1875 | -0.37            | 0.09                                           | 2.44                                       | 2.60                                       | 0.13                                         | 4.57           | 4.29           | 0.09           | 0.05           |                |                |                | 5.09                |
| 36.512  | 26.988 | -3.8             | 3.5                                            | 69.0                                       | 75.0                                       | 3.3                                          | 121.0          | 111.0          | 4.00           | 1.30           | 91.7           | 24.3           | 0.1252         | 2.42                |
| 1.4375  | 1.0625 | -0.15            | 0.14                                           | 2.72                                       | 2.95                                       | 0.13                                         | 4.76           | 4.37           | 0.16           | 0.05           |                |                |                | 5.33                |
| 44.450  | 34.925 | -9.4             | 3.5                                            | 69.0                                       | 75.0                                       | 3.3                                          | 119.0          | 107.0          | 4.10           | 1.00           | 83.2           | 17.2           | 0.0827         | 2.88                |
| 1.7500  | 1.3750 | -0.37            | 0.14                                           | 2.72                                       | 2.95                                       | 0.13                                         | 4.69           | 4.21           | 0.16           | 0.04           |                |                |                | 6.34                |
| 52.388  | 41.275 | -19.6            | 3.5                                            | 65.0                                       | 71.0                                       | 3.3                                          | 117.0          | 108.0          | 2.40           | 2.60           | 103            | 18.7           | 0.0757         | 3.35                |
| 2.0625  | 1.6250 | -0.77            | 0.14                                           | 2.56                                       | 2.80                                       | 0.13                                         | 4.61           | 4.25           | 0.09           | 0.10           |                |                |                | 7.39                |
| 35.000  | 27.000 | -9.7             | 2.0                                            | 62.0                                       | 67.0                                       | 1.5                                          | 96.0           | 89.0           | 2.90           | 2.80           | 59.3           | 15.3           | 0.1010         | 1.25                |
| 1.3780  | 1.0630 | -0.38            | 0.08                                           | 2.44                                       | 2.64                                       | 0.06                                         | 3.78           | 3.50           | 0.11           | 0.11           |                |                |                | 2.76                |
| 22.225  | 16.513 | -4.3             | 2.0                                            | 56.0                                       | 59.0                                       | 1.3                                          | 84.0           | 81.0           | 0.50           | 1.00           | 33.8           | 14             | 0.0773         | 0.50                |
| 0.8750  | 0.6501 | -0.17            | 0.08                                           | 2.20                                       | 2.32                                       | 0.05                                         | 3.31           | 3.19           | 0.02           | 0.04           |                |                |                | 1.10                |
| 22.225  | 15.875 | -4.3             | 2.0                                            | 56.0                                       | 59.0                                       | 2.0                                          | 84.0           | 81.0           | 0.50           | 1.00           | 33.8           | 14             | 0.0773         | 0.51                |
| 0.8750  | 0.6250 | -0.17            | 0.08                                           | 2.20                                       | 2.32                                       | 0.08                                         | 3.31           | 3.19           | 0.02           | 0.04           |                |                |                | 1.11                |
| 18.263  | 12.500 | 2.0              | 2.0                                            | 57.0                                       | 60.0                                       | 1.5                                          | 81.0           | 76.0           | 2.50           | 1.60           | 26.1           | 20.3           | 0.0852         | 0.37                |
| 0.7190  | 0.4921 | 0.08             | 0.08                                           | 2.24                                       | 2.36                                       | 0.06                                         | 3.19           | 2.99           | 0.10           | 0.06           |                |                |                | 0.82                |
| 20.000  | 17.000 | -2.0             | 4.0                                            | 59.0                                       | 66.0                                       | 1.5                                          | 85.0           | 81.0           | 1.40           | 3.10           | 30.3           | 15.9           | 0.0814         | 0.51                |
| 0.7874  | 0.6693 | -0.08            | 0.16                                           | 2.32                                       | 2.60                                       | 0.06                                         | 3.35           | 3.19           | 0.05           | 0.12           |                |                |                | 1.13                |
| 25.400  | 19.987 | -4.8             | 3.5                                            | 58.0                                       | 65.0                                       | 2.3                                          | 86.0           | 81.0           | 1.40           | 1.00           | 46.4           | 22.6           | 0.0912         | 0.62                |
| 1.0000  | 0.7869 | -0.19            | 0.14                                           | 2.28                                       | 2.56                                       | 0.09                                         | 3.39           | 3.19           | 0.06           | 0.04           |                |                |                | 1.37                |
| 25.400  | 19.845 | -4.8             | 3.5                                            | 58.0                                       | 65.0                                       | 0.8                                          | 87.0           | 83.0           | 1.40           | 1.00           | 46.4           | 22.6           | 0.0912         | 0.67                |
| 1.0000  | 0.7813 | -0.19            | 0.14                                           | 2.28                                       | 2.56                                       | 0.03                                         | 3.43           | 3.27           | 0.06           | 0.04           |                |                |                | 1.48                |
| 22.225  | 15.083 | -3.8             | 2.3                                            | 58.0                                       | 62.0                                       | 1.3                                          | 88.0           | 85.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.57                |
| 0.8750  | 0.5938 | -0.15            | 0.09                                           | 2.28                                       | 2.44                                       | 0.05                                         | 3.46           | 3.35           | 0.03           | 0.06           |                |                |                | 1.26                |
| 22.225  | 15.083 | -3.8             | 4.8                                            | 58.0                                       | 67.0                                       | 1.3                                          | 88.0           | 85.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.56                |
| 0.8750  | 0.5938 | -0.15            | 0.19                                           | 2.28                                       | 2.64                                       | 0.05                                         | 3.46           | 3.35           | 0.03           | 0.06           |                |                |                | 1.23                |
| 22.225  | 23.812 | -3.8             | 2.3                                            | 58.0                                       | 62.0                                       | 3.3                                          | 88.0           | 82.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.68                |
| 0.8750  | 0.9375 | -0.15            | 0.09                                           | 2.28                                       | 2.44                                       | 0.13                                         | 3.46           | 3.23           | 0.03           | 0.06           |                |                |                | 1.50                |
| 22.225  | 23.812 | -3.8             | 2.3                                            | 58.0                                       | 62.0                                       | 0.8                                          | 88.0           | 84.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.69                |
| 0.8750  | 0.9375 | -0.15            | 0.09                                           | 2.28                                       | 2.44                                       | 0.03                                         | 3.46           | 3.31           | 0.03           | 0.06           |                |                |                | 1.53                |
| 22.225  | 23.812 | -3.8             | 4.8                                            | 58.0                                       | 67.0                                       | 3.3                                          | 88.0           | 82.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.67                |
| 0.8750  | 0.9375 | -0.15            | 0.19                                           | 2.28                                       | 2.64                                       | 0.13                                         | 3.46           | 3.23           | 0.03           | 0.06           |                |                |                | 1.48                |
| 30.302  | 23.812 | -8.1             | 2.3                                            | 59.0                                       | 63.0                                       | 3.3                                          | 88.0           | 82.0           | 1.80           | 0.90           | 49.9           | 14.5           | 0.0903         | 0.82                |
| 1.1930  | 0.9375 | -0.32            | 0.09                                           | 2.32                                       | 2.48                                       | 0.13                                         | 3.46           | 3.23           | 0.07           | 0.04           |                |                |                | 1.80                |
| 30.302  | 23.812 | -8.1             | 2.3                                            | 59.0                                       | 63.0                                       | 0.8                                          | 88.0           | 84.0           | 1.80           | 0.90           | 49.9           | 14.5           | 0.0903         | 0.83                |
| 1.1930  | 0.9375 | -0.32            | 0.09                                           | 2.32                                       | 2.48                                       | 0.03                                         | 3.46           | 3.31           | 0.07           | 0.04           |                |                |                | 1.82                |
| 28.575  | 22.225 | -7.6             | 1.5                                            | 59.0                                       | 61.0                                       | 2.3                                          | 90.0           | 85.0           | 1.30           | 2.20           | 52.5           | 18.5           | 0.0910         | 0.82                |
| 1.1250  | 0.8750 | -0.30            | 0.06                                           | 2.32                                       | 2.40                                       | 0.09                                         | 3.54           | 3.35           | 0.05           | 0.09           |                |                |                | 1.82                |
| 28.575  | 22.225 | -7.6             | 3.5                                            | 59.0                                       | 66.0                                       | 2.3                                          | 90.0           | 85.0           | 1.30           | 2.20           | 52.5           | 18.5           | 0.0910         | 0.82                |
| 1.1250  | 0.8750 | -0.30            | 0.14                                           | 2.32                                       | 2.60                                       | 0.09                                         | 3.54           | 3.35           | 0.05           | 0.09           |                |                |                | 1.80                |
| 22.225  | 19.050 | -3.8             | 2.3                                            | 58.0                                       | 62.0                                       | 1.5                                          | 90.0           | 86.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.69                |
| 0.8750  | 0.7500 | -0.15            | 0.09                                           | 2.28                                       | 2.44                                       | 0.06                                         | 3.54           | 3.39           | 0.03           | 0.06           |                |                |                | 1.52                |
| 30.302  | 23.812 | -8.1             | 2.3                                            | 59.0                                       | 63.0                                       | 3.3                                          | 90.0           | 84.0           | 1.80           | 0.90           | 49.9           | 14.5           | 0.0903         | 0.96                |
| 1.1930  | 0.9375 | -0.32            | 0.09                                           | 2.32                                       | 2.48                                       | 0.13                                         | 3.54           | 3.31           | 0.07           | 0.04           |                |                |                | 2.12                |
| 22.225  | 21.824 | -3.8             | 2.3                                            | 58.0                                       | 62.0                                       | 2.0                                          | 90.0           | 86.0           | 0.80           | 1.40           | 37.6           | 15.4           | 0.0816         | 0.83                |
| 0.8750  | 0.8592 | -0.15            | 0.09                                           | 2.28                                       | 2.44                                       | 0.08                                         | 3.54           | 3.39           | 0.03           | 0.06           |                |                |                | 1.83                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

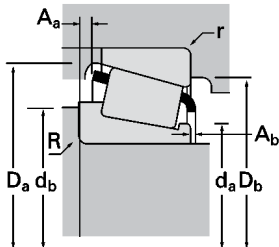
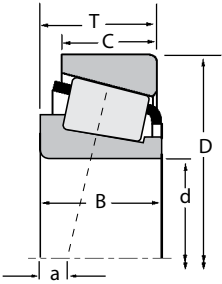




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 52.388<br>2.0625        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 468         | 453X                   |  |                |       |       |
| 52.388<br>2.0625        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 468         | 453A                   |  |                |       |       |
| 52.388<br>2.0625        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 468         | 453AS                  |  |                |       |       |
| 52.388<br>2.0625        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 540         | 532X                   |  |                |       |       |
| 52.388<br>2.0625        | 110.000<br>4.3307 | 34.130<br>1.3437 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 540         | 534                    |  |                |       |       |
| 52.388<br>2.0625        | 111.125<br>4.3750 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700        | 55206       | 55437                  |  |                |       |       |
| 52.388<br>2.0625        | 111.125<br>4.3750 | 30.162<br>1.1875 | 118000<br>26500        | 0.88 | 0.68 | 30600<br>6880          | 46300<br>10400   | 0.66 | 161000<br>36200        | 55206C      | 55437                  |  |                |       |       |
| 52.388<br>2.0625        | 111.125<br>4.3750 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 540         | 532A                   |  |                |       |       |
| 52.388<br>2.0625        | 112.712<br>4.4375 | 30.162<br>1.1875 | 98500<br>22100         | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700        | 55206       | 55443                  |  |                |       |       |
| 53.975<br>2.1250        | 87.312<br>3.4375  | 18.258<br>0.7188 | 58100<br>13100         | 0.39 | 1.54 | 15100<br>3380          | 10000<br>2250    | 1.50 | 95600<br>21500         | L507945     | L507910                |  |                |       |       |
| 53.975<br>2.1250        | 88.900<br>3.5000  | 19.050<br>0.7500 | 60600<br>13600         | 0.55 | 1.10 | 15700<br>3530          | 14700<br>3300    | 1.07 | 81800<br>18400         | LM806649    | LM806610               |  |                |       |       |
| 53.975<br>2.1250        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200        | 33895       | 33821                  |  |                |       |       |
| 53.975<br>2.1250        | 95.250<br>3.7500  | 27.783<br>1.0938 | 120000<br>27000        | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200        | 33895       | 33822                  |  |                |       |       |
| 53.975<br>2.1250        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 389A        | 382A                   |  |                |       |       |
| 53.975<br>2.1250        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 389A        | 382                    |  |                |       |       |
| 53.975<br>2.1250        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 389A        | 383A                   |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600        | 45287       | 45220                  |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600        | 45287       | 45221                  |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 456         | 453X                   |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200        | HM807049A   | HM807011               |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200        | HM807049    | HM807010               |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200        | HM807049    | HM807011               |  |                |       |       |
| 53.975<br>2.1250        | 104.775<br>4.1250 | 39.688<br>1.5625 | 167000<br>37500        | 0.34 | 1.79 | 43300<br>9730          | 24900<br>5590    | 1.74 | 237000<br>53200        | 4595        | 4535                   |  |                |       |       |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 456         | 453A                   |  |                |       |       |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 456         | 453AS                  |  |                |       |       |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 456         | 453                    |  |                |       |       |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 32.558<br>1.2818 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 456         | 452A                   |  |                |       |       |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 539         | 532X                   |  |                |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing |        |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B       | C      | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.317  | 24.605 | -7.1             | 1.5                        | 60.0                              | 62.0                     | 3.3                                 | 98.0           | 92.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.13                |
| 1.1542  | 0.9687 | -0.28            | 0.06                       | 2.36                              | 2.44                     | 0.13                                | 3.86           | 3.62           | 0.09           | 0.05           |                |                |                | 2.49                |
| 29.317  | 22.225 | -7.1             | 1.5                        | 60.0                              | 62.0                     | 0.8                                 | 100.0          | 97.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.19                |
| 1.1542  | 0.8750 | -0.28            | 0.06                       | 2.36                              | 2.44                     | 0.03                                | 3.94           | 3.82           | 0.09           | 0.05           |                |                |                | 2.61                |
| 29.317  | 22.225 | -7.1             | 1.5                        | 60.0                              | 62.0                     | 2.3                                 | 100.0          | 95.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.18                |
| 1.1542  | 0.8750 | -0.28            | 0.06                       | 2.36                              | 2.44                     | 0.09                                | 3.94           | 3.74           | 0.09           | 0.05           |                |                |                | 2.61                |
| 36.957  | 28.575 | -12.2            | 3.5                        | 60.0                              | 67.0                     | 3.3                                 | 100.0          | 94.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.48                |
| 1.4550  | 1.1250 | -0.48            | 0.14                       | 2.36                              | 2.64                     | 0.13                                | 3.94           | 3.70           | 0.11           | 0.04           |                |                |                | 3.27                |
| 36.957  | 26.988 | -12.2            | 3.5                        | 60.0                              | 67.0                     | 3.3                                 | 100.0          | 94.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.51                |
| 1.4550  | 1.0625 | -0.48            | 0.14                       | 2.36                              | 2.64                     | 0.13                                | 3.94           | 3.70           | 0.11           | 0.04           |                |                |                | 3.33                |
| 26.909  | 20.638 | 7.1              | 3.5                        | 64.0                              | 72.0                     | 3.3                                 | 105.0          | 92.0           | 4.80           | 3.20           | 36.8           | 13.2           | 0.1085         | 1.23                |
| 1.0594  | 0.8125 | 0.28             | 0.14                       | 2.51                              | 2.83                     | 0.13                                | 4.13           | 3.62           | 0.19           | 0.13           |                |                |                | 2.71                |
| 26.909  | 20.638 | 7.6              | 3.5                        | 64.5                              | 72.0                     | 3.3                                 | 105.0          | 92.0           | 5.00           | 3.60           | 48.7           | 15.4           | 0.1198         | 1.32                |
| 1.0594  | 0.8125 | 0.30             | 0.14                       | 2.54                              | 2.83                     | 0.13                                | 4.13           | 3.62           | 0.20           | 0.14           |                |                |                | 2.90                |
| 36.957  | 30.162 | -12.2            | 3.5                        | 60.0                              | 67.0                     | 3.3                                 | 100.0          | 95.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.65                |
| 1.4550  | 1.1875 | -0.48            | 0.14                       | 2.36                              | 2.64                     | 0.13                                | 3.94           | 3.74           | 0.11           | 0.04           |                |                |                | 3.65                |
| 26.909  | 20.638 | 7.1              | 3.5                        | 64.0                              | 72.0                     | 3.3                                 | 106.0          | 92.0           | 4.80           | 3.20           | 36.8           | 13.2           | 0.1085         | 1.27                |
| 1.0594  | 0.8125 | 0.28             | 0.14                       | 2.51                              | 2.83                     | 0.13                                | 4.17           | 3.62           | 0.19           | 0.13           |                |                |                | 2.81                |
| 18.258  | 14.288 | -0.8             | 1.5                        | 60.0                              | 62.0                     | 1.5                                 | 83.0           | 79.0           | 0.30           | 2.00           | 46.1           | 36.9           | 0.0914         | 0.43                |
| 0.7188  | 0.5625 | -0.03            | 0.06                       | 2.36                              | 2.44                     | 0.06                                | 3.27           | 3.11           | 0.01           | 0.08           |                |                |                | 0.94                |
| 19.050  | 13.492 | 2.3              | 2.3                        | 61.0                              | 65.0                     | 2.0                                 | 85.0           | 80.0           | 1.50           | 1.60           | 31.8           | 22.1           | 0.0900         | 0.42                |
| 0.7500  | 0.5312 | 0.09             | 0.09                       | 2.40                              | 2.56                     | 0.08                                | 3.35           | 3.15           | 0.06           | 0.06           |                |                |                | 0.94                |
| 28.575  | 22.225 | -7.6             | 1.5                        | 60.0                              | 63.0                     | 2.3                                 | 90.0           | 85.0           | 1.30           | 2.20           | 52.5           | 18.5           | 0.0910         | 0.80                |
| 1.1250  | 0.8750 | -0.30            | 0.06                       | 2.36                              | 2.48                     | 0.09                                | 3.54           | 3.35           | 0.05           | 0.09           |                |                |                | 1.75                |
| 28.575  | 22.225 | -7.6             | 1.5                        | 60.0                              | 63.0                     | 0.8                                 | 90.0           | 86.0           | 1.30           | 2.20           | 52.5           | 18.5           | 0.0910         | 0.80                |
| 1.1250  | 0.8750 | -0.30            | 0.06                       | 2.36                              | 2.48                     | 0.03                                | 3.54           | 3.39           | 0.05           | 0.09           |                |                |                | 1.77                |
| 21.946  | 15.875 | -3.0             | 0.8                        | 60.0                              | 61.0                     | 0.8                                 | 92.0           | 89.0           | 1.10           | 2.00           | 42             | 15.7           | 0.0859         | 0.64                |
| 0.8640  | 0.6250 | -0.12            | 0.03                       | 2.36                              | 2.40                     | 0.03                                | 3.62           | 3.50           | 0.04           | 0.08           |                |                |                | 1.41                |
| 21.946  | 17.826 | -3.0             | 0.8                        | 60.0                              | 61.0                     | 0.8                                 | 92.0           | 90.0           | 1.10           | 2.00           | 42             | 15.7           | 0.0859         | 0.69                |
| 0.8640  | 0.7018 | -0.12            | 0.03                       | 2.36                              | 2.40                     | 0.03                                | 3.62           | 3.54           | 0.04           | 0.08           |                |                |                | 1.51                |
| 21.946  | 17.826 | -3.0             | 0.8                        | 60.0                              | 61.0                     | 2.0                                 | 93.0           | 89.0           | 1.10           | 2.00           | 42             | 15.7           | 0.0859         | 0.72                |
| 0.8640  | 0.7018 | -0.12            | 0.03                       | 2.36                              | 2.40                     | 0.08                                | 3.66           | 3.50           | 0.04           | 0.08           |                |                |                | 1.58                |
| 30.958  | 23.812 | -8.1             | 0.8                        | 62.0                              | 62.0                     | 3.3                                 | 99.0           | 93.0           | 2.10           | 1.80           | 63.5           | 16.9           | 0.0971         | 1.15                |
| 1.2188  | 0.9375 | -0.32            | 0.03                       | 2.44                              | 2.44                     | 0.13                                | 3.90           | 3.66           | 0.08           | 0.07           |                |                |                | 2.54                |
| 30.958  | 23.812 | -8.1             | 0.8                        | 62.0                              | 62.0                     | 0.8                                 | 99.0           | 95.0           | 2.10           | 1.80           | 63.5           | 16.9           | 0.0971         | 1.15                |
| 1.2188  | 0.9375 | -0.32            | 0.03                       | 2.44                              | 2.44                     | 0.03                                | 3.90           | 3.74           | 0.08           | 0.07           |                |                |                | 2.54                |
| 29.317  | 24.605 | -7.1             | 3.5                        | 61.0                              | 68.0                     | 3.3                                 | 98.0           | 92.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.11                |
| 1.1542  | 0.9687 | -0.28            | 0.14                       | 2.40                              | 2.68                     | 0.13                                | 3.86           | 3.62           | 0.09           | 0.05           |                |                |                | 2.44                |
| 36.512  | 28.575 | -7.4             | 1.5                        | 63.0                              | 69.0                     | 0.8                                 | 100.0          | 91.0           | 3.40           | 1.90           | 63.9           | 17.1           | 0.0760         | 1.39                |
| 1.4375  | 1.1250 | -0.29            | 0.06                       | 2.48                              | 2.72                     | 0.03                                | 3.94           | 3.58           | 0.14           | 0.08           |                |                |                | 3.07                |
| 36.512  | 28.575 | -7.4             | 3.5                        | 63.0                              | 73.0                     | 3.3                                 | 100.0          | 89.0           | 3.40           | 1.90           | 63.9           | 17.1           | 0.0760         | 1.40                |
| 1.4375  | 1.1250 | -0.29            | 0.14                       | 2.48                              | 2.87                     | 0.13                                | 3.94           | 3.50           | 0.14           | 0.08           |                |                |                | 3.08                |
| 36.512  | 28.575 | -7.4             | 3.5                        | 63.0                              | 73.0                     | 0.8                                 | 100.0          | 91.0           | 3.40           | 1.90           | 63.9           | 17.1           | 0.0760         | 1.40                |
| 1.4375  | 1.1250 | -0.29            | 0.14                       | 2.48                              | 2.87                     | 0.03                                | 3.94           | 3.58           | 0.14           | 0.08           |                |                |                | 3.08                |
| 40.157  | 33.338 | -12.4            | 3.5                        | 63.0                              | 70.0                     | 3.3                                 | 99.0           | 90.0           | 1.70           | 1.30           | 73.6           | 18.5           | 0.1027         | 1.54                |
| 1.5810  | 1.3125 | -0.49            | 0.14                       | 2.48                              | 2.76                     | 0.13                                | 3.90           | 3.54           | 0.07           | 0.05           |                |                |                | 3.39                |
| 29.317  | 22.225 | -7.1             | 3.5                        | 61.0                              | 68.0                     | 0.8                                 | 100.0          | 97.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.16                |
| 1.1542  | 0.8750 | -0.28            | 0.14                       | 2.40                              | 2.68                     | 0.03                                | 3.94           | 3.82           | 0.09           | 0.05           |                |                |                | 2.56                |
| 29.317  | 22.225 | -7.1             | 3.5                        | 61.0                              | 68.0                     | 2.3                                 | 100.0          | 95.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.16                |
| 1.1542  | 0.8750 | -0.28            | 0.14                       | 2.40                              | 2.68                     | 0.09                                | 3.94           | 3.74           | 0.09           | 0.05           |                |                |                | 2.56                |
| 29.317  | 27.000 | -7.1             | 3.5                        | 61.0                              | 68.0                     | 0.8                                 | 100.0          | 97.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.22                |
| 1.1542  | 1.0630 | -0.28            | 0.14                       | 2.40                              | 2.68                     | 0.03                                | 3.94           | 3.82           | 0.09           | 0.05           |                |                |                | 2.69                |
| 29.317  | 27.000 | -7.1             | 3.5                        | 61.0                              | 68.0                     | 3.3                                 | 100.0          | 93.0           | 2.20           | 1.40           | 58.6           | 17.1           | 0.0946         | 1.27                |
| 1.1542  | 1.0630 | -0.28            | 0.14                       | 2.40                              | 2.68                     | 0.13                                | 3.94           | 3.66           | 0.09           | 0.05           |                |                |                | 2.80                |
| 36.957  | 28.575 | -12.2            | 3.5                        | 61.0                              | 68.0                     | 3.3                                 | 100.0          | 94.0           | 2.80           | 0.90           | 64.3           | 16.1           | 0.0938         | 1.45                |
| 1.4550  | 1.1250 | -0.48            | 0.14                       | 2.40                              | 2.68                     | 0.13                                | 3.94           | 3.70           | 0.11           | 0.04           |                |                |                | 3.19                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

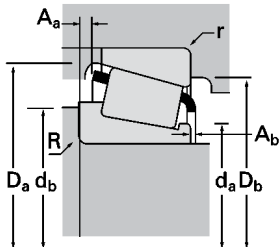
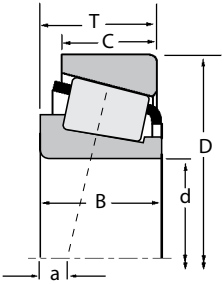
Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 36.512<br>1.4375 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 539A        | 532X     |
| 53.975<br>2.1250        | 110.000<br>4.3307 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 456         | 454      |
| 53.975<br>2.1250        | 110.000<br>4.3307 | 34.130<br>1.3437 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 539         | 534      |
| 53.975<br>2.1250        | 111.125<br>4.3750 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 539A        | 532A     |
| 53.975<br>2.1250        | 111.125<br>4.3750 | 38.895<br>1.5313 | 167000<br>37500        | 0.34 | 1.79 | 43300<br>9730          | 24900<br>5590    | 1.74 | 237000<br>53200 | 4595        | 4536     |
| 53.975<br>2.1250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39578       | 39520    |
| 53.975<br>2.1250        | 117.475<br>4.6250 | 33.338<br>1.3125 | 138000<br>31000        | 0.63 | 0.96 | 35800<br>8040          | 38300<br>8620    | 0.93 | 166000<br>37300 | 66212       | 66461    |
| 53.975<br>2.1250        | 117.475<br>4.6250 | 33.338<br>1.3125 | 138000<br>31000        | 0.63 | 0.96 | 35800<br>8040          | 38300<br>8620    | 0.93 | 166000<br>37300 | 66212       | 66462    |
| 53.975<br>2.1250        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 621         | 612      |
| 53.975<br>2.1250        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 624         | 612      |
| 53.975<br>2.1250        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 621         | 612-S    |
| 53.975<br>2.1250        | 122.238<br>4.8125 | 33.338<br>1.3125 | 143000<br>32200        | 0.67 | 0.90 | 37100<br>8340          | 42300<br>9500    | 0.88 | 178000<br>39900 | 66584       | 66520    |
| 53.975<br>2.1250        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5577        | 5535     |
| 53.975<br>2.1250        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5578        | 5535     |
| 53.975<br>2.1250        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72212C      | 72487    |
| 53.975<br>2.1250        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72213C      | 72487    |
| 53.975<br>2.1250        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 557-S       | 552A     |
| 53.975<br>2.1250        | 127.000<br>5.0000 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72213C      | 72500    |
| 53.975<br>2.1250        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700 | 65212       | 65500    |
| 53.975<br>2.1250        | 127.000<br>5.0000 | 50.800<br>2.0000 | 283000<br>63700        | 0.30 | 2.01 | 73500<br>16500         | 37500<br>8440    | 1.96 | 370000<br>83300 | 6280        | 6220     |
| 53.975<br>2.1250        | 130.175<br>5.1250 | 34.100<br>1.3425 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100 | HM911243    | HM911210 |
| 53.975<br>2.1250        | 130.175<br>5.1250 | 36.512<br>1.4375 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100 | HM911242    | HM911210 |
| 53.975<br>2.1250        | 134.983<br>5.3143 | 33.449<br>1.3169 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100 | HM911243    | HM911216 |
| 53.975<br>2.1250        | 136.525<br>5.3750 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600 | 78215C      | 78537    |
| 53.975<br>2.1250        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 636         | 632      |
| 53.975<br>2.1250        | 140.030<br>5.5130 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600 | 78214C      | 78551    |
| 53.975<br>2.1250        | 140.030<br>5.5130 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600 | 78215C      | 78551    |
| 54.487<br>2.1452        | 104.775<br>4.1250 | 36.512<br>1.4375 | 159000<br>35700        | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807048    | HM807010 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      | Cage                 |                     |                     |                |                |                |                     |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| <b>36.957</b><br>1.4550 | <b>28.575</b><br>1.1250 | <b>-12.2</b><br>-0.48 | <b>5.5</b><br>0.22         | <b>61.0</b><br>2.40               | <b>72.0</b><br>2.83      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>94.0</b><br>3.70  | <b>2.80</b><br>0.11 | <b>0.90</b><br>0.04 | <b>64.3</b>    | <b>16.1</b>    | <b>0.0938</b>  | <b>1.43</b><br>3.16 |
| <b>29.317</b><br>1.1542 | <b>27.000</b><br>1.0630 | <b>-7.1</b><br>-0.28  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>2.0</b><br>0.08                  | <b>100.0</b><br>3.94 | <b>96.0</b><br>3.78  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.29</b><br>2.84 |
| <b>36.957</b><br>1.4550 | <b>26.988</b><br>1.0625 | <b>-12.2</b><br>-0.48 | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>68.0</b><br>2.68      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>94.0</b><br>3.70  | <b>2.80</b><br>0.11 | <b>0.90</b><br>0.04 | <b>64.3</b>    | <b>16.1</b>    | <b>0.0938</b>  | <b>1.47</b><br>3.24 |
| <b>36.957</b><br>1.4550 | <b>30.162</b><br>1.1875 | <b>-12.2</b><br>-0.48 | <b>5.5</b><br>0.22         | <b>61.0</b><br>2.40               | <b>72.0</b><br>2.83      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>95.0</b><br>3.74  | <b>2.80</b><br>0.11 | <b>0.90</b><br>0.04 | <b>64.3</b>    | <b>16.1</b>    | <b>0.0938</b>  | <b>1.60</b><br>3.53 |
| <b>40.157</b><br>1.5810 | <b>32.545</b><br>1.2813 | <b>-12.4</b><br>-0.49 | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>93.0</b><br>3.66  | <b>1.70</b><br>0.07 | <b>1.30</b><br>0.05 | <b>73.6</b>    | <b>18.5</b>    | <b>0.1027</b>  | <b>1.79</b><br>3.95 |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>3.5</b><br>0.14         | <b>64.0</b><br>2.52               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>107.0</b><br>4.21 | <b>101.0</b><br>3.98 | <b>1.60</b><br>0.06 | <b>2.60</b><br>0.10 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.44</b><br>3.18 |
| <b>31.750</b><br>1.2500 | <b>23.812</b><br>0.9375 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>0.8</b><br>0.03                  | <b>111.0</b><br>4.37 | <b>102.0</b><br>4.02 | <b>5.00</b><br>0.20 | <b>2.00</b><br>0.08 | <b>50.2</b>    | <b>16.4</b>    | <b>0.0751</b>  | <b>1.59</b><br>3.50 |
| <b>31.750</b><br>1.2500 | <b>23.812</b><br>0.9375 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>111.0</b><br>4.37 | <b>100.0</b><br>3.94 | <b>5.00</b><br>0.20 | <b>2.00</b><br>0.08 | <b>50.2</b>    | <b>16.4</b>    | <b>0.0751</b>  | <b>1.57</b><br>3.46 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-14.0</b><br>-0.55 | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>110.0</b><br>4.33 | <b>105.0</b><br>4.13 | <b>3.90</b><br>0.15 | <b>1.90</b><br>0.07 | <b>75.9</b>    | <b>16.2</b>    | <b>0.0694</b>  | <b>2.18</b><br>4.82 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-14.0</b><br>-0.55 | <b>0.8</b><br>0.03         | <b>63.0</b><br>2.48               | <b>64.0</b><br>2.52      | <b>3.3</b><br>0.13                  | <b>110.0</b><br>4.33 | <b>105.0</b><br>4.13 | <b>3.90</b><br>0.15 | <b>1.90</b><br>0.07 | <b>75.9</b>    | <b>16.2</b>    | <b>0.0694</b>  | <b>2.19</b><br>4.84 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-14.0</b><br>-0.55 | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>70.0</b><br>2.76      | <b>0.8</b><br>0.03                  | <b>110.0</b><br>4.33 | <b>107.0</b><br>4.21 | <b>3.90</b><br>0.15 | <b>1.90</b><br>0.07 | <b>75.9</b>    | <b>16.2</b>    | <b>0.0694</b>  | <b>2.20</b><br>4.85 |
| <b>31.750</b><br>1.2500 | <b>23.812</b><br>0.9375 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>68.0</b><br>2.68               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>105.0</b><br>4.13 | <b>5.20</b><br>0.21 | <b>2.00</b><br>0.08 | <b>57</b>      | <b>18.3</b>    | <b>0.0797</b>  | <b>1.76</b><br>3.89 |
| <b>43.764</b><br>1.7230 | <b>36.512</b><br>1.4375 | <b>-12.2</b><br>-0.48 | <b>1.3</b><br>0.05         | <b>67.0</b><br>2.64               | <b>69.0</b><br>2.72      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>106.0</b><br>4.17 | <b>2.50</b><br>0.10 | <b>1.20</b><br>0.05 | <b>110</b>     | <b>24.2</b>    | <b>0.0825</b>  | <b>2.60</b><br>5.72 |
| <b>43.764</b><br>1.7230 | <b>36.512</b><br>1.4375 | <b>-12.2</b><br>-0.48 | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>106.0</b><br>4.17 | <b>2.50</b><br>0.10 | <b>1.20</b><br>0.05 | <b>110</b>     | <b>24.2</b>    | <b>0.0825</b>  | <b>2.59</b><br>5.71 |
| <b>32.791</b><br>1.2910 | <b>25.400</b><br>1.0000 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>79.0</b><br>3.11      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>102.0</b><br>4.02 | <b>4.70</b><br>0.19 | <b>4.40</b><br>0.17 | <b>57.4</b>    | <b>13.5</b>    | <b>0.0825</b>  | <b>2.05</b><br>4.51 |
| <b>32.791</b><br>1.2910 | <b>25.400</b><br>1.0000 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>79.0</b><br>3.11      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>102.0</b><br>4.02 | <b>4.70</b><br>0.19 | <b>4.40</b><br>0.17 | <b>57.4</b>    | <b>13.5</b>    | <b>0.0825</b>  | <b>2.05</b><br>4.51 |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>65.0</b><br>2.56               | <b>71.0</b><br>2.80      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>109.0</b><br>4.29 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>2.23</b><br>4.92 |
| <b>32.791</b><br>1.2910 | <b>25.400</b><br>1.0000 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>79.0</b><br>3.11      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>103.0</b><br>4.06 | <b>4.70</b><br>0.19 | <b>4.40</b><br>0.17 | <b>57.4</b>    | <b>13.5</b>    | <b>0.0825</b>  | <b>2.17</b><br>4.79 |
| <b>44.450</b><br>1.7500 | <b>34.925</b><br>1.3750 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>71.0</b><br>2.80               | <b>77.0</b><br>3.03      | <b>3.3</b><br>0.13                  | <b>119.0</b><br>4.69 | <b>107.0</b><br>4.21 | <b>4.10</b><br>0.16 | <b>1.00</b><br>0.04 | <b>83.2</b>    | <b>17.2</b>    | <b>0.0827</b>  | <b>2.79</b><br>6.14 |
| <b>52.388</b><br>2.0625 | <b>41.275</b><br>1.6250 | <b>-19.6</b><br>-0.77 | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>74.0</b><br>2.91      | <b>3.3</b><br>0.13                  | <b>117.0</b><br>4.61 | <b>108.0</b><br>4.25 | <b>2.40</b><br>0.09 | <b>2.60</b><br>0.10 | <b>103</b>     | <b>18.7</b>    | <b>0.0757</b>  | <b>3.25</b><br>7.16 |
| <b>30.924</b><br>1.2175 | <b>23.812</b><br>0.9375 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>74.0</b><br>2.91               | <b>79.0</b><br>3.11      | <b>3.3</b><br>0.13                  | <b>123.5</b><br>4.87 | <b>109.0</b><br>4.29 | <b>5.00</b><br>0.20 | <b>4.20</b><br>0.17 | <b>56.4</b>    | <b>16.5</b>    | <b>0.0842</b>  | <b>2.13</b><br>4.69 |
| <b>33.338</b><br>1.3125 | <b>23.812</b><br>0.9375 | <b>5.3</b><br>0.21    | <b>3.5</b><br>0.14         | <b>74.0</b><br>2.91               | <b>79.0</b><br>3.11      | <b>3.3</b><br>0.13                  | <b>123.5</b><br>4.87 | <b>109.0</b><br>4.29 | <b>7.40</b><br>0.29 | <b>4.20</b><br>0.17 | <b>56.4</b>    | <b>16.5</b>    | <b>0.0842</b>  | <b>2.22</b><br>4.90 |
| <b>30.924</b><br>1.2175 | <b>21.948</b><br>0.8641 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>74.0</b><br>2.91               | <b>79.0</b><br>3.11      | <b>3.5</b><br>0.14                  | <b>123.0</b><br>4.84 | <b>112.0</b><br>4.41 | <b>5.00</b><br>0.20 | <b>4.20</b><br>0.17 | <b>56.4</b>    | <b>16.5</b>    | <b>0.0842</b>  | <b>2.25</b><br>4.96 |
| <b>33.236</b><br>1.3085 | <b>23.520</b><br>0.9260 | <b>8.4</b><br>0.33    | <b>3.5</b><br>0.14         | <b>77.5</b><br>3.05               | <b>84.0</b><br>3.31      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>115.0</b><br>4.53 | <b>6.40</b><br>0.25 | <b>4.90</b><br>0.19 | <b>71.3</b>    | <b>17.6</b>    | <b>0.0926</b>  | <b>2.59</b><br>5.72 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-11.2</b><br>-0.44 | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>125.0</b><br>4.92 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>1.90</b><br>0.08 | <b>106</b>     | <b>21</b>      | <b>0.0814</b>  | <b>3.12</b><br>6.88 |
| <b>33.236</b><br>1.3085 | <b>23.520</b><br>0.9260 | <b>8.4</b><br>0.33    | <b>0.8</b><br>0.03         | <b>77.5</b><br>3.05               | <b>79.0</b><br>3.11      | <b>2.3</b><br>0.09                  | <b>132.0</b><br>5.20 | <b>117.0</b><br>4.61 | <b>6.40</b><br>0.25 | <b>4.90</b><br>0.19 | <b>71.3</b>    | <b>17.6</b>    | <b>0.0926</b>  | <b>2.75</b><br>6.07 |
| <b>33.236</b><br>1.3085 | <b>23.520</b><br>0.9260 | <b>8.4</b><br>0.33    | <b>3.5</b><br>0.14         | <b>77.5</b><br>3.05               | <b>84.0</b><br>3.31      | <b>2.3</b><br>0.09                  | <b>132.0</b><br>5.20 | <b>117.0</b><br>4.61 | <b>6.40</b><br>0.25 | <b>4.90</b><br>0.19 | <b>71.3</b>    | <b>17.6</b>    | <b>0.0926</b>  | <b>2.75</b><br>6.06 |
| <b>36.512</b><br>1.4375 | <b>28.575</b><br>1.1250 | <b>-7.4</b><br>-0.29  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>89.0</b><br>3.50  | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.08 | <b>63.9</b>    | <b>17.1</b>    | <b>0.0760</b>  | <b>1.37</b><br>3.02 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

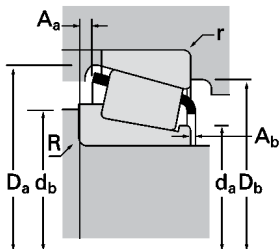
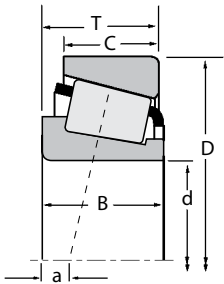
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 54.987<br>2.1649        | 103.188<br>4.0625 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 538         | 533A                   |  |                |       |       |
| 54.987<br>2.1649        | 110.000<br>4.3307 | 38.100<br>1.5000 | 159000<br>35800        | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200        | 538         | 533X                   |  |                |       |       |
| 54.987<br>2.1649        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900        | 6381        | 6320                   |  |                |       |       |
| 55.000<br>2.1654        | 90.000<br>3.5433  | 23.000<br>0.9055 | 85000<br>19100         | 0.40 | 1.49 | 22000<br>4960          | 15200<br>3410    | 1.45 | 123000<br>27600        | JLM506849A  | JLM506810              |  |                |       |       |
| 55.000<br>2.1654        | 90.000<br>3.5433  | 23.000<br>0.9055 | 85000<br>19100         | 0.40 | 1.49 | 22000<br>4960          | 15200<br>3410    | 1.45 | 123000<br>27600        | JLM506849   | JLM506810              |  |                |       |       |
| 55.000<br>2.1654        | 90.000<br>3.5433  | 25.000<br>0.9843 | 85000<br>19100         | 0.40 | 1.49 | 22000<br>4960          | 15200<br>3410    | 1.45 | 123000<br>27600        | JLM506849A  | JLM506811              |  |                |       |       |
| 55.000<br>2.1654        | 95.000<br>3.7402  | 29.000<br>1.1417 | 121000<br>27200        | 0.33 | 1.79 | 31300<br>7040          | 18000<br>4040    | 1.74 | 168000<br>37700        | JM207049A   | JM207010               |  |                |       |       |
| 55.000<br>2.1654        | 95.000<br>3.7402  | 29.000<br>1.1417 | 121000<br>27200        | 0.33 | 1.79 | 31300<br>7040          | 18000<br>4040    | 1.74 | 168000<br>37700        | JM207049    | JM207010               |  |                |       |       |
| 55.000<br>2.1654        | 95.000<br>3.7402  | 30.000<br>1.1811 | 121000<br>27200        | 0.33 | 1.79 | 31300<br>7040          | 18000<br>4040    | 1.74 | 168000<br>37700        | JM207049    | JM207010A              |  |                |       |       |
| 55.000<br>2.1654        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 385         | 382A                   |  |                |       |       |
| 55.000<br>2.1654        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 385X        | 382A                   |  |                |       |       |
| 55.000<br>2.1654        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 385         | 382                    |  |                |       |       |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100        | 385         | 383A                   |  |                |       |       |
| 55.000<br>2.1654        | 110.000<br>4.3307 | 39.000<br>1.5354 | 194000<br>43700        | 0.35 | 1.73 | 50400<br>11300         | 29900<br>6720    | 1.69 | 251000<br>56500        | JH307749    | JH307710               |  |                |       |       |
| 55.000<br>2.1654        | 115.000<br>4.5276 | 34.000<br>1.3386 | 135000<br>30200        | 0.87 | 0.69 | 34900<br>7840          | 51700<br>11600   | 0.67 | 175000<br>39200        | JW5549      | JW5510                 |  |                |       |       |
| 55.000<br>2.1654        | 115.000<br>4.5276 | 41.021<br>1.6150 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800        | 622X        | 614X                   |  |                |       |       |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900        | 475         | 472A                   |  |                |       |       |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900        | 475         | 472                    |  |                |       |       |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900        | 475         | 473                    |  |                |       |       |
| 55.000<br>2.1654        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700        | 557         | 552A                   |  |                |       |       |
| 55.006<br>2.1656        | 120.040<br>4.7260 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800        | 622A        | 612A                   |  |                |       |       |
| 55.562<br>2.1875        | 97.630<br>3.8437  | 24.608<br>0.9688 | 96300<br>21600         | 0.40 | 1.49 | 25000<br>5610          | 17200<br>3870    | 1.45 | 142000<br>32000        | 28680       | 28622                  |  |                |       |       |
| 55.562<br>2.1875        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 466-S       | 453A                   |  |                |       |       |
| 55.562<br>2.1875        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200        | 466-S       | 453AS                  |  |                |       |       |
| 55.562<br>2.1875        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500        | 5566        | 5535                   |  |                |       |       |
| 55.562<br>2.1875        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800        | 72218C      | 72487                  |  |                |       |       |
| 55.562<br>2.1875        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800        | 72219C      | 72487                  |  |                |       |       |
| 55.562<br>2.1875        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600        | HM813840    | HM813810               |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|---------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                     |                |                |                |                     |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| <b>36.957</b><br>1.4550 | <b>30.162</b><br>1.1875 | <b>-12.2</b><br>-0.48 | <b>0.8</b><br>0.03         | <b>62.0</b><br>2.44               | <b>63.0</b><br>2.48      | <b>1.5</b><br>0.06                  | <b>98.0</b><br>3.86  | <b>93.0</b><br>3.66  | <b>2.80</b><br>0.11 | <b>0.90</b><br>0.04 | <b>64.3</b>    | <b>16.1</b>    | <b>0.0938</b>  | <b>1.30</b><br>2.86 |
| <b>36.957</b><br>1.4550 | <b>30.162</b><br>1.1875 | <b>-12.2</b><br>-0.48 | <b>0.8</b><br>0.03         | <b>62.0</b><br>2.44               | <b>63.0</b><br>2.48      | <b>3.3</b><br>0.13                  | <b>100.0</b><br>3.94 | <b>95.0</b><br>3.74  | <b>2.80</b><br>0.11 | <b>0.90</b><br>0.04 | <b>64.3</b>    | <b>16.1</b>    | <b>0.0938</b>  | <b>1.55</b><br>3.43 |
| <b>56.007</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>3.5</b><br>0.14         | <b>70.0</b><br>2.76               | <b>76.0</b><br>2.99      | <b>3.3</b><br>0.13                  | <b>126.0</b><br>4.96 | <b>117.0</b><br>4.61 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>4.04</b><br>8.90 |
| <b>23.000</b><br>0.9055 | <b>18.500</b><br>0.7283 | <b>-2.8</b><br>-0.11  | <b>3.5</b><br>0.14         | <b>60.0</b><br>2.36               | <b>67.0</b><br>2.64      | <b>0.5</b><br>0.02                  | <b>86.0</b><br>3.39  | <b>82.0</b><br>3.23  | <b>1.10</b><br>0.04 | <b>1.50</b><br>0.06 | <b>45.6</b>    | <b>20.4</b>    | <b>0.0925</b>  | <b>0.54</b><br>1.20 |
| <b>23.000</b><br>0.9055 | <b>18.500</b><br>0.7283 | <b>-2.8</b><br>-0.11  | <b>1.5</b><br>0.06         | <b>61.0</b><br>2.40               | <b>63.0</b><br>2.48      | <b>0.5</b><br>0.02                  | <b>86.0</b><br>3.39  | <b>82.0</b><br>3.23  | <b>1.10</b><br>0.04 | <b>1.50</b><br>0.06 | <b>45.6</b>    | <b>20.4</b>    | <b>0.0925</b>  | <b>0.55</b><br>1.21 |
| <b>23.000</b><br>0.9055 | <b>20.500</b><br>0.8071 | <b>-2.8</b><br>-0.11  | <b>3.5</b><br>0.14         | <b>60.0</b><br>2.36               | <b>67.0</b><br>2.64      | <b>0.5</b><br>0.02                  | <b>86.0</b><br>3.39  | <b>82.0</b><br>3.23  | <b>1.10</b><br>0.04 | <b>1.50</b><br>0.06 | <b>45.6</b>    | <b>20.4</b>    | <b>0.0925</b>  | <b>0.58</b><br>1.27 |
| <b>29.000</b><br>1.1417 | <b>23.500</b><br>0.9252 | <b>-7.6</b><br>-0.30  | <b>6.0</b><br>0.24         | <b>62.0</b><br>2.44               | <b>73.0</b><br>2.87      | <b>2.5</b><br>0.10                  | <b>91.0</b><br>3.58  | <b>85.0</b><br>3.35  | <b>1.30</b><br>0.05 | <b>2.40</b><br>0.09 | <b>56.4</b>    | <b>19.9</b>    | <b>0.0937</b>  | <b>0.81</b><br>1.79 |
| <b>29.000</b><br>1.1417 | <b>23.500</b><br>0.9252 | <b>-7.6</b><br>-0.30  | <b>1.5</b><br>0.06         | <b>62.0</b><br>2.44               | <b>64.0</b><br>2.52      | <b>2.5</b><br>0.10                  | <b>91.0</b><br>3.58  | <b>85.0</b><br>3.35  | <b>1.30</b><br>0.05 | <b>2.40</b><br>0.09 | <b>56.4</b>    | <b>19.9</b>    | <b>0.0937</b>  | <b>0.84</b><br>1.84 |
| <b>29.000</b><br>1.1417 | <b>24.500</b><br>0.9646 | <b>-7.6</b><br>-0.30  | <b>1.5</b><br>0.06         | <b>62.0</b><br>2.44               | <b>64.0</b><br>2.52      | <b>2.0</b><br>0.08                  | <b>91.0</b><br>3.58  | <b>87.0</b><br>3.43  | <b>1.30</b><br>0.05 | <b>2.40</b><br>0.09 | <b>56.4</b>    | <b>19.9</b>    | <b>0.0937</b>  | <b>0.86</b><br>1.90 |
| <b>21.946</b><br>0.8640 | <b>15.875</b><br>0.6250 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>61.0</b><br>2.40               | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>89.0</b><br>3.50  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.62</b><br>1.37 |
| <b>21.946</b><br>0.8640 | <b>15.875</b><br>0.6250 | <b>-3.0</b><br>-0.12  | <b>3.5</b><br>0.14         | <b>61.0</b><br>2.40               | <b>67.0</b><br>2.64      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>89.0</b><br>3.50  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.62</b><br>1.36 |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>61.0</b><br>2.40               | <b>65.0</b><br>2.56      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>90.0</b><br>3.54  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.67</b><br>1.47 |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>2.3</b><br>0.09         | <b>61.0</b><br>2.40               | <b>65.0</b><br>2.56      | <b>2.0</b><br>0.08                  | <b>93.0</b><br>3.66  | <b>89.0</b><br>3.50  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.70</b><br>1.54 |
| <b>39.000</b><br>1.5354 | <b>32.000</b><br>1.2598 | <b>-11.7</b><br>-0.46 | <b>3.0</b><br>0.12         | <b>64.0</b><br>2.52               | <b>71.0</b><br>2.80      | <b>2.5</b><br>0.10                  | <b>104.0</b><br>4.09 | <b>97.0</b><br>3.82  | <b>0.80</b><br>0.03 | <b>3.10</b><br>0.12 | <b>72</b>      | <b>16.9</b>    | <b>0.0706</b>  | <b>1.68</b><br>3.71 |
| <b>31.000</b><br>1.2205 | <b>23.500</b><br>0.9252 | <b>5.8</b><br>0.23    | <b>3.0</b><br>0.12         | <b>66.0</b><br>2.59               | <b>78.0</b><br>3.07      | <b>3.0</b><br>0.12                  | <b>109.0</b><br>4.29 | <b>95.0</b><br>3.74  | <b>5.30</b><br>0.21 | <b>3.80</b><br>0.15 | <b>51.1</b>    | <b>17.8</b>    | <b>0.0831</b>  | <b>1.57</b><br>3.46 |
| <b>41.275</b><br>1.6250 | <b>31.496</b><br>1.2400 | <b>-14.0</b><br>-0.55 | <b>3.0</b><br>0.12         | <b>64.0</b><br>2.52               | <b>70.0</b><br>2.76      | <b>3.0</b><br>0.12                  | <b>108.0</b><br>4.25 | <b>101.0</b><br>3.98 | <b>3.90</b><br>0.15 | <b>1.90</b><br>0.07 | <b>75.9</b>    | <b>16.2</b>    | <b>0.0694</b>  | <b>1.90</b><br>4.18 |
| <b>29.007</b><br>1.1420 | <b>23.444</b><br>0.9230 | <b>-4.1</b><br>-0.16  | <b>0.8</b><br>0.03         | <b>66.0</b><br>2.60               | <b>67.0</b><br>2.64      | <b>3.3</b><br>0.13                  | <b>114.0</b><br>4.49 | <b>106.0</b><br>4.17 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.62</b><br>3.57 |
| <b>29.007</b><br>1.1420 | <b>24.237</b><br>0.9542 | <b>-4.1</b><br>-0.16  | <b>0.8</b><br>0.03         | <b>66.0</b><br>2.60               | <b>67.0</b><br>2.64      | <b>2.0</b><br>0.08                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.65</b><br>3.64 |
| <b>29.007</b><br>1.1420 | <b>29.000</b><br>1.1417 | <b>-4.1</b><br>-0.16  | <b>0.8</b><br>0.03         | <b>66.0</b><br>2.60               | <b>67.0</b><br>2.64      | <b>2.0</b><br>0.08                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.70</b><br>3.75 |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>66.0</b><br>2.60               | <b>72.0</b><br>2.83      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>109.0</b><br>4.29 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>2.20</b><br>4.86 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-14.0</b><br>-0.55 | <b>0.8</b><br>0.03         | <b>64.0</b><br>2.52               | <b>65.0</b><br>2.56      | <b>3.3</b><br>0.13                  | <b>110.0</b><br>4.33 | <b>103.0</b><br>4.06 | <b>3.90</b><br>0.15 | <b>1.90</b><br>0.07 | <b>75.9</b>    | <b>16.2</b>    | <b>0.0694</b>  | <b>2.14</b><br>4.72 |
| <b>24.608</b><br>0.9688 | <b>19.446</b><br>0.7656 | <b>-3.3</b><br>-0.13  | <b>3.5</b><br>0.14         | <b>62.0</b><br>2.44               | <b>68.0</b><br>2.68      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>88.0</b><br>3.46  | <b>1.60</b><br>0.06 | <b>1.80</b><br>0.07 | <b>54</b>      | <b>20.2</b>    | <b>0.0979</b>  | <b>0.76</b><br>1.67 |
| <b>29.317</b><br>1.1542 | <b>22.225</b><br>0.8750 | <b>-7.1</b><br>-0.28  | <b>2.3</b><br>0.09         | <b>62.0</b><br>2.44               | <b>66.0</b><br>2.60      | <b>0.8</b><br>0.03                  | <b>100.0</b><br>3.94 | <b>97.0</b><br>3.82  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.14</b><br>2.51 |
| <b>29.317</b><br>1.1542 | <b>22.225</b><br>0.8750 | <b>-7.1</b><br>-0.28  | <b>2.3</b><br>0.09         | <b>62.0</b><br>2.44               | <b>66.0</b><br>2.60      | <b>2.3</b><br>0.09                  | <b>100.0</b><br>3.94 | <b>95.0</b><br>3.74  | <b>2.20</b><br>0.09 | <b>1.40</b><br>0.05 | <b>58.6</b>    | <b>17.1</b>    | <b>0.0946</b>  | <b>1.13</b><br>2.50 |
| <b>43.764</b><br>1.7230 | <b>36.512</b><br>1.4375 | <b>-12.2</b><br>-0.48 | <b>1.3</b><br>0.05         | <b>68.0</b><br>2.68               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>106.0</b><br>4.17 | <b>2.50</b><br>0.10 | <b>1.20</b><br>0.05 | <b>110</b>     | <b>24.2</b>    | <b>0.0825</b>  | <b>2.55</b><br>5.62 |
| <b>32.791</b><br>1.2910 | <b>25.400</b><br>1.0000 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>80.0</b><br>3.15      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>102.0</b><br>4.02 | <b>4.70</b><br>0.19 | <b>4.40</b><br>0.17 | <b>57.4</b>    | <b>13.5</b>    | <b>0.0825</b>  | <b>2.01</b><br>4.43 |
| <b>32.791</b><br>1.2910 | <b>25.400</b><br>1.0000 | <b>2.0</b><br>0.08    | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>80.0</b><br>3.15      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>102.0</b><br>4.02 | <b>4.70</b><br>0.19 | <b>4.40</b><br>0.17 | <b>57.4</b>    | <b>13.5</b>    | <b>0.0825</b>  | <b>2.01</b><br>4.43 |
| <b>36.512</b><br>1.4375 | <b>26.988</b><br>1.0625 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>72.0</b><br>2.83               | <b>78.0</b><br>3.07      | <b>3.3</b><br>0.13                  | <b>121.0</b><br>4.76 | <b>111.0</b><br>4.37 | <b>4.00</b><br>0.16 | <b>1.30</b><br>0.05 | <b>91.7</b>    | <b>24.3</b>    | <b>0.1252</b>  | <b>2.30</b><br>5.08 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

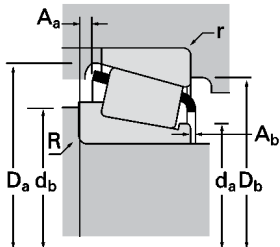
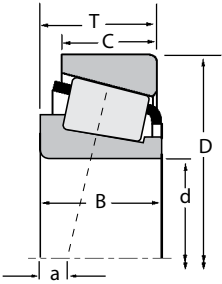
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# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 55.562<br>2.1875        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813840    | HM813811 |
| 55.575<br>2.1880        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 389         | 382A     |
| 55.575<br>2.1880        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 389         | 383A     |
| 57.150<br>2.2500        | 87.312<br>3.4375  | 18.258<br>0.7188 | 58100<br>13100         | 0.39 | 1.54 | 15100<br>3380          | 10000<br>2250    | 1.50 | 95600<br>21500  | L507949     | L507910  |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387         | 382A     |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387A        | 382A     |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387AS       | 382A     |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387-S       | 382A     |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 24.608<br>0.9688 | 96300<br>21600         | 0.40 | 1.49 | 25000<br>5610          | 17200<br>3870    | 1.45 | 142000<br>32000 | 28682       | 28621    |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 25.400<br>1.0000 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387A        | 382-S    |
| 57.150<br>2.2500        | 97.630<br>3.8437  | 24.608<br>0.9688 | 96300<br>21600         | 0.40 | 1.49 | 25000<br>5610          | 17200<br>3870    | 1.45 | 142000<br>32000 | 28682       | 28622    |
| 57.150<br>2.2500        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387         | 382      |
| 57.150<br>2.2500        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387A        | 382      |
| 57.150<br>2.2500        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387AS       | 382      |
| 57.150<br>2.2500        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387-S       | 382      |
| 57.150<br>2.2500        | 98.425<br>3.8750  | 24.608<br>0.9688 | 96300<br>21600         | 0.40 | 1.49 | 25000<br>5610          | 17200<br>3870    | 1.45 | 142000<br>32000 | 28682       | 28623    |
| 57.150<br>2.2500        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387A        | 383A     |
| 57.150<br>2.2500        | 100.000<br>3.9370 | 25.400<br>1.0000 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387         | 383X     |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45289       | 45220    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45289       | 45221    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45290       | 45220    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45290       | 45221    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45291       | 45220    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 142000<br>31900        | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45291       | 45221    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462         | 453X     |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462A        | 453X     |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 30.162<br>1.1875 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 469         | 453X     |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462         | 453A     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 72.0<br>2.83                               | 78.0<br>3.07                               | 1.5<br>0.06                                  | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.30<br>5.08        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 2.3<br>0.09                                    | 61.0<br>2.40                               | 65.0<br>2.56                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.61<br>1.35        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 2.3<br>0.09                                    | 61.0<br>2.40                               | 65.0<br>2.56                               | 2.0<br>0.08                                  | 93.0<br>3.66   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.69<br>1.52        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -0.8<br>-0.03    | 1.5<br>0.06                                    | 62.0<br>2.44                               | 65.0<br>2.56                               | 1.5<br>0.06                                  | 83.0<br>3.27   | 79.0<br>3.11   | 0.30<br>0.01   | 2.00<br>0.08   | 46.1           | 36.9           | 0.0914         | 0.39<br>0.85        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 2.3<br>0.09                                    | 62.0<br>2.44                               | 66.0<br>2.60                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.59<br>1.30        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 62.0<br>2.44                               | 69.0<br>2.72                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.58<br>1.29        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 5.0<br>0.20                                    | 62.0<br>2.44                               | 72.0<br>2.83                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.57<br>1.26        |
| 21.946<br>0.8640 | 15.875<br>0.6250 | -3.0<br>-0.12    | 0.8<br>0.03                                    | 62.0<br>2.44                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.59<br>1.31        |
| 24.608<br>0.9688 | 19.446<br>0.7656 | -3.3<br>-0.13    | 3.5<br>0.14                                    | 63.0<br>2.48                               | 70.0<br>2.76                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 88.0<br>3.46   | 1.60<br>0.06   | 1.80<br>0.07   | 54             | 20.2           | 0.0979         | 0.71<br>1.57        |
| 21.946<br>0.8640 | 20.274<br>0.7982 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 62.0<br>2.44                               | 69.0<br>2.72                               | 2.3<br>0.09                                  | 91.0<br>3.58   | 87.0<br>3.43   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.65<br>1.43        |
| 24.608<br>0.9688 | 19.446<br>0.7656 | -3.3<br>-0.13    | 3.5<br>0.14                                    | 63.0<br>2.48                               | 70.0<br>2.76                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 88.0<br>3.46   | 1.60<br>0.06   | 1.80<br>0.07   | 54             | 20.2           | 0.0979         | 0.73<br>1.61        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 2.3<br>0.09                                    | 62.0<br>2.44                               | 66.0<br>2.60                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 90.0<br>3.54   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.63<br>1.40        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 62.0<br>2.44                               | 69.0<br>2.72                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 90.0<br>3.54   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.63<br>1.39        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 5.0<br>0.20                                    | 62.0<br>2.44                               | 72.0<br>2.83                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 90.0<br>3.54   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.62<br>1.36        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 0.8<br>0.03                                    | 62.0<br>2.44                               | 63.0<br>2.48                               | 0.8<br>0.03                                  | 92.0<br>3.62   | 90.0<br>3.54   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.64<br>1.41        |
| 24.608<br>0.9688 | 19.446<br>0.7656 | -3.3<br>-0.13    | 3.5<br>0.14                                    | 63.0<br>2.48                               | 70.0<br>2.76                               | 0.8<br>0.03                                  | 93.0<br>3.66   | 88.0<br>3.46   | 1.60<br>0.06   | 1.80<br>0.07   | 54             | 20.2           | 0.0979         | 0.75<br>1.65        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 62.0<br>2.44                               | 69.0<br>2.72                               | 2.0<br>0.08                                  | 93.0<br>3.66   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.66<br>1.45        |
| 21.946<br>0.8640 | 22.225<br>0.8750 | -3.0<br>-0.12    | 2.3<br>0.09                                    | 62.0<br>2.44                               | 66.0<br>2.60                               | 1.3<br>0.05                                  | 93.0<br>3.66   | 89.0<br>3.50   | 1.10<br>0.04   | 2.00<br>0.08   | 42             | 15.7           | 0.0859         | 0.76<br>1.67        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 65.0<br>2.56                               | 65.0<br>2.56                               | 3.3<br>0.13                                  | 99.0<br>3.90   | 93.0<br>3.66   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.08<br>2.39        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 65.0<br>2.56                               | 65.0<br>2.56                               | 0.8<br>0.03                                  | 99.0<br>3.90   | 95.0<br>3.74   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.09<br>2.40        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 2.3<br>0.09                                    | 65.0<br>2.56                               | 68.0<br>2.68                               | 3.3<br>0.13                                  | 99.0<br>3.90   | 93.0<br>3.66   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.08<br>2.39        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 2.3<br>0.09                                    | 65.0<br>2.56                               | 68.0<br>2.68                               | 0.8<br>0.03                                  | 99.0<br>3.90   | 95.0<br>3.74   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.09<br>2.40        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 6.4<br>0.25                                    | 65.0<br>2.56                               | 76.0<br>2.99                               | 3.3<br>0.13                                  | 99.0<br>3.90   | 93.0<br>3.66   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.05<br>2.32        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32    | 6.4<br>0.25                                    | 65.0<br>2.56                               | 76.0<br>2.99                               | 0.8<br>0.03                                  | 99.0<br>3.90   | 95.0<br>3.74   | 2.10<br>0.08   | 1.80<br>0.07   | 63.5           | 16.9           | 0.0971         | 1.06<br>2.33        |
| 29.317<br>1.1542 | 24.605<br>0.9687 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 63.0<br>2.48                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 98.0<br>3.86   | 92.0<br>3.62   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.05<br>2.31        |
| 29.317<br>1.1542 | 24.605<br>0.9687 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 68.0<br>2.68                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 98.0<br>3.86   | 92.0<br>3.62   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.04<br>2.29        |
| 29.317<br>1.1542 | 24.605<br>0.9687 | -7.1<br>-0.28    | 3.5<br>0.14                                    | 63.0<br>2.48                               | 70.0<br>2.76                               | 3.3<br>0.13                                  | 98.0<br>3.86   | 92.0<br>3.62   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.04<br>2.30        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 63.0<br>2.48                               | 67.0<br>2.64                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.10<br>2.43        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

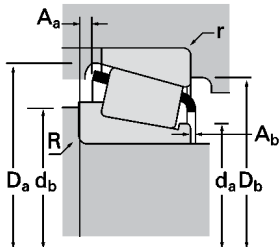
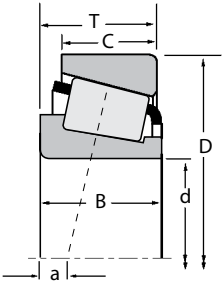




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |        |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|--------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          |             | Inner  | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>  |             |        |       |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462         | 453AS  |       |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 27.783<br>1.0938 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 469         | 453A   |       |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 32.558<br>1.2818 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462         | 452A   |       |
| 57.150<br>2.2500        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390         | 394A   |       |
| 57.150<br>2.2500        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390         | 394AS  |       |
| 57.150<br>2.2500        | 110.000<br>4.3307 | 27.795<br>1.0943 | 126000<br>28200        | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 462         | 454    |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200 | 29665       | 29620  |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390         | 3920   |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3979        | 3920   |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39580       | 39520  |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39580       | 39521  |       |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39581       | 39520  |       |
| 57.150<br>2.2500        | 117.475<br>4.6250 | 33.338<br>1.3125 | 138000<br>31000        | 0.63 | 0.96 | 35800<br>8040          | 38300<br>8620    | 0.93 | 166000<br>37300 | 66225       | 66462  |       |
| 57.150<br>2.2500        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 623         | 612    |       |
| 57.150<br>2.2500        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 623         | 612-S  |       |
| 57.150<br>2.2500        | 120.650<br>4.7500 | 41.275<br>1.6250 | 192000<br>43200        | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 623A        | 612    |       |
| 57.150<br>2.2500        | 122.238<br>4.8125 | 33.338<br>1.3125 | 143000<br>32200        | 0.67 | 0.90 | 37100<br>8340          | 42300<br>9500    | 0.88 | 178000<br>39900 | 66587       | 66520  |       |
| 57.150<br>2.2500        | 123.825<br>4.8750 | 36.512<br>1.4375 | 167000<br>37600        | 0.74 | 0.81 | 43400<br>9760          | 54800<br>12300   | 0.79 | 208000<br>46800 | 72225C      | 72487  |       |
| 57.150<br>2.2500        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 555-S       | 552    |       |
| 57.150<br>2.2500        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 555-S       | 552A   |       |
| 57.150<br>2.2500        | 125.000<br>4.9213 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 555-S       | 553A   |       |
| 57.150<br>2.2500        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700 | 65225       | 65500  |       |
| 57.150<br>2.2500        | 129.944<br>5.1159 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 555-S       | 553-SA |       |
| 57.150<br>2.2500        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6375        | 6320   |       |
| 57.150<br>2.2500        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6387        | 6320   |       |
| 57.150<br>2.2500        | 136.525<br>5.3750 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600 | 78225C      | 78537  |       |
| 57.150<br>2.2500        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 635         | 632    |       |
| 57.150<br>2.2500        | 140.030<br>5.5130 | 36.512<br>1.4375 | 158000<br>35600        | 0.87 | 0.69 | 41100<br>9230          | 60900<br>13700   | 0.67 | 193000<br>43400 | 78225       | 78551  |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 63.0<br>2.48                               | 67.0<br>2.64                               | 2.3<br>0.09                                  | 100.0<br>3.94  | 95.0<br>3.74   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.10<br>2.43        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 3.5<br>0.14                                    | 63.0<br>2.48                               | 70.0<br>2.76                               | 0.8<br>0.03                                  | 100.0<br>3.94  | 97.0<br>3.82   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.10<br>2.42        |
| 29.317<br>1.1542 | 27.000<br>1.0630 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 63.0<br>2.48                               | 67.0<br>2.64                               | 3.3<br>0.13                                  | 100.0<br>3.94  | 93.0<br>3.66   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.21<br>2.67        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 2.3<br>0.09                                    | 66.0<br>2.60                               | 70.0<br>2.76                               | 1.3<br>0.05                                  | 105.0<br>4.13  | 101.0<br>3.98  | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.94<br>2.07        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 2.3<br>0.09                                    | 66.0<br>2.60                               | 70.0<br>2.76                               | 3.3<br>0.13                                  | 104.5<br>4.11  | 99.0<br>3.90   | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.92<br>2.04        |
| 29.317<br>1.1542 | 27.000<br>1.0630 | -7.1<br>-0.28    | 2.3<br>0.09                                    | 63.0<br>2.48                               | 67.0<br>2.64                               | 2.0<br>0.08                                  | 100.0<br>3.94  | 96.0<br>3.78   | 2.20<br>0.09   | 1.40<br>0.05   | 58.6           | 17.1           | 0.0946         | 1.23<br>2.71        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04      | 3.5<br>0.14                                    | 69.0<br>2.72                               | 75.0<br>2.95                               | 3.3<br>0.13                                  | 109.0<br>4.29  | 101.0<br>3.98  | 2.30<br>0.09   | 1.50<br>0.06   | 77.7           | 43.3           | 0.1170         | 1.21<br>2.67        |
| 21.996<br>0.8660 | 23.812<br>0.9375 | -0.8<br>-0.03    | 2.3<br>0.09                                    | 66.0<br>2.60                               | 70.0<br>2.76                               | 3.3<br>0.13                                  | 106.0<br>4.17  | 99.0<br>3.90   | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 1.12<br>2.47        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                                    | 66.0<br>2.60                               | 72.0<br>2.83                               | 3.3<br>0.13                                  | 106.0<br>4.17  | 99.0<br>3.90   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.37<br>3.01        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 66.0<br>2.60                               | 72.0<br>2.83                               | 3.3<br>0.13                                  | 107.0<br>4.21  | 101.0<br>3.98  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.38<br>3.03        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 66.0<br>2.60                               | 72.0<br>2.83                               | 0.8<br>0.03                                  | 107.0<br>4.21  | 103.0<br>4.06  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.38<br>3.04        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 8.0<br>0.31                                    | 66.0<br>2.60                               | 81.0<br>3.19                               | 3.3<br>0.13                                  | 107.0<br>4.21  | 101.0<br>3.98  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.34<br>2.95        |
| 31.750<br>1.2500 | 23.812<br>0.9375 | -0.3<br>-0.01    | 3.5<br>0.14                                    | 69.0<br>2.71                               | 76.0<br>2.99                               | 3.3<br>0.13                                  | 111.0<br>4.37  | 100.0<br>3.94  | 5.00<br>0.20   | 2.00<br>0.08   | 50.2           | 16.4           | 0.0751         | 1.50<br>3.31        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 3.5<br>0.14                                    | 66.0<br>2.60                               | 72.0<br>2.83                               | 3.3<br>0.13                                  | 110.0<br>4.33  | 105.0<br>4.13  | 3.90<br>0.15   | 1.90<br>0.07   | 75.9           | 16.2           | 0.0694         | 2.10<br>4.62        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 3.5<br>0.14                                    | 66.0<br>2.60                               | 72.0<br>2.83                               | 0.8<br>0.03                                  | 110.0<br>4.33  | 107.0<br>4.21  | 3.90<br>0.15   | 1.90<br>0.07   | 75.9           | 16.2           | 0.0694         | 2.11<br>4.65        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 6.4<br>0.25                                    | 66.0<br>2.60                               | 78.0<br>3.07                               | 3.3<br>0.13                                  | 110.0<br>4.33  | 105.0<br>4.13  | 3.90<br>0.15   | 1.90<br>0.07   | 75.9           | 16.2           | 0.0694         | 2.07<br>4.57        |
| 31.750<br>1.2500 | 23.812<br>0.9375 | 2.0<br>0.08      | 3.5<br>0.14                                    | 71.0<br>2.80                               | 77.0<br>3.03                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 105.0<br>4.13  | 5.20<br>0.21   | 2.00<br>0.08   | 57             | 18.3           | 0.0797         | 1.69<br>3.74        |
| 32.791<br>1.2910 | 25.400<br>1.0000 | 2.0<br>0.08      | 3.5<br>0.14                                    | 67.0<br>2.64                               | 81.0<br>3.19                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 102.0<br>4.02  | 4.70<br>0.19   | 4.40<br>0.17   | 57.4           | 13.5           | 0.0825         | 1.98<br>4.36        |
| 36.678<br>1.4440 | 33.338<br>1.3125 | -9.4<br>-0.37    | 3.5<br>0.14                                    | 67.0<br>2.64                               | 73.0<br>2.87                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.20<br>4.84        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                                    | 67.0<br>2.64                               | 73.0<br>2.87                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.15<br>4.74        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                                    | 67.0<br>2.64                               | 73.0<br>2.87                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.20<br>4.85        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37    | 3.5<br>0.14                                    | 71.0<br>2.79                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 119.0<br>4.69  | 107.0<br>4.21  | 4.10<br>0.16   | 1.00<br>0.04   | 83.2           | 17.2           | 0.0827         | 2.69<br>5.93        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                                    | 67.0<br>2.64                               | 73.0<br>2.87                               | 3.3<br>0.13                                  | 116.0<br>4.57  | 111.0<br>4.37  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.43<br>5.37        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 4.3<br>0.17                                    | 72.0<br>2.83                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 126.0<br>4.96  | 117.0<br>4.61  | 4.00<br>0.16   | 0.50<br>0.02   | 124            | 22.4           | 0.0827         | 3.95<br>8.71        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 0.8<br>0.03                                    | 72.0<br>2.83                               | 72.0<br>2.83                               | 3.3<br>0.13                                  | 126.0<br>4.96  | 117.0<br>4.61  | 4.00<br>0.16   | 0.50<br>0.02   | 124            | 22.4           | 0.0827         | 3.96<br>8.74        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 8.4<br>0.33      | 3.5<br>0.14                                    | 77.5<br>3.05                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 130.0<br>5.12  | 115.0<br>4.53  | 6.40<br>0.25   | 4.80<br>0.19   | 71.3           | 17.6           | 0.0926         | 2.52<br>5.56        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                                    | 69.0<br>2.72                               | 75.0<br>2.95                               | 3.3<br>0.13                                  | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 3.03<br>6.68        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 7.9<br>0.31      | 3.5<br>0.14                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 2.3<br>0.09                                  | 132.0<br>5.20  | 117.0<br>4.61  | 6.90<br>0.27   | 4.10<br>0.16   | 62.6           | 19.1           | 0.0884         | 2.57<br>5.66        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

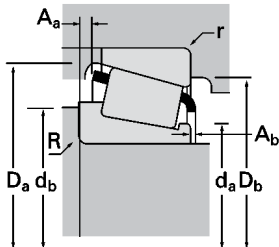
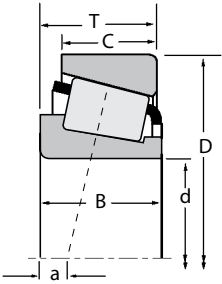
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 57.150<br>2.2500        | 140.030<br>5.5130 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600  | 78225C      | 78551     |
| 57.150<br>2.2500        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6455        | 6420      |
| 57.150<br>2.2500        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6465        | 6420      |
| 57.150<br>2.2500        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6465        | 6420A     |
| 57.150<br>2.2500        | 152.400<br>6.0000 | 53.975<br>2.1250 | 313000<br>70500        | 0.49 | 1.23 | 81300<br>18300         | 67800<br>15200   | 1.20 | 423000<br>95000  | HH814540    | HH814510  |
| 57.531<br>2.2650        | 96.838<br>3.8125  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100  | 388A        | 382A      |
| 57.531<br>2.2650        | 98.425<br>3.8750  | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100  | 388A        | 382       |
| 57.531<br>2.2650        | 100.000<br>3.9370 | 21.000<br>0.8268 | 84200<br>18900         | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100  | 388A        | 383A      |
| 58.738<br>2.3125        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3981        | 3920      |
| 58.738<br>2.3125        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65231       | 65500     |
| 59.530<br>2.3437        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3978        | 3920      |
| 59.880<br>2.3575        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65235       | 65500     |
| 59.931<br>2.3595        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 745         | 742       |
| 59.977<br>2.3613        | 100.000<br>3.9370 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500  | 28980       | 28921     |
| 59.977<br>2.3613        | 122.238<br>4.8125 | 33.338<br>1.3125 | 143000<br>32200        | 0.67 | 0.90 | 37100<br>8340          | 42300<br>9500    | 0.88 | 178000<br>39900  | 66586       | 66520     |
| 59.987<br>2.3617        | 104.775<br>4.1250 | 21.433<br>0.8438 | 89600<br>20100         | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000  | 39236       | 39412     |
| 59.987<br>2.3617        | 109.985<br>4.3301 | 29.751<br>1.1713 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3977X       | 3921XA    |
| 59.987<br>2.3617        | 110.058<br>4.3330 | 22.000<br>0.8661 | 89600<br>20100         | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000  | 39236       | 39433     |
| 59.987<br>2.3617        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3977X       | 3920      |
| 59.987<br>2.3617        | 125.000<br>4.9213 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 558-S       | 553A      |
| 59.987<br>2.3617        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813839    | HM813810  |
| 59.987<br>2.3617        | 129.944<br>5.1159 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 558-S       | 553-SA    |
| 59.987<br>2.3617        | 130.175<br>5.1250 | 34.100<br>1.3425 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911244    | HM911210  |
| 59.987<br>2.3617        | 134.983<br>5.3143 | 33.449<br>1.3169 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911244    | HM911216  |
| 59.987<br>2.3617        | 146.050<br>5.7500 | 41.275<br>1.6250 | 213000<br>47900        | 0.78 | 0.77 | 55200<br>12400         | 74000<br>16600   | 0.75 | 256000<br>57500  | H913840     | H913810   |
| 60.000<br>2.3622        | 95.000<br>3.7402  | 24.000<br>0.9449 | 90400<br>20300         | 0.40 | 1.49 | 23400<br>5270          | 16100<br>3620    | 1.45 | 135000<br>30400  | JLM508748   | JLM508710 |
| 60.000<br>2.3622        | 100.000<br>3.9370 | 21.000<br>0.8268 | 80900<br>18200         | 0.47 | 1.27 | 21000<br>4710          | 17000<br>3820    | 1.24 | 101000<br>22800  | JP6049      | JP6010    |
| 60.000<br>2.3622        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29580       | 29520     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.)  |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|----------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                     | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                      |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.)  |
| <b>33.236</b><br>1.3085 | <b>23.520</b><br>0.9260 | <b>8.4</b><br>0.33    | <b>3.5</b><br>0.14         | <b>77.5</b><br>3.05               | <b>86.0</b><br>3.39      | <b>2.3</b><br>0.09                  | <b>132.0</b><br>5.20 | <b>117.0</b><br>4.61 | <b>6.40</b><br>0.25 | <b>4.80</b><br>0.19 | <b>71.3</b>    | <b>17.6</b>    | <b>0.0926</b>  | <b>2.68</b><br>5.90  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03 | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>5.08</b><br>11.20 |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>6.8</b><br>0.27         | <b>75.0</b><br>2.95               | <b>88.0</b><br>3.46      | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03 | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>5.05</b><br>11.14 |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>6.8</b><br>0.27         | <b>75.0</b><br>2.95               | <b>88.0</b><br>3.46      | <b>0.8</b><br>0.03                  | <b>140.0</b><br>5.51 | <b>131.0</b><br>5.16 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03 | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>5.07</b><br>11.18 |
| <b>57.150</b><br>2.2500 | <b>41.275</b><br>1.6250 | <b>-12.2</b><br>-0.48 | <b>3.5</b><br>0.14         | <b>81.0</b><br>3.19               | <b>87.0</b><br>3.43      | <b>3.3</b><br>0.13                  | <b>143.0</b><br>5.63 | <b>130.0</b><br>5.12 | <b>5.30</b><br>0.21 | <b>0.20</b><br>0.01 | <b>130</b>     | <b>23.5</b>    | <b>0.0957</b>  | <b>5.28</b><br>11.65 |
| <b>21.946</b><br>0.8640 | <b>15.875</b><br>0.6250 | <b>-3.0</b><br>-0.12  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>69.0</b><br>2.72      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>89.0</b><br>3.50  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.58</b><br>1.27  |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>69.0</b><br>2.72      | <b>0.8</b><br>0.03                  | <b>92.0</b><br>3.62  | <b>90.0</b><br>3.54  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.62</b><br>1.37  |
| <b>21.946</b><br>0.8640 | <b>17.826</b><br>0.7018 | <b>-3.0</b><br>-0.12  | <b>3.5</b><br>0.14         | <b>63.0</b><br>2.48               | <b>69.0</b><br>2.72      | <b>2.0</b><br>0.08                  | <b>93.0</b><br>3.66  | <b>89.0</b><br>3.50  | <b>1.10</b><br>0.04 | <b>2.00</b><br>0.08 | <b>42</b>      | <b>15.7</b>    | <b>0.0859</b>  | <b>0.65</b><br>1.44  |
| <b>30.048</b><br>1.1830 | <b>23.812</b><br>0.9375 | <b>-4.6</b><br>-0.18  | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>99.0</b><br>3.90  | <b>2.20</b><br>0.09 | <b>1.10</b><br>0.04 | <b>75.2</b>    | <b>21.3</b>    | <b>0.1092</b>  | <b>1.33</b><br>2.94  |
| <b>44.450</b><br>1.7500 | <b>34.925</b><br>1.3750 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>71.0</b><br>2.79               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>119.0</b><br>4.69 | <b>107.0</b><br>4.21 | <b>4.10</b><br>0.16 | <b>1.00</b><br>0.04 | <b>83.2</b>    | <b>17.2</b>    | <b>0.0827</b>  | <b>2.64</b><br>5.82  |
| <b>30.048</b><br>1.1830 | <b>23.812</b><br>0.9375 | <b>-4.6</b><br>-0.18  | <b>1.5</b><br>0.06         | <b>68.0</b><br>2.68               | <b>70.0</b><br>2.76      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>99.0</b><br>3.90  | <b>2.20</b><br>0.09 | <b>1.10</b><br>0.04 | <b>75.2</b>    | <b>21.3</b>    | <b>0.1092</b>  | <b>1.32</b><br>2.92  |
| <b>44.450</b><br>1.7500 | <b>34.925</b><br>1.3750 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>71.0</b><br>2.79               | <b>82.0</b><br>3.23      | <b>3.3</b><br>0.13                  | <b>119.0</b><br>4.69 | <b>107.0</b><br>4.21 | <b>4.10</b><br>0.16 | <b>1.00</b><br>0.04 | <b>83.2</b>    | <b>17.2</b>    | <b>0.0827</b>  | <b>2.60</b><br>5.74  |
| <b>46.672</b><br>1.8375 | <b>36.512</b><br>1.4375 | <b>-11.9</b><br>-0.47 | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>142.0</b><br>5.59 | <b>134.0</b><br>5.28 | <b>1.90</b><br>0.07 | <b>1.20</b><br>0.05 | <b>160</b>     | <b>26.3</b>    | <b>0.0898</b>  | <b>4.28</b><br>9.44  |
| <b>25.400</b><br>1.0000 | <b>19.845</b><br>0.7813 | <b>-2.5</b><br>-0.10  | <b>3.5</b><br>0.14         | <b>67.0</b><br>2.64               | <b>73.0</b><br>2.87      | <b>3.3</b><br>0.13                  | <b>96.0</b><br>3.78  | <b>89.0</b><br>3.50  | <b>2.00</b><br>0.08 | <b>1.40</b><br>0.05 | <b>60.1</b>    | <b>24.5</b>    | <b>0.1032</b>  | <b>0.76</b><br>1.67  |
| <b>31.750</b><br>1.2500 | <b>23.812</b><br>0.9375 | <b>2.0</b><br>0.08    | <b>1.5</b><br>0.06         | <b>73.0</b><br>2.87               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>105.0</b><br>4.13 | <b>5.20</b><br>0.21 | <b>2.00</b><br>0.08 | <b>57</b>      | <b>18.3</b>    | <b>0.0797</b>  | <b>1.64</b><br>3.61  |
| <b>22.000</b><br>0.8661 | <b>15.875</b><br>0.6250 | <b>-1.5</b><br>-0.06  | <b>2.3</b><br>0.09         | <b>67.0</b><br>2.64               | <b>71.0</b><br>2.80      | <b>2.0</b><br>0.08                  | <b>100.0</b><br>3.94 | <b>96.0</b><br>3.78  | <b>1.70</b><br>0.07 | <b>2.30</b><br>0.09 | <b>51.7</b>    | <b>19.5</b>    | <b>0.0947</b>  | <b>0.74</b><br>1.63  |
| <b>28.000</b><br>1.1024 | <b>23.812</b><br>0.9375 | <b>-4.6</b><br>-0.18  | <b>2.3</b><br>0.09         | <b>68.0</b><br>2.68               | <b>72.0</b><br>2.83      | <b>0.5</b><br>0.02                  | <b>104.5</b><br>4.12 | <b>100.0</b><br>3.94 | <b>2.20</b><br>0.09 | <b>3.10</b><br>0.12 | <b>75.2</b>    | <b>21.3</b>    | <b>0.1092</b>  | <b>1.20</b><br>2.65  |
| <b>22.000</b><br>0.8661 | <b>17.236</b><br>0.6786 | <b>-1.5</b><br>-0.06  | <b>2.3</b><br>0.09         | <b>67.0</b><br>2.64               | <b>71.0</b><br>2.80      | <b>2.3</b><br>0.09                  | <b>103.0</b><br>4.06 | <b>98.0</b><br>3.86  | <b>1.70</b><br>0.07 | <b>2.30</b><br>0.09 | <b>51.7</b>    | <b>19.5</b>    | <b>0.0947</b>  | <b>0.87</b><br>1.92  |
| <b>28.000</b><br>1.1024 | <b>23.812</b><br>0.9375 | <b>-4.6</b><br>-0.18  | <b>2.3</b><br>0.09         | <b>68.0</b><br>2.68               | <b>72.0</b><br>2.83      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>99.0</b><br>3.90  | <b>2.20</b><br>0.09 | <b>3.10</b><br>0.12 | <b>75.2</b>    | <b>21.3</b>    | <b>0.1092</b>  | <b>1.28</b><br>2.83  |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>69.0</b><br>2.72               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>109.0</b><br>4.29 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>2.13</b><br>4.69  |
| <b>36.512</b><br>1.4375 | <b>26.988</b><br>1.0625 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>82.0</b><br>3.23      | <b>3.3</b><br>0.13                  | <b>121.0</b><br>4.76 | <b>111.0</b><br>4.37 | <b>4.00</b><br>0.16 | <b>1.30</b><br>0.05 | <b>91.7</b>    | <b>24.3</b>    | <b>0.1252</b>  | <b>2.19</b><br>4.82  |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>69.0</b><br>2.72               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>111.0</b><br>4.37 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>2.36</b><br>5.20  |
| <b>30.924</b><br>1.2175 | <b>23.812</b><br>0.9375 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>74.5</b><br>2.93               | <b>84.0</b><br>3.31      | <b>3.3</b><br>0.13                  | <b>123.5</b><br>4.87 | <b>109.0</b><br>4.29 | <b>5.00</b><br>0.20 | <b>4.20</b><br>0.17 | <b>56.4</b>    | <b>16.5</b>    | <b>0.0842</b>  | <b>2.00</b><br>4.40  |
| <b>30.924</b><br>1.2175 | <b>21.948</b><br>0.8641 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>74.5</b><br>2.93               | <b>84.0</b><br>3.31      | <b>3.5</b><br>0.14                  | <b>123.0</b><br>4.84 | <b>112.0</b><br>4.41 | <b>5.00</b><br>0.20 | <b>4.20</b><br>0.17 | <b>56.4</b>    | <b>16.5</b>    | <b>0.0842</b>  | <b>2.12</b><br>4.67  |
| <b>39.688</b><br>1.5625 | <b>25.400</b><br>1.0000 | <b>4.3</b><br>0.17    | <b>3.5</b><br>0.14         | <b>82.5</b><br>3.24               | <b>88.0</b><br>3.46      | <b>3.3</b><br>0.13                  | <b>138.0</b><br>5.43 | <b>124.0</b><br>4.88 | <b>8.20</b><br>0.32 | <b>3.60</b><br>0.14 | <b>78.5</b>    | <b>17.3</b>    | <b>0.0927</b>  | <b>3.17</b><br>6.99  |
| <b>24.000</b><br>0.9449 | <b>19.000</b><br>0.7480 | <b>-2.8</b><br>-0.11  | <b>5.0</b><br>0.20         | <b>66.0</b><br>2.60               | <b>75.0</b><br>2.95      | <b>2.5</b><br>0.10                  | <b>91.0</b><br>3.58  | <b>85.0</b><br>3.35  | <b>1.50</b><br>0.06 | <b>1.60</b><br>0.06 | <b>54.2</b>    | <b>25.3</b>    | <b>0.0979</b>  | <b>0.59</b><br>1.30  |
| <b>20.000</b><br>0.7874 | <b>15.500</b><br>0.6102 | <b>1.3</b><br>0.05    | <b>2.0</b><br>0.08         | <b>66.0</b><br>2.60               | <b>69.0</b><br>2.72      | <b>2.0</b><br>0.08                  | <b>95.5</b><br>3.76  | <b>91.0</b><br>3.58  | <b>1.40</b><br>0.06 | <b>2.80</b><br>0.11 | <b>39.5</b>    | <b>22.5</b>    | <b>0.0922</b>  | <b>0.60</b><br>1.32  |
| <b>25.400</b><br>1.0000 | <b>19.050</b><br>0.7500 | <b>-0.8</b><br>-0.03  | <b>3.5</b><br>0.14         | <b>68.0</b><br>2.68               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>103.0</b><br>4.06 | <b>96.0</b><br>3.78  | <b>2.20</b><br>0.08 | <b>1.40</b><br>0.05 | <b>70.3</b>    | <b>25.8</b>    | <b>0.1112</b>  | <b>0.98</b><br>2.16  |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

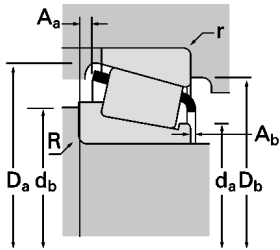
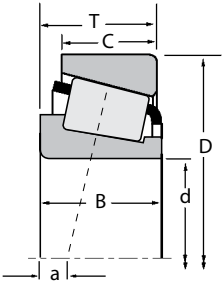
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 60.000<br>2.3622        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29582       | 29520    |
| 60.000<br>2.3622        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29582       | 29522    |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 397         | 394A     |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 397         | 394AS    |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29580       | 29521    |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 38.000<br>1.4961 | 183000<br>41200        | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800 | XAA33212    | Y33212   |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 38.000<br>1.4961 | 183000<br>41200        | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800 | XAB-33212   | Y33212   |
| 60.000<br>2.3622        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3977        | 3920     |
| 60.000<br>2.3622        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3977        | 3925     |
| 60.000<br>2.3622        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 476         | 472      |
| 60.000<br>2.3622        | 122.238<br>4.8125 | 33.338<br>1.3125 | 143000<br>32200        | 0.67 | 0.90 | 37100<br>8340          | 42300<br>9500    | 0.88 | 178000<br>39900 | 66585       | 66520    |
| 60.000<br>2.3622        | 125.000<br>4.9213 | 37.000<br>1.4567 | 159000<br>35800        | 0.82 | 0.73 | 41200<br>9270          | 57900<br>13000   | 0.71 | 210000<br>47100 | JW6049      | JW6010   |
| 60.325<br>2.3750        | 100.000<br>3.9370 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500 | 28985       | 28921    |
| 60.325<br>2.3750        | 100.000<br>3.9370 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500 | 28985       | 28921A   |
| 60.325<br>2.3750        | 101.600<br>4.0000 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500 | 28985       | 28920    |
| 60.325<br>2.3750        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3980        | 3920     |
| 60.325<br>2.3750        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3980        | 3925     |
| 60.325<br>2.3750        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212044    | HM212010 |
| 60.325<br>2.3750        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212044    | HM212011 |
| 60.325<br>2.3750        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5582        | 5535     |
| 60.325<br>2.3750        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5583        | 5535     |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 558         | 552      |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 558         | 552A     |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 558A        | 552A     |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813841A   | HM813811 |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813841    | HM813810 |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813841    | HM813811 |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700 | 65237       | 65500    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                | Cage           |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 0.8<br>0.03                | 68.0<br>2.68                      | 69.0<br>2.72             | 3.3<br>0.13                         | 103.0<br>4.06  | 96.0<br>3.78   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 0.99<br>2.19        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 0.8<br>0.03                | 68.0<br>2.68                      | 69.0<br>2.72             | 0.8<br>0.03                         | 103.0<br>4.06  | 98.0<br>3.86   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 1.00<br>2.21        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 0.8<br>0.03                | 68.0<br>2.68                      | 69.0<br>2.72             | 1.3<br>0.05                         | 105.0<br>4.13  | 101.0<br>3.98  | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.90<br>1.98        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 0.8<br>0.03                | 68.0<br>2.68                      | 69.0<br>2.72             | 3.3<br>0.13                         | 104.5<br>4.11  | 99.0<br>3.90   | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.88<br>1.95        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 3.5<br>0.14                | 68.0<br>2.68                      | 75.0<br>2.95             | 1.3<br>0.05                         | 104.0<br>4.09  | 99.0<br>3.90   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 1.05<br>2.31        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | -9.9<br>-0.39    | 6.0<br>0.24                | 68.0<br>2.68                      | 85.0<br>3.35             | 1.5<br>0.06                         | 105.0<br>4.13  | 98.0<br>3.86   | 4.00<br>0.16   | 2.50<br>0.10   | 76.2           | 18.1           | 0.0758         | 1.53<br>3.37        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | -9.9<br>-0.39    | 5.0<br>0.20                | 68.0<br>2.68                      | 83.0<br>3.27             | 1.5<br>0.06                         | 105.0<br>4.13  | 98.0<br>3.86   | 4.00<br>0.16   | 2.50<br>0.10   | 76.2           | 18.1           | 0.0758         | 1.53<br>3.37        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 68.0<br>2.68                      | 74.0<br>2.91             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.30<br>2.88        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 68.0<br>2.68                      | 74.0<br>2.91             | 0.8<br>0.03                         | 106.0<br>4.17  | 101.0<br>3.98  | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.32<br>2.91        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 2.0<br>0.08                | 69.0<br>2.72                      | 73.0<br>2.87             | 2.0<br>0.08                         | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.54<br>3.40        |
| 31.750<br>1.2500 | 23.812<br>0.9375 | 2.0<br>0.08      | 3.5<br>0.14                | 73.0<br>2.87                      | 79.0<br>3.11             | 3.3<br>0.13                         | 116.0<br>4.57  | 105.0<br>4.13  | 5.20<br>0.21   | 2.00<br>0.08   | 57             | 18.3           | 0.0797         | 1.63<br>3.59        |
| 33.500<br>1.3189 | 26.000<br>1.0236 | 4.8<br>0.19      | 3.0<br>0.12                | 72.0<br>2.83                      | 89.0<br>3.50             | 3.0<br>0.12                         | 119.0<br>4.69  | 104.0<br>4.09  | 6.00<br>0.24   | 4.00<br>0.16   | 64.1           | 18.5           | 0.0883         | 2.02<br>4.46        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10    | 3.5<br>0.14                | 67.0<br>2.64                      | 73.0<br>2.87             | 3.3<br>0.13                         | 96.0<br>3.78   | 89.0<br>3.50   | 2.00<br>0.08   | 1.40<br>0.05   | 60.1           | 24.5           | 0.1032         | 0.75<br>1.65        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10    | 3.5<br>0.14                | 67.0<br>2.64                      | 73.0<br>2.87             | 0.8<br>0.03                         | 96.0<br>3.78   | 91.0<br>3.58   | 2.00<br>0.08   | 1.40<br>0.05   | 60.1           | 24.5           | 0.1032         | 0.76<br>1.68        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10    | 3.5<br>0.14                | 67.0<br>2.64                      | 73.0<br>2.87             | 3.3<br>0.13                         | 97.0<br>3.82   | 90.0<br>3.54   | 2.00<br>0.08   | 1.40<br>0.05   | 60.1           | 24.5           | 0.1032         | 0.79<br>1.74        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 68.0<br>2.68                      | 75.0<br>2.95             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.30<br>2.86        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 68.0<br>2.68                      | 75.0<br>2.95             | 0.8<br>0.03                         | 106.0<br>4.17  | 101.0<br>3.98  | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.31<br>2.89        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 8.0<br>0.31                | 70.0<br>2.76                      | 85.0<br>3.35             | 1.5<br>0.06                         | 116.0<br>4.57  | 110.0<br>4.33  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 2.02<br>4.46        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 8.0<br>0.31                | 70.0<br>2.76                      | 85.0<br>3.35             | 3.3<br>0.13                         | 116.0<br>4.57  | 108.0<br>4.25  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 2.02<br>4.45        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 0.8<br>0.03                | 72.0<br>2.83                      | 73.0<br>2.87             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110            | 24.2           | 0.0825         | 2.40<br>5.30        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110            | 24.2           | 0.0825         | 2.39<br>5.28        |
| 36.678<br>1.4440 | 33.338<br>1.3125 | -9.4<br>-0.37    | 2.3<br>0.09                | 69.0<br>2.72                      | 73.0<br>2.87             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.12<br>4.67        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 2.3<br>0.09                | 69.0<br>2.72                      | 73.0<br>2.87             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.07<br>4.57        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                | 69.0<br>2.72                      | 76.0<br>2.99             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.07<br>4.55        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 1.5<br>0.06                | 76.0<br>2.99                      | 78.0<br>3.07             | 1.5<br>0.06                         | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.18<br>4.81        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 76.5<br>3.02                      | 83.0<br>3.27             | 3.3<br>0.13                         | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.18<br>4.80        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 76.5<br>3.02                      | 83.0<br>3.27             | 1.5<br>0.06                         | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.18<br>4.80        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37    | 3.5<br>0.14                | 71.0<br>2.80                      | 82.0<br>3.23             | 3.3<br>0.13                         | 119.0<br>4.69  | 107.0<br>4.21  | 4.10<br>0.16   | 1.00<br>0.04   | 83.2           | 17.2           | 0.0827         | 2.59<br>5.70        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

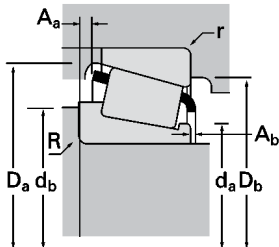
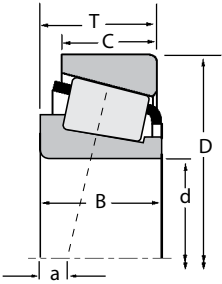
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           |             | Inner    | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>   |             |          |       |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65237       | 65501    |       |
| 60.325<br>2.3750        | 127.000<br>5.0000 | 44.450<br>1.7500 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65237A      | 65500    |       |
| 60.325<br>2.3750        | 130.175<br>5.1250 | 36.512<br>1.4375 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911245    | HM911210 |       |
| 60.325<br>2.3750        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 637         | 633      |       |
| 60.325<br>2.3750        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6376        | 6320     |       |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600  | 78238C      | 78537    |       |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 637         | 632      |       |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 46.038<br>1.8125 | 225000<br>50700        | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65237       | 65537    |       |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715332     | H715311  |       |
| 60.325<br>2.3750        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715332     | H715310  |       |
| 60.325<br>2.3750        | 140.030<br>5.5130 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600  | 78238C      | 78551    |       |
| 60.325<br>2.3750        | 152.400<br>6.0000 | 52.705<br>2.0750 | 328000<br>73700        | 0.49 | 1.23 | 85000<br>19100         | 70900<br>15900   | 1.20 | 451000<br>101000 | HH814542    | HH814510 |       |
| 61.912<br>2.4375        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100  | 392         | 394A     |       |
| 61.912<br>2.4375        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100  | 392         | 3920     |       |
| 61.912<br>2.4375        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 554         | 552A     |       |
| 61.912<br>2.4375        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813843    | HM813810 |       |
| 61.912<br>2.4375        | 130.175<br>5.1250 | 36.512<br>1.4375 | 154000<br>34700        | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911249    | HM911210 |       |
| 61.912<br>2.4375        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715334     | H715311  |       |
| 61.912<br>2.4375        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715334     | H715310  |       |
| 61.912<br>2.4375        | 146.050<br>5.7500 | 41.275<br>1.6250 | 213000<br>47900        | 0.78 | 0.77 | 55200<br>12400         | 74000<br>16600   | 0.75 | 256000<br>57500  | H913842     | H913810  |       |
| 61.912<br>2.4375        | 146.050<br>5.7500 | 41.275<br>1.6250 | 213000<br>47900        | 0.78 | 0.77 | 55200<br>12400         | 74000<br>16600   | 0.75 | 256000<br>57500  | H913843     | H913810  |       |
| 61.912<br>2.4375        | 152.400<br>6.0000 | 47.625<br>1.8750 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700  | 9180        | 9121     |       |
| 61.912<br>2.4375        | 152.400<br>6.0000 | 47.625<br>1.8750 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700  | 9181        | 9121     |       |
| 61.912<br>2.4375        | 158.750<br>6.2500 | 50.800<br>2.0000 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700  | 9180        | 9120     |       |
| 61.912<br>2.4375        | 158.750<br>6.2500 | 50.800<br>2.0000 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700  | 9181        | 9120     |       |
| 61.912<br>2.4375        | 158.750<br>6.2500 | 55.562<br>2.1875 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700  | 9178        | 9120     |       |
| 61.976<br>2.4400        | 99.979<br>3.9362  | 23.812<br>0.9375 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500  | 28990       | 28919    |       |
| 62.738<br>2.4700        | 100.000<br>3.9370 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500  | 28995       | 28921    |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37    | 3.5<br>0.14                | 71.0<br>2.80                      | 82.0<br>3.23             | 1.3<br>0.05                         | 119.0<br>4.69  | 108.0<br>4.25  | 4.10<br>0.16   | 1.00<br>0.04   | 83.2           | 17.2           | 0.0827         | 2.60<br>5.73        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37    | 1.5<br>0.06                | 71.0<br>2.80                      | 78.0<br>3.07             | 3.3<br>0.13                         | 119.0<br>4.69  | 107.0<br>4.21  | 4.10<br>0.16   | 1.00<br>0.04   | 83.2           | 17.2           | 0.0827         | 2.59<br>5.72        |
| 33.338<br>1.3125 | 23.812<br>0.9375 | 5.3<br>0.21      | 5.0<br>0.20                | 74.5<br>2.93                      | 87.0<br>3.43             | 3.3<br>0.13                         | 123.5<br>4.87  | 109.0<br>4.29  | 7.40<br>0.29   | 4.20<br>0.17   | 56.4           | 16.5           | 0.0842         | 2.06<br>4.55        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 124.0<br>4.88  | 116.0<br>4.57  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.59<br>5.71        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 3.5<br>0.14                | 74.0<br>2.91                      | 81.0<br>3.19             | 3.3<br>0.13                         | 126.0<br>4.96  | 117.0<br>4.61  | 4.00<br>0.16   | 0.50<br>0.02   | 124            | 22.4           | 0.0827         | 3.82<br>8.43        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 8.4<br>0.33      | 5.0<br>0.20                | 77.5<br>3.05                      | 91.0<br>3.58             | 3.3<br>0.13                         | 130.0<br>5.12  | 115.0<br>4.53  | 6.40<br>0.25   | 4.90<br>0.19   | 71.3           | 17.6           | 0.0926         | 2.44<br>5.37        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.93<br>6.47        |
| 44.450<br>1.7500 | 36.512<br>1.4375 | -9.4<br>-0.37    | 3.5<br>0.14                | 71.0<br>2.80                      | 82.0<br>3.23             | 3.0<br>0.12                         | 120.0<br>4.72  | 112.0<br>4.41  | 4.10<br>0.16   | 1.00<br>0.04   | 83.2           | 17.2           | 0.0827         | 3.22<br>7.10        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 80.0<br>3.15                      | 86.0<br>3.39             | 3.3<br>0.13                         | 132.0<br>5.20  | 118.0<br>4.65  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.52<br>7.77        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 80.0<br>3.15                      | 86.0<br>3.39             | 3.3<br>0.13                         | 133.0<br>5.24  | 120.0<br>4.72  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.71<br>8.17        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 8.4<br>0.33      | 5.0<br>0.20                | 77.5<br>3.05                      | 91.0<br>3.58             | 2.3<br>0.09                         | 132.0<br>5.20  | 117.0<br>4.61  | 6.40<br>0.25   | 4.90<br>0.19   | 71.3           | 17.6           | 0.0926         | 2.59<br>5.71        |
| 52.705<br>2.0750 | 41.275<br>1.6250 | -10.9<br>-0.43   | 3.5<br>0.14                | 83.0<br>3.27                      | 89.0<br>3.50             | 3.3<br>0.13                         | 143.0<br>5.63  | 130.0<br>5.12  | 4.10<br>0.16   | 2.40<br>0.10   | 136            | 24.6           | 0.0973         | 5.02<br>11.06       |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 0.8<br>0.03                | 69.0<br>2.72                      | 70.0<br>2.76             | 1.3<br>0.05                         | 105.0<br>4.13  | 101.0<br>3.98  | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 0.87<br>1.91        |
| 21.996<br>0.8660 | 23.812<br>0.9375 | -0.8<br>-0.03    | 0.8<br>0.03                | 69.0<br>2.72                      | 70.0<br>2.76             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 1.05<br>2.31        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                | 71.0<br>2.80                      | 77.0<br>3.03             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.02<br>4.46        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 78.0<br>3.07                      | 85.0<br>3.35             | 3.3<br>0.13                         | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.13<br>4.71        |
| 33.338<br>1.3125 | 23.812<br>0.9375 | 5.3<br>0.21      | 3.5<br>0.14                | 74.0<br>2.91                      | 91.0<br>3.58             | 3.3<br>0.13                         | 123.5<br>4.87  | 109.0<br>4.29  | 7.40<br>0.29   | 4.20<br>0.17   | 56.4           | 16.5           | 0.0842         | 2.03<br>4.48        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 81.0<br>3.19                      | 87.0<br>3.43             | 3.3<br>0.13                         | 132.0<br>5.20  | 118.0<br>4.65  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.47<br>7.65        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 81.0<br>3.19                      | 87.0<br>3.43             | 3.3<br>0.13                         | 133.0<br>5.24  | 120.0<br>4.72  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.65<br>8.05        |
| 39.688<br>1.5625 | 25.400<br>1.0000 | 4.3<br>0.17      | 3.5<br>0.14                | 82.5<br>3.24                      | 90.0<br>3.54             | 3.3<br>0.13                         | 138.0<br>5.43  | 124.0<br>4.88  | 8.20<br>0.32   | 3.60<br>0.14   | 78.5           | 17.3           | 0.0927         | 3.12<br>6.87        |
| 39.688<br>1.5625 | 25.400<br>1.0000 | 4.3<br>0.17      | 7.0<br>0.28                | 82.5<br>3.24                      | 97.0<br>3.82             | 3.3<br>0.13                         | 138.0<br>5.43  | 124.0<br>4.88  | 8.20<br>0.32   | 3.60<br>0.14   | 78.5           | 17.3           | 0.0927         | 3.08<br>6.80        |
| 46.038<br>1.8125 | 31.750<br>1.2500 | -3.8<br>-0.15    | 3.5<br>0.14                | 81.5<br>3.20                      | 90.0<br>3.54             | 3.3<br>0.13                         | 145.0<br>5.71  | 130.0<br>5.12  | 8.10<br>0.32   | 4.00<br>0.16   | 87.6           | 13.7           | 0.0912         | 3.98<br>8.78        |
| 46.038<br>1.8125 | 31.750<br>1.2500 | -3.8<br>-0.15    | 0.8<br>0.03                | 81.5<br>3.20                      | 85.0<br>3.35             | 3.3<br>0.13                         | 145.0<br>5.71  | 130.0<br>5.12  | 8.10<br>0.32   | 4.00<br>0.16   | 87.6           | 13.7           | 0.0912         | 3.99<br>8.80        |
| 46.038<br>1.8125 | 34.925<br>1.3750 | -3.8<br>-0.15    | 3.5<br>0.14                | 81.5<br>3.20                      | 90.0<br>3.54             | 3.3<br>0.13                         | 146.0<br>5.75  | 131.0<br>5.16  | 8.10<br>0.32   | 4.00<br>0.16   | 87.6           | 13.7           | 0.0912         | 4.60<br>10.14       |
| 46.038<br>1.8125 | 34.925<br>1.3750 | -3.8<br>-0.15    | 0.8<br>0.03                | 81.5<br>3.20                      | 85.0<br>3.35             | 3.3<br>0.13                         | 146.0<br>5.75  | 131.0<br>5.16  | 8.10<br>0.32   | 4.00<br>0.16   | 87.6           | 13.7           | 0.0912         | 4.61<br>10.17       |
| 52.388<br>2.0625 | 34.925<br>1.3750 | -8.4<br>-0.33    | 3.5<br>0.14                | 81.5<br>3.20                      | 90.0<br>3.54             | 3.3<br>0.13                         | 146.0<br>5.75  | 131.0<br>5.16  | 12.90<br>0.51  | 2.40<br>0.10   | 87.6           | 13.7           | 0.0912         | 4.86<br>10.71       |
| 24.608<br>0.9688 | 19.050<br>0.7500 | -1.8<br>-0.07    | 2.0<br>0.08                | 68.0<br>2.68                      | 72.0<br>2.83             | 1.5<br>0.06                         | 96.0<br>3.78   | 90.0<br>3.54   | 1.20<br>0.05   | 1.40<br>0.05   | 60.1           | 24.5           | 0.1032         | 0.71<br>1.56        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10    | 3.5<br>0.14                | 69.0<br>2.72                      | 75.0<br>2.95             | 3.3<br>0.13                         | 96.0<br>3.78   | 89.0<br>3.50   | 2.00<br>0.08   | 1.40<br>0.05   | 60.1           | 24.5           | 0.1032         | 0.70<br>1.55        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

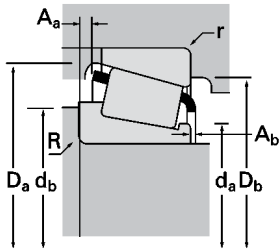
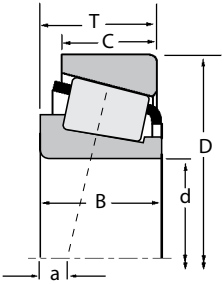
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 62.738<br>2.4700        | 101.600<br>4.0000 | 25.400<br>1.0000 | 98200<br>22100         | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500 | 28995       | 28920    |
| 63.500<br>2.5000        | 92.075<br>3.6250  | 13.495<br>0.5313 | 35800<br>8060          | 0.41 | 1.48 | 9290<br>2090           | 6450<br>1450     | 1.44 | 53300<br>12000  | LL510749    | LL510710 |
| 63.500<br>2.5000        | 94.458<br>3.7188  | 19.050<br>0.7500 | 62000<br>13900         | 0.42 | 1.41 | 16100<br>3620          | 11700<br>2630    | 1.38 | 108000<br>24300 | L610549     | L610510  |
| 63.500<br>2.5000        | 104.775<br>4.1250 | 21.433<br>0.8438 | 89600<br>20100         | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000 | 39250       | 39412    |
| 63.500<br>2.5000        | 107.158<br>4.2188 | 22.000<br>0.8661 | 89600<br>20100         | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000 | 39250       | 39422    |
| 63.500<br>2.5000        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29585       | 29520    |
| 63.500<br>2.5000        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29585       | 29522    |
| 63.500<br>2.5000        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29586       | 29520    |
| 63.500<br>2.5000        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29586       | 29522    |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395         | 394      |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390A        | 394A     |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390A        | 394AS    |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395         | 394A     |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395         | 394AS    |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29585       | 29521    |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29586       | 29521    |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 29.370<br>1.1563 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3982X       | 3927AS   |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3982        | 3927X    |
| 63.500<br>2.5000        | 110.058<br>4.3330 | 22.000<br>0.8661 | 89600<br>20100         | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000 | 39250       | 39433    |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395         | 3920     |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 390A        | 3920     |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3982        | 3920     |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3982        | 3925     |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39585       | 39520    |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39585A      | 39520    |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 33.338<br>1.3125 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3982        | 3926     |
| 63.500<br>2.5000        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33251       | 33462    |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 477         | 472A     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.400  | 19.845 | -2.5             | 3.5                                            | 69.0                                       | 75.0                                       | 3.3                                          | 97.0           | 90.0           | 2.00           | 1.40           | 60.1           | 24.5           | 0.1032         | 0.74                |
| 1.0000  | 0.7813 | -0.10            | 0.14                                           | 2.72                                       | 2.95                                       | 0.13                                         | 3.82           | 3.54           | 0.08           | 0.05           |                |                |                | 1.64                |
| 12.700  | 9.525  | 3.0              | 1.5                                            | 68.0                                       | 70.0                                       | 1.5                                          | 88.0           | 86.0           | 0.60           | 1.80           | 33.9           | 45.9           | 0.0827         | 0.26                |
| 0.5000  | 0.3750 | 0.12             | 0.06                                           | 2.68                                       | 2.76                                       | 0.06                                         | 3.46           | 3.39           | 0.02           | 0.07           |                |                |                | 0.58                |
| 19.050  | 15.083 | 0.5              | 1.5                                            | 69.0                                       | 71.0                                       | 1.5                                          | 91.0           | 86.0           | 0.90           | 1.40           | 56.7           | 43.6           | 0.1006         | 0.45                |
| 0.7500  | 0.5938 | 0.02             | 0.06                                           | 2.72                                       | 2.80                                       | 0.06                                         | 3.58           | 3.39           | 0.04           | 0.06           |                |                |                | 0.99                |
| 22.000  | 15.875 | -1.5             | 2.0                                            | 69.0                                       | 73.0                                       | 2.0                                          | 100.0          | 96.0           | 1.70           | 2.30           | 51.7           | 19.5           | 0.0947         | 0.68                |
| 0.8661  | 0.6250 | -0.06            | 0.08                                           | 2.72                                       | 2.87                                       | 0.08                                         | 3.94           | 3.78           | 0.07           | 0.09           |                |                |                | 1.51                |
| 22.000  | 21.204 | -1.5             | 2.0                                            | 69.0                                       | 73.0                                       | 2.3                                          | 102.0          | 97.0           | 1.70           | 2.30           | 51.7           | 19.5           | 0.0947         | 0.78                |
| 0.8661  | 0.8348 | -0.06            | 0.08                                           | 2.72                                       | 2.87                                       | 0.09                                         | 4.02           | 3.82           | 0.07           | 0.09           |                |                |                | 1.72                |
| 25.400  | 19.050 | -0.8             | 3.5                                            | 71.0                                       | 77.0                                       | 3.3                                          | 103.0          | 96.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.91                |
| 1.0000  | 0.7500 | -0.03            | 0.14                                           | 2.80                                       | 3.03                                       | 0.13                                         | 4.06           | 3.78           | 0.08           | 0.05           |                |                |                | 2.02                |
| 25.400  | 19.050 | -0.8             | 3.5                                            | 71.0                                       | 77.0                                       | 0.8                                          | 103.0          | 98.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.93                |
| 1.0000  | 0.7500 | -0.03            | 0.14                                           | 2.80                                       | 3.03                                       | 0.03                                         | 4.06           | 3.86           | 0.08           | 0.05           |                |                |                | 2.04                |
| 25.400  | 19.050 | -0.8             | 1.5                                            | 71.0                                       | 73.0                                       | 3.3                                          | 103.0          | 96.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.92                |
| 1.0000  | 0.7500 | -0.03            | 0.06                                           | 2.80                                       | 2.87                                       | 0.13                                         | 4.06           | 3.78           | 0.08           | 0.05           |                |                |                | 2.03                |
| 25.400  | 19.050 | -0.8             | 1.5                                            | 71.0                                       | 73.0                                       | 0.8                                          | 103.0          | 98.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.94                |
| 1.0000  | 0.7500 | -0.03            | 0.06                                           | 2.80                                       | 2.87                                       | 0.03                                         | 4.06           | 3.86           | 0.08           | 0.05           |                |                |                | 2.06                |
| 21.996  | 22.000 | -0.8             | 3.5                                            | 70.0                                       | 77.0                                       | 0.8                                          | 106.0          | 101.0          | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 0.85                |
| 0.8660  | 0.8661 | -0.03            | 0.14                                           | 2.76                                       | 3.03                                       | 0.03                                         | 4.18           | 3.98           | 0.07           | 0.08           |                |                |                | 1.87                |
| 21.996  | 18.825 | -0.8             | 1.5                                            | 70.0                                       | 73.0                                       | 1.3                                          | 105.0          | 101.0          | 1.70           | 2.30           | 56             | 21.4           | 0.0984         | 0.84                |
| 0.8660  | 0.7411 | -0.03            | 0.06                                           | 2.76                                       | 2.87                                       | 0.05                                         | 4.13           | 3.98           | 0.07           | 0.09           |                |                |                | 1.85                |
| 21.996  | 18.825 | -0.8             | 1.5                                            | 70.0                                       | 73.0                                       | 3.3                                          | 104.5          | 99.0           | 1.70           | 2.30           | 56             | 21.4           | 0.0984         | 0.82                |
| 0.8660  | 0.7411 | -0.03            | 0.06                                           | 2.76                                       | 2.87                                       | 0.13                                         | 4.11           | 3.90           | 0.07           | 0.09           |                |                |                | 1.81                |
| 21.996  | 18.825 | -0.8             | 3.5                                            | 70.0                                       | 77.0                                       | 1.3                                          | 105.0          | 101.0          | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 0.83                |
| 0.8660  | 0.7411 | -0.03            | 0.14                                           | 2.76                                       | 3.03                                       | 0.05                                         | 4.13           | 3.98           | 0.07           | 0.08           |                |                |                | 1.83                |
| 21.996  | 18.825 | -0.8             | 3.5                                            | 70.0                                       | 77.0                                       | 3.3                                          | 104.5          | 99.0           | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 0.81                |
| 0.8660  | 0.7411 | -0.03            | 0.14                                           | 2.76                                       | 3.03                                       | 0.13                                         | 4.11           | 3.90           | 0.07           | 0.08           |                |                |                | 1.80                |
| 25.400  | 19.050 | -0.8             | 3.5                                            | 71.0                                       | 77.0                                       | 1.3                                          | 104.0          | 99.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.98                |
| 1.0000  | 0.7500 | -0.03            | 0.14                                           | 2.80                                       | 3.03                                       | 0.05                                         | 4.09           | 3.90           | 0.08           | 0.05           |                |                |                | 2.16                |
| 25.400  | 19.050 | -0.8             | 1.5                                            | 71.0                                       | 73.0                                       | 1.3                                          | 104.0          | 99.0           | 2.20           | 1.40           | 70.3           | 25.8           | 0.1112         | 0.99                |
| 1.0000  | 0.7500 | -0.03            | 0.06                                           | 2.80                                       | 2.87                                       | 0.05                                         | 4.09           | 3.90           | 0.08           | 0.05           |                |                |                | 2.17                |
| 30.048  | 23.020 | -4.6             | 7.0                                            | 71.0                                       | 84.0                                       | 0.5                                          | 105.0          | 100.0          | 2.20           | 1.10           | 75.2           | 21.3           | 0.1092         | 1.10                |
| 1.1830  | 0.9063 | -0.18            | 0.28                                           | 2.80                                       | 3.31                                       | 0.02                                         | 4.13           | 3.94           | 0.09           | 0.04           |                |                |                | 2.42                |
| 30.048  | 23.812 | -4.6             | 3.5                                            | 71.0                                       | 77.0                                       | 3.3                                          | 105.0          | 99.0           | 2.20           | 1.10           | 75.2           | 21.3           | 0.1092         | 1.13                |
| 1.1830  | 0.9375 | -0.18            | 0.14                                           | 2.80                                       | 3.03                                       | 0.13                                         | 4.13           | 3.90           | 0.09           | 0.04           |                |                |                | 2.50                |
| 22.000  | 17.236 | -1.5             | 2.0                                            | 69.0                                       | 73.0                                       | 2.3                                          | 103.0          | 98.0           | 1.70           | 2.30           | 51.7           | 19.5           | 0.0947         | 0.81                |
| 0.8661  | 0.6786 | -0.06            | 0.08                                           | 2.72                                       | 2.87                                       | 0.09                                         | 4.06           | 3.86           | 0.07           | 0.09           |                |                |                | 1.80                |
| 21.996  | 23.812 | -0.8             | 3.5                                            | 70.0                                       | 77.0                                       | 3.3                                          | 106.0          | 99.0           | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 1.01                |
| 0.8660  | 0.9375 | -0.03            | 0.14                                           | 2.76                                       | 3.03                                       | 0.13                                         | 4.17           | 3.90           | 0.07           | 0.08           |                |                |                | 2.23                |
| 21.996  | 23.812 | -0.8             | 1.5                                            | 70.0                                       | 73.0                                       | 3.3                                          | 106.0          | 99.0           | 1.70           | 2.30           | 56             | 21.4           | 0.0984         | 1.02                |
| 0.8660  | 0.9375 | -0.03            | 0.06                                           | 2.76                                       | 2.87                                       | 0.13                                         | 4.17           | 3.90           | 0.07           | 0.09           |                |                |                | 2.24                |
| 30.048  | 23.812 | -4.6             | 3.5                                            | 71.0                                       | 77.0                                       | 3.3                                          | 106.0          | 99.0           | 2.20           | 1.10           | 75.2           | 21.3           | 0.1092         | 1.22                |
| 1.1830  | 0.9375 | -0.18            | 0.14                                           | 2.80                                       | 3.03                                       | 0.13                                         | 4.17           | 3.90           | 0.09           | 0.04           |                |                |                | 2.70                |
| 30.048  | 23.812 | -4.6             | 3.5                                            | 71.0                                       | 77.0                                       | 0.8                                          | 106.0          | 101.0          | 2.20           | 1.10           | 75.2           | 21.3           | 0.1092         | 1.24                |
| 1.1830  | 0.9375 | -0.18            | 0.14                                           | 2.80                                       | 3.03                                       | 0.03                                         | 4.17           | 3.98           | 0.09           | 0.04           |                |                |                | 2.73                |
| 30.162  | 23.812 | -6.6             | 3.5                                            | 71.0                                       | 77.0                                       | 3.3                                          | 107.0          | 101.0          | 1.60           | 2.60           | 84.3           | 23.7           | 0.1074         | 1.23                |
| 1.1875  | 0.9375 | -0.26            | 0.14                                           | 2.80                                       | 3.03                                       | 0.13                                         | 4.21           | 3.98           | 0.06           | 0.10           |                |                |                | 2.72                |
| 30.162  | 23.812 | -6.6             | 0.8                                            | 71.0                                       | 72.0                                       | 3.3                                          | 107.0          | 101.0          | 1.60           | 2.60           | 84.3           | 23.7           | 0.1074         | 1.24                |
| 1.1875  | 0.9375 | -0.26            | 0.03                                           | 2.80                                       | 2.83                                       | 0.13                                         | 4.21           | 3.98           | 0.06           | 0.10           |                |                |                | 2.74                |
| 30.048  | 26.988 | -4.6             | 3.5                                            | 71.0                                       | 77.0                                       | 3.3                                          | 106.0          | 98.0           | 2.20           | 1.10           | 75.2           | 21.3           | 0.1092         | 1.31                |
| 1.1830  | 1.0625 | -0.18            | 0.14                                           | 2.80                                       | 3.03                                       | 0.13                                         | 4.17           | 3.86           | 0.09           | 0.04           |                |                |                | 2.89                |
| 30.162  | 23.812 | -2.8             | 0.8                                            | 72.0                                       | 73.0                                       | 3.3                                          | 112.0          | 104.0          | 2.30           | 1.10           | 84.2           | 25.9           | 0.1162         | 1.42                |
| 1.1875  | 0.9375 | -0.11            | 0.03                                           | 2.83                                       | 2.87                                       | 0.13                                         | 4.41           | 4.09           | 0.09           | 0.04           |                |                |                | 3.13                |
| 29.007  | 23.444 | -4.1             | 0.8                                            | 72.0                                       | 73.0                                       | 3.3                                          | 114.0          | 106.0          | 1.50           | 2.20           | 77.2           | 23             | 0.1083         | 1.44                |
| 1.1420  | 0.9230 | -0.16            | 0.03                                           | 2.83                                       | 2.87                                       | 0.13                                         | 4.49           | 4.17           | 0.06           | 0.08           |                |                |                | 3.17                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

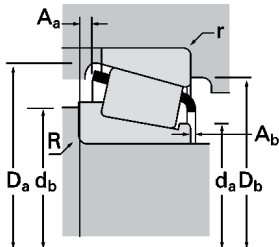
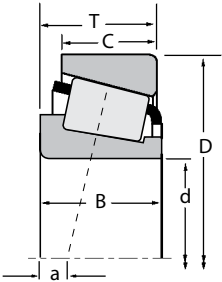
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 483         | 472A     |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 477         | 472      |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 477         | 473      |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 483         | 472      |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212046    | HM212010 |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212046    | HM212011 |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212047    | HM212010 |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212047    | HM212011 |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5564        | 5535     |
| 63.500<br>2.5000        | 122.238<br>4.8125 | 43.658<br>1.7188 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5584        | 5535     |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 30.162<br>1.1875 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 483         | 472X     |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 559         | 552      |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 559         | 552A     |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900 | 565         | 563      |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813842A   | HM813810 |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813842    | HM813810 |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813842    | HM813811 |
| 63.500<br>2.5000        | 130.000<br>5.1181 | 36.937<br>1.4542 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900 | 565         | 562X     |
| 63.500<br>2.5000        | 130.000<br>5.1181 | 36.937<br>1.4542 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900 | 565-S       | 562X     |
| 63.500<br>2.5000        | 130.000<br>5.1181 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 639         | 633X     |
| 63.500<br>2.5000        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 639         | 633      |
| 63.500<br>2.5000        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6382        | 6320     |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 36.512<br>1.4375 | 158000<br>35600        | 0.87 | 0.69 | 41100<br>9230          | 60900<br>13700   | 0.67 | 193000<br>43400 | 78250       | 78537    |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 36.512<br>1.4375 | 185000<br>41500        | 0.87 | 0.69 | 47900<br>10800         | 71000<br>16000   | 0.67 | 234000<br>52600 | 78248C      | 78537    |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 639         | 632      |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 41.275<br>1.6250 | 252000<br>56700        | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400 | H414235     | H414210  |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 41.275<br>1.6250 | 252000<br>56700        | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400 | H414236     | H414210  |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715336     | H715311  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 29.007<br>1.1420 | 23.444<br>0.9230 | -4.1<br>-0.16    | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 114.0<br>4.49  | 106.0<br>4.17  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.43<br>3.15        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 0.8<br>0.03                | 72.0<br>2.83                      | 73.0<br>2.87             | 2.0<br>0.08                         | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.47<br>3.24        |
| 29.007<br>1.1420 | 29.000<br>1.1417 | -4.1<br>-0.16    | 0.8<br>0.03                | 72.0<br>2.83                      | 73.0<br>2.87             | 2.0<br>0.08                         | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.52<br>3.35        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 2.0<br>0.08                         | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.46<br>3.22        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 1.5<br>0.06                         | 116.0<br>4.57  | 110.0<br>4.33  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 1.95<br>4.29        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 3.3<br>0.13                         | 116.0<br>4.57  | 108.0<br>4.25  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 1.94<br>4.29        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 7.0<br>0.28                | 73.0<br>2.87                      | 87.0<br>3.43             | 1.5<br>0.06                         | 116.0<br>4.57  | 110.0<br>4.33  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 1.93<br>4.26        |
| 38.354<br>1.5100 | 29.718<br>1.1700 | -10.9<br>-0.43   | 7.0<br>0.28                | 73.0<br>2.87                      | 87.0<br>3.43             | 3.3<br>0.13                         | 116.0<br>4.57  | 108.0<br>4.25  | 2.20<br>0.09   | 3.00<br>0.12   | 92.2           | 18.1           | 0.0759         | 1.93<br>4.26        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 5.0<br>0.20                | 75.0<br>2.95                      | 84.0<br>3.31             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110            | 24.2           | 0.0825         | 2.28<br>5.02        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 3.5<br>0.14                | 75.0<br>2.95                      | 81.0<br>3.19             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110            | 24.2           | 0.0825         | 2.29<br>5.04        |
| 29.007<br>1.1420 | 24.605<br>0.9687 | -4.1<br>-0.16    | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 115.0<br>4.53  | 109.0<br>4.29  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.60<br>3.52        |
| 36.678<br>1.4440 | 33.338<br>1.3125 | -9.4<br>-0.37    | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 2.02<br>4.46        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 3.5<br>0.14                | 72.0<br>2.83                      | 78.0<br>3.07             | 3.3<br>0.13                         | 116.0<br>4.57  | 109.0<br>4.29  | 2.30<br>0.09   | 1.20<br>0.05   | 91             | 21.1           | 0.1108         | 1.98<br>4.36        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 3.3<br>0.13                         | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 2.08<br>4.59        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 0.8<br>0.03                | 78.0<br>3.07                      | 78.0<br>3.07             | 3.3<br>0.13                         | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.09<br>4.62        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 78.0<br>3.07                      | 84.0<br>3.31             | 3.3<br>0.13                         | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.09<br>4.61        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 78.0<br>3.07                      | 84.0<br>3.31             | 1.5<br>0.06                         | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 2.09<br>4.61        |
| 36.170<br>1.4240 | 29.000<br>1.1417 | -8.1<br>-0.32    | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 3.0<br>0.12                         | 121.0<br>4.76  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 2.24<br>4.93        |
| 36.170<br>1.4240 | 29.000<br>1.1417 | -8.1<br>-0.32    | 6.4<br>0.25                | 73.0<br>2.87                      | 85.0<br>3.35             | 3.0<br>0.12                         | 121.0<br>4.76  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 2.21<br>4.88        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 74.0<br>2.91                      | 81.0<br>3.19             | 3.0<br>0.12                         | 123.0<br>4.84  | 117.0<br>4.61  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.49<br>5.48        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 74.0<br>2.91                      | 81.0<br>3.19             | 3.3<br>0.13                         | 124.0<br>4.88  | 116.0<br>4.57  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.49<br>5.49        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 4.3<br>0.17                | 77.0<br>3.03                      | 84.0<br>3.31             | 3.3<br>0.13                         | 126.0<br>4.96  | 117.0<br>4.61  | 4.00<br>0.16   | 0.50<br>0.02   | 124            | 22.4           | 0.0827         | 3.68<br>8.12        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 7.9<br>0.31      | 2.3<br>0.09                | 78.5<br>3.10                      | 85.0<br>3.35             | 3.3<br>0.13                         | 130.0<br>5.12  | 115.0<br>4.53  | 6.90<br>0.27   | 4.10<br>0.16   | 62.6           | 19.1           | 0.0884         | 2.26<br>4.99        |
| 33.236<br>1.3085 | 23.520<br>0.9260 | 8.4<br>0.33      | 0.8<br>0.03                | 77.0<br>3.03                      | 92.0<br>3.62             | 3.3<br>0.13                         | 130.0<br>5.12  | 115.0<br>4.53  | 6.40<br>0.25   | 4.90<br>0.19   | 71.3           | 17.6           | 0.0926         | 2.38<br>5.24        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 74.0<br>2.91                      | 81.0<br>3.19             | 3.3<br>0.13                         | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.83<br>6.25        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -10.9<br>-0.43   | 3.5<br>0.14                | 78.0<br>3.07                      | 82.0<br>3.23             | 3.3<br>0.13                         | 129.0<br>5.08  | 121.0<br>4.76  | 3.70<br>0.15   | 3.00<br>0.12   | 113            | 22.8           | 0.0827         | 2.84<br>6.25        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -10.9<br>-0.43   | 7.0<br>0.28                | 78.0<br>3.07                      | 89.0<br>3.50             | 3.3<br>0.13                         | 129.0<br>5.08  | 121.0<br>4.76  | 3.70<br>0.15   | 3.00<br>0.12   | 113            | 22.8           | 0.0827         | 2.80<br>6.18        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 82.0<br>3.23                      | 88.0<br>3.46             | 3.3<br>0.13                         | 132.0<br>5.20  | 118.0<br>4.65  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.41<br>7.52        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

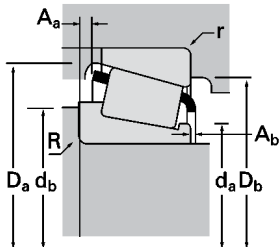
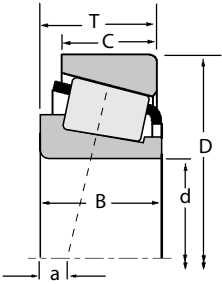
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 63.500<br>2.5000        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715336     | H715310   |
| 63.500<br>2.5000        | 140.030<br>5.5130 | 36.512<br>1.4375 | 158000<br>35600        | 0.87 | 0.69 | 41100<br>9230          | 60900<br>13700   | 0.67 | 193000<br>43400  | 78250       | 78551     |
| 63.500<br>2.5000        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6475        | 6420      |
| 63.500<br>2.5000        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 745-S       | 742       |
| 63.500<br>2.5000        | 177.800<br>7.0000 | 56.642<br>2.2300 | 352000<br>79200        | 0.80 | 0.75 | 91300<br>20500         | 125000<br>28000  | 0.73 | 413000<br>92900  | HH914447    | HH914412  |
| 64.960<br>2.5575        | 149.225<br>5.8750 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 656         | 652A      |
| 64.960<br>2.5575        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6464        | 6420      |
| 64.963<br>2.5576        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 569         | 563       |
| 64.987<br>2.5586        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29588       | 29520     |
| 64.987<br>2.5586        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300  | 39586       | 39520     |
| 64.987<br>2.5586        | 119.985<br>4.7238 | 32.751<br>1.2894 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300  | 39586       | 39528     |
| 64.987<br>2.5586        | 140.030<br>5.5130 | 36.512<br>1.4375 | 158000<br>35600        | 0.87 | 0.69 | 41100<br>9230          | 60900<br>13700   | 0.67 | 193000<br>43400  | 78255X      | 78551     |
| 64.987<br>2.5586        | 144.983<br>5.7080 | 36.000<br>1.4173 | 158000<br>35600        | 0.87 | 0.69 | 41100<br>9230          | 60900<br>13700   | 0.67 | 193000<br>43400  | 78255X      | 78571     |
| 65.000<br>2.5591        | 105.000<br>4.1339 | 24.000<br>0.9449 | 100000<br>22500        | 0.45 | 1.32 | 26000<br>5840          | 20200<br>4540    | 1.29 | 139000<br>31300  | JLM710949C  | JLM710910 |
| 65.000<br>2.5591        | 110.000<br>4.3307 | 28.000<br>1.1024 | 131000<br>29400        | 0.40 | 1.49 | 33900<br>7610          | 23300<br>5240    | 1.45 | 195000<br>43900  | JM511946    | JM511910  |
| 65.000<br>2.5591        | 112.712<br>4.4375 | 22.225<br>0.8750 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100  | 399         | 393A      |
| 65.000<br>2.5591        | 112.712<br>4.4375 | 29.020<br>1.1425 | 131000<br>29400        | 0.40 | 1.49 | 33900<br>7610          | 23300<br>5240    | 1.45 | 195000<br>43900  | JM511945    | 3920      |
| 65.000<br>2.5591        | 112.712<br>4.4375 | 29.020<br>1.1425 | 131000<br>29400        | 0.40 | 1.49 | 33900<br>7610          | 23300<br>5240    | 1.45 | 195000<br>43900  | JM511946    | 3920      |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 478         | 472A      |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 478         | 472       |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 478         | 473       |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 39.000<br>1.5354 | 207000<br>46400        | 0.34 | 1.78 | 53500<br>12000         | 30900<br>6950    | 1.73 | 283000<br>63600  | JH211749A   | JH211710  |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 39.000<br>1.5354 | 207000<br>46400        | 0.34 | 1.78 | 53500<br>12000         | 30900<br>6950    | 1.73 | 283000<br>63600  | JH211749    | JH211710  |
| 65.000<br>2.5591        | 123.825<br>4.8750 | 30.162<br>1.1875 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 478         | 472X      |
| 65.000<br>2.5591        | 140.000<br>5.5118 | 53.980<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | J6392       | J6327     |
| 65.088<br>2.5625        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6379        | 6320      |
| 65.088<br>2.5625        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715340     | H715311   |
| 65.088<br>2.5625        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715340     | H715310   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.)  |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|----------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                     | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                      |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                      |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>82.0</b><br>3.23               | <b>88.0</b><br>3.46      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>120.0</b><br>4.72 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.59</b><br>7.93  |
| <b>33.236</b><br>1.3085 | <b>23.520</b><br>0.9260 | <b>7.9</b><br>0.31    | <b>2.3</b><br>0.09         | <b>78.5</b><br>3.10               | <b>85.0</b><br>3.35      | <b>2.3</b><br>0.09                  | <b>132.0</b><br>5.20 | <b>117.0</b><br>4.61 | <b>6.90</b><br>0.27 | <b>4.10</b><br>0.16 | <b>62.6</b>    | <b>19.1</b>    | <b>0.0884</b>  | <b>2.42</b><br>5.32  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>3.5</b><br>0.14         | <b>80.0</b><br>3.15               | <b>86.0</b><br>3.39      | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03 | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>4.82</b><br>10.63 |
| <b>46.672</b><br>1.8375 | <b>36.512</b><br>1.4375 | <b>-11.9</b><br>-0.47 | <b>3.5</b><br>0.14         | <b>77.0</b><br>3.03               | <b>84.0</b><br>3.31      | <b>3.3</b><br>0.13                  | <b>142.0</b><br>5.59 | <b>134.0</b><br>5.28 | <b>1.90</b><br>0.07 | <b>1.20</b><br>0.05 | <b>160</b>     | <b>26.3</b>    | <b>0.0898</b>  | <b>4.16</b><br>9.16  |
| <b>53.975</b><br>2.1250 | <b>37.308</b><br>1.4688 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>85.5</b><br>3.36               | <b>105.0</b><br>4.13     | <b>3.3</b><br>0.13                  | <b>165.0</b><br>6.50 | <b>146.0</b><br>5.75 | <b>9.90</b><br>0.39 | <b>4.70</b><br>0.18 | <b>111</b>     | <b>17.7</b>    | <b>0.1044</b>  | <b>6.79</b><br>14.97 |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-7.9</b><br>-0.31  | <b>3.5</b><br>0.14         | <b>78.0</b><br>3.07               | <b>85.0</b><br>3.35      | <b>3.3</b><br>0.13                  | <b>141.0</b><br>5.55 | <b>132.0</b><br>5.20 | <b>4.50</b><br>0.18 | <b>2.00</b><br>0.08 | <b>137</b>     | <b>27.3</b>    | <b>0.0919</b>  | <b>3.58</b><br>7.88  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>3.5</b><br>0.14         | <b>81.0</b><br>3.19               | <b>87.0</b><br>3.43      | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03 | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>4.76</b><br>10.49 |
| <b>36.170</b><br>1.4240 | <b>28.575</b><br>1.1250 | <b>-8.1</b><br>-0.32  | <b>3.5</b><br>0.14         | <b>74.0</b><br>2.91               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>120.0</b><br>4.72 | <b>112.0</b><br>4.41 | <b>3.20</b><br>0.13 | <b>1.80</b><br>0.07 | <b>101</b>     | <b>24</b>      | <b>0.1167</b>  | <b>2.04</b><br>4.50  |
| <b>25.400</b><br>1.0000 | <b>19.050</b><br>0.7500 | <b>-0.8</b><br>-0.03  | <b>3.5</b><br>0.14         | <b>72.0</b><br>2.83               | <b>78.0</b><br>3.07      | <b>3.3</b><br>0.13                  | <b>103.0</b><br>4.06 | <b>96.0</b><br>3.78  | <b>2.20</b><br>0.08 | <b>1.40</b><br>0.05 | <b>70.3</b>    | <b>25.8</b>    | <b>0.1112</b>  | <b>0.88</b><br>1.95  |
| <b>30.925</b><br>1.2175 | <b>23.812</b><br>0.9375 | <b>-6.6</b><br>-0.26  | <b>2.3</b><br>0.09         | <b>72.0</b><br>2.83               | <b>76.0</b><br>2.99      | <b>3.3</b><br>0.13                  | <b>107.0</b><br>4.21 | <b>101.0</b><br>3.98 | <b>1.60</b><br>0.06 | <b>1.80</b><br>0.07 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.21</b><br>2.67  |
| <b>30.925</b><br>1.2175 | <b>26.950</b><br>1.0610 | <b>-6.6</b><br>-0.26  | <b>2.3</b><br>0.09         | <b>72.0</b><br>2.83               | <b>76.0</b><br>2.99      | <b>0.8</b><br>0.03                  | <b>110.0</b><br>4.33 | <b>107.0</b><br>4.21 | <b>1.60</b><br>0.06 | <b>1.80</b><br>0.07 | <b>84.3</b>    | <b>23.7</b>    | <b>0.1074</b>  | <b>1.56</b><br>3.43  |
| <b>32.923</b><br>1.2962 | <b>23.520</b><br>0.9260 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>79.0</b><br>3.11               | <b>89.0</b><br>3.50      | <b>2.3</b><br>0.09                  | <b>132.0</b><br>5.20 | <b>117.0</b><br>4.61 | <b>6.90</b><br>0.27 | <b>4.40</b><br>0.18 | <b>62.6</b>    | <b>19.1</b>    | <b>0.0884</b>  | <b>2.37</b><br>5.22  |
| <b>32.923</b><br>1.2962 | <b>23.007</b><br>0.9058 | <b>7.9</b><br>0.31    | <b>3.5</b><br>0.14         | <b>79.0</b><br>3.11               | <b>89.0</b><br>3.50      | <b>3.5</b><br>0.14                  | <b>132.0</b><br>5.20 | <b>118.0</b><br>4.65 | <b>6.90</b><br>0.27 | <b>4.40</b><br>0.18 | <b>62.6</b>    | <b>19.1</b>    | <b>0.0884</b>  | <b>2.52</b><br>5.56  |
| <b>23.000</b><br>0.9055 | <b>18.500</b><br>0.7283 | <b>-0.3</b><br>-0.01  | <b>3.0</b><br>0.12         | <b>72.0</b><br>2.83               | <b>78.0</b><br>3.07      | <b>1.0</b><br>0.04                  | <b>100.5</b><br>3.96 | <b>96.0</b><br>3.78  | <b>1.50</b><br>0.06 | <b>2.90</b><br>0.12 | <b>55.5</b>    | <b>22.4</b>    | <b>0.1023</b>  | <b>0.75</b><br>1.65  |
| <b>28.000</b><br>1.1024 | <b>22.500</b><br>0.8858 | <b>-3.3</b><br>-0.13  | <b>3.0</b><br>0.12         | <b>72.0</b><br>2.83               | <b>78.0</b><br>3.07      | <b>2.5</b><br>0.10                  | <b>105.0</b><br>4.13 | <b>99.0</b><br>3.90  | <b>1.20</b><br>0.05 | <b>1.90</b><br>0.08 | <b>76.3</b>    | <b>23.5</b>    | <b>0.1098</b>  | <b>1.05</b><br>2.32  |
| <b>21.996</b><br>0.8660 | <b>15.875</b><br>0.6250 | <b>-0.8</b><br>-0.03  | <b>2.0</b><br>0.08         | <b>71.0</b><br>2.80               | <b>75.0</b><br>2.95      | <b>3.3</b><br>0.13                  | <b>105.0</b><br>4.13 | <b>100.0</b><br>3.94 | <b>1.70</b><br>0.07 | <b>2.30</b><br>0.09 | <b>56</b>      | <b>21.4</b>    | <b>0.0984</b>  | <b>0.84</b><br>1.85  |
| <b>30.000</b><br>1.1811 | <b>23.812</b><br>0.9375 | <b>-3.3</b><br>-0.13  | <b>3.0</b><br>0.12         | <b>74.0</b><br>2.91               | <b>80.0</b><br>3.15      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>99.0</b><br>3.90  | <b>1.20</b><br>0.05 | <b>0.10</b><br>0.00 | <b>76.3</b>    | <b>23.5</b>    | <b>0.1098</b>  | <b>1.18</b><br>2.61  |
| <b>28.000</b><br>1.1024 | <b>23.812</b><br>0.9375 | <b>-3.3</b><br>-0.13  | <b>3.0</b><br>0.12         | <b>72.0</b><br>2.83               | <b>78.0</b><br>3.07      | <b>3.3</b><br>0.13                  | <b>106.0</b><br>4.17 | <b>99.0</b><br>3.90  | <b>1.20</b><br>0.05 | <b>1.90</b><br>0.08 | <b>76.3</b>    | <b>23.5</b>    | <b>0.1098</b>  | <b>1.16</b><br>2.56  |
| <b>29.007</b><br>1.1420 | <b>23.444</b><br>0.9230 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>73.0</b><br>2.87               | <b>77.0</b><br>3.03      | <b>3.3</b><br>0.13                  | <b>114.0</b><br>4.49 | <b>106.0</b><br>4.17 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.40</b><br>3.08  |
| <b>29.007</b><br>1.1420 | <b>24.237</b><br>0.9542 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>73.0</b><br>2.87               | <b>77.0</b><br>3.03      | <b>2.0</b><br>0.08                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.43</b><br>3.15  |
| <b>29.007</b><br>1.1420 | <b>29.000</b><br>1.1417 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>73.0</b><br>2.87               | <b>77.0</b><br>3.03      | <b>2.0</b><br>0.08                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.48</b><br>3.27  |
| <b>38.500</b><br>1.5157 | <b>32.000</b><br>1.2598 | <b>-10.7</b><br>-0.42 | <b>7.0</b><br>0.28         | <b>74.0</b><br>2.91               | <b>88.0</b><br>3.46      | <b>2.5</b><br>0.10                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.20</b><br>0.05 | <b>3.40</b><br>0.13 | <b>94</b>      | <b>22.5</b>    | <b>0.0764</b>  | <b>1.83</b><br>4.04  |
| <b>38.500</b><br>1.5157 | <b>32.000</b><br>1.2598 | <b>-10.7</b><br>-0.42 | <b>3.0</b><br>0.12         | <b>74.0</b><br>2.91               | <b>80.0</b><br>3.15      | <b>2.5</b><br>0.10                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.20</b><br>0.05 | <b>3.40</b><br>0.13 | <b>94</b>      | <b>22.5</b>    | <b>0.0764</b>  | <b>1.87</b><br>4.12  |
| <b>29.007</b><br>1.1420 | <b>24.605</b><br>0.9687 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>73.0</b><br>2.87               | <b>77.0</b><br>3.03      | <b>3.3</b><br>0.13                  | <b>115.0</b><br>4.53 | <b>109.0</b><br>4.29 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.57</b><br>3.46  |
| <b>56.000</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>3.0</b><br>0.12         | <b>77.0</b><br>3.04               | <b>83.0</b><br>3.27      | <b>3.3</b><br>0.13                  | <b>136.0</b><br>5.35 | <b>119.0</b><br>4.69 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>3.94</b><br>8.70  |
| <b>56.007</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>3.5</b><br>0.14         | <b>77.0</b><br>3.04               | <b>84.0</b><br>3.31      | <b>3.3</b><br>0.13                  | <b>126.0</b><br>4.96 | <b>117.0</b><br>4.61 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>3.62</b><br>7.98  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>83.0</b><br>3.27               | <b>89.0</b><br>3.50      | <b>3.3</b><br>0.13                  | <b>132.0</b><br>5.20 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.36</b><br>7.40  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>83.0</b><br>3.27               | <b>89.0</b><br>3.50      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>120.0</b><br>4.72 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.54</b><br>7.80  |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

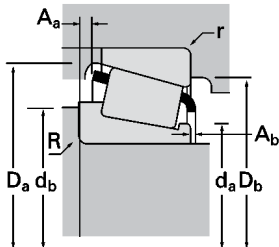
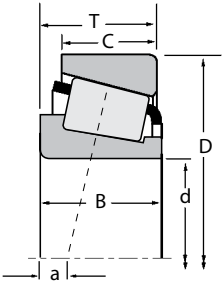




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |         |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|---------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | C <sub>0</sub>  | Inner       | Outer   |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |         |
| 65.883<br>2.5938        | 122.238<br>4.8125 | 43.655<br>1.7187 | 219000<br>49200        | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500 | 5595        | 5535    |
| 66.675<br>2.6250        | 103.213<br>4.0635 | 17.247<br>0.6790 | 64800<br>14600         | 0.49 | 1.23 | 16800<br>3780          | 14000<br>3150    | 1.20 | 89100<br>20000  | L812147     | L812111 |
| 66.675<br>2.6250        | 103.213<br>4.0635 | 17.602<br>0.6930 | 64800<br>14600         | 0.49 | 1.23 | 16800<br>3780          | 14000<br>3150    | 1.20 | 89100<br>20000  | L812148     | L812111 |
| 66.675<br>2.6250        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29590       | 29520   |
| 66.675<br>2.6250        | 107.950<br>4.2500 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29590       | 29522   |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395A        | 394     |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395A        | 394A    |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395-S       | 394     |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395-S       | 394A    |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395-S       | 394AS   |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 25.400<br>1.0000 | 102000<br>22900        | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300 | 29590       | 29521   |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3984        | 3927X   |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3994        | 3927X   |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 22.225<br>0.8750 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395A        | 393A    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395A        | 3920    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 395-S       | 3920    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 29.337<br>1.1550 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3992        | 3920    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3984        | 3920    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3984        | 3925    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3994        | 3920    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3994        | 3925    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39589       | 39520   |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39590       | 39520   |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39590       | 39521   |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 30.162<br>1.1875 | 155000<br>34700        | 0.34 | 1.77 | 40100<br>9010          | 23300<br>5230    | 1.72 | 224000<br>50300 | 39591       | 39520   |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 33.338<br>1.3125 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3984        | 3926    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 33.338<br>1.3125 | 129000<br>28900        | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000 | 3994        | 3926    |
| 66.675<br>2.6250        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33261       | 33462   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 3.5<br>0.14                | 77.0<br>3.03                      | 83.0<br>3.27             | 3.3<br>0.13                         | 116.0<br>4.57  | 106.0<br>4.17  | 2.50<br>0.10   | 1.20<br>0.05   | 110            | 24.2           | 0.0825         | 2.20<br>4.86        |
| 17.247<br>0.6790 | 11.989<br>0.4720 | 4.1<br>0.16      | 1.5<br>0.06                | 72.0<br>2.83                      | 75.0<br>2.95             | 0.8<br>0.03                         | 99.0<br>3.90   | 96.0<br>3.78   | 1.20<br>0.05   | 1.40<br>0.06   | 43.5           | 26.8           | 0.0958         | 0.50<br>1.10        |
| 17.602<br>0.6930 | 11.989<br>0.4720 | 3.6<br>0.14      | 1.5<br>0.06                | 72.0<br>2.83                      | 75.0<br>2.95             | 0.8<br>0.03                         | 99.0<br>3.90   | 96.0<br>3.78   | 1.60<br>0.06   | 1.40<br>0.06   | 43.5           | 26.8           | 0.0958         | 0.51<br>1.11        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 3.3<br>0.13                         | 103.0<br>4.06  | 96.0<br>3.78   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 0.85<br>1.87        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 0.8<br>0.03                         | 103.0<br>4.06  | 98.0<br>3.86   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 0.86<br>1.90        |
| 21.996<br>0.8660 | 22.000<br>0.8661 | -0.8<br>-0.03    | 0.8<br>0.03                | 73.0<br>2.87                      | 73.0<br>2.87             | 0.8<br>0.03                         | 106.0<br>4.18  | 101.0<br>3.98  | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 0.81<br>1.77        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 0.8<br>0.03                | 73.0<br>2.87                      | 73.0<br>2.87             | 1.3<br>0.05                         | 105.0<br>4.13  | 101.0<br>3.98  | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 0.78<br>1.73        |
| 21.996<br>0.8660 | 22.000<br>0.8661 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 79.0<br>3.11             | 0.8<br>0.03                         | 106.0<br>4.18  | 101.0<br>3.98  | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.80<br>1.77        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 79.0<br>3.11             | 1.3<br>0.05                         | 105.0<br>4.13  | 101.0<br>3.98  | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.78<br>1.72        |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 79.0<br>3.11             | 3.3<br>0.13                         | 104.5<br>4.11  | 99.0<br>3.90   | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.77<br>1.69        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 80.0<br>3.15             | 1.3<br>0.05                         | 104.0<br>4.09  | 99.0<br>3.90   | 2.20<br>0.08   | 1.40<br>0.05   | 70.3           | 25.8           | 0.1112         | 0.91<br>2.01        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 74.0<br>2.91                      | 80.0<br>3.15             | 3.3<br>0.13                         | 105.0<br>4.13  | 99.0<br>3.90   | 2.40<br>0.09   | 0.90<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.06<br>2.33        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 5.5<br>0.22                | 74.0<br>2.91                      | 84.0<br>3.31             | 3.3<br>0.13                         | 105.0<br>4.13  | 99.0<br>3.90   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.06<br>2.33        |
| 21.996<br>0.8660 | 15.875<br>0.6250 | -0.8<br>-0.03    | 0.8<br>0.03                | 73.0<br>2.87                      | 73.0<br>2.87             | 3.3<br>0.13                         | 105.0<br>4.13  | 100.0<br>3.94  | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 0.81<br>1.79        |
| 21.996<br>0.8660 | 23.812<br>0.9375 | -0.8<br>-0.03    | 0.8<br>0.03                | 73.0<br>2.87                      | 73.0<br>2.87             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 1.80<br>0.07   | 2.00<br>0.08   | 56             | 21.4           | 0.0984         | 0.97<br>2.13        |
| 21.996<br>0.8660 | 23.812<br>0.9375 | -0.8<br>-0.03    | 3.5<br>0.14                | 73.0<br>2.87                      | 79.0<br>3.11             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 1.70<br>0.07   | 2.30<br>0.09   | 56             | 21.4           | 0.0984         | 0.96<br>2.12        |
| 29.223<br>1.1505 | 23.812<br>0.9375 | -3.8<br>-0.15    | 5.5<br>0.22                | 75.0<br>2.95                      | 86.0<br>3.39             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 1.40<br>0.05   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.13<br>2.50        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 74.0<br>2.91                      | 80.0<br>3.15             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 2.40<br>0.09   | 0.90<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.15<br>2.53        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 3.5<br>0.14                | 74.0<br>2.91                      | 80.0<br>3.15             | 0.8<br>0.03                         | 106.0<br>4.17  | 101.0<br>3.98  | 2.40<br>0.09   | 0.90<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.16<br>2.56        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 5.5<br>0.22                | 74.0<br>2.91                      | 84.0<br>3.31             | 3.3<br>0.13                         | 106.0<br>4.17  | 99.0<br>3.90   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.15<br>2.53        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 5.5<br>0.22                | 74.0<br>2.91                      | 84.0<br>3.31             | 0.8<br>0.03                         | 106.0<br>4.17  | 101.0<br>3.98  | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.16<br>2.56        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 1.5<br>0.06                | 75.0<br>2.95                      | 78.0<br>3.07             | 3.3<br>0.13                         | 107.0<br>4.21  | 101.0<br>3.98  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.16<br>2.57        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 3.5<br>0.14                | 75.0<br>2.95                      | 82.0<br>3.23             | 3.3<br>0.13                         | 107.0<br>4.21  | 101.0<br>3.98  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.16<br>2.57        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 3.5<br>0.14                | 75.0<br>2.95                      | 82.0<br>3.23             | 0.8<br>0.03                         | 107.0<br>4.21  | 103.0<br>4.06  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.17<br>2.57        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -6.6<br>-0.26    | 5.5<br>0.22                | 74.0<br>2.91                      | 84.0<br>3.31             | 3.3<br>0.13                         | 107.0<br>4.21  | 101.0<br>3.98  | 1.60<br>0.06   | 2.60<br>0.10   | 84.3           | 23.7           | 0.1074         | 1.14<br>2.51        |
| 30.048<br>1.1830 | 26.988<br>1.0625 | -4.6<br>-0.18    | 3.5<br>0.14                | 74.0<br>2.91                      | 80.0<br>3.15             | 3.3<br>0.13                         | 106.0<br>4.17  | 98.0<br>3.86   | 2.40<br>0.09   | 0.90<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.23<br>2.72        |
| 30.048<br>1.1830 | 26.988<br>1.0625 | -4.6<br>-0.18    | 5.5<br>0.22                | 74.0<br>2.91                      | 84.0<br>3.31             | 3.3<br>0.13                         | 106.0<br>4.17  | 98.0<br>3.86   | 2.20<br>0.09   | 1.10<br>0.04   | 75.2           | 21.3           | 0.1092         | 1.24<br>2.72        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11    | 5.5<br>0.22                | 75.0<br>2.95                      | 85.0<br>3.35             | 3.3<br>0.13                         | 112.0<br>4.41  | 104.0<br>4.09  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 25.9           | 0.1162         | 1.32<br>2.90        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

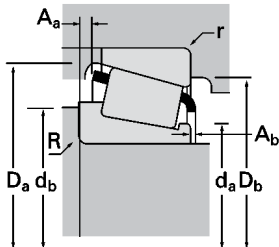
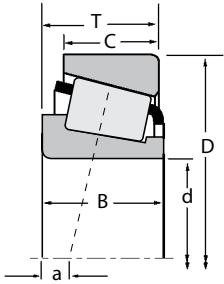
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 66.675<br>2.6250        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33262       | 33461    |
| 66.675<br>2.6250        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33262       | 33462    |
| 66.675<br>2.6250        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 479         | 472A     |
| 66.675<br>2.6250        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 479         | 472      |
| 66.675<br>2.6250        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33262       | 33472    |
| 66.675<br>2.6250        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212049    | HM212010 |
| 66.675<br>2.6250        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212049    | HM212011 |
| 66.675<br>2.6250        | 122.238<br>4.8125 | 38.100<br>1.5000 | 209000<br>46900        | 0.34 | 1.78 | 54100<br>12200         | 31300<br>7030    | 1.73 | 279000<br>62700 | HM212049X   | HM212010 |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 30.162<br>1.1875 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 479         | 472X     |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560         | 552      |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560         | 552A     |
| 66.675<br>2.6250        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813844    | HM813810 |
| 66.675<br>2.6250        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600 | HM813844    | HM813811 |
| 66.675<br>2.6250        | 129.944<br>5.1159 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560         | 553-SA   |
| 66.675<br>2.6250        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 641         | 633      |
| 66.675<br>2.6250        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6386        | 6320     |
| 66.675<br>2.6250        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6389        | 6320     |
| 66.675<br>2.6250        | 135.755<br>5.3447 | 53.975<br>2.1250 | 298000<br>66900        | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6386A       | 6320     |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600 | 495AA       | 493      |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 641         | 632      |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 41.275<br>1.6250 | 252000<br>56700        | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400 | H414242     | H414210  |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715341A    | H715311  |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715341     | H715311  |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715341     | H715311A |
| 66.675<br>2.6250        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715341     | H715310  |
| 66.675<br>2.6250        | 152.400<br>6.0000 | 53.975<br>2.1250 | 313000<br>70500        | 0.49 | 1.23 | 81300<br>18300         | 67800<br>15200   | 1.20 | 423000<br>95000 | HH814547    | HH814510 |
| 66.675<br>2.6250        | 177.800<br>7.0000 | 57.150<br>2.2500 | 352000<br>79200        | 0.80 | 0.75 | 91300<br>20500         | 125000<br>28000  | 0.73 | 413000<br>92900 | HH914449    | HH914412 |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 399A        | 394A     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                     | Factors        |                |                | Weight<br>kg (lbs.)  |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|---------------------|----------------|----------------|----------------|----------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                     |                |                |                |                      |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                      |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-2.8</b><br>-0.11  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>0.8</b><br>0.03                  | <b>112.0</b><br>4.41 | <b>106.0</b><br>4.17 | <b>2.30</b><br>0.09 | <b>1.10</b><br>0.04 | <b>84.2</b>    | <b>25.9</b>    | <b>0.1162</b>  | <b>1.35</b><br>2.97  |
| <b>30.162</b><br>1.1875 | <b>23.812</b><br>0.9375 | <b>-2.8</b><br>-0.11  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>112.0</b><br>4.41 | <b>104.0</b><br>4.09 | <b>2.30</b><br>0.09 | <b>1.10</b><br>0.04 | <b>84.2</b>    | <b>25.9</b>    | <b>0.1162</b>  | <b>1.33</b><br>2.94  |
| <b>29.007</b><br>1.1420 | <b>23.444</b><br>0.9230 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>74.0</b><br>2.91               | <b>78.0</b><br>3.07      | <b>3.3</b><br>0.13                  | <b>114.0</b><br>4.49 | <b>106.0</b><br>4.17 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.36</b><br>3.00  |
| <b>29.007</b><br>1.1420 | <b>24.237</b><br>0.9542 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>74.0</b><br>2.91               | <b>78.0</b><br>3.07      | <b>2.0</b><br>0.08                  | <b>114.0</b><br>4.49 | <b>107.0</b><br>4.21 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.39</b><br>3.07  |
| <b>30.162</b><br>1.1875 | <b>23.444</b><br>0.9230 | <b>-2.8</b><br>-0.11  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>0.8</b><br>0.03                  | <b>113.0</b><br>4.45 | <b>107.0</b><br>4.21 | <b>2.30</b><br>0.09 | <b>1.10</b><br>0.04 | <b>84.2</b>    | <b>25.9</b>    | <b>0.1162</b>  | <b>1.42</b><br>3.14  |
| <b>38.354</b><br>1.5100 | <b>29.718</b><br>1.1700 | <b>-10.9</b><br>-0.43 | <b>3.5</b><br>0.14         | <b>75.5</b><br>2.97               | <b>82.0</b><br>3.23      | <b>1.5</b><br>0.06                  | <b>116.0</b><br>4.57 | <b>110.0</b><br>4.33 | <b>2.20</b><br>0.09 | <b>3.00</b><br>0.12 | <b>92.2</b>    | <b>18.1</b>    | <b>0.0759</b>  | <b>1.85</b><br>4.07  |
| <b>38.354</b><br>1.5100 | <b>29.718</b><br>1.1700 | <b>-10.9</b><br>-0.43 | <b>3.5</b><br>0.14         | <b>75.5</b><br>2.97               | <b>82.0</b><br>3.23      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>108.0</b><br>4.25 | <b>2.20</b><br>0.09 | <b>3.00</b><br>0.12 | <b>92.2</b>    | <b>18.1</b>    | <b>0.0759</b>  | <b>1.85</b><br>4.07  |
| <b>38.354</b><br>1.5100 | <b>29.718</b><br>1.1700 | <b>-10.9</b><br>-0.43 | <b>7.0</b><br>0.28         | <b>75.5</b><br>2.97               | <b>89.0</b><br>3.50      | <b>1.5</b><br>0.06                  | <b>116.0</b><br>4.57 | <b>110.0</b><br>4.33 | <b>2.20</b><br>0.09 | <b>3.00</b><br>0.12 | <b>92.2</b>    | <b>18.1</b>    | <b>0.0759</b>  | <b>1.83</b><br>4.04  |
| <b>29.007</b><br>1.1420 | <b>24.605</b><br>0.9687 | <b>-4.1</b><br>-0.16  | <b>2.3</b><br>0.09         | <b>74.0</b><br>2.91               | <b>78.0</b><br>3.07      | <b>3.3</b><br>0.13                  | <b>115.0</b><br>4.53 | <b>109.0</b><br>4.29 | <b>1.50</b><br>0.06 | <b>2.20</b><br>0.08 | <b>77.2</b>    | <b>23</b>      | <b>0.1083</b>  | <b>1.53</b><br>3.37  |
| <b>36.678</b><br>1.4440 | <b>33.338</b><br>1.3125 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>109.0</b><br>4.29 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>1.93</b><br>4.25  |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>109.0</b><br>4.29 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>1.88</b><br>4.15  |
| <b>36.512</b><br>1.4375 | <b>26.988</b><br>1.0625 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>82.0</b><br>3.23               | <b>88.0</b><br>3.46      | <b>3.3</b><br>0.13                  | <b>121.0</b><br>4.76 | <b>111.0</b><br>4.37 | <b>4.00</b><br>0.16 | <b>1.30</b><br>0.05 | <b>91.7</b>    | <b>24.3</b>    | <b>0.1252</b>  | <b>2.00</b><br>4.40  |
| <b>36.512</b><br>1.4375 | <b>26.988</b><br>1.0625 | <b>-3.8</b><br>-0.15  | <b>3.5</b><br>0.14         | <b>82.0</b><br>3.23               | <b>88.0</b><br>3.46      | <b>1.5</b><br>0.06                  | <b>121.0</b><br>4.76 | <b>113.0</b><br>4.45 | <b>4.00</b><br>0.16 | <b>1.30</b><br>0.05 | <b>91.7</b>    | <b>24.3</b>    | <b>0.1252</b>  | <b>2.00</b><br>4.41  |
| <b>36.678</b><br>1.4440 | <b>30.162</b><br>1.1875 | <b>-9.4</b><br>-0.37  | <b>3.5</b><br>0.14         | <b>75.0</b><br>2.95               | <b>81.0</b><br>3.19      | <b>3.3</b><br>0.13                  | <b>116.0</b><br>4.57 | <b>111.0</b><br>4.37 | <b>2.30</b><br>0.09 | <b>1.20</b><br>0.05 | <b>91</b>      | <b>21.1</b>    | <b>0.1108</b>  | <b>2.17</b><br>4.78  |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-11.2</b><br>-0.44 | <b>3.5</b><br>0.14         | <b>77.0</b><br>3.03               | <b>83.0</b><br>3.27      | <b>3.3</b><br>0.13                  | <b>124.0</b><br>4.88 | <b>116.0</b><br>4.57 | <b>4.20</b><br>0.16 | <b>1.90</b><br>0.08 | <b>106</b>     | <b>21</b>      | <b>0.0814</b>  | <b>2.39</b><br>5.26  |
| <b>56.007</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>4.3</b><br>0.17         | <b>77.0</b><br>3.04               | <b>87.0</b><br>3.43      | <b>3.3</b><br>0.13                  | <b>126.0</b><br>4.96 | <b>117.0</b><br>4.61 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>3.54</b><br>7.81  |
| <b>56.007</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>6.4</b><br>0.25         | <b>77.0</b><br>3.04               | <b>91.0</b><br>3.58      | <b>3.3</b><br>0.13                  | <b>126.0</b><br>4.96 | <b>117.0</b><br>4.61 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>3.52</b><br>7.77  |
| <b>56.007</b><br>2.2050 | <b>44.450</b><br>1.7500 | <b>-19.3</b><br>-0.76 | <b>8.7</b><br>0.34         | <b>77.0</b><br>3.04               | <b>96.0</b><br>3.78      | <b>3.3</b><br>0.13                  | <b>126.0</b><br>4.96 | <b>117.0</b><br>4.61 | <b>4.00</b><br>0.16 | <b>0.50</b><br>0.02 | <b>124</b>     | <b>22.4</b>    | <b>0.0827</b>  | <b>3.49</b><br>7.69  |
| <b>29.769</b><br>1.1720 | <b>22.225</b><br>0.8750 | <b>-0.8</b><br>-0.03  | <b>3.5</b><br>0.14         | <b>78.0</b><br>3.07               | <b>85.0</b><br>3.35      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>122.0</b><br>4.80 | <b>2.50</b><br>0.10 | <b>2.10</b><br>0.08 | <b>105</b>     | <b>29.3</b>    | <b>0.1252</b>  | <b>2.05</b><br>4.51  |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-11.2</b><br>-0.44 | <b>3.5</b><br>0.14         | <b>77.0</b><br>3.03               | <b>83.0</b><br>3.27      | <b>3.3</b><br>0.13                  | <b>125.0</b><br>4.92 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>1.90</b><br>0.08 | <b>106</b>     | <b>21</b>      | <b>0.0814</b>  | <b>2.73</b><br>6.02  |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-10.9</b><br>-0.43 | <b>3.5</b><br>0.14         | <b>81.0</b><br>3.19               | <b>85.0</b><br>3.35      | <b>3.3</b><br>0.13                  | <b>129.0</b><br>5.08 | <b>121.0</b><br>4.76 | <b>3.70</b><br>0.15 | <b>3.00</b><br>0.12 | <b>113</b>     | <b>22.8</b>    | <b>0.0827</b>  | <b>2.73</b><br>6.02  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>7.0</b><br>0.28         | <b>85.0</b><br>3.35               | <b>98.0</b><br>3.86      | <b>3.3</b><br>0.13                  | <b>132.0</b><br>5.20 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.28</b><br>7.23  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>91.0</b><br>3.58      | <b>3.3</b><br>0.13                  | <b>132.0</b><br>5.20 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.30</b><br>7.27  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>91.0</b><br>3.58      | <b>0.8</b><br>0.03                  | <b>132.0</b><br>5.20 | <b>121.0</b><br>4.76 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.30</b><br>7.27  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>91.0</b><br>3.58      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>120.0</b><br>4.72 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08 | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.48</b><br>7.67  |
| <b>57.150</b><br>2.2500 | <b>41.275</b><br>1.6250 | <b>-12.2</b><br>-0.48 | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>93.0</b><br>3.66      | <b>3.3</b><br>0.13                  | <b>143.0</b><br>5.63 | <b>130.0</b><br>5.12 | <b>5.30</b><br>0.21 | <b>0.20</b><br>0.01 | <b>130</b>     | <b>23.5</b>    | <b>0.0957</b>  | <b>4.87</b><br>10.73 |
| <b>53.975</b><br>2.1250 | <b>37.308</b><br>1.4688 | <b>-0.3</b><br>-0.01  | <b>3.5</b><br>0.14         | <b>85.5</b><br>3.36               | <b>106.0</b><br>4.17     | <b>3.3</b><br>0.13                  | <b>165.0</b><br>6.50 | <b>146.0</b><br>5.75 | <b>9.90</b><br>0.39 | <b>4.70</b><br>0.18 | <b>111</b>     | <b>17.7</b>    | <b>0.1044</b>  | <b>6.65</b><br>14.66 |
| <b>21.996</b><br>0.8660 | <b>18.825</b><br>0.7411 | <b>-0.8</b><br>-0.03  | <b>2.3</b><br>0.09         | <b>74.0</b><br>2.91               | <b>78.0</b><br>3.07      | <b>1.3</b><br>0.05                  | <b>105.0</b><br>4.13 | <b>101.0</b><br>3.98 | <b>1.80</b><br>0.07 | <b>2.00</b><br>0.08 | <b>56</b>      | <b>21.4</b>    | <b>0.0984</b>  | <b>0.75</b><br>1.65  |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

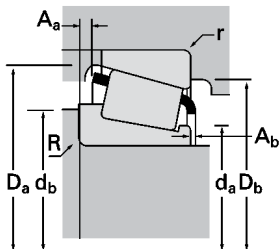
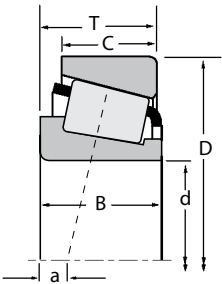
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 399AS       | 394A     |
| 68.262<br>2.6875        | 111.125<br>4.3750 | 22.000<br>0.8661 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 399A        | 393AS    |
| 68.262<br>2.6875        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 399A        | 3920     |
| 68.262<br>2.6875        | 112.712<br>4.4375 | 26.967<br>1.0617 | 91600<br>20600         | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100 | 399AS       | 3920     |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 480         | 472A     |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 480         | 472      |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 480         | 473      |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300 | 33269       | 33472    |
| 68.262<br>2.6875        | 123.825<br>4.8750 | 34.912<br>1.3745 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560-S       | 552-S    |
| 68.262<br>2.6875        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560-S       | 552      |
| 68.262<br>2.6875        | 123.825<br>4.8750 | 38.100<br>1.5000 | 177000<br>39700        | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 560-S       | 552A     |
| 68.262<br>2.6875        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900 | 570         | 563      |
| 68.262<br>2.6875        | 130.048<br>5.1200 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900 | 570         | 562      |
| 68.262<br>2.6875        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 642         | 633      |
| 68.262<br>2.6875        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 642         | 632      |
| 68.262<br>2.6875        | 136.525<br>5.3750 | 41.275<br>1.6250 | 252000<br>56700        | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400 | H414245X    | H414210  |
| 68.262<br>2.6875        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715343     | H715311  |
| 68.262<br>2.6875        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000 | H715343     | H715310  |
| 68.262<br>2.6875        | 152.400<br>6.0000 | 47.625<br>1.8750 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700 | 9185        | 9121     |
| 68.262<br>2.6875        | 152.400<br>6.0000 | 47.625<br>1.8750 | 256000<br>57600        | 0.90 | 0.67 | 66400<br>14900         | 102000<br>23000  | 0.65 | 401000<br>90100 | H914841     | H914811  |
| 68.262<br>2.6875        | 158.750<br>6.2500 | 50.800<br>2.0000 | 264000<br>59400        | 0.66 | 0.91 | 68500<br>15400         | 76900<br>17300   | 0.89 | 306000<br>68700 | 9185        | 9120     |
| 68.262<br>2.6875        | 161.925<br>6.3750 | 49.212<br>1.9375 | 275000<br>61900        | 0.71 | 0.85 | 71400<br>16100         | 86700<br>19500   | 0.82 | 330000<br>74200 | 9278        | 9220     |
| 69.850<br>2.7500        | 98.425<br>3.8750  | 13.495<br>0.5313 | 37400<br>8400          | 0.44 | 1.37 | 9690<br>2180           | 7260<br>1630     | 1.33 | 58100<br>13100  | LL713049    | LL713010 |
| 69.850<br>2.7500        | 99.217<br>3.9062  | 17.000<br>0.6693 | 45200<br>10200         | 0.46 | 1.29 | 11700<br>2630          | 9330<br>2100     | 1.26 | 75000<br>16900  | LL713149    | LL713110 |
| 69.850<br>2.7500        | 101.600<br>4.0000 | 19.050<br>0.7500 | 61900<br>13900         | 0.46 | 1.30 | 16000<br>3610          | 12700<br>2850    | 1.27 | 111000<br>25000 | L713049     | L713010  |
| 69.850<br>2.7500        | 112.712<br>4.4375 | 22.225<br>0.8750 | 93400<br>21000         | 0.42 | 1.44 | 24200<br>5450          | 17300<br>3880    | 1.40 | 130000<br>29300 | LM613449    | LM613410 |
| 69.850<br>2.7500        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200 | 29675       | 29620    |
| 69.850<br>2.7500        | 114.300<br>4.5000 | 27.780<br>1.0937 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200 | 29675       | 29624    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 21.996  | 18.825 | -0.8             | 5.0                                            | 74.0                                       | 83.0                                       | 1.3                                          | 105.0          | 101.0          | 1.70           | 2.30           | 56             | 21.4           | 0.0984         | 0.73                |
| 0.8660  | 0.7411 | -0.03            | 0.20                                           | 2.91                                       | 3.27                                       | 0.05                                         | 4.13           | 3.98           | 0.07           | 0.09           |                |                |                | 1.61                |
| 21.996  | 18.825 | -0.8             | 2.3                                            | 74.0                                       | 78.0                                       | 1.3                                          | 105.0          | 101.0          | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 0.78                |
| 0.8660  | 0.7411 | -0.03            | 0.09                                           | 2.91                                       | 3.07                                       | 0.05                                         | 4.13           | 3.98           | 0.07           | 0.08           |                |                |                | 1.71                |
| 21.996  | 23.812 | -0.8             | 2.3                                            | 74.0                                       | 78.0                                       | 3.3                                          | 106.0          | 99.0           | 1.80           | 2.00           | 56             | 21.4           | 0.0984         | 0.93                |
| 0.8660  | 0.9375 | -0.03            | 0.09                                           | 2.91                                       | 3.07                                       | 0.13                                         | 4.17           | 3.90           | 0.07           | 0.08           |                |                |                | 2.05                |
| 21.996  | 23.812 | -0.8             | 5.0                                            | 74.0                                       | 83.0                                       | 3.3                                          | 106.0          | 99.0           | 1.70           | 2.30           | 56             | 21.4           | 0.0984         | 0.91                |
| 0.8660  | 0.9375 | -0.03            | 0.20                                           | 2.91                                       | 3.27                                       | 0.13                                         | 4.17           | 3.90           | 0.07           | 0.09           |                |                |                | 2.01                |
| 29.007  | 23.444 | -4.1             | 3.5                                            | 75.0                                       | 82.0                                       | 3.3                                          | 114.0          | 106.0          | 1.50           | 2.20           | 77.2           | 23             | 0.1083         | 1.32                |
| 1.1420  | 0.9230 | -0.16            | 0.14                                           | 2.95                                       | 3.23                                       | 0.13                                         | 4.49           | 4.17           | 0.06           | 0.08           |                |                |                | 2.90                |
| 29.007  | 24.237 | -4.1             | 3.5                                            | 75.0                                       | 82.0                                       | 2.0                                          | 114.0          | 107.0          | 1.50           | 2.20           | 77.2           | 23             | 0.1083         | 1.35                |
| 1.1420  | 0.9542 | -0.16            | 0.14                                           | 2.95                                       | 3.23                                       | 0.08                                         | 4.49           | 4.21           | 0.06           | 0.08           |                |                |                | 2.97                |
| 29.007  | 29.000 | -4.1             | 3.5                                            | 75.0                                       | 82.0                                       | 2.0                                          | 114.0          | 107.0          | 1.50           | 2.20           | 77.2           | 23             | 0.1083         | 1.40                |
| 1.1420  | 1.1417 | -0.16            | 0.14                                           | 2.95                                       | 3.23                                       | 0.08                                         | 4.49           | 4.21           | 0.06           | 0.08           |                |                |                | 3.08                |
| 30.162  | 23.444 | -2.8             | 3.5                                            | 76.0                                       | 82.0                                       | 0.8                                          | 113.0          | 107.0          | 2.30           | 1.10           | 84.2           | 25.9           | 0.1162         | 1.38                |
| 1.1875  | 0.9230 | -0.11            | 0.14                                           | 2.99                                       | 3.23                                       | 0.03                                         | 4.45           | 4.21           | 0.09           | 0.04           |                |                |                | 3.05                |
| 36.678  | 26.975 | -9.4             | 3.5                                            | 76.0                                       | 83.0                                       | 4.8                                          | 115.0          | 107.0          | 2.30           | 1.20           | 91             | 21.1           | 0.1108         | 1.71                |
| 1.4440  | 1.0620 | -0.37            | 0.14                                           | 2.99                                       | 3.27                                       | 0.19                                         | 4.53           | 4.21           | 0.09           | 0.05           |                |                |                | 3.77                |
| 36.678  | 33.338 | -9.4             | 3.5                                            | 76.0                                       | 83.0                                       | 3.3                                          | 116.0          | 109.0          | 2.30           | 1.20           | 91             | 21.1           | 0.1108         | 1.88                |
| 1.4440  | 1.3125 | -0.37            | 0.14                                           | 2.99                                       | 3.27                                       | 0.13                                         | 4.57           | 4.29           | 0.09           | 0.05           |                |                |                | 4.15                |
| 36.678  | 30.162 | -9.4             | 3.5                                            | 76.0                                       | 83.0                                       | 3.3                                          | 116.0          | 109.0          | 2.30           | 1.20           | 91             | 21.1           | 0.1108         | 1.83                |
| 1.4440  | 1.1875 | -0.37            | 0.14                                           | 2.99                                       | 3.27                                       | 0.13                                         | 4.57           | 4.29           | 0.09           | 0.05           |                |                |                | 4.04                |
| 36.170  | 28.575 | -8.1             | 3.5                                            | 77.0                                       | 83.0                                       | 3.3                                          | 120.0          | 112.0          | 3.20           | 1.80           | 101            | 24             | 0.1167         | 1.94                |
| 1.4240  | 1.1250 | -0.32            | 0.14                                           | 3.03                                       | 3.27                                       | 0.13                                         | 4.72           | 4.41           | 0.13           | 0.07           |                |                |                | 4.29                |
| 36.170  | 28.575 | -8.1             | 3.5                                            | 77.0                                       | 83.0                                       | 0.8                                          | 121.0          | 116.0          | 3.20           | 1.80           | 101            | 24             | 0.1167         | 2.10                |
| 1.4240  | 1.1250 | -0.32            | 0.14                                           | 3.03                                       | 3.27                                       | 0.03                                         | 4.76           | 4.57           | 0.13           | 0.07           |                |                |                | 4.62                |
| 41.275  | 31.750 | -11.2            | 3.5                                            | 78.0                                       | 85.0                                       | 3.3                                          | 124.0          | 116.0          | 4.20           | 1.90           | 106            | 21             | 0.0814         | 2.33                |
| 1.6250  | 1.2500 | -0.44            | 0.14                                           | 3.07                                       | 3.35                                       | 0.13                                         | 4.88           | 4.57           | 0.16           | 0.08           |                |                |                | 5.14                |
| 41.275  | 31.750 | -11.2            | 3.5                                            | 78.0                                       | 85.0                                       | 3.3                                          | 125.0          | 118.0          | 4.20           | 1.90           | 106            | 21             | 0.0814         | 2.67                |
| 1.6250  | 1.2500 | -0.44            | 0.14                                           | 3.07                                       | 3.35                                       | 0.13                                         | 4.92           | 4.65           | 0.16           | 0.08           |                |                |                | 5.90                |
| 41.275  | 31.750 | -10.9            | 9.7                                            | 82.0                                       | 98.0                                       | 3.3                                          | 129.0          | 121.0          | 3.70           | 3.00           | 113            | 22.8           | 0.0827         | 2.60                |
| 1.6250  | 1.2500 | -0.43            | 0.38                                           | 3.23                                       | 3.86                                       | 0.13                                         | 5.08           | 4.76           | 0.15           | 0.12           |                |                |                | 5.74                |
| 46.038  | 36.512 | -8.6             | 3.5                                            | 86.0                                       | 92.0                                       | 3.3                                          | 132.0          | 118.0          | 4.20           | 2.00           | 147            | 32.8           | 0.0993         | 3.23                |
| 1.8125  | 1.4375 | -0.34            | 0.14                                           | 3.39                                       | 3.62                                       | 0.13                                         | 5.20           | 4.65           | 0.16           | 0.08           |                |                |                | 7.13                |
| 46.038  | 36.512 | -8.6             | 3.5                                            | 86.0                                       | 92.0                                       | 3.3                                          | 133.0          | 120.0          | 4.20           | 2.00           | 147            | 32.8           | 0.0993         | 3.42                |
| 1.8125  | 1.4375 | -0.34            | 0.14                                           | 3.39                                       | 3.62                                       | 0.13                                         | 5.24           | 4.72           | 0.16           | 0.08           |                |                |                | 7.53                |
| 46.038  | 31.750 | -3.8             | 3.5                                            | 81.5                                       | 94.0                                       | 3.3                                          | 145.0          | 130.0          | 8.10           | 4.00           | 87.6           | 13.7           | 0.0912         | 3.75                |
| 1.8125  | 1.2500 | -0.15            | 0.14                                           | 3.20                                       | 3.70                                       | 0.13                                         | 5.71           | 5.12           | 0.32           | 0.16           |                |                |                | 8.26                |
| 46.038  | 35.100 | 7.9              | 3.5                                            | 87.0                                       | 108.0                                      | 3.3                                          | 148.0          | 123.0          | 5.80           | 3.20           | 135            | 30.3           | 0.1165         | 4.41                |
| 1.8125  | 1.3819 | 0.31             | 0.14                                           | 3.43                                       | 4.25                                       | 0.13                                         | 5.83           | 4.84           | 0.23           | 0.13           |                |                |                | 9.73                |
| 46.038  | 34.925 | -3.8             | 3.5                                            | 81.5                                       | 94.0                                       | 3.3                                          | 146.0          | 131.0          | 8.10           | 4.00           | 87.6           | 13.7           | 0.0912         | 4.37                |
| 1.8125  | 1.3750 | -0.15            | 0.14                                           | 3.20                                       | 3.70                                       | 0.13                                         | 5.75           | 5.16           | 0.32           | 0.16           |                |                |                | 9.63                |
| 46.038  | 31.750 | 0.0              | 3.5                                            | 90.5                                       | 97.0                                       | 3.3                                          | 153.0          | 138.0          | 9.10           | 4.00           | 102            | 18.4           | 0.0984         | 4.50                |
| 1.8125  | 1.2500 | 0.00             | 0.14                                           | 3.56                                       | 3.82                                       | 0.13                                         | 6.03           | 5.43           | 0.36           | 0.16           |                |                |                | 9.92                |
| 13.495  | 9.525  | 4.6              | 1.5                                            | 74.0                                       | 77.0                                       | 1.5                                          | 94.0           | 92.0           | 1.00           | 1.40           | 39.9           | 55             | 0.0893         | 0.30                |
| 0.5313  | 0.3750 | 0.18             | 0.06                                           | 2.91                                       | 3.03                                       | 0.06                                         | 3.70           | 3.62           | 0.04           | 0.06           |                |                |                | 0.65                |
| 16.000  | 13.000 | 4.6              | 1.5                                            | 75.0                                       | 77.0                                       | 1.5                                          | 95.0           | 91.0           | 0.70           | 0.60           | 47.9           | 56.5           | 0.0972         | 0.38                |
| 0.6299  | 0.5118 | 0.18             | 0.06                                           | 2.95                                       | 3.03                                       | 0.06                                         | 3.74           | 3.58           | 0.03           | 0.02           |                |                |                | 0.84                |
| 19.050  | 15.083 | 2.5              | 1.5                                            | 75.0                                       | 78.0                                       | 1.5                                          | 98.0           | 93.0           | 0.80           | 1.40           | 64.3           | 52.5           | 0.1075         | 0.50                |
| 0.7500  | 0.5938 | 0.10             | 0.06                                           | 2.95                                       | 3.07                                       | 0.06                                         | 3.86           | 3.66           | 0.03           | 0.05           |                |                |                | 1.10                |
| 21.996  | 15.875 | 0.0              | 1.5                                            | 76.0                                       | 78.0                                       | 0.8                                          | 107.0          | 104.0          | 1.70           | 2.30           | 60.3           | 23.1           | 0.1019         | 0.78                |
| 0.8660  | 0.6250 | 0.00             | 0.06                                           | 2.99                                       | 3.07                                       | 0.03                                         | 4.21           | 4.09           | 0.07           | 0.09           |                |                |                | 1.72                |
| 25.400  | 19.050 | 1.0              | 1.5                                            | 77.0                                       | 80.0                                       | 3.3                                          | 109.0          | 101.0          | 2.30           | 1.50           | 77.7           | 43.3           | 0.1170         | 0.97                |
| 1.0000  | 0.7500 | 0.04             | 0.06                                           | 3.03                                       | 3.15                                       | 0.13                                         | 4.29           | 3.98           | 0.09           | 0.06           |                |                |                | 2.13                |
| 25.400  | 22.225 | 1.0              | 1.5                                            | 77.0                                       | 80.0                                       | 3.3                                          | 109.0          | 103.0          | 2.30           | 1.50           | 77.7           | 43.3           | 0.1170         | 1.06                |
| 1.0000  | 0.8750 | 0.04             | 0.06                                           | 3.03                                       | 3.15                                       | 0.13                                         | 4.29           | 4.06           | 0.09           | 0.06           |                |                |                | 2.33                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

B

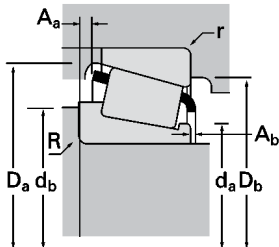
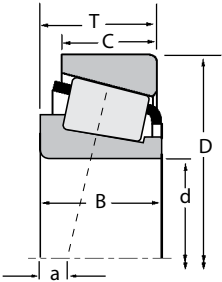




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>   | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |          |
| 69.850<br>2.7500        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33275       | 33462    |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482         | 472A     |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482A        | 472A     |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482         | 472      |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482         | 473      |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33275       | 33472    |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 29.794<br>1.1730 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482A        | 472      |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 32.545<br>1.2813 | 166000<br>37200        | 0.36 | 1.67 | 42900<br>9650          | 26500<br>5950    | 1.62 | 249000<br>56000  | 47487       | 47420    |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 32.545<br>1.2813 | 166000<br>37200        | 0.36 | 1.67 | 42900<br>9650          | 26500<br>5950    | 1.62 | 249000<br>56000  | 47487       | 47420A   |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 46.751<br>1.8406 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482E        | 472      |
| 69.850<br>2.7500        | 120.650<br>4.7500 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29675       | 29630    |
| 69.850<br>2.7500        | 123.825<br>4.8750 | 30.162<br>1.1875 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482         | 472X     |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 566         | 563      |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 566-S       | 563      |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 566X        | 563      |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813846    | HM813810 |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813846    | HM813811 |
| 69.850<br>2.7500        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 643         | 633      |
| 69.850<br>2.7500        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 643         | 632      |
| 69.850<br>2.7500        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715344     | H715310  |
| 69.850<br>2.7500        | 146.050<br>5.7500 | 36.512<br>1.4375 | 161000<br>36200        | 0.94 | 0.64 | 41700<br>9380          | 66900<br>15000   | 0.62 | 202000<br>45400  | HM914545    | HM914510 |
| 69.850<br>2.7500        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 655         | 653      |
| 69.850<br>2.7500        | 146.050<br>5.7500 | 41.275<br>1.6250 | 213000<br>47900        | 0.78 | 0.77 | 55200<br>12400         | 74000<br>16600   | 0.75 | 256000<br>57500  | H913849     | H913810  |
| 69.850<br>2.7500        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6454        | 6420     |
| 69.850<br>2.7500        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6484        | 6420     |
| 69.850<br>2.7500        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 744A        | 742      |
| 69.850<br>2.7500        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 745A        | 742      |
| 69.850<br>2.7500        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 655         | 652      |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 84.0<br>3.31                               | 3.3<br>0.13                                  | 112.0<br>4.41  | 104.0<br>4.09  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 25.9           | 0.1162         | 1.25<br>2.76        |
| 29.007<br>1.1420 | 23.444<br>0.9230 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 3.3<br>0.13                                  | 114.0<br>4.49  | 106.0<br>4.17  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.28<br>2.81        |
| 29.007<br>1.1420 | 23.444<br>0.9230 | -4.1<br>-0.16    | 4.8<br>0.19                                    | 77.0<br>3.03                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 114.0<br>4.49  | 106.0<br>4.17  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.27<br>2.79        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 2.0<br>0.08                                  | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.31<br>2.88        |
| 29.007<br>1.1420 | 29.000<br>1.1417 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 2.0<br>0.08                                  | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.36<br>2.99        |
| 30.162<br>1.1875 | 23.444<br>0.9230 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 84.0<br>3.31                               | 0.8<br>0.03                                  | 113.0<br>4.45  | 107.0<br>4.21  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 25.9           | 0.1162         | 1.34<br>2.96        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 4.8<br>0.19                                    | 77.0<br>3.03                               | 86.0<br>3.39                               | 2.0<br>0.08                                  | 114.0<br>4.49  | 107.0<br>4.21  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.30<br>2.86        |
| 32.545<br>1.2813 | 26.195<br>1.0313 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 78.0<br>3.07                               | 84.0<br>3.31                               | 3.3<br>0.13                                  | 114.0<br>4.49  | 107.0<br>4.21  | 2.20<br>0.09   | 1.90<br>0.08   | 98.4           | 26.3           | 0.1153         | 1.45<br>3.20        |
| 32.545<br>1.2813 | 26.195<br>1.0313 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 78.0<br>3.07                               | 84.0<br>3.31                               | 0.5<br>0.02                                  | 114.0<br>4.49  | 109.0<br>4.29  | 2.20<br>0.09   | 1.90<br>0.08   | 98.4           | 26.3           | 0.1153         | 1.47<br>3.24        |
| 45.963<br>1.8096 | 24.237<br>0.9542 | -21.1<br>-0.83   | 1.0<br>0.04                                    | 77.0<br>3.03                               | 87.0<br>3.43                               | 2.0<br>0.08                                  | 114.0<br>4.49  | 107.0<br>4.21  | 18.50<br>0.73  | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.69<br>3.73        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04      | 1.5<br>0.06                                    | 77.0<br>3.03                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 113.0<br>4.45  | 104.0<br>4.09  | 2.30<br>0.09   | 1.50<br>0.06   | 77.7           | 43.3           | 0.1170         | 1.17<br>2.59        |
| 29.007<br>1.1420 | 24.605<br>0.9687 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 3.3<br>0.13                                  | 115.0<br>4.53  | 109.0<br>4.29  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.45<br>3.19        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 78.0<br>3.07                               | 85.0<br>3.35                               | 3.3<br>0.13                                  | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.89<br>4.18        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 0.8<br>0.03                                    | 78.0<br>3.07                               | 79.0<br>3.11                               | 3.3<br>0.13                                  | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.91<br>4.20        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 6.8<br>0.27                                    | 78.0<br>3.07                               | 91.0<br>3.58                               | 3.3<br>0.13                                  | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.87<br>4.11        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 82.0<br>3.23                               | 89.0<br>3.50                               | 3.3<br>0.13                                  | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 1.90<br>4.19        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                                    | 82.0<br>3.23                               | 89.0<br>3.50                               | 1.5<br>0.06                                  | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 1.90<br>4.19        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                                    | 80.0<br>3.15                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 124.0<br>4.88  | 116.0<br>4.57  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.28<br>5.02        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                                    | 80.0<br>3.15                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.62<br>5.77        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                                    | 87.0<br>3.43                               | 93.0<br>3.66                               | 3.3<br>0.13                                  | 133.0<br>5.24  | 120.0<br>4.72  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.36<br>7.40        |
| 33.338<br>1.3125 | 23.812<br>0.9375 | 12.4<br>0.49     | 4.0<br>0.16                                    | 86.0<br>3.38                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 139.0<br>5.47  | 122.0<br>4.80  | 7.20<br>0.28   | 4.50<br>0.18   | 71.5           | 21.8           | 0.0943         | 2.57<br>5.66        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                                    | 82.0<br>3.23                               | 88.0<br>3.46                               | 3.3<br>0.13                                  | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 3.23<br>7.11        |
| 39.688<br>1.5625 | 25.400<br>1.0000 | 4.3<br>0.17      | 3.5<br>0.14                                    | 82.5<br>3.24                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 138.0<br>5.43  | 124.0<br>4.88  | 8.20<br>0.32   | 3.60<br>0.14   | 78.5           | 17.3           | 0.0927         | 2.86<br>6.30        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 5.0<br>0.20                                    | 85.0<br>3.35                               | 94.0<br>3.70                               | 3.3<br>0.13                                  | 140.0<br>5.51  | 129.0<br>5.08  | 2.70<br>0.11   | 0.70<br>0.03   | 158            | 29.1           | 0.0931         | 4.53<br>9.98        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 6.4<br>0.25                                    | 85.0<br>3.35                               | 97.0<br>3.82                               | 3.3<br>0.13                                  | 140.0<br>5.51  | 129.0<br>5.08  | 2.70<br>0.11   | 0.70<br>0.03   | 158            | 29.1           | 0.0931         | 4.51<br>9.95        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 5.0<br>0.20                                    | 82.0<br>3.23                               | 91.0<br>3.58                               | 3.3<br>0.13                                  | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.90<br>8.60        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 3.5<br>0.14                                    | 82.0<br>3.23                               | 88.0<br>3.46                               | 3.3<br>0.13                                  | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.91<br>8.62        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                                    | 82.0<br>3.23                               | 88.0<br>3.46                               | 3.3<br>0.13                                  | 141.0<br>5.55  | 134.0<br>5.28  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 3.59<br>7.92        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

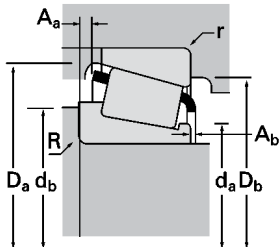
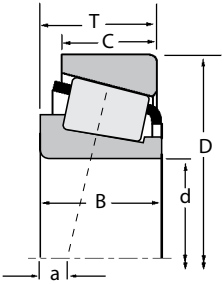
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 69.850<br>2.7500        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 835         | 832       |
| 69.914<br>2.7525        | 171.450<br>6.7500 | 49.212<br>1.9375 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800  | 9382        | 9321      |
| 69.952<br>2.7540        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34274       | 34478     |
| 69.987<br>2.7554        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715347     | H715311   |
| 69.987<br>2.7554        | 176.212<br>6.9375 | 54.770<br>2.1563 | 339000<br>76100        | 0.70 | 0.86 | 87800<br>19700         | 105000<br>23600  | 0.84 | 431000<br>96900  | H916642     | H916610   |
| 70.000<br>2.7559        | 110.000<br>4.3307 | 21.000<br>0.8268 | 84800<br>19100         | 0.46 | 1.30 | 22000<br>4940          | 17400<br>3900    | 1.27 | 112000<br>25200  | JP7049      | JP7010    |
| 70.000<br>2.7559        | 110.000<br>4.3307 | 26.000<br>1.0236 | 106000<br>23800        | 0.49 | 1.23 | 27500<br>6180          | 22900<br>5160    | 1.20 | 168000<br>37800  | JLM813049   | JLM813010 |
| 70.000<br>2.7559        | 115.000<br>4.5276 | 29.000<br>1.1417 | 139000<br>31200        | 0.43 | 1.39 | 36000<br>8100          | 26500<br>5960    | 1.36 | 198000<br>44500  | JM612949    | JM612910  |
| 70.000<br>2.7559        | 120.000<br>4.7244 | 29.002<br>1.1418 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 484         | 472A      |
| 70.000<br>2.7559        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34275       | 34478     |
| 70.000<br>2.7559        | 123.825<br>4.8750 | 30.162<br>1.1875 | 133000<br>29900        | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 484         | 472X      |
| 70.000<br>2.7559        | 125.095<br>4.9250 | 24.000<br>0.9449 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34275       | 34492     |
| 70.000<br>2.7559        | 130.000<br>5.1181 | 36.937<br>1.4542 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 570X        | 562X      |
| 70.000<br>2.7559        | 130.000<br>5.1181 | 43.000<br>1.6929 | 254000<br>57200        | 0.33 | 1.80 | 65900<br>14800         | 37600<br>8450    | 1.75 | 360000<br>80800  | JF7049A     | JF7010    |
| 70.000<br>2.7559        | 130.000<br>5.1181 | 43.000<br>1.6929 | 254000<br>57200        | 0.33 | 1.80 | 65900<br>14800         | 37600<br>8450    | 1.75 | 360000<br>80800  | JF7049      | JF7010    |
| 70.000<br>2.7559        | 140.000<br>5.5118 | 39.000<br>1.5354 | 189000<br>42400        | 0.87 | 0.69 | 48900<br>11000         | 72500<br>16300   | 0.67 | 257000<br>57800  | JW7049      | JW7010    |
| 70.000<br>2.7559        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6459        | 6420      |
| 70.000<br>2.7559        | 150.000<br>5.9055 | 54.000<br>2.1260 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6459        | 6424      |
| 70.637<br>2.7810        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29680       | 29620     |
| 70.637<br>2.7810        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29681       | 29620     |
| 71.438<br>2.8125        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33281       | 33461     |
| 71.438<br>2.8125        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33281       | 33462     |
| 71.438<br>2.8125        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33281       | 33472     |
| 71.438<br>2.8125        | 120.000<br>4.7244 | 32.545<br>1.2813 | 166000<br>37200        | 0.36 | 1.67 | 42900<br>9650          | 26500<br>5950    | 1.62 | 249000<br>56000  | 47490       | 47420     |
| 71.438<br>2.8125        | 120.650<br>4.7500 | 32.545<br>1.2813 | 166000<br>37200        | 0.36 | 1.67 | 42900<br>9650          | 26500<br>5950    | 1.62 | 249000<br>56000  | 47490       | 47423     |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567A        | 563       |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567-S       | 563       |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813849    | HM813810  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  | Dimensions, mm (inches) |                                                |                                            |                                            |                                              |                |                |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  | Shaft                   |                                                |                                            | Housing                                    |                                              |                | Cage           |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup>        | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73          | 3.5<br>0.14                                    | 84.0<br>3.31                               | 91.0<br>3.58                               | 3.3<br>0.13                                  | 155.0<br>6.10  | 149.0<br>5.87  | 5.20<br>0.20   | 1.60<br>0.06   | 198            | 34.8           | 0.0937         | 6.09<br>13.43       |
| 46.038<br>1.8125 | 31.750<br>1.2500 | 4.3<br>0.17             | 3.5<br>0.14                                    | 95.0<br>3.74                               | 101.0<br>3.98                              | 3.3<br>0.13                                  | 164.0<br>6.46  | 147.0<br>5.79  | 9.00<br>0.35   | 3.90<br>0.15   | 118            | 18.6           | 0.1053         | 5.37<br>11.83       |
| 23.012<br>0.9060 | 17.462<br>0.6875 | 1.5<br>0.06             | 2.0<br>0.08                                    | 78.0<br>3.07                               | 81.0<br>3.19                               | 2.0<br>0.08                                  | 116.0<br>4.57  | 110.0<br>4.33  | 2.60<br>0.10   | 2.10<br>0.08   | 69.3           | 27             | 0.1093         | 1.08<br>2.38        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34           | 3.5<br>0.14                                    | 87.0<br>3.43                               | 93.0<br>3.66                               | 3.3<br>0.13                                  | 132.0<br>5.20  | 118.0<br>4.65  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.17<br>6.98        |
| 53.183<br>2.0938 | 36.512<br>1.4375 | -2.0<br>-0.08           | 3.3<br>0.13                                    | 95.0<br>3.74                               | 103.0<br>4.06                              | 3.3<br>0.13                                  | 164.0<br>6.46  | 147.0<br>5.79  | 8.60<br>0.34   | 3.40<br>0.13   | 133            | 18.7           | 0.1071         | 6.32<br>13.93       |
| 20.000<br>0.7874 | 15.500<br>0.6102 | 2.5<br>0.10             | 2.0<br>0.08                                    | 76.0<br>2.99                               | 80.0<br>3.15                               | 2.0<br>0.08                                  | 105.5<br>4.15  | 101.0<br>3.98  | 1.50<br>0.06   | 2.80<br>0.11   | 51.1           | 30.9           | 0.0995         | 0.68<br>1.50        |
| 25.000<br>0.9843 | 20.500<br>0.8071 | 0.3<br>0.01             | 1.0<br>0.04                                    | 77.0<br>3.03                               | 78.0<br>3.07                               | 2.5<br>0.10                                  | 105.0<br>4.13  | 98.0<br>3.86   | 1.70<br>0.07   | 2.70<br>0.11   | 73.5           | 26.3           | 0.1151         | 0.88<br>1.93        |
| 29.000<br>1.1417 | 23.000<br>0.9055 | -2.5<br>-0.10           | 3.0<br>0.12                                    | 77.0<br>3.03                               | 83.0<br>3.27                               | 2.5<br>0.10                                  | 110.0<br>4.33  | 103.0<br>4.06  | 1.00<br>0.04   | 2.30<br>0.09   | 76.7           | 25.7           | 0.1122         | 1.13<br>2.49        |
| 29.007<br>1.1420 | 23.444<br>0.9230 | -4.1<br>-0.16           | 2.0<br>0.08                                    | 77.0<br>3.03                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 114.0<br>4.49  | 106.0<br>4.17  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.28<br>2.82        |
| 23.012<br>0.9060 | 17.462<br>0.6875 | 1.5<br>0.06             | 2.0<br>0.08                                    | 78.0<br>3.07                               | 82.0<br>3.23                               | 2.0<br>0.08                                  | 116.0<br>4.57  | 110.0<br>4.33  | 2.60<br>0.10   | 2.10<br>0.08   | 69.3           | 27             | 0.1093         | 1.08<br>2.38        |
| 29.007<br>1.1420 | 24.605<br>0.9687 | -4.1<br>-0.16           | 2.0<br>0.08                                    | 77.0<br>3.03                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 115.0<br>4.53  | 109.0<br>4.29  | 1.50<br>0.06   | 2.20<br>0.08   | 77.2           | 23             | 0.1083         | 1.45<br>3.20        |
| 23.012<br>0.9060 | 16.670<br>0.6563 | 1.5<br>0.06             | 2.0<br>0.08                                    | 78.0<br>3.07                               | 82.0<br>3.23                               | 2.0<br>0.08                                  | 118.0<br>4.65  | 112.0<br>4.41  | 2.60<br>0.10   | 2.10<br>0.08   | 69.3           | 27             | 0.1093         | 1.16<br>2.55        |
| 36.170<br>1.4240 | 29.000<br>1.1417 | -8.1<br>-0.32           | 3.0<br>0.12                                    | 78.0<br>3.07                               | 84.0<br>3.31                               | 3.0<br>0.12                                  | 121.0<br>4.76  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 2.05<br>4.51        |
| 42.000<br>1.6535 | 35.000<br>1.3780 | -12.4<br>-0.49          | 7.0<br>0.28                                    | 80.5<br>3.17                               | 94.0<br>3.70                               | 2.5<br>0.10                                  | 124.0<br>4.88  | 116.0<br>4.57  | 2.10<br>0.08   | 4.00<br>0.16   | 121            | 24.5           | 0.0828         | 2.45<br>5.40        |
| 42.000<br>1.6535 | 35.000<br>1.3780 | -12.4<br>-0.49          | 3.0<br>0.12                                    | 80.5<br>3.17                               | 86.0<br>3.39                               | 2.5<br>0.10                                  | 124.0<br>4.88  | 116.0<br>4.57  | 2.10<br>0.08   | 4.00<br>0.16   | 121            | 24.5           | 0.0828         | 2.49<br>5.49        |
| 35.500<br>1.3976 | 27.000<br>1.0630 | 8.6<br>0.34             | 3.0<br>0.12                                    | 82.0<br>3.23                               | 95.0<br>3.74                               | 3.0<br>0.12                                  | 133.5<br>5.25  | 117.0<br>4.61  | 5.80<br>0.23   | 4.40<br>0.18   | 85.2           | 23.3           | 0.0984         | 2.63<br>5.79        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59          | 3.0<br>0.12                                    | 85.0<br>3.35                               | 90.0<br>3.54                               | 3.3<br>0.13                                  | 140.0<br>5.51  | 129.0<br>5.08  | 2.70<br>0.11   | 0.70<br>0.03   | 158            | 29.1           | 0.0931         | 4.54<br>10.00       |
| 54.229<br>2.1350 | 45.000<br>1.7717 | -15.0<br>-0.59          | 3.0<br>0.12                                    | 85.0<br>3.35                               | 90.0<br>3.54                               | 3.0<br>0.12                                  | 140.0<br>5.51  | 129.0<br>5.08  | 2.70<br>0.11   | 0.70<br>0.03   | 158            | 29.1           | 0.0931         | 4.61<br>10.17       |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04             | 1.3<br>0.05                                    | 78.0<br>3.07                               | 80.0<br>3.15                               | 3.3<br>0.13                                  | 109.0<br>4.29  | 101.0<br>3.98  | 2.30<br>0.09   | 1.50<br>0.06   | 77.7           | 43.3           | 0.1170         | 0.95<br>2.08        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04             | 3.5<br>0.14                                    | 78.0<br>3.07                               | 85.0<br>3.35                               | 3.3<br>0.13                                  | 109.0<br>4.29  | 101.0<br>3.98  | 2.30<br>0.09   | 1.50<br>0.06   | 77.7           | 43.3           | 0.1170         | 0.94<br>2.07        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11           | 3.5<br>0.14                                    | 79.0<br>3.11                               | 85.0<br>3.35                               | 0.8<br>0.03                                  | 112.0<br>4.41  | 106.0<br>4.17  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 24.4           | 0.1162         | 1.22<br>2.70        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11           | 3.5<br>0.14                                    | 79.0<br>3.11                               | 85.0<br>3.35                               | 3.3<br>0.13                                  | 112.0<br>4.41  | 104.0<br>4.09  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 24.4           | 0.1162         | 1.21<br>2.67        |
| 30.162<br>1.1875 | 23.444<br>0.9230 | -2.8<br>-0.11           | 3.5<br>0.14                                    | 79.0<br>3.11                               | 85.0<br>3.35                               | 0.8<br>0.03                                  | 113.0<br>4.45  | 107.0<br>4.21  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 24.4           | 0.1162         | 1.30<br>2.87        |
| 32.545<br>1.2813 | 26.195<br>1.0313 | -6.4<br>-0.25           | 3.5<br>0.14                                    | 79.0<br>3.11                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 114.0<br>4.49  | 107.0<br>4.21  | 2.20<br>0.09   | 1.90<br>0.08   | 98.4           | 26.3           | 0.1153         | 1.41<br>3.11        |
| 32.545<br>1.2813 | 26.195<br>1.0313 | -6.4<br>-0.25           | 3.5<br>0.14                                    | 79.0<br>3.11                               | 86.0<br>3.39                               | 0.8<br>0.03                                  | 115.0<br>4.53  | 109.0<br>4.29  | 2.20<br>0.09   | 1.90<br>0.08   | 98.4           | 26.3           | 0.1153         | 1.45<br>3.19        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32           | 3.5<br>0.14                                    | 80.0<br>3.15                               | 86.0<br>3.39                               | 3.3<br>0.13                                  | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.85<br>4.07        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32           | 6.4<br>0.25                                    | 80.0<br>3.15                               | 92.0<br>3.62                               | 3.3<br>0.13                                  | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.82<br>4.01        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15           | 3.5<br>0.14                                    | 82.0<br>3.23                               | 91.0<br>3.58                               | 3.3<br>0.13                                  | 121.0<br>4.76  | 111.0<br>4.37  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 1.85<br>4.08        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

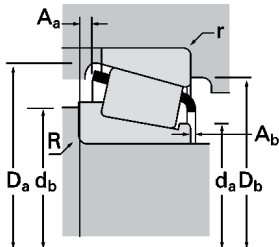
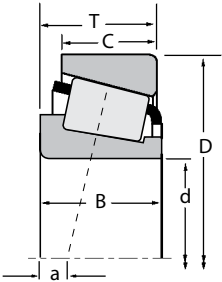
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           |             | Inner    | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>   |             |          |       |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 36.512<br>1.4375 | 179000<br>40300        | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813849    | HM813811 |       |
| 71.438<br>2.8125        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 644         | 633      |       |
| 71.438<br>2.8125        | 130.175<br>5.1250 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 645         | 633      |       |
| 71.438<br>2.8125        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47675       | 47620    |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 495-S       | 493      |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 644         | 632      |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 645         | 632      |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 41.275<br>1.6250 | 216000<br>48500        | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 645X        | 632      |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 41.275<br>1.6250 | 252000<br>56700        | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400  | H414249     | H414210  |       |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715345     | H715311  |       |
| 71.438<br>2.8125        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715345     | H715310  |       |
| 73.025<br>2.8750        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29685       | 29620    |       |
| 73.025<br>2.8750        | 117.475<br>4.6250 | 25.400<br>1.0000 | 109000<br>24500        | 0.51 | 1.18 | 28300<br>6360          | 24700<br>5550    | 1.15 | 183000<br>41200  | LM814845    | LM814810 |       |
| 73.025<br>2.8750        | 117.475<br>4.6250 | 30.162<br>1.1875 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33287       | 33462    |       |
| 73.025<br>2.8750        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33287       | 33472    |       |
| 73.025<br>2.8750        | 120.000<br>4.7244 | 29.794<br>1.1730 | 128000<br>28800        | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33287A      | 33472    |       |
| 73.025<br>2.8750        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27680       | 27620    |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 30.162<br>1.1875 | 149000<br>33500        | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800  | 42683       | 42620    |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567         | 563      |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567         | 563X     |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567X        | 563      |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567X        | 563X     |       |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567XA       | 563      |       |
| 73.025<br>2.8750        | 130.000<br>5.1181 | 36.937<br>1.4542 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567X        | 562X     |       |
| 73.025<br>2.8750        | 130.048<br>5.1200 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567         | 562      |       |
| 73.025<br>2.8750        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 576         | 572      |       |
| 73.025<br>2.8750        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 657         | 653      |       |
| 73.025<br>2.8750        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6460        | 6420     |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 3.5<br>0.14                | 82.0<br>3.23                      | 91.0<br>3.58             | 1.5<br>0.06                         | 121.0<br>4.76  | 113.0<br>4.45  | 4.00<br>0.16   | 1.30<br>0.05   | 91.7           | 24.3           | 0.1252         | 1.85<br>4.08        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 81.0<br>3.19                      | 87.0<br>3.43             | 3.3<br>0.13                         | 124.0<br>4.88  | 116.0<br>4.57  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.23<br>4.91        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 6.4<br>0.25                | 81.0<br>3.19                      | 93.0<br>3.66             | 3.3<br>0.13                         | 124.0<br>4.88  | 116.0<br>4.57  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.19<br>4.83        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 3.5<br>0.14                | 82.0<br>3.23                      | 88.0<br>3.46             | 3.3<br>0.13                         | 128.0<br>5.04  | 119.0<br>4.69  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 2.04<br>4.50        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                | 82.0<br>3.23                      | 88.0<br>3.46             | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.93<br>4.25        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 3.5<br>0.14                | 81.0<br>3.19                      | 87.0<br>3.43             | 3.3<br>0.13                         | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.57<br>5.67        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 6.4<br>0.25                | 81.0<br>3.19                      | 93.0<br>3.66             | 3.3<br>0.13                         | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.54<br>5.59        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 6.4<br>0.25                | 82.5<br>3.25                      | 93.0<br>3.66             | 3.3<br>0.13                         | 125.0<br>4.92  | 118.0<br>4.65  | 4.20<br>0.16   | 1.90<br>0.08   | 106            | 21             | 0.0814         | 2.53<br>5.59        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -10.9<br>-0.43   | 3.5<br>0.14                | 83.0<br>3.27                      | 89.0<br>3.50             | 3.3<br>0.13                         | 129.0<br>5.08  | 121.0<br>4.76  | 3.70<br>0.15   | 3.00<br>0.12   | 113            | 22.8           | 0.0827         | 2.56<br>5.65        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 88.0<br>3.46                      | 94.0<br>3.70             | 3.3<br>0.13                         | 132.0<br>5.20  | 118.0<br>4.65  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.11<br>6.86        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 3.5<br>0.14                | 88.0<br>3.46                      | 94.0<br>3.70             | 3.3<br>0.13                         | 133.0<br>5.24  | 120.0<br>4.72  | 4.20<br>0.16   | 2.00<br>0.08   | 147            | 32.8           | 0.0993         | 3.29<br>7.26        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04      | 3.5<br>0.14                | 80.0<br>3.15                      | 86.0<br>3.39             | 3.3<br>0.13                         | 109.0<br>4.29  | 101.0<br>3.98  | 2.30<br>0.09   | 1.50<br>0.06   | 77.7           | 43.3           | 0.1170         | 0.89<br>1.97        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 2.3<br>0.09      | 3.5<br>0.14                | 81.0<br>3.19                      | 87.0<br>3.43             | 3.3<br>0.13                         | 113.0<br>4.45  | 105.0<br>4.13  | 2.50<br>0.10   | 1.40<br>0.06   | 88.6           | 36.6           | 0.1239         | 1.02<br>2.25        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11    | 3.5<br>0.14                | 80.0<br>3.15                      | 87.0<br>3.43             | 3.3<br>0.13                         | 112.0<br>4.41  | 104.0<br>4.09  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 24.4           | 0.1162         | 1.17<br>2.57        |
| 30.162<br>1.1875 | 23.444<br>0.9230 | -2.8<br>-0.11    | 3.5<br>0.14                | 80.0<br>3.15                      | 87.0<br>3.43             | 0.8<br>0.03                         | 113.0<br>4.45  | 107.0<br>4.21  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 24.4           | 0.1162         | 1.26<br>2.77        |
| 30.162<br>1.1875 | 23.444<br>0.9230 | -2.8<br>-0.11    | 0.3<br>0.01                | 81.0<br>3.19                      | 81.0<br>3.19             | 0.8<br>0.03                         | 113.0<br>4.45  | 107.0<br>4.21  | 2.30<br>0.09   | 1.10<br>0.04   | 84.2           | 25.9           | 0.1162         | 1.27<br>2.80        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | 0.5<br>0.02      | 3.5<br>0.14                | 82.0<br>3.23                      | 88.0<br>3.46             | 1.5<br>0.06                         | 120.0<br>4.72  | 115.0<br>4.53  | 1.50<br>0.06   | 1.70<br>0.07   | 98.2           | 41.8           | 0.1198         | 1.29<br>2.84        |
| 31.000<br>1.2205 | 22.225<br>0.8750 | -2.8<br>-0.11    | 3.5<br>0.14                | 81.0<br>3.19                      | 88.0<br>3.46             | 3.3<br>0.13                         | 121.0<br>4.76  | 114.0<br>4.49  | 3.40<br>0.13   | 0.90<br>0.03   | 96.2           | 28.6           | 0.1197         | 1.52<br>3.34        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 3.5<br>0.14                | 81.0<br>3.19                      | 88.0<br>3.46             | 3.3<br>0.13                         | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.79<br>3.95        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 3.5<br>0.14                | 81.0<br>3.19                      | 88.0<br>3.46             | 0.8<br>0.03                         | 120.0<br>4.72  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.81<br>3.99        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 4.8<br>0.19                | 81.0<br>3.19                      | 90.0<br>3.54             | 3.3<br>0.13                         | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.80<br>3.96        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 4.8<br>0.19                | 81.0<br>3.19                      | 90.0<br>3.54             | 0.8<br>0.03                         | 120.0<br>4.72  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.81<br>4.00        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 6.4<br>0.25                | 81.0<br>3.19                      | 93.0<br>3.66             | 3.3<br>0.13                         | 120.0<br>4.72  | 112.0<br>4.41  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.79<br>3.94        |
| 36.170<br>1.4240 | 29.000<br>1.1417 | -8.1<br>-0.32    | 4.8<br>0.19                | 81.0<br>3.19                      | 90.0<br>3.54             | 3.0<br>0.12                         | 121.0<br>4.76  | 114.0<br>4.49  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.95<br>4.30        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 3.5<br>0.14                | 81.0<br>3.19                      | 88.0<br>3.46             | 0.8<br>0.03                         | 121.0<br>4.76  | 116.0<br>4.57  | 3.20<br>0.13   | 1.80<br>0.07   | 101            | 24             | 0.1167         | 1.95<br>4.29        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                | 83.0<br>3.27                      | 90.0<br>3.54             | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.46<br>5.43        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                | 85.0<br>3.35                      | 91.0<br>3.58             | 3.3<br>0.13                         | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 3.11<br>6.86        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 3.5<br>0.14                | 87.0<br>3.43                      | 93.0<br>3.66             | 3.3<br>0.13                         | 140.0<br>5.51  | 129.0<br>5.08  | 2.70<br>0.11   | 0.70<br>0.03   | 158            | 29.1           | 0.0931         | 4.39<br>9.67        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

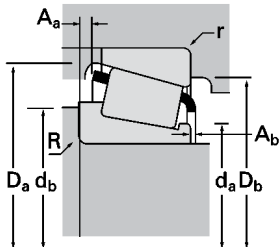
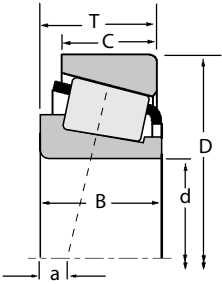
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 73.025<br>2.8750        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000       | 6460        | 6420A                  |  |                |       |       |
| 73.025<br>2.8750        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800        | 744         | 742                    |  |                |       |       |
| 73.025<br>2.8750        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300        | 657         | 652                    |  |                |       |       |
| 73.817<br>2.9062        | 112.712<br>4.4375 | 25.400<br>1.0000 | 102000<br>23000        | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200        | 29688       | 29620                  |  |                |       |       |
| 73.817<br>2.9062        | 127.000<br>5.0000 | 36.512<br>1.4375 | 182000<br>40900        | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900        | 568         | 563                    |  |                |       |       |
| 74.612<br>2.9375        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400        | 577         | 572                    |  |                |       |       |
| 74.612<br>2.9375        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300        | 658         | 652                    |  |                |       |       |
| 74.976<br>2.9518        | 127.000<br>5.0000 | 26.988<br>1.0625 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34294       | 34500                  |  |                |       |       |
| 74.987<br>2.9523        | 129.974<br>5.1171 | 33.249<br>1.3090 | 149000<br>33500        | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800        | 42686       | 42624                  |  |                |       |       |
| 75.000<br>2.9528        | 115.000<br>4.5276 | 25.000<br>0.9843 | 110000<br>24700        | 0.46 | 1.31 | 28400<br>6390          | 22300<br>5020    | 1.27 | 167000<br>37500        | JLM714149   | JLM714110              |  |                |       |       |
| 75.000<br>2.9528        | 120.000<br>4.7244 | 31.000<br>1.2205 | 148000<br>33200        | 0.44 | 1.35 | 38300<br>8600          | 29100<br>6540    | 1.31 | 229000<br>51500        | JM714249A   | JM714210               |  |                |       |       |
| 75.000<br>2.9528        | 120.000<br>4.7244 | 31.000<br>1.2205 | 148000<br>33200        | 0.44 | 1.35 | 38300<br>8600          | 29100<br>6540    | 1.31 | 229000<br>51500        | JM714249    | JM714210               |  |                |       |       |
| 75.000<br>2.9528        | 145.000<br>5.7087 | 51.000<br>2.0079 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000       | JH415647    | JH415610               |  |                |       |       |
| 75.987<br>2.9916        | 131.976<br>5.1959 | 39.000<br>1.5354 | 222000<br>49900        | 0.33 | 1.80 | 57600<br>12900         | 32800<br>7370    | 1.76 | 324000<br>72800        | HM215249    | HM215210               |  |                |       |       |
| 76.000<br>2.9921        | 120.000<br>4.7244 | 23.000<br>0.9055 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34299X      | 34472X                 |  |                |       |       |
| 76.200<br>3.0000        | 105.570<br>4.1563 | 13.495<br>0.5313 | 37900<br>8530          | 0.47 | 1.27 | 9830<br>2210           | 7960<br>1790     | 1.24 | 61000<br>13700         | LL714649    | LL714610               |  |                |       |       |
| 76.200<br>3.0000        | 109.538<br>4.3125 | 19.050<br>0.7500 | 64100<br>14400         | 0.50 | 1.20 | 16600<br>3730          | 14300<br>3210    | 1.16 | 120000<br>27000        | L814749     | L814710                |  |                |       |       |
| 76.200<br>3.0000        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34300       | 34478                  |  |                |       |       |
| 76.200<br>3.0000        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34301       | 34478                  |  |                |       |       |
| 76.200<br>3.0000        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900        | 27684       | 27620                  |  |                |       |       |
| 76.200<br>3.0000        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900        | 27684A      | 27620                  |  |                |       |       |
| 76.200<br>3.0000        | 127.000<br>5.0000 | 26.988<br>1.0625 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34300       | 34500                  |  |                |       |       |
| 76.200<br>3.0000        | 127.000<br>5.0000 | 26.988<br>1.0625 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34301       | 34500                  |  |                |       |       |
| 76.200<br>3.0000        | 127.000<br>5.0000 | 30.162<br>1.1875 | 149000<br>33500        | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800        | 42687       | 42620                  |  |                |       |       |
| 76.200<br>3.0000        | 127.000<br>5.0000 | 30.162<br>1.1875 | 149000<br>33500        | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800        | 42688       | 42620                  |  |                |       |       |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600        | 495A        | 492A                   |  |                |       |       |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900        | 47678       | 47620                  |  |                |       |       |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900        | 47679       | 47620                  |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 54.229  | 44.450 | -15.0            | 3.5                                            | 87.0                                       | 93.0                                       | 0.8                                          | 140.0          | 131.0          | 2.70           | 0.70           | 158            | 29.1           | 0.0931         | 4.41                |
| 2.1350  | 1.7500 | -0.59            | 0.14                                           | 3.43                                       | 3.66                                       | 0.03                                         | 5.51           | 5.16           | 0.11           | 0.03           |                |                |                | 9.71                |
| 46.672  | 36.512 | -11.9            | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 142.0          | 134.0          | 1.90           | 1.20           | 160            | 26.3           | 0.0898         | 3.78                |
| 1.8375  | 1.4375 | -0.47            | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 5.59           | 5.28           | 0.07           | 0.05           |                |                |                | 8.34                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 141.0          | 134.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 3.48                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 5.55           | 5.28           | 0.18           | 0.08           |                |                |                | 7.67                |
| 25.400  | 19.050 | 1.0              | 1.5                                            | 80.0                                       | 83.0                                       | 3.3                                          | 109.0          | 101.0          | 2.30           | 1.50           | 77.7           | 43.3           | 0.1170         | 0.87                |
| 1.0000  | 0.7500 | 0.04             | 0.06                                           | 3.15                                       | 3.27                                       | 0.13                                         | 4.29           | 3.98           | 0.09           | 0.06           |                |                |                | 1.93                |
| 36.170  | 28.575 | -8.1             | 0.8                                            | 82.0                                       | 83.0                                       | 3.3                                          | 120.0          | 112.0          | 3.20           | 1.80           | 101            | 24             | 0.1167         | 1.78                |
| 1.4240  | 1.1250 | -0.32            | 0.03                                           | 3.23                                       | 3.27                                       | 0.13                                         | 4.72           | 4.41           | 0.13           | 0.07           |                |                |                | 3.92                |
| 36.098  | 28.575 | -5.3             | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 133.0          | 125.0          | 3.40           | 1.90           | 126            | 32             | 0.1295         | 2.41                |
| 1.4212  | 1.1250 | -0.21            | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 5.24           | 4.92           | 0.14           | 0.07           |                |                |                | 5.32                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 86.0                                       | 92.0                                       | 3.3                                          | 141.0          | 134.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 3.42                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.39                                       | 3.62                                       | 0.13                                         | 5.55           | 5.28           | 0.18           | 0.08           |                |                |                | 7.54                |
| 23.012  | 19.842 | 1.5              | 2.0                                            | 82.0                                       | 85.0                                       | 3.3                                          | 118.0          | 112.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 1.20                |
| 0.9060  | 0.7812 | 0.06             | 0.08                                           | 3.23                                       | 3.35                                       | 0.13                                         | 4.65           | 4.41           | 0.10           | 0.08           |                |                |                | 2.64                |
| 31.000  | 27.000 | -2.8             | 6.4                                            | 83.0                                       | 94.0                                       | 2.3                                          | 123.0          | 115.0          | 3.40           | 0.90           | 96.2           | 28.6           | 0.1197         | 1.68                |
| 1.2205  | 1.0630 | -0.11            | 0.25                                           | 3.27                                       | 3.70                                       | 0.09                                         | 4.84           | 4.53           | 0.13           | 0.03           |                |                |                | 3.70                |
| 25.000  | 19.000 | 0.5              | 3.0                                            | 81.0                                       | 87.0                                       | 2.5                                          | 110.0          | 104.0          | 2.00           | 2.10           | 76.3           | 30.5           | 0.1140         | 0.87                |
| 0.9843  | 0.7480 | 0.02             | 0.12                                           | 3.19                                       | 3.43                                       | 0.10                                         | 4.33           | 4.09           | 0.08           | 0.08           |                |                |                | 1.92                |
| 29.500  | 25.000 | -2.0             | 6.0                                            | 83.0                                       | 94.0                                       | 2.5                                          | 115.0          | 108.0          | 2.10           | 2.70           | 95             | 32.8           | 0.1218         | 1.27                |
| 1.1614  | 0.9843 | -0.08            | 0.24                                           | 3.27                                       | 3.70                                       | 0.10                                         | 4.53           | 4.25           | 0.08           | 0.11           |                |                |                | 2.80                |
| 29.500  | 25.000 | -2.0             | 3.0                                            | 83.0                                       | 88.0                                       | 2.5                                          | 115.0          | 108.0          | 2.10           | 2.70           | 95             | 32.1           | 0.1218         | 1.30                |
| 1.1614  | 0.9843 | -0.08            | 0.12                                           | 3.26                                       | 3.46                                       | 0.10                                         | 4.53           | 4.25           | 0.08           | 0.11           |                |                |                | 2.86                |
| 51.000  | 42.000 | -14.2            | 3.0                                            | 89.0                                       | 94.0                                       | 2.5                                          | 139.0          | 129.0          | 2.00           | 3.20           | 158            | 26.4           | 0.0931         | 3.80                |
| 2.0079  | 1.6535 | -0.56            | 0.12                                           | 3.50                                       | 3.70                                       | 0.10                                         | 5.47           | 5.08           | 0.08           | 0.12           |                |                |                | 8.39                |
| 39.000  | 32.000 | -9.7             | 7.0                                            | 85.0                                       | 98.0                                       | 3.5                                          | 126.0          | 118.0          | 1.20           | 2.80           | 126            | 30.2           | 0.0837         | 2.11                |
| 1.5354  | 1.2598 | -0.38            | 0.28                                           | 3.35                                       | 3.86                                       | 0.14                                         | 4.96           | 4.65           | 0.05           | 0.11           |                |                |                | 4.65                |
| 23.012  | 16.000 | 1.5              | 2.3                                            | 83.0                                       | 86.0                                       | 2.3                                          | 115.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.88                |
| 0.9060  | 0.6299 | 0.06             | 0.09                                           | 3.27                                       | 3.39                                       | 0.09                                         | 4.53           | 4.33           | 0.10           | 0.08           |                |                |                | 1.94                |
| 13.495  | 9.525  | 6.6              | 1.5                                            | 81.0                                       | 83.0                                       | 1.5                                          | 102.0          | 99.0           | 0.90           | 1.20           | 45.7           | 64.3           | 0.0956         | 0.32                |
| 0.5313  | 0.3750 | 0.26             | 0.06                                           | 3.19                                       | 3.27                                       | 0.06                                         | 4.02           | 3.90           | 0.04           | 0.05           |                |                |                | 0.71                |
| 19.050  | 15.083 | 5.1              | 1.5                                            | 82.0                                       | 84.0                                       | 1.5                                          | 105.0          | 100.0          | 0.90           | 1.20           | 76             | 59.6           | 0.1164         | 0.58                |
| 0.7500  | 0.5938 | 0.20             | 0.06                                           | 3.23                                       | 3.31                                       | 0.06                                         | 4.13           | 3.94           | 0.04           | 0.05           |                |                |                | 1.28                |
| 23.012  | 17.462 | 1.5              | 2.0                                            | 83.0                                       | 86.0                                       | 2.0                                          | 116.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.96                |
| 0.9060  | 0.6875 | 0.06             | 0.08                                           | 3.27                                       | 3.39                                       | 0.08                                         | 4.57           | 4.33           | 0.10           | 0.08           |                |                |                | 2.11                |
| 23.012  | 17.462 | 1.5              | 3.5                                            | 83.0                                       | 89.0                                       | 2.0                                          | 116.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.94                |
| 0.9060  | 0.6875 | 0.06             | 0.14                                           | 3.27                                       | 3.50                                       | 0.08                                         | 4.57           | 4.33           | 0.10           | 0.08           |                |                |                | 2.08                |
| 25.400  | 19.845 | 0.5              | 3.5                                            | 84.0                                       | 91.0                                       | 1.5                                          | 120.0          | 115.0          | 1.50           | 1.70           | 98.2           | 41.8           | 0.1198         | 1.21                |
| 1.0000  | 0.7813 | 0.02             | 0.14                                           | 3.31                                       | 3.58                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.67                |
| 25.400  | 19.845 | 0.5              | 0.8                                            | 84.0                                       | 85.0                                       | 1.5                                          | 120.0          | 115.0          | 1.50           | 1.70           | 98.2           | 41.8           | 0.1198         | 1.22                |
| 1.0000  | 0.7813 | 0.02             | 0.03                                           | 3.31                                       | 3.35                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.70                |
| 23.012  | 19.842 | 1.5              | 2.0                                            | 83.0                                       | 86.0                                       | 3.3                                          | 118.0          | 112.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 1.17                |
| 0.9060  | 0.7812 | 0.06             | 0.08                                           | 3.27                                       | 3.39                                       | 0.13                                         | 4.65           | 4.41           | 0.10           | 0.08           |                |                |                | 2.59                |
| 23.012  | 19.842 | 1.5              | 3.5                                            | 83.0                                       | 89.0                                       | 3.3                                          | 118.0          | 112.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 1.16                |
| 0.9060  | 0.7812 | 0.06             | 0.14                                           | 3.27                                       | 3.50                                       | 0.13                                         | 4.65           | 4.41           | 0.10           | 0.08           |                |                |                | 2.56                |
| 31.000  | 22.225 | -2.8             | 3.5                                            | 84.0                                       | 90.0                                       | 3.3                                          | 121.0          | 114.0          | 3.40           | 0.90           | 96.2           | 28.6           | 0.1197         | 1.43                |
| 1.2205  | 0.8750 | -0.11            | 0.14                                           | 3.31                                       | 3.54                                       | 0.13                                         | 4.76           | 4.49           | 0.13           | 0.03           |                |                |                | 3.16                |
| 31.000  | 22.225 | -2.8             | 6.4                                            | 84.0                                       | 96.0                                       | 3.3                                          | 121.0          | 114.0          | 3.40           | 0.90           | 96.2           | 28.6           | 0.1197         | 1.40                |
| 1.2205  | 0.8750 | -0.11            | 0.25                                           | 3.31                                       | 3.78                                       | 0.13                                         | 4.76           | 4.49           | 0.13           | 0.03           |                |                |                | 3.08                |
| 29.769  | 22.225 | -0.8             | 3.5                                            | 86.0                                       | 92.0                                       | 3.3                                          | 128.0          | 120.0          | 2.50           | 2.10           | 105            | 29.3           | 0.1252         | 1.68                |
| 1.1720  | 0.8750 | -0.03            | 0.14                                           | 3.39                                       | 3.62                                       | 0.13                                         | 5.04           | 4.72           | 0.10           | 0.08           |                |                |                | 3.70                |
| 33.338  | 26.195 | -4.3             | 6.4                                            | 85.0                                       | 97.0                                       | 3.3                                          | 128.0          | 119.0          | 2.30           | 2.40           | 119            | 29.2           | 0.1273         | 1.87                |
| 1.3125  | 1.0313 | -0.17            | 0.25                                           | 3.35                                       | 3.82                                       | 0.13                                         | 5.04           | 4.69           | 0.09           | 0.09           |                |                |                | 4.12                |
| 33.338  | 26.195 | -4.3             | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 128.0          | 119.0          | 2.30           | 2.40           | 119            | 29.2           | 0.1273         | 1.90                |
| 1.3125  | 1.0313 | -0.17            | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 5.04           | 4.69           | 0.09           | 0.09           |                |                |                | 4.18                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

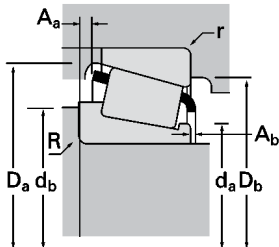
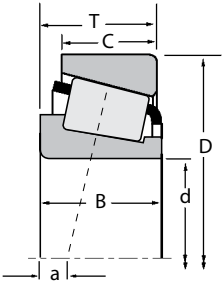




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |          |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47680       | 47620    |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47679       | 47620A   |
| 76.200<br>3.0000        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300  | HM516442    | HM516410 |
| 76.200<br>3.0000        | 135.733<br>5.3438 | 44.450<br>1.7500 | 237000<br>53200        | 0.41 | 1.48 | 61300<br>13800         | 42700<br>9600    | 1.44 | 380000<br>85400  | 5760        | 5735     |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 495A        | 493      |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 495AX       | 493      |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715346     | H715311  |
| 76.200<br>3.0000        | 139.700<br>5.5000 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 575         | 572X     |
| 76.200<br>3.0000        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715346     | H715310  |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 575         | 572      |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 36.512<br>1.4375 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47679       | 47621    |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 36.512<br>1.4375 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47680       | 47621    |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 575-S       | 572      |
| 76.200<br>3.0000        | 142.138<br>5.5960 | 44.450<br>1.7500 | 223000<br>50200        | 0.39 | 1.55 | 57900<br>13000         | 38200<br>8600    | 1.51 | 318000<br>71400  | HM515745    | HM515716 |
| 76.200<br>3.0000        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 659         | 653      |
| 76.200<br>3.0000        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6461        | 6420     |
| 76.200<br>3.0000        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6466        | 6420     |
| 76.200<br>3.0000        | 149.225<br>5.8750 | 53.975<br>2.1250 | 321000<br>72200        | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6461A       | 6420     |
| 76.200<br>3.0000        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 590A        | JM719113 |
| 76.200<br>3.0000        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 748-S       | 742      |
| 76.200<br>3.0000        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 590A        | 592A     |
| 76.200<br>3.0000        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 659         | 652      |
| 76.200<br>3.0000        | 160.000<br>6.2992 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6576        | 6525X    |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 755         | 752      |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 49.212<br>1.9375 | 275000<br>61900        | 0.71 | 0.85 | 71400<br>16100         | 86700<br>19500   | 0.82 | 330000<br>74200  | 9285        | 9220     |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6575        | 6535     |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6576        | 6535     |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6576        | 6536     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                      |                      | Cage                |                       | Factors        |                |                | Weight<br>kg (lbs.)  |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------------|----------------------|---------------------|-----------------------|----------------|----------------|----------------|----------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                      |                      |                     |                       |                |                |                |                      |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>       | D <sub>b</sub>       | A <sub>a</sub>      | A <sub>b</sub>        | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                      |
| <b>33.338</b><br>1.3125 | <b>26.195</b><br>1.0313 | <b>-4.3</b><br>-0.17  | <b>0.8</b><br>0.03         | <b>85.0</b><br>3.35               | <b>86.0</b><br>3.39      | <b>3.3</b><br>0.13                  | <b>128.0</b><br>5.04 | <b>119.0</b><br>4.69 | <b>2.30</b><br>0.09 | <b>2.40</b><br>0.09   | <b>119</b>     | <b>29.2</b>    | <b>0.1273</b>  | <b>1.91</b><br>4.21  |
| <b>33.338</b><br>1.3125 | <b>26.195</b><br>1.0313 | <b>-4.3</b><br>-0.17  | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>91.0</b><br>3.58      | <b>0.8</b><br>0.03                  | <b>128.0</b><br>5.04 | <b>121.0</b><br>4.76 | <b>2.30</b><br>0.09 | <b>2.40</b><br>0.09   | <b>119</b>     | <b>29.2</b>    | <b>0.1273</b>  | <b>1.91</b><br>4.22  |
| <b>39.688</b><br>1.5625 | <b>32.545</b><br>1.2813 | <b>-7.4</b><br>-0.29  | <b>3.5</b><br>0.14         | <b>87.0</b><br>3.43               | <b>93.0</b><br>3.66      | <b>3.3</b><br>0.13                  | <b>128.0</b><br>5.04 | <b>118.0</b><br>4.65 | <b>1.70</b><br>0.07 | <b>2.50</b><br>0.10   | <b>154</b>     | <b>43</b>      | <b>0.0955</b>  | <b>2.40</b><br>5.30  |
| <b>46.100</b><br>1.8150 | <b>34.925</b><br>1.3750 | <b>-11.7</b><br>-0.46 | <b>3.5</b><br>0.14         | <b>88.0</b><br>3.46               | <b>94.0</b><br>3.70      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>119.0</b><br>4.69 | <b>5.40</b><br>0.21 | <b>1.40</b><br>0.06   | <b>145</b>     | <b>31.6</b>    | <b>0.0940</b>  | <b>2.69</b><br>5.94  |
| <b>29.769</b><br>1.1720 | <b>22.225</b><br>0.8750 | <b>-0.8</b><br>-0.03  | <b>3.5</b><br>0.14         | <b>86.0</b><br>3.39               | <b>92.0</b><br>3.62      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>122.0</b><br>4.80 | <b>2.50</b><br>0.10 | <b>2.10</b><br>0.08   | <b>105</b>     | <b>29.3</b>    | <b>0.1252</b>  | <b>1.80</b><br>3.96  |
| <b>29.769</b><br>1.1720 | <b>22.225</b><br>0.8750 | <b>-0.8</b><br>-0.03  | <b>6.4</b><br>0.25         | <b>86.0</b><br>3.39               | <b>98.0</b><br>3.86      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>122.0</b><br>4.80 | <b>2.50</b><br>0.10 | <b>2.10</b><br>0.08   | <b>105</b>     | <b>29.3</b>    | <b>0.1252</b>  | <b>1.77</b><br>3.90  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>88.0</b><br>3.46               | <b>98.0</b><br>3.86      | <b>3.3</b><br>0.13                  | <b>132.0</b><br>5.20 | <b>118.0</b><br>4.65 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08   | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>2.91</b><br>6.42  |
| <b>36.098</b><br>1.4212 | <b>28.575</b><br>1.1250 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>86.0</b><br>3.39               | <b>92.0</b><br>3.62      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>125.0</b><br>4.92 | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.07   | <b>126</b>     | <b>32</b>      | <b>0.1295</b>  | <b>2.33</b><br>5.14  |
| <b>46.038</b><br>1.8125 | <b>36.512</b><br>1.4375 | <b>-8.6</b><br>-0.34  | <b>3.5</b><br>0.14         | <b>88.0</b><br>3.46               | <b>98.0</b><br>3.86      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>120.0</b><br>4.72 | <b>4.20</b><br>0.16 | <b>2.00</b><br>0.08   | <b>147</b>     | <b>32.8</b>    | <b>0.0993</b>  | <b>3.10</b><br>6.82  |
| <b>36.098</b><br>1.4212 | <b>28.575</b><br>1.1250 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>86.0</b><br>3.39               | <b>92.0</b><br>3.62      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>125.0</b><br>4.92 | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.07   | <b>126</b>     | <b>32</b>      | <b>0.1295</b>  | <b>2.36</b><br>5.20  |
| <b>33.338</b><br>1.3125 | <b>29.370</b><br>1.1563 | <b>-4.3</b><br>-0.17  | <b>3.5</b><br>0.14         | <b>85.0</b><br>3.35               | <b>91.0</b><br>3.58      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>122.0</b><br>4.80 | <b>2.30</b><br>0.09 | <b>2.40</b><br>0.09   | <b>119</b>     | <b>29.2</b>    | <b>0.1273</b>  | <b>2.33</b><br>5.13  |
| <b>33.338</b><br>1.3125 | <b>29.370</b><br>1.1563 | <b>-4.3</b><br>-0.17  | <b>0.8</b><br>0.03         | <b>85.0</b><br>3.35               | <b>86.0</b><br>3.39      | <b>3.3</b><br>0.13                  | <b>130.0</b><br>5.12 | <b>122.0</b><br>4.80 | <b>2.30</b><br>0.09 | <b>2.40</b><br>0.09   | <b>119</b>     | <b>29.2</b>    | <b>0.1273</b>  | <b>2.34</b><br>5.15  |
| <b>36.098</b><br>1.4212 | <b>28.575</b><br>1.1250 | <b>-5.3</b><br>-0.21  | <b>6.8</b><br>0.27         | <b>86.0</b><br>3.39               | <b>99.0</b><br>3.90      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>125.0</b><br>4.92 | <b>3.40</b><br>0.14 | <b>1.90</b><br>0.07   | <b>126</b>     | <b>32</b>      | <b>0.1295</b>  | <b>2.32</b><br>5.12  |
| <b>46.100</b><br>1.8150 | <b>33.338</b><br>1.3125 | <b>-10.9</b><br>-0.43 | <b>3.5</b><br>0.14         | <b>87.0</b><br>3.43               | <b>92.0</b><br>3.62      | <b>3.3</b><br>0.13                  | <b>133.0</b><br>5.24 | <b>124.0</b><br>4.88 | <b>6.00</b><br>0.24 | <b>-1.30</b><br>-0.05 | <b>122</b>     | <b>26.3</b>    | <b>0.0869</b>  | <b>2.91</b><br>6.41  |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-7.9</b><br>-0.31  | <b>3.5</b><br>0.14         | <b>87.0</b><br>3.43               | <b>93.0</b><br>3.66      | <b>3.3</b><br>0.13                  | <b>139.0</b><br>5.47 | <b>131.0</b><br>5.16 | <b>4.50</b><br>0.18 | <b>2.00</b><br>0.08   | <b>137</b>     | <b>27.3</b>    | <b>0.0919</b>  | <b>2.99</b><br>6.59  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>3.5</b><br>0.14         | <b>89.5</b><br>3.52               | <b>96.0</b><br>3.78      | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03   | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>4.23</b><br>9.32  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>6.4</b><br>0.25         | <b>89.5</b><br>3.52               | <b>102.0</b><br>4.02     | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03   | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>4.20</b><br>9.26  |
| <b>54.229</b><br>2.1350 | <b>44.450</b><br>1.7500 | <b>-15.0</b><br>-0.59 | <b>9.7</b><br>0.38         | <b>89.5</b><br>3.52               | <b>108.0</b><br>4.25     | <b>3.3</b><br>0.13                  | <b>140.0</b><br>5.51 | <b>129.0</b><br>5.08 | <b>2.70</b><br>0.11 | <b>0.70</b><br>0.03   | <b>158</b>     | <b>29.1</b>    | <b>0.0931</b>  | <b>4.15</b><br>9.15  |
| <b>36.322</b><br>1.4300 | <b>27.000</b><br>1.0630 | <b>-2.5</b><br>-0.10  | <b>3.5</b><br>0.14         | <b>89.0</b><br>3.50               | <b>95.0</b><br>3.74      | <b>2.5</b><br>0.10                  | <b>143.0</b><br>5.63 | <b>135.0</b><br>5.31 | <b>4.10</b><br>0.16 | <b>1.70</b><br>0.07   | <b>151</b>     | <b>38.3</b>    | <b>0.1416</b>  | <b>2.94</b><br>6.48  |
| <b>46.672</b><br>1.8375 | <b>36.512</b><br>1.4375 | <b>-11.9</b><br>-0.47 | <b>3.5</b><br>0.14         | <b>87.0</b><br>3.43               | <b>93.0</b><br>3.66      | <b>3.3</b><br>0.13                  | <b>142.0</b><br>5.59 | <b>134.0</b><br>5.28 | <b>1.90</b><br>0.07 | <b>1.20</b><br>0.05   | <b>160</b>     | <b>26.3</b>    | <b>0.0898</b>  | <b>3.65</b><br>8.04  |
| <b>36.322</b><br>1.4300 | <b>30.162</b><br>1.1875 | <b>-2.5</b><br>-0.10  | <b>3.5</b><br>0.14         | <b>89.0</b><br>3.50               | <b>95.0</b><br>3.74      | <b>3.3</b><br>0.13                  | <b>144.0</b><br>5.67 | <b>135.0</b><br>5.31 | <b>4.10</b><br>0.16 | <b>1.70</b><br>0.07   | <b>151</b>     | <b>38.3</b>    | <b>0.1416</b>  | <b>3.22</b><br>7.09  |
| <b>41.275</b><br>1.6250 | <b>31.750</b><br>1.2500 | <b>-7.9</b><br>-0.31  | <b>3.5</b><br>0.14         | <b>87.0</b><br>3.43               | <b>93.0</b><br>3.66      | <b>3.3</b><br>0.13                  | <b>141.0</b><br>5.55 | <b>134.0</b><br>5.28 | <b>4.50</b><br>0.18 | <b>2.00</b><br>0.08   | <b>137</b>     | <b>27.3</b>    | <b>0.0919</b>  | <b>3.36</b><br>7.40  |
| <b>55.100</b><br>2.1693 | <b>44.450</b><br>1.7500 | <b>-13.2</b><br>-0.52 | <b>3.5</b><br>0.14         | <b>92.0</b><br>3.62               | <b>99.0</b><br>3.90      | <b>3.0</b><br>0.12                  | <b>153.5</b><br>6.04 | <b>141.0</b><br>5.55 | <b>4.10</b><br>0.16 | <b>0.90</b><br>0.03   | <b>199</b>     | <b>33.5</b>    | <b>0.1037</b>  | <b>5.24</b><br>11.54 |
| <b>48.260</b><br>1.9000 | <b>38.100</b><br>1.5000 | <b>-11.9</b><br>-0.47 | <b>3.5</b><br>0.14         | <b>88.0</b><br>3.46               | <b>95.0</b><br>3.74      | <b>3.3</b><br>0.13                  | <b>150.0</b><br>5.91 | <b>144.0</b><br>5.67 | <b>3.30</b><br>0.13 | <b>0.90</b><br>0.04   | <b>177</b>     | <b>29.4</b>    | <b>0.0945</b>  | <b>4.69</b><br>10.34 |
| <b>46.038</b><br>1.8125 | <b>31.750</b><br>1.2500 | <b>0.0</b><br>0.00    | <b>3.5</b><br>0.14         | <b>90.5</b><br>3.56               | <b>103.0</b><br>4.06     | <b>3.3</b><br>0.13                  | <b>153.0</b><br>6.03 | <b>138.0</b><br>5.43 | <b>9.10</b><br>0.36 | <b>4.00</b><br>0.16   | <b>102</b>     | <b>18.4</b>    | <b>0.0984</b>  | <b>4.18</b><br>9.20  |
| <b>55.100</b><br>2.1693 | <b>42.862</b><br>1.6875 | <b>-13.2</b><br>-0.52 | <b>6.4</b><br>0.25         | <b>92.0</b><br>3.62               | <b>104.0</b><br>4.09     | <b>3.3</b><br>0.13                  | <b>154.0</b><br>6.06 | <b>141.0</b><br>5.55 | <b>4.10</b><br>0.16 | <b>0.90</b><br>0.03   | <b>199</b>     | <b>33.5</b>    | <b>0.1037</b>  | <b>5.34</b><br>11.78 |
| <b>55.100</b><br>2.1693 | <b>42.862</b><br>1.6875 | <b>-13.2</b><br>-0.52 | <b>3.5</b><br>0.14         | <b>92.0</b><br>3.62               | <b>99.0</b><br>3.90      | <b>3.3</b><br>0.13                  | <b>154.0</b><br>6.06 | <b>141.0</b><br>5.55 | <b>4.10</b><br>0.16 | <b>0.90</b><br>0.03   | <b>199</b>     | <b>33.5</b>    | <b>0.1037</b>  | <b>5.37</b><br>11.84 |
| <b>55.100</b><br>2.1693 | <b>42.862</b><br>1.6875 | <b>-13.2</b><br>-0.52 | <b>3.5</b><br>0.14         | <b>92.0</b><br>3.62               | <b>99.0</b><br>3.90      | <b>0.8</b><br>0.03                  | <b>154.0</b><br>6.06 | <b>144.0</b><br>5.67 | <b>4.10</b><br>0.16 | <b>0.90</b><br>0.03   | <b>199</b>     | <b>33.5</b>    | <b>0.1037</b>  | <b>5.39</b><br>11.89 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

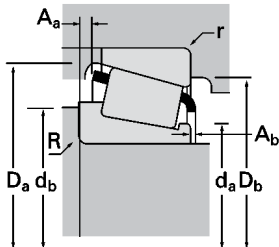
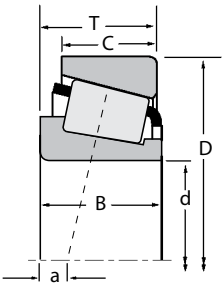
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |        |  |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|--------|--|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |       |       |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000       | 6576C       | 6535                   |  |        |  |       |       |
| 76.200<br>3.0000        | 168.275<br>6.6250 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200        | 755         | 753                    |  |        |  |       |       |
| 76.200<br>3.0000        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000       | 837         | 832                    |  |        |  |       |       |
| 76.200<br>3.0000        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000       | 843         | 832                    |  |        |  |       |       |
| 76.200<br>3.0000        | 171.450<br>6.7500 | 49.212<br>1.9375 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800        | 9380        | 9321                   |  |        |  |       |       |
| 76.200<br>3.0000        | 171.450<br>6.7500 | 51.473<br>2.0265 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800        | 9378        | 9321                   |  |        |  |       |       |
| 76.200<br>3.0000        | 177.800<br>7.0000 | 52.388<br>2.0625 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800        | 9380        | 9320                   |  |        |  |       |       |
| 76.200<br>3.0000        | 177.800<br>7.0000 | 55.562<br>2.1875 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800        | 9378        | 9320                   |  |        |  |       |       |
| 76.200<br>3.0000        | 180.975<br>7.1250 | 53.975<br>2.1250 | 350000<br>78700        | 0.73 | 0.82 | 90800<br>20400         | 114000<br>25600  | 0.80 | 458000<br>103000       | H917840     | H917810                |  |        |  |       |       |
| 76.200<br>3.0000        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000       | HH221430    | HH221410               |  |        |  |       |       |
| 77.788<br>3.0625        | 117.475<br>4.6250 | 25.400<br>1.0000 | 109000<br>24500        | 0.51 | 1.18 | 28300<br>6360          | 24700<br>5550    | 1.15 | 183000<br>41200        | LM814849    | LM814810               |  |        |  |       |       |
| 77.788<br>3.0625        | 120.000<br>4.7244 | 23.000<br>0.9055 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34306       | 34472X                 |  |        |  |       |       |
| 77.788<br>3.0625        | 120.650<br>4.7500 | 27.783<br>1.0938 | 109000<br>24500        | 0.51 | 1.18 | 28300<br>6360          | 24700<br>5550    | 1.15 | 183000<br>41200        | LM814849    | LM814814               |  |        |  |       |       |
| 77.788<br>3.0625        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34306       | 34478                  |  |        |  |       |       |
| 77.788<br>3.0625        | 121.442<br>4.7812 | 24.608<br>0.9688 | 94600<br>21300         | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600        | 34307       | 34478                  |  |        |  |       |       |
| 77.788<br>3.0625        | 127.000<br>5.0000 | 30.162<br>1.1875 | 149000<br>33500        | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800        | 42690       | 42620                  |  |        |  |       |       |
| 77.788<br>3.0625        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600        | 495AS       | 492A                   |  |        |  |       |       |
| 77.788<br>3.0625        | 135.733<br>5.3438 | 44.450<br>1.7500 | 237000<br>53200        | 0.41 | 1.48 | 61300<br>13800         | 42700<br>9600    | 1.44 | 380000<br>85400        | 5795        | 5735                   |  |        |  |       |       |
| 77.788<br>3.0625        | 136.525<br>5.3750 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000        | H715348     | H715311                |  |        |  |       |       |
| 77.788<br>3.0625        | 139.700<br>5.5000 | 46.038<br>1.8125 | 249000<br>56000        | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000        | H715348     | H715310                |  |        |  |       |       |
| 77.788<br>3.0625        | 164.976<br>6.4951 | 49.500<br>1.9488 | 325000<br>73200        | 0.51 | 1.17 | 84400<br>19000         | 73800<br>16600   | 1.14 | 400000<br>90000        | H816249     | H816210                |  |        |  |       |       |
| 79.375<br>3.1250        | 140.000<br>5.5118 | 44.450<br>1.7500 | 223000<br>50200        | 0.39 | 1.55 | 57900<br>13000         | 38200<br>8600    | 1.51 | 318000<br>71400        | HM515749    | HM515714               |  |        |  |       |       |
| 79.375<br>3.1250        | 142.138<br>5.5960 | 44.450<br>1.7500 | 223000<br>50200        | 0.39 | 1.55 | 57900<br>13000         | 38200<br>8600    | 1.51 | 318000<br>71400        | HM515749    | HM515716               |  |        |  |       |       |
| 79.375<br>3.1250        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300        | 661         | 653                    |  |        |  |       |       |
| 79.375<br>3.1250        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 595A        | 592XE                  |  |        |  |       |       |
| 79.375<br>3.1250        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 595A        | 593X                   |  |        |  |       |       |
| 79.375<br>3.1250        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800        | 750         | 742                    |  |        |  |       |       |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 595A        | 592AS                  |  |        |  |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 55.100  | 42.862 | -13.2            | 3.5                                            | 94.0                                       | 101.0                                      | 3.3                                          | 154.0          | 141.0          | 4.10           | 0.90           | 199            | 33.5           | 0.1037         | 5.37                |
| 2.1693  | 1.6875 | -0.52            | 0.14                                           | 3.70                                       | 3.98                                       | 0.13                                         | 6.06           | 5.55           | 0.16           | 0.03           |                |                |                | 11.85               |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 88.0                                       | 95.0                                       | 3.3                                          | 150.0          | 147.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 5.16                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.46                                       | 3.74                                       | 0.13                                         | 5.91           | 5.79           | 0.13           | 0.04           |                |                |                | 11.38               |
| 56.363  | 41.275 | -18.5            | 0.8                                            | 89.0                                       | 90.0                                       | 3.3                                          | 155.0          | 149.0          | 5.20           | 1.60           | 198            | 34.8           | 0.0937         | 5.78                |
| 2.2190  | 1.6250 | -0.73            | 0.03                                           | 3.50                                       | 3.54                                       | 0.13                                         | 6.10           | 5.87           | 0.20           | 0.06           |                |                |                | 12.75               |
| 56.363  | 41.275 | -18.5            | 6.4                                            | 89.0                                       | 101.0                                      | 3.3                                          | 155.0          | 149.0          | 5.20           | 1.60           | 198            | 34.8           | 0.0937         | 5.76                |
| 2.2190  | 1.6250 | -0.73            | 0.25                                           | 3.50                                       | 3.98                                       | 0.13                                         | 6.10           | 5.87           | 0.20           | 0.06           |                |                |                | 12.71               |
| 46.038  | 31.750 | 4.3              | 3.5                                            | 98.5                                       | 105.0                                      | 3.3                                          | 164.0          | 147.0          | 9.00           | 3.90           | 118            | 18.6           | 0.1053         | 5.11                |
| 1.8125  | 1.2500 | 0.17             | 0.14                                           | 3.87                                       | 4.13                                       | 0.13                                         | 6.46           | 5.79           | 0.35           | 0.15           |                |                |                | 11.26               |
| 50.800  | 31.750 | 1.3              | 3.5                                            | 98.5                                       | 105.0                                      | 3.3                                          | 164.0          | 147.0          | 12.20          | 2.30           | 118            | 18.6           | 0.1053         | 5.35                |
| 2.0000  | 1.2500 | 0.05             | 0.14                                           | 3.87                                       | 4.13                                       | 0.13                                         | 6.46           | 5.79           | 0.48           | 0.09           |                |                |                | 11.80               |
| 46.038  | 34.925 | 4.3              | 3.5                                            | 98.5                                       | 105.0                                      | 3.3                                          | 164.0          | 148.0          | 9.00           | 3.90           | 118            | 18.6           | 0.1053         | 5.81                |
| 1.8125  | 1.3750 | 0.17             | 0.14                                           | 3.87                                       | 4.13                                       | 0.13                                         | 6.46           | 5.83           | 0.35           | 0.15           |                |                |                | 12.80               |
| 50.800  | 34.925 | 1.3              | 3.5                                            | 98.5                                       | 105.0                                      | 3.3                                          | 164.0          | 148.0          | 12.20          | 2.30           | 118            | 18.6           | 0.1053         | 6.05                |
| 2.0000  | 1.3750 | 0.05             | 0.14                                           | 3.87                                       | 4.13                                       | 0.13                                         | 6.46           | 5.83           | 0.48           | 0.09           |                |                |                | 13.34               |
| 53.183  | 35.720 | 0.5              | 3.5                                            | 100.0                                      | 110.0                                      | 3.3                                          | 170.0          | 152.0          | 9.50           | 2.80           | 147            | 20.7           | 0.1123         | 6.55                |
| 2.0938  | 1.4063 | 0.02             | 0.14                                           | 3.94                                       | 4.33                                       | 0.13                                         | 6.69           | 5.98           | 0.38           | 0.11           |                |                |                | 14.45               |
| 57.531  | 46.038 | -15.0            | 3.5                                            | 95.0                                       | 101.0                                      | 3.3                                          | 179.0          | 171.0          | 2.50           | 3.20           | 266            | 28.4           | 0.1072         | 8.87                |
| 2.2650  | 1.8125 | -0.59            | 0.14                                           | 3.74                                       | 3.98                                       | 0.13                                         | 7.05           | 6.73           | 0.10           | 0.13           |                |                |                | 19.55               |
| 25.400  | 19.050 | 2.3              | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 113.0          | 105.0          | 2.50           | 1.40           | 88.6           | 36.6           | 0.1239         | 0.91                |
| 1.0000  | 0.7500 | 0.09             | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 4.45           | 4.13           | 0.10           | 0.06           |                |                |                | 2.00                |
| 23.012  | 16.000 | 1.5              | 3.5                                            | 84.0                                       | 90.0                                       | 2.3                                          | 115.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.83                |
| 0.9060  | 0.6299 | 0.06             | 0.14                                           | 3.31                                       | 3.54                                       | 0.09                                         | 4.53           | 4.33           | 0.10           | 0.08           |                |                |                | 1.84                |
| 25.400  | 26.195 | 2.3              | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 116.0          | 107.0          | 2.50           | 1.40           | 88.6           | 36.6           | 0.1239         | 1.11                |
| 1.0000  | 1.0313 | 0.09             | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 4.56           | 4.21           | 0.10           | 0.06           |                |                |                | 2.45                |
| 23.012  | 17.462 | 1.5              | 3.5                                            | 84.0                                       | 90.0                                       | 2.0                                          | 116.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.91                |
| 0.9060  | 0.6875 | 0.06             | 0.14                                           | 3.31                                       | 3.54                                       | 0.08                                         | 4.57           | 4.33           | 0.10           | 0.08           |                |                |                | 2.00                |
| 23.012  | 17.462 | 1.5              | 6.4                                            | 84.0                                       | 96.0                                       | 2.0                                          | 116.0          | 110.0          | 2.60           | 2.10           | 69.3           | 27             | 0.1093         | 0.88                |
| 0.9060  | 0.6875 | 0.06             | 0.25                                           | 3.31                                       | 3.78                                       | 0.08                                         | 4.57           | 4.33           | 0.10           | 0.08           |                |                |                | 1.94                |
| 31.000  | 22.225 | -2.8             | 3.5                                            | 85.0                                       | 91.0                                       | 3.3                                          | 121.0          | 114.0          | 3.40           | 0.90           | 96.2           | 28.6           | 0.1197         | 1.38                |
| 1.2205  | 0.8750 | -0.11            | 0.14                                           | 3.35                                       | 3.58                                       | 0.13                                         | 4.76           | 4.49           | 0.13           | 0.03           |                |                |                | 3.04                |
| 29.769  | 22.225 | -0.8             | 3.5                                            | 87.0                                       | 93.0                                       | 3.3                                          | 128.0          | 120.0          | 2.50           | 2.10           | 105            | 29.3           | 0.1252         | 1.64                |
| 1.1720  | 0.8750 | -0.03            | 0.14                                           | 3.43                                       | 3.66                                       | 0.13                                         | 5.04           | 4.72           | 0.10           | 0.08           |                |                |                | 3.61                |
| 46.100  | 34.925 | -11.7            | 3.5                                            | 89.0                                       | 96.0                                       | 3.3                                          | 130.0          | 119.0          | 5.40           | 1.40           | 145            | 31.6           | 0.0940         | 2.62                |
| 1.8150  | 1.3750 | -0.46            | 0.14                                           | 3.50                                       | 3.78                                       | 0.13                                         | 5.12           | 4.69           | 0.21           | 0.06           |                |                |                | 5.78                |
| 46.038  | 36.512 | -8.6             | 3.5                                            | 88.0                                       | 99.0                                       | 3.3                                          | 132.0          | 118.0          | 4.20           | 2.00           | 147            | 32.8           | 0.0993         | 2.84                |
| 1.8125  | 1.4375 | -0.34            | 0.14                                           | 3.46                                       | 3.90                                       | 0.13                                         | 5.20           | 4.65           | 0.16           | 0.08           |                |                |                | 6.26                |
| 46.038  | 36.512 | -8.6             | 3.5                                            | 88.0                                       | 99.0                                       | 3.3                                          | 133.0          | 120.0          | 4.20           | 2.00           | 147            | 32.8           | 0.0993         | 3.02                |
| 1.8125  | 1.4375 | -0.34            | 0.14                                           | 3.46                                       | 3.90                                       | 0.13                                         | 5.24           | 4.72           | 0.16           | 0.08           |                |                |                | 6.67                |
| 46.248  | 36.251 | -6.4             | 3.5                                            | 92.5                                       | 102.0                                      | 3.3                                          | 154.5          | 144.0          | 4.60           | 5.90           | 127            | 23.2           | 0.0959         | 4.84                |
| 1.8208  | 1.4272 | -0.25            | 0.14                                           | 3.64                                       | 4.02                                       | 0.13                                         | 6.08           | 5.67           | 0.18           | 0.23           |                |                |                | 10.66               |
| 46.100  | 33.338 | -10.9            | 3.5                                            | 89.5                                       | 95.0                                       | 3.3                                          | 133.0          | 123.0          | 6.00           | -1.30          | 122            | 26.3           | 0.0869         | 2.64                |
| 1.8150  | 1.3125 | -0.43            | 0.14                                           | 3.52                                       | 3.74                                       | 0.13                                         | 5.24           | 4.84           | 0.24           | -0.05          |                |                |                | 5.83                |
| 46.100  | 33.338 | -10.9            | 3.5                                            | 89.5                                       | 95.0                                       | 3.3                                          | 133.0          | 124.0          | 6.00           | -1.30          | 122            | 26.3           | 0.0869         | 2.77                |
| 1.8150  | 1.3125 | -0.43            | 0.14                                           | 3.52                                       | 3.74                                       | 0.13                                         | 5.24           | 4.88           | 0.24           | -0.05          |                |                |                | 6.10                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 90.0                                       | 96.0                                       | 3.3                                          | 139.0          | 131.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 2.86                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.54                                       | 3.78                                       | 0.13                                         | 5.47           | 5.16           | 0.18           | 0.08           |                |                |                | 6.31                |
| 36.322  | 26.192 | -2.5             | 3.5                                            | 91.0                                       | 98.0                                       | 0.8                                          | 142.0          | 135.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.71                |
| 1.4300  | 1.0312 | -0.10            | 0.14                                           | 3.58                                       | 3.86                                       | 0.03                                         | 5.59           | 5.31           | 0.16           | 0.07           |                |                |                | 5.97                |
| 36.322  | 27.000 | -2.5             | 3.5                                            | 91.0                                       | 98.0                                       | 3.0                                          | 142.0          | 134.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.82                |
| 1.4300  | 1.0630 | -0.10            | 0.14                                           | 3.58                                       | 3.86                                       | 0.12                                         | 5.59           | 5.28           | 0.16           | 0.07           |                |                |                | 6.22                |
| 46.672  | 36.512 | -11.9            | 3.5                                            | 90.0                                       | 96.0                                       | 3.3                                          | 142.0          | 134.0          | 1.90           | 1.20           | 160            | 26.3           | 0.0898         | 3.50                |
| 1.8375  | 1.4375 | -0.47            | 0.14                                           | 3.54                                       | 3.78                                       | 0.13                                         | 5.59           | 5.28           | 0.07           | 0.05           |                |                |                | 7.72                |
| 36.322  | 26.192 | -2.5             | 3.5                                            | 91.0                                       | 98.0                                       | 0.8                                          | 144.0          | 137.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.94                |
| 1.4300  | 1.0312 | -0.10            | 0.14                                           | 3.58                                       | 3.86                                       | 0.03                                         | 5.67           | 5.39           | 0.16           | 0.07           |                |                |                | 6.48                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

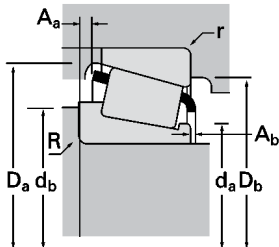
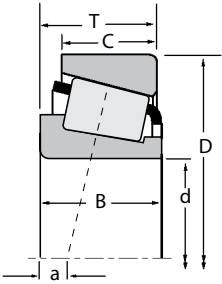
B





# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 595A        | 592A      |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 661         | 652       |
| 79.375<br>3.1250        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 756A        | 752       |
| 79.375<br>3.1250        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221431    | HH221410  |
| 79.975<br>3.1486        | 146.975<br>5.7864 | 40.000<br>1.5748 | 254000<br>57000        | 0.33 | 1.80 | 65800<br>14800         | 37400<br>8420    | 1.76 | 388000<br>87300  | HM218238    | HM218210  |
| 79.975<br>3.1486        | 152.400<br>6.0000 | 40.000<br>1.5748 | 254000<br>57000        | 0.33 | 1.80 | 65800<br>14800         | 37400<br>8420    | 1.76 | 388000<br>87300  | HM218238    | HM218215  |
| 79.985<br>3.1490        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 578         | 572       |
| 79.985<br>3.1490        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 578X        | 572       |
| 79.985<br>3.1490        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 590         | 592XE     |
| 79.985<br>3.1490        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 590         | 592A      |
| 80.000<br>3.1496        | 125.000<br>4.9213 | 24.000<br>0.9449 | 105000<br>23600        | 0.45 | 1.33 | 27200<br>6110          | 21000<br>4730    | 1.29 | 141000<br>31800  | JP8049      | JP8010    |
| 80.000<br>3.1496        | 130.000<br>5.1181 | 35.000<br>1.3780 | 184000<br>41300        | 0.39 | 1.54 | 47700<br>10700         | 31700<br>7130    | 1.50 | 283000<br>63500  | JM515649    | JM515610  |
| 80.000<br>3.1496        | 141.000<br>5.5512 | 30.250<br>1.1909 | 151000<br>34000        | 0.42 | 1.43 | 39300<br>8830          | 28200<br>6350    | 1.39 | 187000<br>42000  | XUB-30216   | YFA30216  |
| 80.000<br>3.1496        | 150.000<br>5.9055 | 44.455<br>1.7502 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 748         | 743       |
| 80.000<br>3.1496        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 748         | 742       |
| 80.000<br>3.1496        | 160.000<br>6.2992 | 45.000<br>1.7717 | 244000<br>54900        | 0.87 | 0.69 | 63300<br>14200         | 93900<br>21100   | 0.67 | 339000<br>76100  | JW8049      | JW8010    |
| 80.000<br>3.1496        | 200.000<br>7.8740 | 52.761<br>2.0772 | 376000<br>84600        | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98316       | 98788     |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 496         | 492A      |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47681       | 47620     |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300  | HM516447    | HM516410  |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300  | HM516447    | HM516410A |
| 80.962<br>3.1875        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 496         | 493       |
| 80.962<br>3.1875        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 581         | 572       |
| 80.962<br>3.1875        | 146.050<br>5.7500 | 38.100<br>1.5000 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 662         | 653       |
| 80.962<br>3.1875        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 740         | 742       |
| 80.962<br>3.1875        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 838         | 832       |
| 82.550<br>3.2500        | 114.300<br>4.5000 | 15.083<br>0.5938 | 55400<br>12400         | 0.31 | 1.94 | 14400<br>3230          | 7610<br>1710     | 1.89 | 87000<br>19600   | LL116249    | LL116210  |
| 82.550<br>3.2500        | 115.888<br>4.5625 | 20.638<br>0.8125 | 83500<br>18800         | 0.31 | 1.95 | 21700<br>4870          | 11400<br>2570    | 1.90 | 147000<br>33100  | L116149     | L116110   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 3.3<br>0.13                                  | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 3.11<br>6.85        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                                    | 90.0<br>3.54                               | 96.0<br>3.78                               | 3.3<br>0.13                                  | 141.0<br>5.55  | 134.0<br>5.28  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 3.23<br>7.13        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 8.0<br>0.31                                    | 91.0<br>3.58                               | 106.0<br>4.17                              | 3.3<br>0.13                                  | 150.0<br>5.91  | 144.0<br>5.67  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.49<br>9.90        |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 3.5<br>0.14                                    | 97.0<br>3.82                               | 103.0<br>4.06                              | 3.3<br>0.13                                  | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 8.69<br>19.16       |
| 40.000<br>1.5748 | 32.500<br>1.2795 | -8.6<br>-0.34    | 7.0<br>0.28                                    | 91.0<br>3.58                               | 104.0<br>4.09                              | 3.5<br>0.14                                  | 141.0<br>5.55  | 133.0<br>5.24  | 1.40<br>0.06   | 2.90<br>0.12   | 168            | 34.7           | 0.0921         | 2.95<br>6.51        |
| 40.000<br>1.5748 | 32.500<br>1.2795 | -8.6<br>-0.34    | 7.0<br>0.28                                    | 91.0<br>3.58                               | 104.0<br>4.09                              | 3.3<br>0.13                                  | 143.0<br>5.63  | 135.0<br>5.31  | 1.40<br>0.06   | 2.90<br>0.12   | 168            | 34.7           | 0.0921         | 3.28<br>7.23        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                                    | 89.0<br>3.50                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.23<br>4.91        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 8.0<br>0.31                                    | 89.0<br>3.50                               | 104.0<br>4.09                              | 3.3<br>0.13                                  | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.17<br>4.79        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 0.8<br>0.03                                  | 142.0<br>5.59  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.68<br>5.92        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 3.3<br>0.13                                  | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 3.08<br>6.80        |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 2.3<br>0.09      | 2.0<br>0.08                                    | 86.0<br>3.39                               | 89.0<br>3.50                               | 2.0<br>0.08                                  | 120.0<br>4.72  | 115.0<br>4.53  | 1.90<br>0.08   | 3.40<br>0.14   | 69.7           | 37.4           | 0.1095         | 0.95<br>2.10        |
| 34.000<br>1.3386 | 28.500<br>1.1220 | -5.1<br>-0.20    | 3.0<br>0.12                                    | 88.0<br>3.46                               | 94.0<br>3.70                               | 2.5<br>0.10                                  | 125.0<br>4.92  | 117.0<br>4.61  | 1.60<br>0.06   | 2.70<br>0.11   | 118            | 31.1           | 0.0863         | 1.71<br>3.77        |
| 28.000<br>1.1024 | 22.000<br>0.8661 | -2.0<br>-0.08    | 0.5<br>0.02                                    | 90.0<br>3.54                               | 90.0<br>3.54                               | 2.0<br>0.08                                  | 133.0<br>5.24  | 128.0<br>5.04  | 3.80<br>0.15   | 3.50<br>0.14   | 80.7           | 25.6           | 0.0771         | 1.80<br>3.98        |
| 46.672<br>1.8375 | 35.000<br>1.3780 | -11.9<br>-0.47   | 3.0<br>0.12                                    | 90.0<br>3.54                               | 96.0<br>3.78                               | 3.3<br>0.13                                  | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.43<br>7.57        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 3.0<br>0.12                                    | 90.0<br>3.54                               | 96.0<br>3.78                               | 3.3<br>0.13                                  | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.48<br>7.67        |
| 41.000<br>1.6142 | 31.000<br>1.2205 | 9.7<br>0.38      | 3.0<br>0.12                                    | 93.0<br>3.67                               | 108.0<br>4.25                              | 3.0<br>0.12                                  | 152.0<br>5.98  | 134.0<br>5.28  | 7.10<br>0.28   | 4.80<br>0.19   | 117            | 27.2           | 0.1094         | 4.04<br>8.90        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 3.5<br>0.14                                    | 105.0<br>4.13                              | 111.0<br>4.37                              | 3.3<br>0.13                                  | 188.0<br>7.40  | 174.0<br>6.85  | 8.60<br>0.34   | 5.40<br>0.21   | 203            | 37.4           | 0.1197         | 7.95<br>17.52       |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 89.0<br>3.50                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 128.0<br>5.04  | 120.0<br>4.72  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.54<br>3.40        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 3.5<br>0.14                                    | 89.0<br>3.50                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 128.0<br>5.04  | 119.0<br>4.69  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 1.74<br>3.84        |
| 39.688<br>1.5625 | 32.545<br>1.2813 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 3.3<br>0.13                                  | 128.0<br>5.04  | 118.0<br>4.65  | 1.70<br>0.07   | 2.50<br>0.10   | 154            | 43             | 0.0955         | 2.22<br>4.90        |
| 39.688<br>1.5625 | 32.545<br>1.2813 | -7.4<br>-0.29    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 0.8<br>0.03                                  | 128.0<br>5.04  | 120.0<br>4.72  | 1.70<br>0.07   | 2.50<br>0.10   | 154            | 43             | 0.0955         | 2.24<br>4.93        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                                    | 89.0<br>3.50                               | 95.0<br>3.74                               | 3.3<br>0.13                                  | 130.0<br>5.12  | 122.0<br>4.80  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.66<br>3.66        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                                    | 90.0<br>3.54                               | 96.0<br>3.78                               | 3.3<br>0.13                                  | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.19<br>4.83        |
| 38.100<br>1.5000 | 31.750<br>1.2500 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 91.0<br>3.58                               | 98.0<br>3.86                               | 3.3<br>0.13                                  | 139.0<br>5.47  | 131.0<br>5.16  | 1.40<br>0.05   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.67<br>5.90        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 5.0<br>0.20                                    | 91.0<br>3.58                               | 101.0<br>3.98                              | 3.3<br>0.13                                  | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.42<br>7.53        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 0.8<br>0.03                                    | 93.0<br>3.66                               | 94.0<br>3.70                               | 3.3<br>0.13                                  | 155.0<br>6.10  | 149.0<br>5.87  | 5.20<br>0.20   | 1.60<br>0.06   | 198            | 34.8           | 0.0937         | 5.52<br>12.18       |
| 15.082<br>0.5938 | 11.112<br>0.4375 | 1.5<br>0.06      | 1.5<br>0.06                                    | 87.0<br>3.43                               | 90.0<br>3.54                               | 1.5<br>0.06                                  | 110.0<br>4.33  | 108.0<br>4.25  | 0.30<br>0.01   | 2.10<br>0.08   | 66.2           | 68.2           | 0.0944         | 0.44<br>0.96        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -1.3<br>-0.05    | 1.5<br>0.06                                    | 88.0<br>3.46                               | 90.0<br>3.54                               | 1.5<br>0.06                                  | 111.0<br>4.37  | 108.0<br>4.25  | 0.60<br>0.02   | 1.30<br>0.05   | 97.2           | 64.3           | 0.1079         | 0.66<br>1.46        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

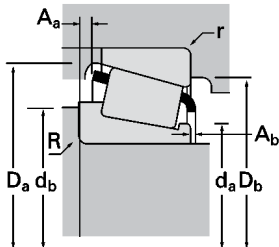
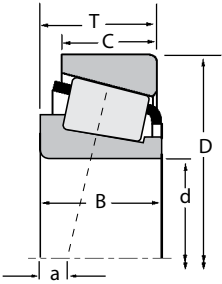
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static          | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |          |
| 82.550<br>3.2500        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900 | 27687       | 27620    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600 | 495         | 492A     |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900 | 47685       | 47620    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900 | 47686       | 47620    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900 | 47687       | 47620    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300 | HM516448    | HM516410 |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300 | HM516449A   | HM516410 |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 39.688<br>1.5625 | 202000<br>45400        | 0.40 | 1.49 | 52400<br>11800         | 36100<br>8110    | 1.45 | 353000<br>79300 | HM516449C   | HM516410 |
| 82.550<br>3.2500        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600 | 495         | 493      |
| 82.550<br>3.2500        | 139.700<br>5.5000 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 580         | 572X     |
| 82.550<br>3.2500        | 139.700<br>5.5000 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 582         | 572X     |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 580         | 572      |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 580         | 574      |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 582         | 572      |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900 | 47685       | 47621    |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900 | 47686       | 47621    |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 36.512<br>1.4375 | 191000<br>43000        | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400 | 580X        | 572      |
| 82.550<br>3.2500        | 142.138<br>5.5960 | 42.862<br>1.6875 | 242000<br>54300        | 0.43 | 1.39 | 62700<br>14100         | 46300<br>10400   | 1.35 | 399000<br>89700 | HM617045    | HM617010 |
| 82.550<br>3.2500        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300 | 663         | 653      |
| 82.550<br>3.2500        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300 | 663A        | 653      |
| 82.550<br>3.2500        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600 | 595         | 592XE    |
| 82.550<br>3.2500        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600 | 595         | 592XS    |
| 82.550<br>3.2500        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600 | 595         | 593X     |
| 82.550<br>3.2500        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800 | 749A        | 742      |
| 82.550<br>3.2500        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800 | 750A        | 742      |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600 | 595         | 592AS    |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600 | 595         | 592A     |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300 | 663         | 652      |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.400<br>1.0000 | 19.845<br>0.7813 | 0.5<br>0.02      | 3.5<br>0.14                | 89.0<br>3.50                      | 96.0<br>3.78             | 1.5<br>0.06                         | 120.0<br>4.72  | 115.0<br>4.53  | 1.50<br>0.06   | 1.70<br>0.07   | 98.2           | 41.8           | 0.1198         | 1.05<br>2.33        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                | 90.0<br>3.54                      | 97.0<br>3.82             | 3.3<br>0.13                         | 128.0<br>5.04  | 120.0<br>4.72  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.50<br>3.30        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 0.8<br>0.03                | 90.0<br>3.54                      | 91.0<br>3.58             | 3.3<br>0.13                         | 128.0<br>5.04  | 119.0<br>4.69  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 1.70<br>3.75        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 3.5<br>0.14                | 90.0<br>3.54                      | 97.0<br>3.82             | 3.3<br>0.13                         | 128.0<br>5.04  | 119.0<br>4.69  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 1.69<br>3.72        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 6.8<br>0.27                | 90.0<br>3.54                      | 103.0<br>4.06            | 3.3<br>0.13                         | 128.0<br>5.04  | 119.0<br>4.69  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 1.65<br>3.65        |
| 39.688<br>1.5625 | 32.545<br>1.2813 | -7.4<br>-0.29    | 6.8<br>0.27                | 92.0<br>3.62                      | 106.0<br>4.17            | 3.3<br>0.13                         | 128.0<br>5.04  | 118.0<br>4.65  | 1.70<br>0.07   | 2.50<br>0.10   | 154            | 43             | 0.0955         | 2.14<br>4.72        |
| 39.688<br>1.5625 | 32.545<br>1.2813 | -7.4<br>-0.29    | 6.0<br>0.24                | 92.0<br>3.62                      | 105.0<br>4.13            | 3.3<br>0.13                         | 128.0<br>5.04  | 118.0<br>4.65  | 1.70<br>0.07   | 2.50<br>0.10   | 154            | 43             | 0.0955         | 2.10<br>4.62        |
| 39.688<br>1.5625 | 32.545<br>1.2813 | -7.4<br>-0.29    | 3.5<br>0.14                | 92.0<br>3.62                      | 99.0<br>3.90             | 3.3<br>0.13                         | 128.0<br>5.04  | 118.0<br>4.65  | 1.70<br>0.07   | 2.50<br>0.10   | 154            | 43             | 0.0955         | 2.15<br>4.74        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                | 90.0<br>3.54                      | 97.0<br>3.82             | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.61<br>3.55        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                | 91.0<br>3.58                      | 98.0<br>3.86             | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.11<br>4.65        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 6.8<br>0.27                | 91.0<br>3.58                      | 104.0<br>4.09            | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.07<br>4.56        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                | 91.0<br>3.58                      | 98.0<br>3.86             | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.14<br>4.71        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 3.5<br>0.14                | 91.0<br>3.58                      | 98.0<br>3.86             | 0.5<br>0.02                         | 133.0<br>5.24  | 128.0<br>5.04  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.14<br>4.72        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 6.8<br>0.27                | 91.0<br>3.58                      | 104.0<br>4.09            | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.10<br>4.62        |
| 33.338<br>1.3125 | 29.370<br>1.1563 | -4.3<br>-0.17    | 0.8<br>0.03                | 90.0<br>3.54                      | 91.0<br>3.58             | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 2.13<br>4.70        |
| 33.338<br>1.3125 | 29.370<br>1.1563 | -4.3<br>-0.17    | 3.5<br>0.14                | 90.0<br>3.54                      | 97.0<br>3.82             | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.30<br>0.09   | 2.40<br>0.09   | 119            | 29.2           | 0.1273         | 2.12<br>4.67        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 4.8<br>0.19                | 92.0<br>3.62                      | 100.0<br>3.94            | 3.3<br>0.13                         | 133.0<br>5.24  | 125.0<br>4.92  | 3.40<br>0.14   | 1.90<br>0.07   | 126            | 32             | 0.1295         | 2.12<br>4.68        |
| 42.862<br>1.6875 | 34.133<br>1.3438 | -7.4<br>-0.29    | 3.5<br>0.14                | 95.0<br>3.74                      | 101.0<br>3.98            | 3.3<br>0.13                         | 137.0<br>5.39  | 125.0<br>4.92  | 3.30<br>0.13   | 2.40<br>0.09   | 163            | 38.9           | 0.0996         | 2.77<br>6.11        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                | 92.0<br>3.62                      | 99.0<br>3.90             | 3.3<br>0.13                         | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.73<br>6.02        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 6.8<br>0.27                | 92.0<br>3.62                      | 105.0<br>4.13            | 3.3<br>0.13                         | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.70<br>5.94        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 93.0<br>3.66                      | 100.0<br>3.94            | 0.8<br>0.03                         | 142.0<br>5.59  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.59<br>5.71        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 93.0<br>3.66                      | 100.0<br>3.94            | 3.3<br>0.13                         | 142.0<br>5.59  | 133.0<br>5.24  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.57<br>5.67        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 93.0<br>3.66                      | 100.0<br>3.94            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.71<br>5.97        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 3.5<br>0.14                | 93.0<br>3.66                      | 99.0<br>3.90             | 3.3<br>0.13                         | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.35<br>7.40        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 6.5<br>0.26                | 93.0<br>3.66                      | 106.0<br>4.17            | 3.3<br>0.13                         | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.32<br>7.32        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 93.0<br>3.66                      | 100.0<br>3.94            | 0.8<br>0.03                         | 144.0<br>5.67  | 137.0<br>5.39  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.82<br>6.23        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 93.0<br>3.66                      | 100.0<br>3.94            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.99<br>6.59        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                | 92.0<br>3.62                      | 99.0<br>3.90             | 3.3<br>0.13                         | 141.0<br>5.55  | 134.0<br>5.28  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 3.10<br>6.84        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

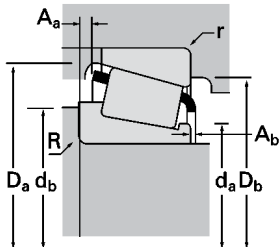
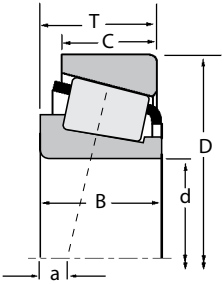
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 82.550<br>3.2500        | 159.995<br>6.2990 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 757         | 752A      |
| 82.550<br>3.2500        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 757         | 752       |
| 82.550<br>3.2500        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6559C       | 6535      |
| 82.550<br>3.2500        | 168.275<br>6.6250 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 757         | 753       |
| 82.550<br>3.2500        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 839         | 832       |
| 82.550<br>3.2500        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 842         | 832       |
| 82.550<br>3.2500        | 180.975<br>7.1250 | 53.975<br>2.1250 | 350000<br>78700        | 0.73 | 0.82 | 90800<br>20400         | 114000<br>25600  | 0.80 | 458000<br>103000 | H917849     | H917810   |
| 83.345<br>3.2813        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27689       | 27620     |
| 83.345<br>3.2813        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27690       | 27620     |
| 83.345<br>3.2813        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27691       | 27620     |
| 83.345<br>3.2813        | 133.350<br>5.2500 | 33.338<br>1.3125 | 167000<br>37600        | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47688       | 47620     |
| 84.000<br>3.3071        | 140.000<br>5.5118 | 32.000<br>1.2598 | 170000<br>38200        | 0.42 | 1.42 | 44000<br>9890          | 31900<br>7160    | 1.38 | 264000<br>59400  | XUA32018X   | Y32018X   |
| 84.138<br>3.3125        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 498         | 492A      |
| 84.138<br>3.3125        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 498         | 493       |
| 84.138<br>3.3125        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 664         | 652       |
| 84.138<br>3.3125        | 171.450<br>6.7500 | 49.212<br>1.9375 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800  | 9386H       | 9321      |
| 84.138<br>3.3125        | 177.800<br>7.0000 | 52.388<br>2.0625 | 284000<br>63700        | 0.76 | 0.79 | 73500<br>16500         | 96200<br>21600   | 0.76 | 351000<br>78800  | 9386H       | 9320      |
| 84.975<br>3.3455        | 125.412<br>4.9375 | 25.400<br>1.0000 | 109000<br>24400        | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27695       | 27620     |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 29.000<br>1.1417 | 151000<br>33800        | 0.44 | 1.36 | 39000<br>8770          | 29500<br>6640    | 1.32 | 235000<br>52900  | XAA32017X   | Y32017X   |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 30.000<br>1.1811 | 149000<br>33600        | 0.44 | 1.35 | 38700<br>8700          | 29400<br>6620    | 1.31 | 245000<br>55100  | JM716648    | JM716610  |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 30.000<br>1.1811 | 149000<br>33600        | 0.44 | 1.35 | 38700<br>8700          | 29400<br>6620    | 1.31 | 245000<br>55100  | JM716649    | JM716610  |
| 85.000<br>3.3465        | 140.000<br>5.5118 | 39.000<br>1.5354 | 220000<br>49500        | 0.41 | 1.47 | 57000<br>12800         | 39800<br>8940    | 1.43 | 339000<br>76300  | JHM516849   | JHM516810 |
| 85.000<br>3.3465        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665X        | 653       |
| 85.000<br>3.3465        | 150.000<br>5.9055 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665X        | 653X      |
| 85.000<br>3.3465        | 150.000<br>5.9055 | 46.000<br>1.8110 | 307000<br>69100        | 0.33 | 1.80 | 79700<br>17900         | 45400<br>10200   | 1.76 | 446000<br>100000 | JH217249    | JH217210  |
| 85.000<br>3.3465        | 188.912<br>7.4375 | 53.297<br>2.0983 | 299000<br>67300        | 0.87 | 0.69 | 77600<br>17400         | 115000<br>25900  | 0.67 | 392000<br>88100  | 90334       | 90744     |
| 85.000<br>3.3465        | 200.000<br>7.8740 | 52.761<br>2.0772 | 376000<br>84600        | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98335       | 98788     |
| 85.026<br>3.3475        | 150.000<br>5.9055 | 44.455<br>1.7502 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 749         | 743       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 94.0                                       | 100.0                                      | 0.8                                          | 150.0          | 146.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 4.26                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.70                                       | 3.94                                       | 0.03                                         | 5.91           | 5.75           | 0.13           | 0.04           |                |                |                | 9.40                |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 94.0                                       | 100.0                                      | 3.3                                          | 150.0          | 144.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 4.39                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.70                                       | 3.94                                       | 0.13                                         | 5.91           | 5.67           | 0.13           | 0.04           |                |                |                | 9.68                |
| 55.100  | 42.862 | -13.2            | 3.5                                            | 98.0                                       | 104.0                                      | 3.3                                          | 154.0          | 141.0          | 4.10           | 0.90           | 199            | 33.5           | 0.1037         | 5.03                |
| 2.1693  | 1.6875 | -0.52            | 0.14                                           | 3.86                                       | 4.09                                       | 0.13                                         | 6.06           | 5.55           | 0.16           | 0.03           |                |                |                | 11.09               |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 94.0                                       | 100.0                                      | 3.3                                          | 150.0          | 147.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 4.86                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.70                                       | 3.94                                       | 0.13                                         | 5.91           | 5.79           | 0.13           | 0.04           |                |                |                | 10.72               |
| 56.363  | 41.275 | -18.5            | 0.8                                            | 94.0                                       | 95.0                                       | 3.3                                          | 155.0          | 149.0          | 5.20           | 1.60           | 198            | 34.8           | 0.0937         | 5.43                |
| 2.2190  | 1.6250 | -0.73            | 0.03                                           | 3.70                                       | 3.74                                       | 0.13                                         | 6.10           | 5.87           | 0.20           | 0.06           |                |                |                | 11.98               |
| 56.363  | 41.275 | -18.5            | 3.5                                            | 94.0                                       | 101.0                                      | 3.3                                          | 155.0          | 149.0          | 5.20           | 1.60           | 198            | 34.8           | 0.0937         | 5.42                |
| 2.2190  | 1.6250 | -0.73            | 0.14                                           | 3.70                                       | 3.98                                       | 0.13                                         | 6.10           | 5.87           | 0.20           | 0.06           |                |                |                | 11.95               |
| 53.183  | 35.720 | 0.5              | 3.3                                            | 100.0                                      | 114.0                                      | 3.3                                          | 170.0          | 152.0          | 9.50           | 2.80           | 147            | 20.7           | 0.1123         | 6.22                |
| 2.0938  | 1.4063 | 0.02             | 0.13                                           | 3.94                                       | 4.49                                       | 0.13                                         | 6.69           | 5.98           | 0.38           | 0.11           |                |                |                | 13.72               |
| 25.400  | 19.845 | 0.5              | 0.8                                            | 90.0                                       | 90.0                                       | 1.5                                          | 120.0          | 115.0          | 1.50           | 1.70           | 98.2           | 41.8           | 0.1198         | 1.05                |
| 1.0000  | 0.7813 | 0.02             | 0.03                                           | 3.54                                       | 3.54                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.31                |
| 25.400  | 19.845 | 0.5              | 3.5                                            | 90.0                                       | 96.0                                       | 1.5                                          | 120.0          | 115.0          | 1.60           | 1.70           | 98.2           | 41.8           | 0.1198         | 1.03                |
| 1.0000  | 0.7813 | 0.02             | 0.14                                           | 3.54                                       | 3.78                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.28                |
| 25.400  | 19.845 | 0.5              | 6.4                                            | 90.0                                       | 102.0                                      | 1.5                                          | 120.0          | 115.0          | 1.50           | 1.70           | 98.2           | 41.8           | 0.1198         | 1.00                |
| 1.0000  | 0.7813 | 0.02             | 0.25                                           | 3.54                                       | 4.02                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.21                |
| 33.338  | 26.195 | -4.3             | 3.5                                            | 91.0                                       | 97.0                                       | 3.3                                          | 128.0          | 119.0          | 2.30           | 2.40           | 119            | 29.2           | 0.1273         | 1.66                |
| 1.3125  | 1.0313 | -0.17            | 0.14                                           | 3.58                                       | 3.82                                       | 0.13                                         | 5.04           | 4.69           | 0.09           | 0.09           |                |                |                | 3.66                |
| 32.000  | 24.000 | -2.0             | 0.5                                            | 94.0                                       | 94.0                                       | 1.5                                          | 134.0          | 128.0          | 3.20           | 2.20           | 128            | 42.8           | 0.1317         | 1.96                |
| 1.2598  | 0.9449 | -0.08            | 0.02                                           | 3.70                                       | 3.70                                       | 0.06                                         | 5.28           | 5.04           | 0.13           | 0.09           |                |                |                | 4.32                |
| 29.769  | 22.225 | -0.8             | 3.5                                            | 91.0                                       | 98.0                                       | 3.3                                          | 128.0          | 120.0          | 2.50           | 2.10           | 105            | 29.3           | 0.1252         | 1.45                |
| 1.1720  | 0.8750 | -0.03            | 0.14                                           | 3.58                                       | 3.86                                       | 0.13                                         | 5.04           | 4.72           | 0.10           | 0.08           |                |                |                | 3.19                |
| 29.769  | 22.225 | -0.8             | 3.5                                            | 91.0                                       | 98.0                                       | 3.3                                          | 130.0          | 122.0          | 2.50           | 2.10           | 105            | 29.3           | 0.1252         | 1.56                |
| 1.1720  | 0.8750 | -0.03            | 0.14                                           | 3.58                                       | 3.86                                       | 0.13                                         | 5.12           | 4.80           | 0.10           | 0.08           |                |                |                | 3.45                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 94.0                                       | 100.0                                      | 3.3                                          | 141.0          | 134.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 3.03                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.70                                       | 3.94                                       | 0.13                                         | 5.55           | 5.28           | 0.18           | 0.08           |                |                |                | 6.69                |
| 46.038  | 31.750 | 4.3              | 3.5                                            | 98.5                                       | 111.0                                      | 3.3                                          | 164.0          | 147.0          | 9.00           | 3.90           | 118            | 18.6           | 0.1053         | 4.70                |
| 1.8125  | 1.2500 | 0.17             | 0.14                                           | 3.87                                       | 4.37                                       | 0.13                                         | 6.46           | 5.79           | 0.35           | 0.15           |                |                |                | 10.36               |
| 46.038  | 34.925 | 4.3              | 3.5                                            | 98.5                                       | 111.0                                      | 3.3                                          | 164.0          | 148.0          | 9.00           | 3.90           | 118            | 18.6           | 0.1053         | 5.40                |
| 1.8125  | 1.3750 | 0.17             | 0.14                                           | 3.87                                       | 4.37                                       | 0.13                                         | 6.46           | 5.83           | 0.35           | 0.15           |                |                |                | 11.91               |
| 25.400  | 19.845 | 0.5              | 5.0                                            | 91.0                                       | 100.0                                      | 1.5                                          | 120.0          | 115.0          | 1.50           | 1.70           | 98.2           | 41.8           | 0.1198         | 0.98                |
| 1.0000  | 0.7813 | 0.02             | 0.20                                           | 3.58                                       | 3.94                                       | 0.06                                         | 4.72           | 4.53           | 0.06           | 0.07           |                |                |                | 2.15                |
| 29.000  | 22.000 | -0.5             | 6.5                                            | 92.0                                       | 106.0                                      | 1.5                                          | 125.0          | 119.0          | 2.10           | 2.70           | 109            | 36.3           | 0.1270         | 1.31                |
| 1.1417  | 0.8661 | -0.02            | 0.26                                           | 3.62                                       | 4.17                                       | 0.06                                         | 4.92           | 4.69           | 0.08           | 0.11           |                |                |                | 2.89                |
| 29.000  | 24.000 | -0.3             | 6.0                                            | 92.0                                       | 104.0                                      | 2.5                                          | 125.0          | 117.0          | 2.10           | 2.50           | 117            | 36.6           | 0.1303         | 1.32                |
| 1.1417  | 0.9449 | -0.01            | 0.24                                           | 3.62                                       | 4.09                                       | 0.10                                         | 4.92           | 4.61           | 0.08           | 0.10           |                |                |                | 2.92                |
| 29.000  | 24.000 | -0.3             | 3.0                                            | 92.0                                       | 98.0                                       | 2.5                                          | 125.0          | 117.0          | 2.10           | 2.50           | 117            | 36.6           | 0.1303         | 1.36                |
| 1.1417  | 0.9449 | -0.01            | 0.12                                           | 3.62                                       | 3.86                                       | 0.10                                         | 4.92           | 4.61           | 0.08           | 0.10           |                |                |                | 3.00                |
| 38.000  | 31.500 | -5.8             | 3.0                                            | 94.0                                       | 100.0                                      | 2.5                                          | 134.0          | 125.0          | 1.50           | 3.60           | 141            | 35.1           | 0.0929         | 2.27                |
| 1.4961  | 1.2402 | -0.23            | 0.12                                           | 3.70                                       | 3.94                                       | 0.10                                         | 5.28           | 4.92           | 0.06           | 0.14           |                |                |                | 4.99                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 95.0                                       | 101.0                                      | 3.3                                          | 139.0          | 131.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 2.63                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.74                                       | 3.98                                       | 0.13                                         | 5.47           | 5.16           | 0.18           | 0.08           |                |                |                | 5.79                |
| 41.275  | 31.750 | -7.9             | 3.5                                            | 95.0                                       | 101.0                                      | 3.0                                          | 141.0          | 133.0          | 4.50           | 2.00           | 137            | 27.3           | 0.0919         | 2.86                |
| 1.6250  | 1.2500 | -0.31            | 0.14                                           | 3.74                                       | 3.98                                       | 0.12                                         | 5.55           | 5.24           | 0.18           | 0.08           |                |                |                | 6.30                |
| 46.000  | 38.000 | -11.9            | 3.0                                            | 95.0                                       | 101.0                                      | 2.5                                          | 142.0          | 134.0          | 1.10           | 3.40           | 169            | 33.3           | 0.0924         | 3.34                |
| 1.8110  | 1.4961 | -0.47            | 0.12                                           | 3.74                                       | 3.98                                       | 0.10                                         | 5.59           | 5.28           | 0.04           | 0.14           |                |                |                | 7.37                |
| 52.761  | 31.750 | 10.4             | 3.5                                            | 112.0                                      | 116.0                                      | 3.3                                          | 179.5          | 161.0          | 13.50          | -0.60          | 150            | 23.8           | 0.1180         | 6.57                |
| 2.0772  | 1.2500 | 0.41             | 0.14                                           | 4.41                                       | 4.57                                       | 0.13                                         | 7.06           | 6.34           | 0.53           | -0.02          |                |                |                | 14.48               |
| 49.212  | 34.925 | 1.3              | 3.5                                            | 109.0                                      | 115.0                                      | 3.3                                          | 188.0          | 174.0          | 8.60           | 5.40           | 203            | 37.4           | 0.1197         | 7.70                |
| 1.9375  | 1.3750 | 0.05             | 0.14                                           | 4.29                                       | 4.53                                       | 0.13                                         | 7.40           | 6.85           | 0.34           | 0.21           |                |                |                | 16.96               |
| 46.672  | 35.000 | -11.9            | 3.5                                            | 95.0                                       | 101.0                                      | 3.3                                          | 142.0          | 134.0          | 1.90           | 1.20           | 160            | 26.3           | 0.0898         | 3.20                |
| 1.8375  | 1.3780 | -0.47            | 0.14                                           | 3.74                                       | 3.98                                       | 0.13                                         | 5.59           | 5.28           | 0.07           | 0.05           |                |                |                | 7.06                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

B

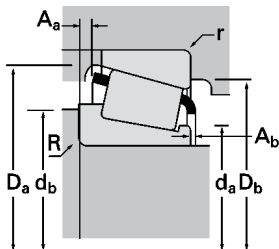
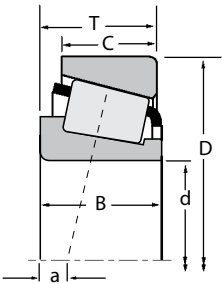




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |          |
| 85.026<br>3.3475        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 749         | 742      |
| 85.026<br>3.3475        | 150.089<br>5.9090 | 44.450<br>1.7500 | 294000<br>66100        | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 749-S       | 742      |
| 85.725<br>3.3750        | 133.350<br>5.2500 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 497         | 492A     |
| 85.725<br>3.3750        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 497         | 493      |
| 85.725<br>3.3750        | 136.525<br>5.3750 | 30.162<br>1.1875 | 143000<br>32100        | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 497A        | 493      |
| 85.725<br>3.3750        | 142.138<br>5.5960 | 42.862<br>1.6875 | 242000<br>54300        | 0.43 | 1.39 | 62700<br>14100         | 46300<br>10400   | 1.35 | 399000<br>89700  | HM617048    | HM617010 |
| 85.725<br>3.3750        | 142.138<br>5.5960 | 42.862<br>1.6875 | 242000<br>54300        | 0.43 | 1.39 | 62700<br>14100         | 46300<br>10400   | 1.35 | 399000<br>89700  | HM617049    | HM617010 |
| 85.725<br>3.3750        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665         | 653      |
| 85.725<br>3.3750        | 146.050<br>5.7500 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665A        | 653      |
| 85.725<br>3.3750        | 147.828<br>5.8200 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596         | 592AX    |
| 85.725<br>3.3750        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596         | JM719113 |
| 85.725<br>3.3750        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596         | 593X     |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596         | 592A     |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 41.275<br>1.6250 | 229000<br>51400        | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665         | 652      |
| 85.725<br>3.3750        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 758         | 752      |
| 85.725<br>3.3750        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 677         | 672      |
| 85.725<br>3.3750        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 841         | 832      |
| 87.312<br>3.4375        | 123.825<br>4.8750 | 20.638<br>0.8125 | 85800<br>19300         | 0.33 | 1.82 | 22200<br>5000          | 12600<br>2820    | 1.77 | 156000<br>35200  | L217847     | L217810  |
| 87.312<br>3.4375        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596-S       | 592A     |
| 87.312<br>3.4375        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221432    | HH221410 |
| 87.960<br>3.4630        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42346       | 42584    |
| 87.960<br>3.4630        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42346       | 42587    |
| 88.900<br>3.5000        | 121.442<br>4.7812 | 15.083<br>0.5938 | 55100<br>12400         | 0.33 | 1.81 | 14300<br>3210          | 8080<br>1820     | 1.77 | 88700<br>20000   | LL217849    | LL217810 |
| 88.900<br>3.5000        | 123.825<br>4.8750 | 20.638<br>0.8125 | 85800<br>19300         | 0.33 | 1.82 | 22200<br>5000          | 12600<br>2820    | 1.77 | 156000<br>35200  | L217849     | L217810  |
| 88.900<br>3.5000        | 127.000<br>5.0000 | 20.638<br>0.8125 | 85800<br>19300         | 0.33 | 1.82 | 22200<br>5000          | 12600<br>2820    | 1.77 | 156000<br>35200  | L217849     | L217813  |
| 88.900<br>3.5000        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42350       | 42584    |
| 88.900<br>3.5000        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42350       | 42587    |
| 88.900<br>3.5000        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593A        | JM719113 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 3.5<br>0.14                | 95.0<br>3.74                      | 101.0<br>3.98            | 3.3<br>0.13                         | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.25<br>7.16        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 5.0<br>0.20                | 95.0<br>3.74                      | 104.0<br>4.09            | 3.3<br>0.13                         | 142.0<br>5.59  | 134.0<br>5.28  | 1.90<br>0.07   | 1.20<br>0.05   | 160            | 26.3           | 0.0898         | 3.22<br>7.10        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                | 93.0<br>3.66                      | 99.0<br>3.90             | 3.3<br>0.13                         | 128.0<br>5.04  | 120.0<br>4.72  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.40<br>3.08        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 3.5<br>0.14                | 93.0<br>3.66                      | 99.0<br>3.90             | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.51<br>3.34        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 6.4<br>0.25                | 93.0<br>3.66                      | 105.0<br>4.13            | 3.3<br>0.13                         | 130.0<br>5.12  | 122.0<br>4.80  | 2.50<br>0.10   | 2.10<br>0.08   | 105            | 29.3           | 0.1252         | 1.48<br>3.27        |
| 42.862<br>1.6875 | 34.133<br>1.3438 | -7.4<br>-0.29    | 1.5<br>0.06                | 95.0<br>3.75                      | 99.0<br>3.90             | 3.3<br>0.13                         | 137.0<br>5.39  | 125.0<br>4.92  | 3.30<br>0.13   | 2.40<br>0.09   | 163            | 38.9           | 0.0996         | 2.64<br>5.82        |
| 42.862<br>1.6875 | 34.133<br>1.3438 | -7.4<br>-0.29    | 4.8<br>0.19                | 95.0<br>3.75                      | 106.0<br>4.17            | 3.3<br>0.13                         | 137.0<br>5.39  | 125.0<br>4.92  | 3.30<br>0.13   | 2.40<br>0.09   | 163            | 38.9           | 0.0996         | 2.62<br>5.77        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                | 95.0<br>3.74                      | 102.0<br>4.02            | 3.3<br>0.13                         | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.60<br>5.72        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 6.4<br>0.25                | 95.0<br>3.74                      | 107.0<br>4.21            | 3.3<br>0.13                         | 139.0<br>5.47  | 131.0<br>5.16  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.57<br>5.66        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 96.0<br>3.78                      | 102.0<br>4.02            | 3.3<br>0.13                         | 142.0<br>5.59  | 133.0<br>5.24  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.49<br>5.48        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 96.0<br>3.78                      | 102.0<br>4.02            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.59<br>5.72        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 96.0<br>3.78                      | 102.0<br>4.02            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.59<br>5.70        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 96.0<br>3.78                      | 102.0<br>4.02            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.87<br>6.33        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 3.5<br>0.14                | 95.0<br>3.74                      | 102.0<br>4.02            | 3.3<br>0.13                         | 141.0<br>5.55  | 134.0<br>5.28  | 4.50<br>0.18   | 2.00<br>0.08   | 137            | 27.3           | 0.0919         | 2.97<br>6.54        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 3.5<br>0.14                | 97.0<br>3.82                      | 103.0<br>4.06            | 3.3<br>0.13                         | 150.0<br>5.91  | 144.0<br>5.67  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.23<br>9.33        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                | 99.0<br>3.90                      | 105.0<br>4.13            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 4.12<br>9.08        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 3.5<br>0.14                | 97.0<br>3.82                      | 104.0<br>4.09            | 3.3<br>0.13                         | 155.0<br>6.10  | 149.0<br>5.87  | 5.20<br>0.20   | 1.60<br>0.06   | 198            | 34.8           | 0.0937         | 5.24<br>11.54       |
| 20.638<br>0.8125 | 16.670<br>0.6563 | 0.0<br>0.00      | 1.5<br>0.06                | 93.0<br>3.66                      | 96.0<br>3.78             | 1.5<br>0.06                         | 119.0<br>4.69  | 116.0<br>4.57  | 0.50<br>0.02   | 2.10<br>0.08   | 111            | 74.7           | 0.1152         | 0.77<br>1.70        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 97.0<br>3.82                      | 103.0<br>4.06            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.81<br>6.19        |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 8.0<br>0.31                | 103.0<br>4.06                     | 118.0<br>4.65            | 3.3<br>0.13                         | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 8.17<br>18.00       |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.0<br>0.12                | 98.0<br>3.86                      | 103.0<br>4.06            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.96<br>4.32        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.0<br>0.12                | 98.0<br>3.86                      | 103.0<br>4.06            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 2.10<br>4.63        |
| 15.083<br>0.5938 | 11.112<br>0.4375 | 3.0<br>0.12      | 1.5<br>0.06                | 94.0<br>3.70                      | 97.0<br>3.82             | 1.5<br>0.06                         | 117.0<br>4.61  | 115.0<br>4.53  | 0.50<br>0.02   | 2.00<br>0.08   | 73.4           | 74.1           | 0.0996         | 0.47<br>1.04        |
| 20.638<br>0.8125 | 16.670<br>0.6563 | 0.0<br>0.00      | 1.5<br>0.06                | 94.0<br>3.70                      | 97.0<br>3.82             | 1.5<br>0.06                         | 119.0<br>4.69  | 116.0<br>4.57  | 0.50<br>0.02   | 2.10<br>0.08   | 111            | 74.7           | 0.1152         | 0.74<br>1.63        |
| 20.638<br>0.8125 | 19.050<br>0.7500 | 0.0<br>0.00      | 1.5<br>0.06                | 94.0<br>3.70                      | 97.0<br>3.82             | 1.5<br>0.06                         | 121.0<br>4.76  | 117.0<br>4.61  | 0.50<br>0.02   | 2.10<br>0.08   | 111            | 74.7           | 0.1152         | 0.85<br>1.87        |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.0<br>0.12                | 98.0<br>3.86                      | 104.0<br>4.09            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.93<br>4.26        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.0<br>0.12                | 98.0<br>3.86                      | 104.0<br>4.09            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 2.07<br>4.57        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 6.4<br>0.25                | 98.0<br>3.86                      | 110.0<br>4.33            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.44<br>5.37        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

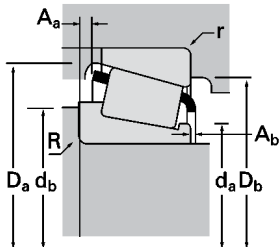
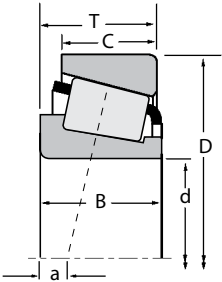
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           |             | Inner    | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>   |             |          |       |
| 88.900<br>3.5000        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593         | JM719113 |       |
| 88.900<br>3.5000        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593         | 593X     |       |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593         | 592A     |       |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593A        | 592A     |       |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 39.688<br>1.5625 | 275000<br>61800        | 0.40 | 1.49 | 71200<br>16000         | 49000<br>11000   | 1.45 | 404000<br>90800  | HM518445    | HM518410 |       |
| 88.900<br>3.5000        | 159.995<br>6.2990 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 759         | 752A     |       |
| 88.900<br>3.5000        | 160.000<br>6.2992 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6580        | 6525X    |       |
| 88.900<br>3.5000        | 160.096<br>6.3030 | 30.124<br>1.1860 | 167000<br>37600        | 0.42 | 1.42 | 43400<br>9750          | 31400<br>7060    | 1.38 | 230000<br>51700  | 69350X      | 69630    |       |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 759         | 752      |       |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 766         | 752      |       |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6580        | 6535     |       |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6580        | 6536     |       |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 679         | 672      |       |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 759         | 753      |       |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 766         | 753      |       |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 850         | 832      |       |
| 88.900<br>3.5000        | 171.450<br>6.7500 | 47.625<br>1.8750 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000 | 77350       | 77675    |       |
| 88.900<br>3.5000        | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 775         | 772      |       |
| 88.900<br>3.5000        | 190.500<br>7.5000 | 57.150<br>2.2500 | 424000<br>95300        | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000 | 855         | 854      |       |
| 88.900<br>3.5000        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221434    | HH221410 |       |
| 88.900<br>3.5000        | 200.000<br>7.8740 | 52.761<br>2.0772 | 376000<br>84600        | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98350       | 98788    |       |
| 89.090<br>3.5075        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593-S       | 592XE    |       |
| 89.090<br>3.5075        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593-S       | 592A     |       |
| 89.891<br>3.5390        | 168.275<br>6.6250 | 53.975<br>2.1250 | 379000<br>85100        | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 850A        | 832      |       |
| 89.975<br>3.5423        | 146.975<br>5.7864 | 40.000<br>1.5748 | 254000<br>57000        | 0.33 | 1.80 | 65800<br>14800         | 37400<br>8420    | 1.76 | 388000<br>87300  | HM218248    | HM218210 |       |
| 89.992<br>3.5430        | 160.096<br>6.3030 | 30.124<br>1.1860 | 167000<br>37600        | 0.42 | 1.42 | 43400<br>9750          | 31400<br>7060    | 1.38 | 230000<br>51700  | 69354       | 69630    |       |
| 90.000<br>3.5433        | 135.000<br>5.3150 | 24.000<br>0.9449 | 110000<br>24600        | 0.49 | 1.21 | 28400<br>6390          | 24000<br>5410    | 1.18 | 155000<br>34900  | JP9049      | JP9010   |       |
| 90.000<br>3.5433        | 140.000<br>5.5118 | 32.000<br>1.2598 | 170000<br>38200        | 0.42 | 1.42 | 44000<br>9890          | 31900<br>7160    | 1.38 | 264000<br>59400  | XAA32018X   | Y32018X  |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 98.0<br>3.86                      | 104.0<br>4.09            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.47<br>5.44        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 98.0<br>3.86                      | 104.0<br>4.09            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.46<br>5.43        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 98.0<br>3.86                      | 104.0<br>4.09            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.75<br>6.05        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 6.4<br>0.25                | 98.0<br>3.86                      | 110.0<br>4.33            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.71<br>5.98        |
| 39.688<br>1.5625 | 30.162<br>1.1875 | -6.4<br>-0.25    | 6.4<br>0.25                | 100.0<br>3.94                     | 112.0<br>4.41            | 3.3<br>0.13                         | 147.0<br>5.79  | 137.0<br>5.39  | 3.20<br>0.13   | 3.50<br>0.14   | 162            | 33.7           | 0.0966         | 2.79<br>6.14        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 3.5<br>0.14                | 99.0<br>3.90                      | 106.0<br>4.17            | 0.8<br>0.03                         | 150.0<br>5.91  | 146.0<br>5.75  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 3.94<br>8.69        |
| 55.100<br>2.1693 | 44.450<br>1.7500 | -13.2<br>-0.52   | 3.5<br>0.14                | 102.0<br>4.01                     | 109.0<br>4.29            | 3.0<br>0.12                         | 153.5<br>6.04  | 141.0<br>5.55  | 4.10<br>0.16   | 0.90<br>0.03   | 199            | 33.5           | 0.1037         | 4.52<br>9.97        |
| 30.162<br>1.1875 | 22.301<br>0.8780 | -0.5<br>-0.02    | 2.3<br>0.09                | 98.0<br>3.86                      | 102.0<br>4.02            | 3.3<br>0.13                         | 149.0<br>5.87  | 143.0<br>5.63  | 3.80<br>0.15   | 2.50<br>0.10   | 117            | 39.6           | 0.0874         | 2.40<br>5.28        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 3.5<br>0.14                | 99.0<br>3.90                      | 106.0<br>4.17            | 3.3<br>0.13                         | 150.0<br>5.91  | 144.0<br>5.67  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.07<br>8.97        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 7.0<br>0.28                | 99.0<br>3.90                      | 113.0<br>4.45            | 3.3<br>0.13                         | 150.0<br>5.91  | 144.0<br>5.67  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.02<br>8.87        |
| 55.100<br>2.1693 | 42.862<br>1.6875 | -13.2<br>-0.52   | 3.5<br>0.14                | 102.0<br>4.01                     | 109.0<br>4.29            | 3.3<br>0.13                         | 154.0<br>6.06  | 141.0<br>5.55  | 4.10<br>0.16   | 0.90<br>0.03   | 199            | 33.5           | 0.1037         | 4.66<br>10.28       |
| 55.100<br>2.1693 | 42.862<br>1.6875 | -13.2<br>-0.52   | 3.5<br>0.14                | 102.0<br>4.01                     | 109.0<br>4.29            | 0.8<br>0.03                         | 154.0<br>6.06  | 144.0<br>5.67  | 4.10<br>0.16   | 0.90<br>0.03   | 199            | 33.5           | 0.1037         | 4.68<br>10.32       |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                | 101.0<br>3.98                     | 107.0<br>4.21            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.98<br>8.77        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 3.5<br>0.14                | 99.0<br>3.90                      | 106.0<br>4.17            | 3.3<br>0.13                         | 150.0<br>5.91  | 147.0<br>5.79  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.54<br>10.01       |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 7.0<br>0.28                | 99.0<br>3.90                      | 113.0<br>4.45            | 3.3<br>0.13                         | 150.0<br>5.91  | 147.0<br>5.79  | 3.30<br>0.13   | 0.90<br>0.04   | 177            | 29.4           | 0.0945         | 4.49<br>9.91        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 3.5<br>0.14                | 100.0<br>3.94                     | 106.0<br>4.17            | 3.3<br>0.13                         | 155.0<br>6.10  | 149.0<br>5.87  | 5.20<br>0.20   | 1.60<br>0.06   | 198            | 34.8           | 0.0937         | 5.04<br>11.12       |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -9.7<br>-0.38    | 5.0<br>0.20                | 101.0<br>3.98                     | 110.0<br>4.33            | 3.3<br>0.13                         | 161.0<br>6.34  | 153.0<br>6.02  | 3.50<br>0.14   | 1.00<br>0.04   | 206            | 37.7           | 0.1017         | 4.87<br>10.74       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 4.8<br>0.19                | 103.0<br>4.06                     | 112.0<br>4.41            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.73<br>12.64       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 8.0<br>0.31                | 103.0<br>4.06                     | 118.0<br>4.65            | 3.3<br>0.13                         | 174.0<br>6.85  | 170.0<br>6.69  | 5.60<br>0.22   | 0.60<br>0.02   | 264            | 44.9           | 0.1072         | 7.65<br>16.87       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 8.0<br>0.31                | 105.0<br>4.13                     | 120.0<br>4.72            | 3.3<br>0.13                         | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 8.07<br>17.78       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 3.5<br>0.14                | 112.0<br>4.41                     | 118.0<br>4.65            | 3.3<br>0.13                         | 188.0<br>7.40  | 174.0<br>6.85  | 8.60<br>0.34   | 5.40<br>0.21   | 203            | 37.4           | 0.1197         | 7.49<br>16.51       |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 98.0<br>3.86                      | 105.0<br>4.13            | 0.8<br>0.03                         | 142.0<br>5.59  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.34<br>5.16        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 98.0<br>3.86                      | 105.0<br>4.13            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.74<br>6.04        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 3.5<br>0.14                | 101.0<br>3.98                     | 107.0<br>4.21            | 3.3<br>0.13                         | 155.0<br>6.10  | 149.0<br>5.87  | 5.20<br>0.20   | 1.60<br>0.06   | 198            | 34.8           | 0.0937         | 4.98<br>10.98       |
| 40.000<br>1.5748 | 32.500<br>1.2795 | -8.6<br>-0.34    | 7.0<br>0.28                | 99.0<br>3.90                      | 112.0<br>4.41            | 3.5<br>0.14                         | 141.0<br>5.55  | 133.0<br>5.24  | 1.40<br>0.06   | 2.90<br>0.12   | 168            | 34.7           | 0.0921         | 2.53<br>5.58        |
| 30.162<br>1.1875 | 22.301<br>0.8780 | -0.5<br>-0.02    | 2.3<br>0.09                | 99.0<br>3.90                      | 103.0<br>4.06            | 3.3<br>0.13                         | 149.0<br>5.87  | 143.0<br>5.63  | 3.80<br>0.15   | 2.50<br>0.10   | 117            | 39.6           | 0.0874         | 2.36<br>5.20        |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 5.6<br>0.22      | 2.0<br>0.08                | 97.0<br>3.82                      | 100.0<br>3.94            | 2.0<br>0.08                         | 130.0<br>5.12  | 125.0<br>4.92  | 1.90<br>0.07   | 3.30<br>0.13   | 83.8           | 46             | 0.1196         | 1.09<br>2.41        |
| 32.000<br>1.2598 | 24.000<br>0.9449 | -2.0<br>-0.08    | 6.0<br>0.24                | 98.0<br>3.86                      | 111.0<br>4.37            | 1.5<br>0.06                         | 134.0<br>5.28  | 128.0<br>5.04  | 3.20<br>0.13   | 2.20<br>0.09   | 128            | 41.1           | 0.1317         | 1.70<br>3.75        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

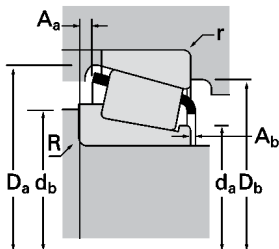
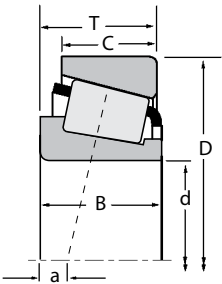
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.





# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 90.000<br>3.5433        | 145.000<br>5.7087 | 35.000<br>1.3780 | 206000<br>46300        | 0.44 | 1.35 | 53400<br>12000         | 40600<br>9130    | 1.31 | 313000<br>70500  | JM718149A   | JM718110  |
| 90.000<br>3.5433        | 145.000<br>5.7087 | 35.000<br>1.3780 | 206000<br>46300        | 0.44 | 1.35 | 53400<br>12000         | 40600<br>9130    | 1.31 | 313000<br>70500  | JM718149    | JM718110  |
| 90.000<br>3.5433        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42354X      | 42587     |
| 90.000<br>3.5433        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 597X        | 593X      |
| 90.000<br>3.5433        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 597X        | 592A      |
| 90.000<br>3.5433        | 155.000<br>6.1024 | 44.000<br>1.7323 | 306000<br>68900        | 0.34 | 1.76 | 79400<br>17900         | 46400<br>10400   | 1.71 | 447000<br>101000 | JHM318448   | JHM318410 |
| 90.000<br>3.5433        | 160.000<br>6.2992 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6581X       | 6525X     |
| 90.000<br>3.5433        | 161.925<br>6.3750 | 53.975<br>2.1250 | 343000<br>77200        | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6581X       | 6535      |
| 90.000<br>3.5433        | 190.000<br>7.4803 | 50.800<br>2.0000 | 299000<br>67300        | 0.87 | 0.69 | 77600<br>17400         | 115000<br>25900  | 0.67 | 392000<br>88100  | J90354      | J90748    |
| 90.000<br>3.5433        | 190.000<br>7.4803 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | JHH221436   | JHH221413 |
| 90.488<br>3.5625        | 161.925<br>6.3750 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 760         | 752       |
| 90.488<br>3.5625        | 168.275<br>6.6250 | 47.625<br>1.8750 | 303000<br>68100        | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 760         | 753       |
| 91.975<br>3.6210        | 142.875<br>5.6250 | 30.000<br>1.1811 | 152000<br>34100        | 0.48 | 1.25 | 39300<br>8830          | 32200<br>7230    | 1.22 | 240000<br>53900  | LM718947    | LM718910  |
| 92.075<br>3.6250        | 130.175<br>5.1250 | 20.638<br>0.8125 | 88300<br>19900         | 0.35 | 1.72 | 22900<br>5150          | 13700<br>3080    | 1.67 | 166000<br>37400  | L319245     | L319210   |
| 92.075<br>3.6250        | 146.050<br>5.7500 | 33.338<br>1.3125 | 182000<br>41000        | 0.45 | 1.34 | 47300<br>10600         | 36300<br>8160    | 1.30 | 307000<br>69000  | 47890       | 47820     |
| 92.075<br>3.6250        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598         | 592XE     |
| 92.075<br>3.6250        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598         | 592XS     |
| 92.075<br>3.6250        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42362       | 42584     |
| 92.075<br>3.6250        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42362       | 42587     |
| 92.075<br>3.6250        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598         | JM719113  |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598         | 592A      |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598         | 592-S     |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598A        | 592A      |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598X        | 592A      |
| 92.075<br>3.6250        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 681         | 672       |
| 92.075<br>3.6250        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 681A        | 672       |
| 92.075<br>3.6250        | 171.450<br>6.7500 | 47.625<br>1.8750 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000 | 77362       | 77675     |
| 92.075<br>3.6250        | 171.450<br>6.7500 | 47.625<br>1.8750 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000 | 77364       | 77675     |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 34.000  | 27.000 | -2.0             | 6.0                                            | 99.0                                       | 112.0                                      | 2.5                                          | 138.5          | 131.0          | 2.10           | 3.80           | 138            | 35.1           | 0.0946         | 2.13                |
| 1.3386  | 1.0630 | -0.08            | 0.24                                           | 3.90                                       | 4.41                                       | 0.10                                         | 5.46           | 5.16           | 0.08           | 0.15           |                |                |                | 4.69                |
| 34.000  | 27.000 | -2.0             | 3.0                                            | 99.0                                       | 106.0                                      | 2.5                                          | 138.5          | 131.0          | 2.10           | 3.80           | 138            | 35.1           | 0.0946         | 2.14                |
| 1.3386  | 1.0630 | -0.08            | 0.12                                           | 3.90                                       | 4.17                                       | 0.10                                         | 5.46           | 5.16           | 0.08           | 0.15           |                |                |                | 4.72                |
| 28.971  | 24.608 | 3.0              | 3.0                                            | 99.0                                       | 104.0                                      | 3.3                                          | 143.0          | 134.0          | 2.80           | 3.00           | 130            | 37.2           | 0.1386         | 2.04                |
| 1.1406  | 0.9688 | 0.12             | 0.12                                           | 3.90                                       | 4.09                                       | 0.13                                         | 5.63           | 5.28           | 0.11           | 0.12           |                |                |                | 4.49                |
| 36.322  | 27.000 | -2.5             | 3.0                                            | 99.0                                       | 104.0                                      | 3.0                                          | 142.0          | 134.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.42                |
| 1.4300  | 1.0630 | -0.10            | 0.12                                           | 3.90                                       | 4.09                                       | 0.12                                         | 5.59           | 5.28           | 0.16           | 0.07           |                |                |                | 5.34                |
| 36.322  | 30.162 | -2.5             | 3.0                                            | 99.0                                       | 104.0                                      | 3.3                                          | 144.0          | 135.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.71                |
| 1.4300  | 1.1875 | -0.10            | 0.12                                           | 3.90                                       | 4.09                                       | 0.13                                         | 5.67           | 5.31           | 0.16           | 0.07           |                |                |                | 5.97                |
| 44.000  | 35.500 | -9.9             | 3.0                                            | 100.0                                      | 106.0                                      | 2.5                                          | 148.0          | 140.0          | 1.30           | 3.30           | 179            | 32.4           | 0.0948         | 3.32                |
| 1.7323  | 1.3976 | -0.39            | 0.12                                           | 3.94                                       | 4.17                                       | 0.10                                         | 5.83           | 5.51           | 0.05           | 0.13           |                |                |                | 7.31                |
| 55.100  | 44.450 | -13.2            | 3.0                                            | 102.0                                      | 109.0                                      | 3.0                                          | 153.5          | 141.0          | 4.10           | 0.90           | 199            | 33.5           | 0.1037         | 4.47                |
| 2.1693  | 1.7500 | -0.52            | 0.12                                           | 4.02                                       | 4.29                                       | 0.12                                         | 6.04           | 5.55           | 0.16           | 0.03           |                |                |                | 9.86                |
| 55.100  | 42.862 | -13.2            | 3.0                                            | 102.0                                      | 109.0                                      | 3.3                                          | 154.0          | 141.0          | 4.10           | 0.90           | 199            | 33.5           | 0.1037         | 4.61                |
| 2.1693  | 1.6875 | -0.52            | 0.12                                           | 4.02                                       | 4.29                                       | 0.13                                         | 6.06           | 5.55           | 0.16           | 0.03           |                |                |                | 10.16               |
| 46.038  | 31.750 | 12.7             | 3.5                                            | 112.0                                      | 120.0                                      | 3.3                                          | 179.5          | 162.0          | 11.00          | 3.60           | 150            | 23.8           | 0.1180         | 6.04                |
| 1.8125  | 1.2500 | 0.50             | 0.14                                           | 4.40                                       | 4.72                                       | 0.13                                         | 7.06           | 6.38           | 0.43           | 0.14           |                |                |                | 13.31               |
| 57.531  | 46.038 | -15.0            | 8.0                                            | 106.0                                      | 121.0                                      | 3.3                                          | 179.0          | 171.0          | 2.50           | 3.20           | 266            | 28.4           | 0.1072         | 7.94                |
| 2.2650  | 1.8125 | -0.59            | 0.31                                           | 4.17                                       | 4.76                                       | 0.13                                         | 7.05           | 6.73           | 0.10           | 0.13           |                |                |                | 17.51               |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 150.0          | 144.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 3.98                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.91           | 5.67           | 0.13           | 0.04           |                |                |                | 8.78                |
| 48.260  | 38.100 | -11.9            | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 150.0          | 147.0          | 3.30           | 0.90           | 177            | 29.4           | 0.0945         | 4.45                |
| 1.9000  | 1.5000 | -0.47            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.91           | 5.79           | 0.13           | 0.04           |                |                |                | 9.82                |
| 30.000  | 22.000 | 1.8              | 3.5                                            | 100.0                                      | 106.0                                      | 3.3                                          | 138.0          | 129.0          | 2.70           | 1.90           | 124            | 37.6           | 0.1355         | 1.63                |
| 1.1811  | 0.8661 | 0.07             | 0.14                                           | 3.94                                       | 4.17                                       | 0.13                                         | 5.43           | 5.08           | 0.11           | 0.08           |                |                |                | 3.60                |
| 21.433  | 16.670 | 1.3              | 3.5                                            | 99.0                                       | 105.0                                      | 1.5                                          | 125.0          | 122.0          | 0.70           | 1.40           | 125            | 90.7           | 0.1220         | 0.86                |
| 0.8438  | 0.6563 | 0.05             | 0.14                                           | 3.90                                       | 4.13                                       | 0.06                                         | 4.92           | 4.80           | 0.03           | 0.05           |                |                |                | 1.89                |
| 34.925  | 26.195 | -1.0             | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 140.0          | 131.0          | 2.60           | 0.30           | 153            | 38.1           | 0.1428         | 2.05                |
| 1.3750  | 1.0313 | -0.04            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.51           | 5.16           | 0.10           | 0.01           |                |                |                | 4.53                |
| 36.322  | 26.192 | -2.5             | 3.5                                            | 101.0                                      | 107.0                                      | 0.8                                          | 142.0          | 135.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.22                |
| 1.4300  | 1.0312 | -0.10            | 0.14                                           | 3.98                                       | 4.21                                       | 0.03                                         | 5.59           | 5.31           | 0.16           | 0.07           |                |                |                | 4.89                |
| 36.322  | 26.192 | -2.5             | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 142.0          | 133.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.20                |
| 1.4300  | 1.0312 | -0.10            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.59           | 5.24           | 0.16           | 0.07           |                |                |                | 4.85                |
| 28.971  | 21.433 | 3.0              | 3.5                                            | 101.0                                      | 107.0                                      | 3.0                                          | 142.0          | 134.0          | 2.80           | 3.00           | 130            | 37.2           | 0.1386         | 1.82                |
| 1.1406  | 0.8438 | 0.12             | 0.14                                           | 3.98                                       | 4.21                                       | 0.12                                         | 5.59           | 5.28           | 0.11           | 0.12           |                |                |                | 4.02                |
| 28.971  | 24.608 | 3.0              | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 143.0          | 134.0          | 2.80           | 3.00           | 130            | 37.2           | 0.1386         | 1.96                |
| 1.1406  | 0.9688 | 0.12             | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.63           | 5.28           | 0.11           | 0.12           |                |                |                | 4.33                |
| 36.322  | 27.000 | -2.5             | 3.5                                            | 101.0                                      | 107.0                                      | 2.5                                          | 143.0          | 135.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.34                |
| 1.4300  | 1.0630 | -0.10            | 0.14                                           | 3.98                                       | 4.21                                       | 0.10                                         | 5.63           | 5.31           | 0.16           | 0.07           |                |                |                | 5.16                |
| 36.322  | 30.162 | -2.5             | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 144.0          | 135.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.62                |
| 1.4300  | 1.1875 | -0.10            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.67           | 5.31           | 0.16           | 0.07           |                |                |                | 5.77                |
| 36.322  | 39.688 | -2.5             | 3.5                                            | 101.0                                      | 107.0                                      | 3.3                                          | 147.0          | 135.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.76                |
| 1.4300  | 1.5625 | -0.10            | 0.14                                           | 3.98                                       | 4.21                                       | 0.13                                         | 5.79           | 5.31           | 0.16           | 0.07           |                |                |                | 6.09                |
| 36.322  | 30.162 | -2.5             | 6.4                                            | 101.0                                      | 113.0                                      | 3.3                                          | 144.0          | 135.0          | 4.10           | 1.70           | 151            | 36.8           | 0.1416         | 2.59                |
| 1.4300  | 1.1875 | -0.10            | 0.25                                           | 3.98                                       | 4.45                                       | 0.13                                         | 5.67           | 5.31           | 0.16           | 0.07           |                |                |                | 5.70                |
| 36.322  | 30.162 | -2.5             | 3.5                                            | 104.0                                      | 107.0                                      | 3.3                                          | 144.0          | 135.0          | 4.10           | 1.70           | 151            | 38.3           | 0.1416         | 2.61                |
| 1.4300  | 1.1875 | -0.10            | 0.14                                           | 4.09                                       | 4.21                                       | 0.13                                         | 5.67           | 5.31           | 0.16           | 0.07           |                |                |                | 5.76                |
| 41.275  | 30.162 | -2.8             | 3.5                                            | 104.0                                      | 110.0                                      | 3.3                                          | 160.0          | 149.0          | 5.00           | 2.00           | 182            | 37.2           | 0.1056         | 3.83                |
| 1.6250  | 1.1875 | -0.11            | 0.14                                           | 4.09                                       | 4.33                                       | 0.13                                         | 6.30           | 5.87           | 0.20           | 0.08           |                |                |                | 8.45                |
| 41.275  | 30.162 | -2.8             | 6.4                                            | 104.0                                      | 116.0                                      | 3.3                                          | 160.0          | 149.0          | 5.00           | 2.00           | 182            | 37.2           | 0.1056         | 3.80                |
| 1.6250  | 1.1875 | -0.11            | 0.25                                           | 4.09                                       | 4.57                                       | 0.13                                         | 6.30           | 5.87           | 0.20           | 0.08           |                |                |                | 8.38                |
| 48.260  | 38.100 | -9.7             | 3.5                                            | 103.0                                      | 109.0                                      | 3.3                                          | 161.0          | 153.0          | 3.50           | 1.00           | 206            | 37.7           | 0.1017         | 4.72                |
| 1.9000  | 1.5000 | -0.38            | 0.14                                           | 4.06                                       | 4.29                                       | 0.13                                         | 6.34           | 6.02           | 0.14           | 0.04           |                |                |                | 10.40               |
| 48.260  | 38.100 | -9.7             | 6.4                                            | 103.0                                      | 115.0                                      | 3.3                                          | 161.0          | 153.0          | 3.50           | 1.00           | 206            | 37.7           | 0.1017         | 4.68                |
| 1.9000  | 1.5000 | -0.38            | 0.25                                           | 4.06                                       | 4.53                                       | 0.13                                         | 6.34           | 6.02           | 0.14           | 0.04           |                |                |                | 10.33               |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

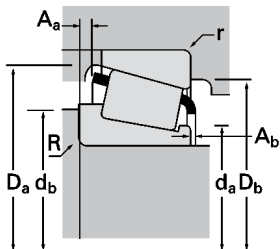
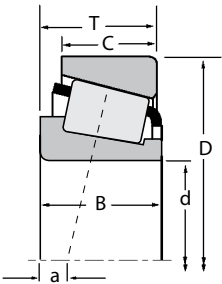
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number    |                        |                |        |  |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|----------------|------------------------|----------------|--------|--|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |                | Factors <sup>(5)</sup> |                | Static |  | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | C <sub>0</sub> | C <sub>0</sub>         | C <sub>0</sub> |        |  |       |       |
| 92.075<br>3.6250        | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000       | 778            | 772                    |                |        |  |       |       |
| 92.075<br>3.6250        | 190.500<br>7.5000 | 57.150<br>2.2500 | 424000<br>95300        | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000       | 857            | 854                    |                |        |  |       |       |
| 92.075<br>3.6250        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000       | HH221438       | HH221410               |                |        |  |       |       |
| 92.075<br>3.6250        | 214.312<br>8.4375 | 73.025<br>2.8750 | 596000<br>134000       | 0.46 | 1.31 | 155000<br>34800        | 121000<br>27300  | 1.27 | 786000<br>177000       | EE213362       | 213843                 |                |        |  |       |       |
| 93.662<br>3.6875        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42368          | 42584                  |                |        |  |       |       |
| 93.662<br>3.6875        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42368          | 42587                  |                |        |  |       |       |
| 93.662<br>3.6875        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 597            | 592A                   |                |        |  |       |       |
| 94.975<br>3.7392        | 149.974<br>5.9045 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42373          | 42590                  |                |        |  |       |       |
| 94.975<br>3.7392        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700        | 682            | 672                    |                |        |  |       |       |
| 95.000<br>3.7402        | 135.000<br>5.3150 | 20.000<br>0.7874 | 76900<br>17300         | 0.58 | 1.03 | 19900<br>4480          | 19900<br>4470    | 1.00 | 133000<br>29900        | JL819349       | JL819310               |                |        |  |       |       |
| 95.000<br>3.7402        | 145.000<br>5.7087 | 24.000<br>0.9449 | 116000<br>26100        | 0.47 | 1.27 | 30100<br>6770          | 24400<br>5480    | 1.24 | 172000<br>38700        | JP10044        | JP10010                |                |        |  |       |       |
| 95.000<br>3.7402        | 145.000<br>5.7087 | 39.000<br>1.5354 | 228000<br>51300        | 0.28 | 2.16 | 59100<br>13300         | 28100<br>6320    | 2.10 | 378000<br>85100        | XAA33019       | Y33019                 |                |        |  |       |       |
| 95.000<br>3.7402        | 150.000<br>5.9055 | 35.000<br>1.3780 | 199000<br>44700        | 0.44 | 1.36 | 51500<br>11600         | 39000<br>8770    | 1.32 | 316000<br>71100        | JM719149       | JM719113               |                |        |  |       |       |
| 95.000<br>3.7402        | 152.400<br>6.0000 | 39.690<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | J594X          | 592A                   |                |        |  |       |       |
| 95.000<br>3.7402        | 160.000<br>6.2992 | 46.000<br>1.8110 | 328000<br>73800        | 0.34 | 1.77 | 85100<br>19100         | 49300<br>11100   | 1.73 | 506000<br>114000       | JF9549         | JF9510                 |                |        |  |       |       |
| 95.000<br>3.7402        | 190.000<br>7.4803 | 57.000<br>2.2441 | 424000<br>95300        | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000       | 862            | 853                    |                |        |  |       |       |
| 95.250<br>3.7500        | 130.175<br>5.1250 | 20.638<br>0.8125 | 88300<br>19900         | 0.35 | 1.72 | 22900<br>5150          | 13700<br>3080    | 1.67 | 166000<br>37400        | L319249        | L319210                |                |        |  |       |       |
| 95.250<br>3.7500        | 136.525<br>5.3750 | 30.162<br>1.1875 | 129000<br>29100        | 0.28 | 2.11 | 33500<br>7530          | 16300<br>3660    | 2.06 | 227000<br>51100        | LM119348       | LM119311               |                |        |  |       |       |
| 95.250<br>3.7500        | 146.050<br>5.7500 | 33.338<br>1.3125 | 182000<br>41000        | 0.45 | 1.34 | 47300<br>10600         | 36300<br>8160    | 1.30 | 307000<br>69000        | 47896          | 47820                  |                |        |  |       |       |
| 95.250<br>3.7500        | 146.050<br>5.7500 | 33.338<br>1.3125 | 182000<br>41000        | 0.45 | 1.34 | 47300<br>10600         | 36300<br>8160    | 1.30 | 307000<br>69000        | 47898          | 47820                  |                |        |  |       |       |
| 95.250<br>3.7500        | 147.638<br>5.8125 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594            | 592XS                  |                |        |  |       |       |
| 95.250<br>3.7500        | 147.828<br>5.8200 | 35.717<br>1.4062 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594            | 592AX                  |                |        |  |       |       |
| 95.250<br>3.7500        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42375          | 42584                  |                |        |  |       |       |
| 95.250<br>3.7500        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42376          | 42584                  |                |        |  |       |       |
| 95.250<br>3.7500        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42375A         | 42584                  |                |        |  |       |       |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42375          | 42587                  |                |        |  |       |       |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42376          | 42587                  |                |        |  |       |       |
| 95.250<br>3.7500        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594AA          | JM719113               |                |        |  |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                | 105.0<br>4.13                     | 111.0<br>4.37            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.57<br>12.29       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 8.0<br>0.31                | 106.0<br>4.17                     | 121.0<br>4.76            | 3.3<br>0.13                         | 174.0<br>6.85  | 170.0<br>6.69  | 5.60<br>0.22   | 0.60<br>0.02   | 264            | 44.9           | 0.1072         | 7.45<br>16.42       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 8.0<br>0.31                | 107.0<br>4.21                     | 122.0<br>4.80            | 3.3<br>0.13                         | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 7.86<br>17.33       |
| 73.025<br>2.8750 | 53.975<br>2.1250 | -18.3<br>-0.72   | 9.7<br>0.38                | 117.0<br>4.61                     | 135.0<br>5.31            | 6.4<br>0.25                         | 196.0<br>7.71  | 182.0<br>7.17  | *<br>*         | *<br>*         | 262            | 38.1           | 0.1180         | 12.33<br>27.19      |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.0<br>0.12                | 102.0<br>4.02                     | 107.0<br>4.21            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.78<br>3.91        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.0<br>0.12                | 102.0<br>4.02                     | 107.0<br>4.21            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.92<br>4.22        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 102.0<br>4.02                     | 109.0<br>4.29            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.55<br>5.63        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.0<br>0.12                | 103.0<br>4.06                     | 108.0<br>4.25            | 3.3<br>0.13                         | 143.0<br>5.63  | 135.0<br>5.31  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.91<br>4.22        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                | 106.0<br>4.17                     | 113.0<br>4.45            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.69<br>8.15        |
| 20.000<br>0.7874 | 14.000<br>0.5512 | 10.9<br>0.43     | 5.0<br>0.20                | 102.0<br>4.02                     | 111.0<br>4.37            | 2.5<br>0.10                         | 129.0<br>5.08  | 123.0<br>4.84  | 2.50<br>0.10   | 1.40<br>0.05   | 93.3           | 70.5           | 0.1298         | 0.85<br>1.88        |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 6.1<br>0.24      | 3.0<br>0.12                | 102.0<br>4.02                     | 108.0<br>4.25            | 3.0<br>0.12                         | 140.0<br>5.51  | 134.0<br>5.28  | 1.90<br>0.08   | 3.30<br>0.13   | 104            | 40.9           | 0.1264         | 1.27<br>2.79        |
| 39.000<br>1.5354 | 32.500<br>1.2795 | -10.2<br>-0.40   | 6.0<br>0.24                | 102.0<br>4.02                     | 114.0<br>4.49            | 1.5<br>0.06                         | 139.0<br>5.47  | 133.0<br>5.24  | 1.90<br>0.07   | 2.30<br>0.09   | 192            | 48.4           | 0.0907         | 2.23<br>4.93        |
| 34.000<br>1.3386 | 27.000<br>1.0630 | -1.5<br>-0.06    | 3.0<br>0.12                | 104.0<br>4.09                     | 109.0<br>4.29            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 3.10<br>0.12   | 3.00<br>0.12   | 150            | 36.1           | 0.1413         | 2.17<br>4.78        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | 2.5<br>0.10      | 8.0<br>0.31                | 103.0<br>4.06                     | 119.0<br>4.69            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 38.3           | 0.1416         | 2.43<br>5.37        |
| 46.000<br>1.8110 | 38.000<br>1.4961 | -10.7<br>-0.42   | 3.0<br>0.12                | 105.5<br>4.15                     | 111.0<br>4.37            | 3.0<br>0.12                         | 154.0<br>6.06  | 145.0<br>5.71  | 1.40<br>0.06   | 3.00<br>0.12   | 210            | 39.7           | 0.0998         | 3.73<br>8.22        |
| 57.531<br>2.2650 | 48.000<br>1.8898 | -15.2<br>-0.60   | 6.4<br>0.25                | 108.0<br>4.25                     | 120.0<br>4.72            | 3.0<br>0.12                         | 174.0<br>6.86  | 170.0<br>6.69  | 5.60<br>0.22   | 0.60<br>0.02   | 264            | 44.9           | 0.1072         | 7.36<br>16.22       |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 1.3<br>0.05      | 1.5<br>0.06                | 101.0<br>3.98                     | 103.0<br>4.06            | 1.5<br>0.06                         | 125.0<br>4.92  | 122.0<br>4.80  | 0.70<br>0.03   | 1.40<br>0.05   | 125            | 90.7           | 0.1220         | 0.79<br>1.75        |
| 30.162<br>1.1875 | 24.608<br>0.9688 | -4.6<br>-0.18    | 2.3<br>0.09                | 102.0<br>4.02                     | 105.0<br>4.13            | 2.3<br>0.09                         | 131.0<br>5.16  | 126.0<br>4.96  | 1.30<br>0.05   | -0.20<br>-0.01 | 149            | 69             | 0.1213         | 1.35<br>2.97        |
| 34.925<br>1.3750 | 26.195<br>1.0313 | -1.0<br>-0.04    | 3.5<br>0.14                | 103.0<br>4.06                     | 110.0<br>4.33            | 3.3<br>0.13                         | 140.0<br>5.51  | 131.0<br>5.16  | 2.60<br>0.10   | 0.30<br>0.01   | 153            | 38.1           | 0.1428         | 1.93<br>4.25        |
| 34.925<br>1.3750 | 26.195<br>1.0313 | -1.0<br>-0.04    | 7.0<br>0.28                | 103.0<br>4.06                     | 117.0<br>4.61            | 3.3<br>0.13                         | 140.0<br>5.51  | 131.0<br>5.16  | 2.60<br>0.10   | 0.30<br>0.01   | 153            | 38.1           | 0.1428         | 1.87<br>4.12        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.3<br>0.13                         | 142.0<br>5.59  | 133.0<br>5.24  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.07<br>4.56        |
| 36.322<br>1.4300 | 26.192<br>1.0312 | -2.5<br>-0.10    | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.3<br>0.13                         | 142.0<br>5.59  | 133.0<br>5.24  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.10<br>4.63        |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.0<br>0.12                | 103.0<br>4.06                     | 108.0<br>4.25            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.73<br>3.82        |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.5<br>0.14                | 103.0<br>4.06                     | 109.0<br>4.29            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.72<br>3.79        |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 0.8<br>0.03                | 103.0<br>4.06                     | 104.0<br>4.09            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.73<br>3.82        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.0<br>0.12                | 103.0<br>4.06                     | 108.0<br>4.25            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.87<br>4.13        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.5<br>0.14                | 103.0<br>4.06                     | 109.0<br>4.29            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.86<br>4.10        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 0.8<br>0.03                | 104.0<br>4.09                     | 107.0<br>4.21            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.22<br>4.90        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

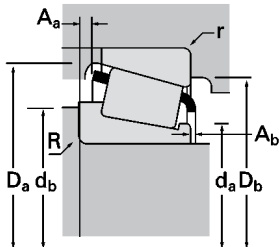
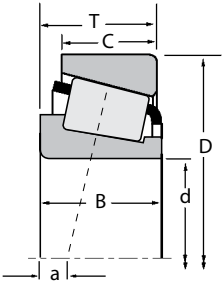
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number     |                        |                 |        |  |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-----------------|------------------------|-----------------|--------|--|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |                 | Factors <sup>(5)</sup> |                 | Static |  | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | C <sub>a0</sub> | C <sub>0</sub>         | C <sub>a0</sub> |        |  |       |       |
| 95.250<br>3.7500        | 150.000<br>5.9055 | 35.966<br>1.4160 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594             | JM719113               |                 |        |  |       |       |
| 95.250<br>3.7500        | 150.000<br>5.9055 | 35.992<br>1.4170 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594             | 593X                   |                 |        |  |       |       |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594             | 592A                   |                 |        |  |       |       |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 39.688<br>1.5625 | 200000<br>45000        | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600        | 594A            | 592A                   |                 |        |  |       |       |
| 95.250<br>3.7500        | 157.162<br>6.1875 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000        | 52375           | 52618                  |                 |        |  |       |       |
| 95.250<br>3.7500        | 161.925<br>6.3750 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000        | 52375           | 52637                  |                 |        |  |       |       |
| 95.250<br>3.7500        | 161.925<br>6.3750 | 39.690<br>1.5626 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000        | 52375           | 52638                  |                 |        |  |       |       |
| 95.250<br>3.7500        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700        | 683             | 672                    |                 |        |  |       |       |
| 95.250<br>3.7500        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700        | 683XA           | 672                    |                 |        |  |       |       |
| 95.250<br>3.7500        | 171.450<br>6.7500 | 47.625<br>1.8750 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000       | 77375           | 77675                  |                 |        |  |       |       |
| 95.250<br>3.7500        | 171.450<br>6.7500 | 47.625<br>1.8750 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000       | 77376           | 77675                  |                 |        |  |       |       |
| 95.250<br>3.7500        | 171.450<br>6.7500 | 50.800<br>2.0000 | 315000<br>70700        | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000       | 77375           | 77676X                 |                 |        |  |       |       |
| 95.250<br>3.7500        | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000       | 776             | 772                    |                 |        |  |       |       |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 57.150<br>2.2500 | 424000<br>95300        | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000       | 864             | 854                    |                 |        |  |       |       |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000       | HH221440        | HH221410               |                 |        |  |       |       |
| 95.250<br>3.7500        | 200.025<br>7.8750 | 61.912<br>2.4375 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000       | HH221440        | HH221416               |                 |        |  |       |       |
| 95.250<br>3.7500        | 200.025<br>7.8750 | 73.025<br>2.8750 | 662000<br>149000       | 0.32 | 1.88 | 172000<br>38600        | 93700<br>21100   | 1.83 | 906000<br>204000       | EH220749        | EH220710               |                 |        |  |       |       |
| 96.838<br>3.8125        | 148.430<br>5.8437 | 28.575<br>1.1250 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42381           | 42584                  |                 |        |  |       |       |
| 96.838<br>3.8125        | 149.225<br>5.8750 | 31.750<br>1.2500 | 151000<br>33900        | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300        | 42381           | 42587                  |                 |        |  |       |       |
| 96.838<br>3.8125        | 188.912<br>7.4375 | 50.800<br>2.0000 | 299000<br>67300        | 0.87 | 0.69 | 77600<br>17400         | 115000<br>25900  | 0.67 | 392000<br>88100        | 90381           | 90744                  |                 |        |  |       |       |
| 98.425<br>3.8750        | 157.162<br>6.1875 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000        | 52387           | 52618                  |                 |        |  |       |       |
| 98.425<br>3.8750        | 161.925<br>6.3750 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000        | 52387           | 52637                  |                 |        |  |       |       |
| 98.425<br>3.8750        | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700        | 685             | 672                    |                 |        |  |       |       |
| 98.425<br>3.8750        | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000       | 779             | 772                    |                 |        |  |       |       |
| 98.425<br>3.8750        | 184.150<br>7.2500 | 63.500<br>2.5000 | 491000<br>110000       | 0.37 | 1.60 | 127000<br>28600        | 81500<br>18300   | 1.56 | 772000<br>174000       | HH421246C       | HH421210               |                 |        |  |       |       |
| 98.425<br>3.8750        | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000       | HH221442        | HH221410               |                 |        |  |       |       |
| 98.425<br>3.8750        | 212.725<br>8.3750 | 66.675<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000       | HH224332        | HH224310               |                 |        |  |       |       |
| 99.975<br>3.9360        | 156.975<br>6.1801 | 42.000<br>1.6535 | 278000<br>62500        | 0.33 | 1.80 | 72100<br>16200         | 41000<br>9230    | 1.76 | 438000<br>98500        | HM220149        | HM220110               |                 |        |  |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 2.5<br>0.10                         | 143.0<br>5.63  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.21<br>4.87        |
| 36.322<br>1.4300 | 27.000<br>1.0630 | -2.5<br>-0.10    | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.20<br>4.85        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.48<br>5.48        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 5.0<br>0.20                | 104.0<br>4.09                     | 113.0<br>4.45            | 3.3<br>0.13                         | 144.0<br>5.67  | 135.0<br>5.31  | 4.10<br>0.16   | 1.70<br>0.07   | 151            | 36.8           | 0.1416         | 2.47<br>5.44        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                | 105.0<br>4.13                     | 112.0<br>4.41            | 3.3<br>0.13                         | 152.0<br>5.98  | 142.0<br>5.59  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.66<br>5.86        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                | 105.0<br>4.13                     | 112.0<br>4.41            | 3.3<br>0.13                         | 154.0<br>6.06  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.90<br>6.39        |
| 36.116<br>1.4219 | 29.370<br>1.1563 | -0.5<br>-0.02    | 3.5<br>0.14                | 105.0<br>4.13                     | 112.0<br>4.41            | 3.3<br>0.13                         | 154.0<br>6.06  | 143.0<br>5.63  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 3.07<br>6.76        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                | 106.0<br>4.17                     | 113.0<br>4.45            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.68<br>8.12        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 5.0<br>0.20                | 106.0<br>4.17                     | 116.0<br>4.57            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.67<br>8.08        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -9.7<br>-0.38    | 3.5<br>0.14                | 106.0<br>4.17                     | 113.0<br>4.45            | 3.3<br>0.13                         | 161.0<br>6.34  | 153.0<br>6.02  | 3.50<br>0.14   | 1.00<br>0.04   | 206            | 37.7           | 0.1017         | 4.54<br>10.01       |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -9.7<br>-0.38    | 6.4<br>0.25                | 106.0<br>4.17                     | 118.0<br>4.65            | 3.3<br>0.13                         | 161.0<br>6.34  | 153.0<br>6.02  | 3.50<br>0.14   | 1.00<br>0.04   | 206            | 37.7           | 0.1017         | 4.51<br>9.93        |
| 48.260<br>1.9000 | 41.275<br>1.6250 | -9.7<br>-0.38    | 3.5<br>0.14                | 106.0<br>4.17                     | 113.0<br>4.45            | 3.3<br>0.13                         | 161.0<br>6.34  | 152.0<br>5.98  | 3.50<br>0.14   | 1.00<br>0.04   | 206            | 37.7           | 0.1017         | 4.74<br>10.44       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                | 107.0<br>4.21                     | 114.0<br>4.49            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.40<br>11.90       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 8.0<br>0.31                | 108.0<br>4.25                     | 123.0<br>4.84            | 3.3<br>0.13                         | 174.0<br>6.85  | 170.0<br>6.69  | 5.60<br>0.22   | 0.60<br>0.02   | 264            | 44.9           | 0.1072         | 7.24<br>15.95       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 8.0<br>0.31                | 110.0<br>4.33                     | 125.0<br>4.92            | 3.3<br>0.13                         | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 7.65<br>16.86       |
| 57.531<br>2.2650 | 50.800<br>2.0000 | -15.0<br>-0.59   | 8.0<br>0.31                | 110.0<br>4.33                     | 125.0<br>4.92            | 3.3<br>0.13                         | 179.0<br>7.05  | 174.0<br>6.85  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 9.15<br>20.17       |
| 73.025<br>2.8750 | 58.738<br>2.3125 | -24.6<br>-0.97   | 3.3<br>0.13                | 115.5<br>4.55                     | 120.0<br>4.72            | 3.3<br>0.13                         | 187.0<br>7.36  | 177.0<br>6.97  | 5.80<br>0.23   | 2.40<br>0.09   | 306            | 26.2           | 0.1106         | 10.64<br>23.46      |
| 28.971<br>1.1406 | 21.433<br>0.8438 | 3.0<br>0.12      | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.0<br>0.12                         | 142.0<br>5.59  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.66<br>3.67        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 3.5<br>0.14                | 104.0<br>4.09                     | 110.0<br>4.33            | 3.3<br>0.13                         | 143.0<br>5.63  | 134.0<br>5.28  | 2.80<br>0.11   | 3.00<br>0.12   | 130            | 37.2           | 0.1386         | 1.80<br>3.98        |
| 46.038<br>1.8125 | 31.750<br>1.2500 | 12.7<br>0.50     | 3.5<br>0.14                | 113.0<br>4.44                     | 125.0<br>4.92            | 3.3<br>0.13                         | 179.5<br>7.06  | 161.0<br>6.34  | 11.00<br>0.43  | 3.60<br>0.14   | 150            | 22.1           | 0.1180         | 5.59<br>12.33       |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                | 108.0<br>4.25                     | 114.0<br>4.49            | 3.3<br>0.13                         | 152.0<br>5.98  | 142.0<br>5.59  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.52<br>5.55        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                | 108.0<br>4.25                     | 114.0<br>4.49            | 3.3<br>0.13                         | 154.0<br>6.06  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.76<br>6.08        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                | 109.0<br>4.29                     | 116.0<br>4.57            | 3.3<br>0.13                         | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.53<br>7.77        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                | 110.0<br>4.33                     | 116.0<br>4.57            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.22<br>11.50       |
| 63.500<br>2.5000 | 52.388<br>2.0625 | -16.8<br>-0.66   | 6.4<br>0.25                | 115.0<br>4.53                     | 127.0<br>5.00            | 3.3<br>0.13                         | 176.0<br>6.93  | 163.0<br>6.42  | 3.10<br>0.12   | 3.10<br>0.12   | 298            | 40.9           | 0.1162         | 7.31<br>16.11       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 3.5<br>0.14                | 113.0<br>4.45                     | 119.0<br>4.69            | 3.3<br>0.13                         | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 7.49<br>16.52       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 3.5<br>0.14                | 119.0<br>4.69                     | 123.0<br>4.84            | 3.3<br>0.13                         | 201.5<br>7.94  | 192.0<br>7.56  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 11.31<br>24.94      |
| 42.000<br>1.6535 | 34.000<br>1.3386 | -8.6<br>-0.34    | 8.0<br>0.31                | 108.0<br>4.25                     | 123.0<br>4.84            | 3.5<br>0.14                         | 151.0<br>5.94  | 142.0<br>5.59  | 2.10<br>0.08   | 2.40<br>0.09   | 204            | 45.9           | 0.0981         | 2.80<br>6.17        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

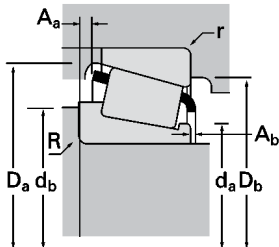
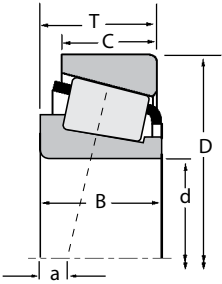
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |           |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|-----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static           | Inner       | Outer     |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |           |
| 99.975<br>3.9360        | 214.975<br>8.4636 | 64.798<br>2.5511 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | HH224334    | HH224314  |
| 100.000<br>3.9370       | 145.000<br>5.7087 | 24.000<br>0.9449 | 116000<br>26100        | 0.47 | 1.27 | 30100<br>6770          | 24400<br>5480    | 1.24 | 172000<br>38700  | JP10049A    | JP10010   |
| 100.000<br>3.9370       | 145.000<br>5.7087 | 24.000<br>0.9449 | 116000<br>26100        | 0.47 | 1.27 | 30100<br>6770          | 24400<br>5480    | 1.24 | 172000<br>38700  | JP10049     | JP10010   |
| 100.000<br>3.9370       | 145.000<br>5.7087 | 24.000<br>0.9449 | 116000<br>26100        | 0.47 | 1.27 | 30100<br>6770          | 24400<br>5480    | 1.24 | 172000<br>38700  | JP10049     | JP10010A  |
| 100.000<br>3.9370       | 150.000<br>5.9055 | 32.000<br>1.2598 | 150000<br>33800        | 0.50 | 1.20 | 39000<br>8770          | 33500<br>7530    | 1.16 | 242000<br>54400  | JLM820048   | JLM820012 |
| 100.000<br>3.9370       | 155.000<br>6.1024 | 36.000<br>1.4173 | 214000<br>48200        | 0.47 | 1.27 | 55600<br>12500         | 45000<br>10100   | 1.24 | 355000<br>79900  | JM720249    | JM720210  |
| 100.000<br>3.9370       | 160.000<br>6.2992 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52394X      | 52630X    |
| 100.000<br>3.9370       | 160.000<br>6.2992 | 41.000<br>1.6142 | 259000<br>58100        | 0.47 | 1.28 | 67000<br>15100         | 54000<br>12100   | 1.24 | 416000<br>93500  | JHM720249   | JHM720210 |
| 100.000<br>3.9370       | 180.000<br>7.0866 | 48.000<br>1.8898 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 783         | 773       |
| 100.000<br>3.9370       | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 783         | 772       |
| 100.000<br>3.9370       | 200.000<br>7.8740 | 52.761<br>2.0772 | 376000<br>84600        | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98394X      | 98788     |
| 100.000<br>3.9370       | 215.000<br>8.4646 | 66.680<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | JHH224333   | JHH224315 |
| 100.012<br>3.9375       | 157.162<br>6.1875 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52393       | 52618     |
| 100.012<br>3.9375       | 161.925<br>6.3750 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52393       | 52637     |
| 100.012<br>3.9375       | 161.925<br>6.3750 | 39.688<br>1.5625 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52393       | 52638     |
| 101.600<br>4.0000       | 134.938<br>5.3125 | 15.875<br>0.6250 | 60100<br>13500         | 0.37 | 1.62 | 15600<br>3500          | 9890<br>2220     | 1.58 | 104000<br>23400  | LL420549    | LL420510  |
| 101.600<br>4.0000       | 136.525<br>5.3750 | 21.433<br>0.8438 | 90500<br>20400         | 0.37 | 1.63 | 23500<br>5280          | 14800<br>3330    | 1.59 | 175000<br>39400  | L420449     | L420410   |
| 101.600<br>4.0000       | 146.050<br>5.7500 | 21.433<br>0.8438 | 88900<br>20000         | 0.39 | 1.53 | 23100<br>5180          | 15500<br>3480    | 1.49 | 175000<br>39400  | L521945     | L521910   |
| 101.600<br>4.0000       | 146.050<br>5.7500 | 25.400<br>1.0000 | 122000<br>27400        | 0.46 | 1.31 | 31600<br>7100          | 24800<br>5580    | 1.27 | 202000<br>45400  | LM720648    | LM720610  |
| 101.600<br>4.0000       | 152.400<br>6.0000 | 21.433<br>0.8438 | 88900<br>20000         | 0.39 | 1.53 | 23100<br>5180          | 15500<br>3480    | 1.49 | 175000<br>39400  | L521945     | L521914   |
| 101.600<br>4.0000       | 157.162<br>6.1875 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400       | 52618     |
| 101.600<br>4.0000       | 157.162<br>6.1875 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52401       | 52618     |
| 101.600<br>4.0000       | 160.000<br>6.2992 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400       | 52630X    |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 36.512<br>1.4375 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400       | 52637     |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 39.688<br>1.5625 | 207000<br>46500        | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400       | 52638     |
| 101.600<br>4.0000       | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 687         | 672       |
| 101.600<br>4.0000       | 168.275<br>6.6250 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 687         | 672A      |
| 101.600<br>4.0000       | 171.450<br>6.7500 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 687         | 674       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                |                | Cage           |                |                | Factors        |                |  | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing          |                |                |                |                |                |                |                |                |  |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |  |                     |
| 66.675<br>2.6250 | 50.800<br>2.0000 | -18.8<br>-0.74   | 3.5<br>0.14                                    | 120.0<br>4.72                              | 124.0<br>4.88                              | 3.3<br>0.13      | 201.0<br>7.92  | 192.0<br>7.56  | 4.80<br>0.19   | 2.80<br>0.11   | 367            | 43.4           | 0.1182         | 11.30<br>24.91 |  |                     |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 6.1<br>0.24      | 5.0<br>0.20                                    | 106.0<br>4.17                              | 116.0<br>4.57                              | 3.0<br>0.12      | 140.0<br>5.51  | 134.0<br>5.28  | 1.90<br>0.08   | 3.30<br>0.13   | 104            | 40.9           | 0.1264         | 1.13<br>2.49   |  |                     |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 6.1<br>0.24      | 3.0<br>0.12                                    | 106.0<br>4.17                              | 112.0<br>4.41                              | 3.0<br>0.12      | 140.0<br>5.51  | 134.0<br>5.28  | 1.90<br>0.08   | 3.30<br>0.13   | 104            | 40.9           | 0.1264         | 1.13<br>2.49   |  |                     |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 6.1<br>0.24      | 3.0<br>0.12                                    | 106.0<br>4.17                              | 112.0<br>4.41                              | 0.8<br>0.03      | 140.0<br>5.51  | 136.0<br>5.35  | 1.90<br>0.08   | 3.30<br>0.13   | 104            | 40.9           | 0.1264         | 1.15<br>2.54   |  |                     |
| 30.000<br>1.1811 | 26.000<br>1.0236 | 4.6<br>0.18      | 2.3<br>0.09                                    | 107.0<br>4.21                              | 111.0<br>4.37                              | 2.3<br>0.09      | 144.0<br>5.67  | 135.0<br>5.31  | 2.40<br>0.09   | 0.90<br>0.04   | 133            | 38.3           | 0.1405         | 1.81<br>3.99   |  |                     |
| 35.000<br>1.3780 | 28.000<br>1.1024 | 0.3<br>0.01      | 3.0<br>0.12                                    | 109.0<br>4.29                              | 115.0<br>4.53                              | 2.5<br>0.10      | 149.0<br>5.87  | 140.0<br>5.51  | 3.00<br>0.12   | 3.00<br>0.12   | 175            | 48.5           | 0.1043         | 2.36<br>5.20   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                                    | 109.0<br>4.29                              | 116.0<br>4.57                              | 3.0<br>0.12      | 153.0<br>6.02  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.59<br>5.72   |  |                     |
| 40.000<br>1.5748 | 32.000<br>1.2598 | -2.5<br>-0.10    | 3.0<br>0.12                                    | 109.0<br>4.30                              | 117.0<br>4.61                              | 2.5<br>0.10      | 154.0<br>6.06  | 143.0<br>5.63  | 3.40<br>0.13   | 3.60<br>0.14   | 188            | 45.5           | 0.1068         | 2.99<br>6.60   |  |                     |
| 48.006<br>1.8900 | 40.000<br>1.5748 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 118.0<br>4.65                              | 3.0<br>0.12      | 168.0<br>6.61  | 160.0<br>6.30  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.09<br>11.23  |  |                     |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 118.0<br>4.65                              | 3.3<br>0.13      | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 5.12<br>11.30  |  |                     |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 3.5<br>0.14                                    | 120.5<br>4.75                              | 126.0<br>4.96                              | 3.3<br>0.13      | 188.0<br>7.40  | 174.0<br>6.85  | 8.60<br>0.34   | 5.40<br>0.21   | 203            | 37.4           | 0.1197         | 6.85<br>15.11  |  |                     |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 120.0<br>4.72                              | 131.0<br>5.16                              | 3.3<br>0.13      | 201.5<br>7.94  | 193.0<br>7.60  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 11.46<br>25.27 |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                                    | 109.0<br>4.29                              | 116.0<br>4.57                              | 3.3<br>0.13      | 152.0<br>5.98  | 142.0<br>5.59  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.45<br>5.39   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 3.5<br>0.14                                    | 109.0<br>4.29                              | 116.0<br>4.57                              | 3.3<br>0.13      | 154.0<br>6.06  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.69<br>5.93   |  |                     |
| 36.116<br>1.4219 | 29.370<br>1.1563 | -0.5<br>-0.02    | 3.5<br>0.14                                    | 109.0<br>4.29                              | 116.0<br>4.57                              | 3.3<br>0.13      | 154.0<br>6.06  | 143.0<br>5.63  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.86<br>6.29   |  |                     |
| 15.083<br>0.5938 | 11.908<br>0.4688 | 5.6<br>0.22      | 1.5<br>0.06                                    | 107.0<br>4.21                              | 109.0<br>4.29                              | 1.5<br>0.06      | 130.0<br>5.12  | 128.0<br>5.04  | 1.10<br>0.04   | 2.10<br>0.08   | 95.5           | 89.7           | 0.1126         | 0.56<br>1.24   |  |                     |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 2.8<br>0.11      | 1.5<br>0.06                                    | 107.0<br>4.21                              | 109.0<br>4.29                              | 1.5<br>0.06      | 132.0<br>5.20  | 128.0<br>5.04  | 0.70<br>0.03   | 1.60<br>0.06   | 140            | 102            | 0.1286         | 0.84<br>1.86   |  |                     |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 4.8<br>0.19      | 1.5<br>0.06                                    | 109.0<br>4.29                              | 112.0<br>4.41                              | 1.5<br>0.06      | 141.0<br>5.55  | 136.0<br>5.35  | 0.80<br>0.03   | 1.50<br>0.06   | 152            | 108            | 0.1346         | 1.16<br>2.56   |  |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 4.8<br>0.19      | 1.5<br>0.06                                    | 109.0<br>4.29                              | 110.0<br>4.33                              | 1.5<br>0.06      | 141.0<br>5.55  | 136.0<br>5.35  | 2.50<br>0.10   | 1.10<br>0.04   | 128            | 58.4           | 0.1342         | 1.29<br>2.84   |  |                     |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 4.8<br>0.19      | 1.5<br>0.06                                    | 109.0<br>4.29                              | 112.0<br>4.41                              | 1.5<br>0.06      | 144.0<br>5.67  | 139.0<br>5.47  | 0.80<br>0.03   | 1.50<br>0.06   | 152            | 108            | 0.1346         | 1.35<br>2.99   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 117.0<br>4.61                              | 3.3<br>0.13      | 152.0<br>5.98  | 142.0<br>5.59  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.39<br>5.27   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02    | 8.0<br>0.31                                    | 111.0<br>4.37                              | 126.0<br>4.96                              | 3.3<br>0.13      | 152.0<br>5.98  | 142.0<br>5.59  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.39<br>5.27   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 117.0<br>4.61                              | 3.0<br>0.12      | 153.0<br>6.02  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.54<br>5.59   |  |                     |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 117.0<br>4.61                              | 3.3<br>0.13      | 154.0<br>6.06  | 144.0<br>5.67  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.63<br>5.81   |  |                     |
| 36.116<br>1.4219 | 29.370<br>1.1563 | -5.1<br>-0.20    | 3.5<br>0.14                                    | 111.0<br>4.37                              | 117.0<br>4.61                              | 3.3<br>0.13      | 154.0<br>6.06  | 143.0<br>5.63  | 4.40<br>0.17   | 2.50<br>0.10   | 175            | 41.7           | 0.1519         | 2.80<br>6.17   |  |                     |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 112.0<br>4.41                              | 118.0<br>4.65                              | 3.3<br>0.13      | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.36<br>7.42   |  |                     |
| 41.275<br>1.6250 | 34.925<br>1.3750 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 112.0<br>4.41                              | 118.0<br>4.65                              | 3.3<br>0.13      | 160.0<br>6.30  | 149.0<br>5.87  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.46<br>7.64   |  |                     |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 112.0<br>4.41                              | 118.0<br>4.65                              | 3.3<br>0.13      | 160.0<br>6.30  | 150.0<br>5.91  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.54<br>7.81   |  |                     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

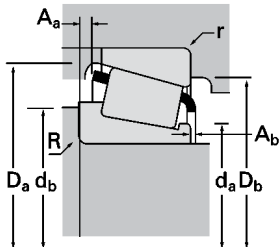
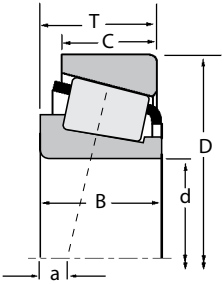
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static           | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |          |
| 101.600<br>4.0000       | 177.800<br>7.0000 | 34.925<br>1.3750 | 158000<br>35500        | 1.17 | 0.51 | 40900<br>9200          | 82100<br>18400   | 0.50 | 219000<br>49200  | LM921845    | LM921810 |
| 101.600<br>4.0000       | 180.000<br>7.0866 | 48.000<br>1.8898 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 780         | 773      |
| 101.600<br>4.0000       | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 780         | 772      |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 57.150<br>2.2500 | 424000<br>95300        | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000 | 861         | 854      |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221449A   | HH221410 |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 57.150<br>2.2500 | 494000<br>111000       | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221449    | HH221410 |
| 101.600<br>4.0000       | 200.000<br>7.8740 | 52.761<br>2.0772 | 376000<br>84600        | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98400       | 98788    |
| 101.600<br>4.0000       | 212.725<br>8.3750 | 66.675<br>2.6250 | 530000<br>119000       | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000 | 941         | 932      |
| 101.600<br>4.0000       | 212.725<br>8.3750 | 66.675<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | HH224335    | HH224310 |
| 101.600<br>4.0000       | 214.312<br>8.4375 | 55.562<br>2.1875 | 435000<br>97800        | 0.67 | 0.89 | 113000<br>25400        | 130000<br>29300  | 0.87 | 610000<br>137000 | H924033     | H924010  |
| 101.600<br>4.0000       | 214.975<br>8.4636 | 64.798<br>2.5511 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | HH224335    | HH224314 |
| 101.600<br>4.0000       | 250.825<br>9.8750 | 76.200<br>3.0000 | 647000<br>145000       | 0.70 | 0.86 | 168000<br>37700        | 201000<br>45100  | 0.84 | 827000<br>186000 | HH923649    | HH923611 |
| 103.188<br>4.0625       | 171.450<br>6.7500 | 41.275<br>1.6250 | 245000<br>55100        | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 689         | 674      |
| 104.775<br>4.1250       | 142.083<br>5.5938 | 15.875<br>0.6250 | 60200<br>13500         | 0.39 | 1.53 | 15600<br>3510          | 10500<br>2350    | 1.49 | 107000<br>24000  | LL521845    | LL521810 |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 782         | 772      |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 786         | 772      |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 47.625<br>1.8750 | 320000<br>72000        | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 787         | 772      |
| 104.775<br>4.1250       | 190.500<br>7.5000 | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000 | 71412       | 71750    |
| 106.000<br>4.1732       | 160.000<br>6.2992 | 35.000<br>1.3780 | 210000<br>47300        | 0.44 | 1.35 | 54500<br>12300         | 41500<br>9320    | 1.31 | 339000<br>76200  | XGA32021X   | Y32021X  |
| 106.362<br>4.1875       | 165.100<br>6.5000 | 36.512<br>1.4375 | 210000<br>47100        | 0.50 | 1.21 | 54400<br>12200         | 46300<br>10400   | 1.18 | 355000<br>79700  | 56418       | 56650    |
| 106.975<br>4.2116       | 146.975<br>5.7864 | 28.500<br>1.1220 | 158000<br>35600        | 0.27 | 2.23 | 41000<br>9220          | 18900<br>4250    | 2.17 | 285000<br>64100  | LM121349    | LM121310 |
| 107.950<br>4.2500       | 142.083<br>5.5938 | 15.875<br>0.6250 | 60200<br>13500         | 0.39 | 1.53 | 15600<br>3510          | 10500<br>2350    | 1.49 | 107000<br>24000  | LL521849C   | LL521810 |
| 107.950<br>4.2500       | 146.050<br>5.7500 | 21.433<br>0.8438 | 88900<br>20000         | 0.39 | 1.53 | 23100<br>5180          | 15500<br>3480    | 1.49 | 175000<br>39400  | L521949     | L521910  |
| 107.950<br>4.2500       | 152.400<br>6.0000 | 21.433<br>0.8438 | 88900<br>20000         | 0.39 | 1.53 | 23100<br>5180          | 15500<br>3480    | 1.49 | 175000<br>39400  | L521949     | L521914  |
| 107.950<br>4.2500       | 158.750<br>6.2500 | 23.020<br>0.9063 | 107000<br>24000        | 0.61 | 0.99 | 27600<br>6220          | 28700<br>6450    | 0.96 | 179000<br>40100  | 37425       | 37625    |
| 107.950<br>4.2500       | 159.987<br>6.2987 | 34.925<br>1.3750 | 181000<br>40700        | 0.40 | 1.49 | 47000<br>10600         | 32300<br>7270    | 1.45 | 357000<br>80300  | LM522546    | LM522510 |
| 107.950<br>4.2500       | 161.925<br>6.3750 | 34.925<br>1.3750 | 178000<br>40000        | 0.51 | 1.19 | 46100<br>10400         | 39900<br>8970    | 1.16 | 308000<br>69200  | 48190       | 48120    |
| 107.950<br>4.2500       | 165.100<br>6.5000 | 36.512<br>1.4375 | 210000<br>47100        | 0.50 | 1.21 | 54400<br>12200         | 46300<br>10400   | 1.18 | 355000<br>79700  | 56425       | 56650    |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 31.750<br>1.2500 | 19.050<br>0.7500 | 34.5<br>1.36     | 3.3<br>0.13                                    | 119.0<br>4.69                              | 128.0<br>5.04                              | 3.3<br>0.13                                  | 172.0<br>6.77  | 154.0<br>6.06  | 8.90<br>0.35   | 3.30<br>0.13   | 114            | 37.4           | 0.1153         | 3.10<br>6.83        |
| 48.006<br>1.8900 | 40.000<br>1.5748 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 113.0<br>4.45                              | 119.0<br>4.69                              | 3.0<br>0.12                                  | 168.0<br>6.61  | 160.0<br>6.30  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 38.2           | 0.1067         | 5.00<br>11.02       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 113.0<br>4.45                              | 119.0<br>4.69                              | 3.3<br>0.13                                  | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 38.2           | 0.1067         | 5.03<br>11.08       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 8.0<br>0.31                                    | 114.0<br>4.49                              | 129.0<br>5.08                              | 3.3<br>0.13                                  | 174.0<br>6.85  | 170.0<br>6.69  | 5.60<br>0.22   | 0.60<br>0.02   | 264            | 44.9           | 0.1072         | 6.79<br>14.97       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 3.5<br>0.14                                    | 116.0<br>4.56                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 7.27<br>16.02       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 8.0<br>0.31                                    | 116.0<br>4.56                              | 131.0<br>5.16                              | 3.3<br>0.13                                  | 179.0<br>7.05  | 171.0<br>6.73  | 2.50<br>0.10   | 3.20<br>0.13   | 266            | 28.4           | 0.1072         | 7.20<br>15.88       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 3.5<br>0.14                                    | 120.5<br>4.75                              | 128.0<br>5.04                              | 3.3<br>0.13                                  | 188.0<br>7.40  | 174.0<br>6.85  | 8.60<br>0.34   | 5.40<br>0.21   | 203            | 37.4           | 0.1197         | 6.76<br>14.89       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 7.0<br>0.28                                    | 117.0<br>4.61                              | 130.0<br>5.12                              | 3.3<br>0.13                                  | 193.0<br>7.60  | 187.0<br>7.36  | 6.70<br>0.26   | 1.20<br>0.05   | 339            | 39.7           | 0.1153         | 10.95<br>24.13      |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 121.0<br>4.76                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 201.5<br>7.94  | 192.0<br>7.56  | 4.80<br>0.19   | 2.80<br>0.11   | 367            | 43.4           | 0.1182         | 11.00<br>24.26      |
| 52.388<br>2.0625 | 39.688<br>1.5625 | 6.9<br>0.27      | 3.5<br>0.14                                    | 128.0<br>5.04                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 205.0<br>8.07  | 186.0<br>7.32  | 6.60<br>0.26   | 3.40<br>0.13   | 246            | 32.2           | 0.1299         | 8.95<br>19.72       |
| 66.675<br>2.6250 | 50.800<br>2.0000 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 121.0<br>4.76                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 201.0<br>7.92  | 192.0<br>7.56  | 4.80<br>0.19   | 2.80<br>0.11   | 367            | 43.4           | 0.1182         | 11.12<br>24.51      |
| 73.025<br>2.8750 | 50.800<br>2.0000 | -3.3<br>-0.13    | 6.4<br>0.25                                    | 131.0<br>5.15                              | 149.0<br>5.87                              | 3.3<br>0.13                                  | 229.0<br>9.01  | 210.0<br>8.27  | 15.10<br>0.60  | 4.60<br>0.18   | 282            | 35.2           | 0.1370         | 17.07<br>37.64      |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 3.5<br>0.14                                    | 113.5<br>4.46                              | 123.0<br>4.84                              | 3.3<br>0.13                                  | 160.0<br>6.30  | 150.0<br>5.91  | 5.00<br>0.20   | 2.00<br>0.08   | 182            | 37.2           | 0.1056         | 3.46<br>7.62        |
| 15.083<br>0.5938 | 11.908<br>0.4688 | 7.4<br>0.29      | 1.5<br>0.06                                    | 111.0<br>4.37                              | 113.0<br>4.45                              | 1.5<br>0.06                                  | 137.0<br>5.39  | 135.0<br>5.31  | 0.80<br>0.03   | 2.20<br>0.09   | 105            | 110            | 0.1179         | 0.68<br>1.50        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 3.5<br>0.14                                    | 116.0<br>4.57                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 38.2           | 0.1067         | 4.83<br>10.66       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 6.4<br>0.25                                    | 116.0<br>4.57                              | 128.0<br>5.04                              | 3.3<br>0.13                                  | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 38.2           | 0.1067         | 4.80<br>10.58       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 7.0<br>0.28                                    | 116.0<br>4.57                              | 129.0<br>5.08                              | 3.3<br>0.13                                  | 168.0<br>6.61  | 161.0<br>6.34  | 3.60<br>0.14   | 1.30<br>0.05   | 227            | 41.3           | 0.1067         | 4.78<br>10.54       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 118.0<br>4.65                              | 124.0<br>4.88                              | 3.3<br>0.13                                  | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.78<br>12.74       |
| 35.000<br>1.3780 | 26.000<br>1.0236 | -0.3<br>-0.01    | 6.0<br>0.24                                    | 115.0<br>4.53                              | 128.0<br>5.04                              | 2.0<br>0.08                                  | 154.0<br>6.06  | 147.0<br>5.79  | 3.20<br>0.13   | 2.60<br>0.10   | 176            | 50.7           | 0.1024         | 2.36<br>5.19        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | 2.0<br>0.08      | 3.5<br>0.14                                    | 116.0<br>4.57                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 159.0<br>6.26  | 149.0<br>5.87  | 4.00<br>0.16   | 1.50<br>0.06   | 191            | 47.7           | 0.1584         | 2.68<br>5.91        |
| 28.000<br>1.1024 | 24.000<br>0.9449 | -3.8<br>-0.15    | 2.3<br>0.09                                    | 112.0<br>4.41                              | 116.0<br>4.57                              | 2.3<br>0.09                                  | 142.0<br>5.59  | 138.0<br>5.43  | 0.60<br>0.02   | 2.30<br>0.09   | 195            | 75.6           | 0.1302         | 1.31<br>2.90        |
| 15.083<br>0.5938 | 11.908<br>0.4688 | 7.4<br>0.29      | 1.5<br>0.06                                    | 113.0<br>4.45                              | 115.0<br>4.53                              | 1.5<br>0.06                                  | 137.0<br>5.39  | 135.0<br>5.31  | 0.80<br>0.03   | 2.20<br>0.09   | 105            | 110            | 0.1179         | 0.62<br>1.37        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 4.8<br>0.19      | 1.5<br>0.06                                    | 114.0<br>4.49                              | 116.0<br>4.57                              | 1.5<br>0.06                                  | 141.0<br>5.55  | 136.0<br>5.35  | 0.80<br>0.03   | 1.50<br>0.06   | 152            | 108            | 0.1346         | 0.99<br>2.17        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 4.8<br>0.19      | 1.5<br>0.06                                    | 114.0<br>4.49                              | 116.0<br>4.57                              | 1.5<br>0.06                                  | 144.0<br>5.67  | 139.0<br>5.47  | 0.80<br>0.03   | 1.50<br>0.06   | 152            | 108            | 0.1346         | 1.18<br>2.60        |
| 21.438<br>0.8440 | 15.875<br>0.6250 | 13.7<br>0.54     | 3.5<br>0.14                                    | 115.0<br>4.53                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 152.0<br>5.98  | 143.0<br>5.63  | 2.60<br>0.10   | 3.00<br>0.12   | 124            | 57             | 0.1443         | 1.35<br>2.98        |
| 34.925<br>1.3750 | 26.987<br>1.0625 | -1.5<br>-0.06    | 3.5<br>0.14                                    | 116.0<br>4.57                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 154.0<br>6.06  | 146.0<br>5.75  | 2.50<br>0.10   | 1.30<br>0.05   | 232            | 63.3           | 0.1576         | 2.34<br>5.17        |
| 34.925<br>1.3750 | 26.988<br>1.0625 | 3.8<br>0.15      | 3.5<br>0.14                                    | 116.0<br>4.57                              | 122.0<br>4.80                              | 3.3<br>0.13                                  | 156.0<br>6.14  | 146.0<br>5.75  | 2.90<br>0.11   | 0.70<br>0.03   | 180            | 44.7           | 0.1558         | 2.35<br>5.17        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | 2.0<br>0.08      | 3.5<br>0.14                                    | 117.0<br>4.61                              | 123.0<br>4.84                              | 3.3<br>0.13                                  | 159.0<br>6.26  | 149.0<br>5.87  | 4.00<br>0.16   | 1.50<br>0.06   | 191            | 47.7           | 0.1584         | 2.60<br>5.74        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

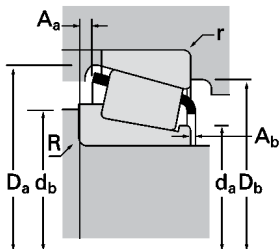
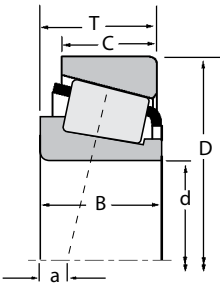
<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        |                | Part Number    |            |           |       |       |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|----------------|----------------|------------|-----------|-------|-------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |                |                | Static     |           | Inner | Outer |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         | C <sub>0</sub> | C <sub>0</sub> |            |           |       |       |
| 107.950<br>4.2500       | 165.100<br>6.5000 | 36.512<br>1.4375 | 210000<br>47100        | 0.50 | 1.21 | 54400<br>12200         | 46300<br>10400   | 1.18 | 355000<br>79700        |                |                | 56426      | 56650     |       |       |
| 107.950<br>4.2500       | 168.275<br>6.6250 | 36.512<br>1.4375 | 210000<br>47100        | 0.50 | 1.21 | 54400<br>12200         | 46300<br>10400   | 1.18 | 355000<br>79700        |                |                | 56425      | 56662     |       |       |
| 107.950<br>4.2500       | 171.450<br>6.7500 | 34.000<br>1.3386 | 182000<br>41000        | 0.47 | 1.27 | 47300<br>10600         | 38300<br>8600    | 1.24 | 268000<br>60300        |                |                | 67425      | 67675     |       |       |
| 107.950<br>4.2500       | 190.500<br>7.5000 | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       |                |                | 71425      | 71750     |       |       |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 66.675<br>2.6250 | 530000<br>119000       | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000       |                |                | 936        | 932       |       |       |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 66.675<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000       |                |                | HH224340   | HH224310  |       |       |
| 109.538<br>4.3125       | 158.750<br>6.2500 | 23.020<br>0.9063 | 107000<br>24000        | 0.61 | 0.99 | 27600<br>6220          | 28700<br>6450    | 0.96 | 179000<br>40100        |                |                | 37431      | 37625     |       |       |
| 109.538<br>4.3125       | 158.750<br>6.2500 | 23.020<br>0.9063 | 107000<br>24000        | 0.61 | 0.99 | 27600<br>6220          | 28700<br>6450    | 0.96 | 179000<br>40100        |                |                | 37431A     | 37625     |       |       |
| 109.952<br>4.3288       | 190.500<br>7.5000 | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       |                |                | 71432      | 71750     |       |       |
| 109.975<br>4.3297       | 179.974<br>7.0856 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64432      | 64708     |       |       |
| 110.000<br>4.3301       | 214.312<br>8.4375 | 55.562<br>2.1875 | 435000<br>97800        | 0.67 | 0.89 | 113000<br>25400        | 130000<br>29300  | 0.87 | 610000<br>137000       |                |                | H924043    | H924010   |       |       |
| 109.987<br>4.3302       | 159.987<br>6.2987 | 34.925<br>1.3750 | 181000<br>40700        | 0.40 | 1.49 | 47000<br>10600         | 32300<br>7270    | 1.45 | 357000<br>80300        |                |                | LM522548   | LM522510  |       |       |
| 109.987<br>4.3302       | 159.987<br>6.2987 | 34.925<br>1.3750 | 181000<br>40700        | 0.40 | 1.49 | 47000<br>10600         | 32300<br>7270    | 1.45 | 357000<br>80300        |                |                | LM522549   | LM522510  |       |       |
| 109.992<br>4.3304       | 177.800<br>7.0000 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64433      | 64700     |       |       |
| 110.000<br>4.3307       | 165.000<br>6.4961 | 35.000<br>1.3780 | 210000<br>47300        | 0.50 | 1.21 | 54500<br>12300         | 46400<br>10400   | 1.18 | 356000<br>80100        |                |                | JM822049   | JM822010  |       |       |
| 110.000<br>4.3307       | 180.000<br>7.0866 | 47.000<br>1.8504 | 344000<br>77300        | 0.41 | 1.48 | 89100<br>20000         | 61900<br>13900   | 1.44 | 554000<br>125000       |                |                | JHM522649A | JHM522610 |       |       |
| 110.000<br>4.3307       | 212.725<br>8.3750 | 66.675<br>2.6250 | 530000<br>119000       | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000       |                |                | 942        | 932       |       |       |
| 110.000<br>4.3307       | 215.000<br>8.4646 | 61.500<br>2.4213 | 502000<br>113000       | 0.44 | 1.38 | 130000<br>29300        | 97000<br>21800   | 1.34 | 753000<br>169000       |                |                | XFA32224   | Y32224    |       |       |
| 110.332<br>4.3438       | 171.450<br>6.7500 | 34.000<br>1.3386 | 182000<br>41000        | 0.47 | 1.27 | 47300<br>10600         | 38300<br>8600    | 1.24 | 268000<br>60300        |                |                | 67434      | 67675     |       |       |
| 111.125<br>4.3750       | 171.450<br>6.7500 | 34.000<br>1.3386 | 182000<br>41000        | 0.47 | 1.27 | 47300<br>10600         | 38300<br>8600    | 1.24 | 268000<br>60300        |                |                | 67437      | 67675     |       |       |
| 111.125<br>4.3750       | 190.500<br>7.5000 | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       |                |                | 71437      | 71750     |       |       |
| 111.125<br>4.3750       | 214.312<br>8.4375 | 55.562<br>2.1875 | 435000<br>97800        | 0.67 | 0.89 | 113000<br>25400        | 130000<br>29300  | 0.87 | 610000<br>137000       |                |                | H924045    | H924010   |       |       |
| 114.300<br>4.5000       | 152.400<br>6.0000 | 21.433<br>0.8438 | 92400<br>20800         | 0.41 | 1.45 | 23900<br>5380          | 16900<br>3810    | 1.41 | 188000<br>42300        |                |                | L623149    | L623110   |       |       |
| 114.300<br>4.5000       | 177.800<br>7.0000 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64450      | 64700     |       |       |
| 114.300<br>4.5000       | 178.000<br>7.0079 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64450      | 64701X    |       |       |
| 114.300<br>4.5000       | 179.974<br>7.0856 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64450      | 64708     |       |       |
| 114.300<br>4.5000       | 180.975<br>7.1250 | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        |                |                | 64450      | 64713     |       |       |
| 114.300<br>4.5000       | 190.500<br>7.5000 | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       |                |                | 71450      | 71750     |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 36.512<br>1.4375 | 26.988<br>1.0625 | 2.0<br>0.08      | 8.0<br>0.31                | 117.0<br>4.61                     | 132.0<br>5.20            | 3.3<br>0.13                         | 159.0<br>6.26  | 149.0<br>5.87  | 4.00<br>0.16   | 1.50<br>0.06   | 191            | 47.7           | 0.1584         | 2.54<br>5.59        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | 2.0<br>0.08      | 3.5<br>0.14                | 117.0<br>4.61                     | 123.0<br>4.84            | 3.3<br>0.13                         | 161.0<br>6.34  | 151.0<br>5.94  | 4.00<br>0.16   | 1.50<br>0.06   | 191            | 47.7           | 0.1584         | 2.78<br>6.13        |
| 30.162<br>1.1875 | 25.268<br>0.9948 | 4.6<br>0.18      | 3.5<br>0.14                | 116.0<br>4.57                     | 123.0<br>4.84            | 3.3<br>0.13                         | 164.0<br>6.46  | 156.0<br>6.14  | 3.40<br>0.13   | 2.10<br>0.08   | 152            | 50.5           | 0.0987         | 2.51<br>5.53        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                | 120.0<br>4.72                     | 126.0<br>4.96            | 3.3<br>0.13                         | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.57<br>12.29       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 8.0<br>0.31                | 122.0<br>4.80                     | 137.0<br>5.39            | 3.3<br>0.13                         | 193.0<br>7.60  | 187.0<br>7.36  | 6.70<br>0.26   | 1.20<br>0.05   | 339            | 39.7           | 0.1153         | 10.38<br>22.89      |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 8.0<br>0.31                | 126.0<br>4.96                     | 139.0<br>5.47            | 3.3<br>0.13                         | 201.5<br>7.94  | 192.0<br>7.56  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 10.44<br>23.01      |
| 21.438<br>0.8440 | 15.875<br>0.6250 | 13.7<br>0.54     | 3.5<br>0.14                | 116.0<br>4.57                     | 123.0<br>4.84            | 3.3<br>0.13                         | 152.0<br>5.98  | 143.0<br>5.63  | 2.60<br>0.10   | 3.00<br>0.12   | 124            | 48.7           | 0.1443         | 1.31<br>2.88        |
| 21.438<br>0.8440 | 15.875<br>0.6250 | 13.7<br>0.54     | 5.0<br>0.20                | 117.0<br>4.61                     | 126.0<br>4.96            | 3.3<br>0.13                         | 152.0<br>5.98  | 143.0<br>5.63  | 2.60<br>0.10   | 3.00<br>0.12   | 124            | 57             | 0.1443         | 1.30<br>2.87        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                | 122.0<br>4.80                     | 128.0<br>5.04            | 3.3<br>0.13                         | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.44<br>12.00       |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 121.0<br>4.76                     | 128.0<br>5.04            | 3.3<br>0.13                         | 173.0<br>6.81  | 161.0<br>6.34  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.86<br>8.50        |
| 52.388<br>2.0625 | 39.688<br>1.5625 | 6.9<br>0.27      | 3.5<br>0.14                | 131.0<br>5.16                     | 139.0<br>5.47            | 3.3<br>0.13                         | 205.0<br>8.07  | 186.0<br>7.32  | 6.60<br>0.26   | 3.40<br>0.13   | 246            | 32.2           | 0.1299         | 8.37<br>18.46       |
| 34.925<br>1.3750 | 26.987<br>1.0625 | -1.5<br>-0.06    | 8.0<br>0.31                | 118.0<br>4.65                     | 133.0<br>5.24            | 3.3<br>0.13                         | 154.0<br>6.06  | 146.0<br>5.75  | 2.50<br>0.10   | 1.30<br>0.05   | 232            | 63.3           | 0.1576         | 2.18<br>4.80        |
| 34.925<br>1.3750 | 26.987<br>1.0625 | -1.5<br>-0.06    | 3.5<br>0.14                | 118.0<br>4.65                     | 124.0<br>4.88            | 3.3<br>0.13                         | 154.0<br>6.06  | 146.0<br>5.75  | 2.50<br>0.10   | 1.30<br>0.05   | 232            | 63.3           | 0.1576         | 2.25<br>4.96        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 121.0<br>4.76                     | 128.0<br>5.04            | 3.3<br>0.13                         | 172.0<br>6.77  | 160.0<br>6.30  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.71<br>8.18        |
| 35.000<br>1.3780 | 26.500<br>1.0433 | 3.0<br>0.12      | 3.0<br>0.12                | 119.0<br>4.69                     | 125.0<br>4.92            | 2.5<br>0.10                         | 159.0<br>6.26  | 149.0<br>5.87  | 3.00<br>0.12   | 2.00<br>0.08   | 192            | 45.8           | 0.1585         | 2.44<br>5.38        |
| 46.000<br>1.8110 | 38.000<br>1.4961 | -5.8<br>-0.23    | 7.0<br>0.28                | 122.0<br>4.80                     | 138.0<br>5.43            | 2.5<br>0.10                         | 172.0<br>6.77  | 162.0<br>6.38  | 2.70<br>0.10   | 3.90<br>0.15   | 259            | 52.1           | 0.1134         | 4.59<br>10.13       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 6.4<br>0.25                | 124.0<br>4.88                     | 136.0<br>5.35            | 3.3<br>0.13                         | 193.0<br>7.60  | 187.0<br>7.36  | 6.60<br>0.26   | 1.20<br>0.05   | 339            | 39.7           | 0.1153         | 10.25<br>22.59      |
| 58.000<br>2.2835 | 50.000<br>1.9685 | -9.4<br>-0.37    | 3.0<br>0.12                | 133.0<br>5.24                     | 137.0<br>5.39            | 2.5<br>0.10                         | 204.0<br>8.03  | 192.0<br>7.56  | 7.80<br>0.31   | 3.00<br>0.12   | 329            | 52.3           | 0.1253         | 9.85<br>21.72       |
| 30.162<br>1.1875 | 25.268<br>0.9948 | 4.6<br>0.18      | 3.5<br>0.14                | 118.0<br>4.65                     | 124.0<br>4.88            | 3.3<br>0.13                         | 164.0<br>6.46  | 156.0<br>6.14  | 3.40<br>0.13   | 2.10<br>0.08   | 152            | 50.5           | 0.0987         | 2.41<br>5.32        |
| 30.162<br>1.1875 | 25.268<br>0.9948 | 4.6<br>0.18      | 3.5<br>0.14                | 119.0<br>4.69                     | 125.0<br>4.92            | 3.3<br>0.13                         | 164.0<br>6.46  | 156.0<br>6.14  | 3.40<br>0.13   | 2.10<br>0.08   | 152            | 50.5           | 0.0987         | 2.38<br>5.25        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                | 123.0<br>4.84                     | 129.0<br>5.08            | 3.3<br>0.13                         | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.36<br>11.82       |
| 52.388<br>2.0625 | 39.688<br>1.5625 | 6.9<br>0.27      | 3.5<br>0.14                | 131.0<br>5.16                     | 139.0<br>5.47            | 3.3<br>0.13                         | 205.0<br>8.07  | 186.0<br>7.32  | 6.60<br>0.26   | 3.40<br>0.13   | 246            | 32.2           | 0.1299         | 8.29<br>18.28       |
| 21.432<br>0.8438 | 16.670<br>0.6563 | 6.4<br>0.25      | 1.5<br>0.06                | 120.0<br>4.72                     | 123.0<br>4.84            | 1.5<br>0.06                         | 147.0<br>5.79  | 143.0<br>5.63  | 1.10<br>0.04   | 1.60<br>0.06   | 171            | 102            | 0.1422         | 1.05<br>2.31        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 125.0<br>4.92                     | 131.0<br>5.16            | 3.3<br>0.13                         | 172.0<br>6.77  | 160.0<br>6.30  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.47<br>7.64        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 125.0<br>4.92                     | 131.0<br>5.16            | 3.0<br>0.12                         | 172.0<br>6.77  | 160.0<br>6.30  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.48<br>7.68        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 125.0<br>4.92                     | 131.0<br>5.16            | 3.3<br>0.13                         | 173.0<br>6.81  | 161.0<br>6.34  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.61<br>7.96        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                | 125.0<br>4.92                     | 131.0<br>5.16            | 3.3<br>0.13                         | 173.0<br>6.81  | 161.0<br>6.34  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.68<br>8.11        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                | 125.0<br>4.92                     | 132.0<br>5.20            | 3.3<br>0.13                         | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.15<br>11.34       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

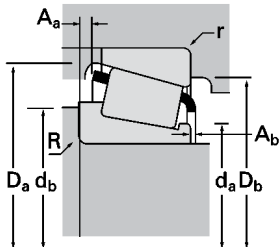
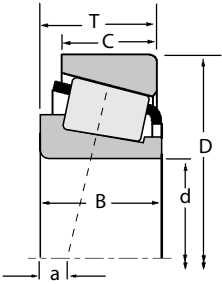
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 114.300<br>4.5000       | 206.375<br>8.1250  | 66.675<br>2.6250 | 530000<br>119000       | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000       | 938         | 930                    |  |                |       |       |
| 114.300<br>4.5000       | 212.725<br>8.3750  | 66.675<br>2.6250 | 530000<br>119000       | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000       | 938         | 932                    |  |                |       |       |
| 114.300<br>4.5000       | 212.725<br>8.3750  | 66.675<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000       | HH224346    | HH224310               |  |                |       |       |
| 114.300<br>4.5000       | 214.975<br>8.4636  | 64.798<br>2.5511 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000       | HH224346    | HH224314               |  |                |       |       |
| 114.300<br>4.5000       | 228.600<br>9.0000  | 53.975<br>2.1250 | 458000<br>103000       | 0.74 | 0.81 | 119000<br>26700        | 150000<br>33700  | 0.79 | 673000<br>151000       | HM926740    | HM926710               |  |                |       |       |
| 114.300<br>4.5000       | 273.050<br>10.7500 | 82.550<br>3.2500 | 832000<br>187000       | 0.63 | 0.95 | 216000<br>48500        | 234000<br>52500  | 0.92 | 1080000<br>243000      | HH926744    | HH926710               |  |                |       |       |
| 114.300<br>4.5000       | 279.400<br>11.0000 | 82.550<br>3.2500 | 832000<br>187000       | 0.63 | 0.95 | 216000<br>48500        | 234000<br>52500  | 0.92 | 1080000<br>243000      | HH926744    | HH926716               |  |                |       |       |
| 114.975<br>4.5266       | 177.800<br>7.0000  | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        | 64452A      | 64700                  |  |                |       |       |
| 114.975<br>4.5266       | 179.974<br>7.0856  | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        | 64452       | 64708                  |  |                |       |       |
| 114.975<br>4.5266       | 180.975<br>7.1250  | 41.275<br>1.6250 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        | 64452A      | 64713                  |  |                |       |       |
| 114.975<br>4.5266       | 212.725<br>8.3750  | 66.675<br>2.6250 | 630000<br>142000       | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000       | HH224349    | HH224310               |  |                |       |       |
| 115.000<br>4.5276       | 165.000<br>6.4961  | 28.000<br>1.1024 | 148000<br>33200        | 0.46 | 1.31 | 38300<br>8620          | 30100<br>6770    | 1.27 | 245000<br>55100        | JLM722948   | JLM722912              |  |                |       |       |
| 115.000<br>4.5276       | 178.000<br>7.0079  | 40.000<br>1.5748 | 254000<br>57200        | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200        | 64452X      | 64701X                 |  |                |       |       |
| 115.087<br>4.5310       | 190.500<br>7.5000  | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       | 71453       | 71750                  |  |                |       |       |
| 115.087<br>4.5310       | 190.500<br>7.5000  | 47.625<br>1.8750 | 337000<br>75700        | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000       | 71455       | 71750                  |  |                |       |       |
| 117.475<br>4.6250       | 179.974<br>7.0856  | 34.925<br>1.3750 | 181000<br>40700        | 0.50 | 1.21 | 46900<br>10600         | 39900<br>8980    | 1.18 | 271000<br>61000        | 68462       | 68709                  |  |                |       |       |
| 117.475<br>4.6250       | 180.975<br>7.1250  | 34.925<br>1.3750 | 181000<br>40700        | 0.50 | 1.21 | 46900<br>10600         | 39900<br>8980    | 1.18 | 271000<br>61000        | 68462       | 68712                  |  |                |       |       |
| 117.475<br>4.6250       | 180.975<br>7.1250  | 34.925<br>1.3750 | 181000<br>40700        | 0.50 | 1.21 | 46900<br>10600         | 39900<br>8980    | 1.18 | 271000<br>61000        | 68463       | 68712                  |  |                |       |       |
| 119.964<br>4.7230       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000       | 74472       | 74850                  |  |                |       |       |
| 119.975<br>4.7234       | 174.625<br>6.8750  | 35.720<br>1.4063 | 226000<br>50900        | 0.33 | 1.80 | 58700<br>13200         | 33400<br>7510    | 1.76 | 422000<br>94900        | M224748     | M224710                |  |                |       |       |
| 120.000<br>4.7244       | 170.000<br>6.6929  | 25.400<br>1.0000 | 134000<br>30200        | 0.46 | 1.31 | 34800<br>7820          | 27300<br>6140    | 1.27 | 231000<br>52000        | JL724348    | JL724314               |  |                |       |       |
| 120.000<br>4.7244       | 170.000<br>6.6929  | 27.000<br>1.0630 | 153000<br>34400        | 0.47 | 1.27 | 39700<br>8920          | 32100<br>7220    | 1.24 | 238000<br>53500        | JP12049A    | JP12010                |  |                |       |       |
| 120.000<br>4.7244       | 170.000<br>6.6929  | 27.000<br>1.0630 | 153000<br>34400        | 0.47 | 1.27 | 39700<br>8920          | 32100<br>7220    | 1.24 | 238000<br>53500        | JP12049     | JP12010                |  |                |       |       |
| 120.000<br>4.7244       | 180.000<br>7.0866  | 36.000<br>1.4173 | 229000<br>51400        | 0.41 | 1.45 | 59300<br>13300         | 41900<br>9430    | 1.41 | 377000<br>84700        | JM624649    | JM624610               |  |                |       |       |
| 120.000<br>4.7244       | 180.000<br>7.0866  | 38.000<br>1.4961 | 271000<br>60900        | 0.46 | 1.31 | 70200<br>15800         | 55100<br>12400   | 1.27 | 466000<br>105000       | XAA32024X   | Y32024X                |  |                |       |       |
| 120.000<br>4.7244       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000       | 74473X      | 74850                  |  |                |       |       |
| 120.000<br>4.7244       | 230.000<br>9.0551  | 53.975<br>2.1250 | 348000<br>78300        | 0.74 | 0.81 | 90200<br>20300         | 114000<br>25600  | 0.79 | 486000<br>109000       | 97472X      | 97905X                 |  |                |       |       |
| 120.650<br>4.7500       | 161.925<br>6.3750  | 21.433<br>0.8438 | 97500<br>21900         | 0.43 | 1.38 | 25300<br>5680          | 18800<br>4230    | 1.34 | 206000<br>46400        | L624549     | L624514                |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 7.0<br>0.28                                    | 128.0<br>5.04                              | 141.0<br>5.55                              | 3.3<br>0.13                                  | 193.0<br>7.60  | 184.0<br>7.24  | 6.70<br>0.26   | 1.20<br>0.05   | 339            | 39.7           | 0.1153         | 8.92<br>19.66       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 7.0<br>0.28                                    | 128.0<br>5.04                              | 141.0<br>5.55                              | 3.3<br>0.13                                  | 193.0<br>7.60  | 187.0<br>7.36  | 6.70<br>0.26   | 1.20<br>0.05   | 339            | 39.7           | 0.1153         | 9.82<br>21.64       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 131.0<br>5.16                              | 143.0<br>5.63                              | 3.3<br>0.13                                  | 201.5<br>7.94  | 192.0<br>7.56  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 9.88<br>21.77       |
| 66.675<br>2.6250 | 50.800<br>2.0000 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 131.0<br>5.16                              | 143.0<br>5.63                              | 3.3<br>0.13                                  | 201.0<br>7.92  | 192.0<br>7.56  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 9.99<br>22.02       |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.5<br>0.53     | 3.5<br>0.14                                    | 142.0<br>5.59                              | 146.0<br>5.75                              | 3.3<br>0.13                                  | 219.0<br>8.63  | 200.0<br>7.87  | 9.00<br>0.36   | 6.40<br>0.25   | 295            | 39             | 0.1416         | 9.54<br>21.04       |
| 82.550<br>3.2500 | 53.975<br>2.1250 | -6.6<br>-0.26    | 6.4<br>0.25                                    | 147.5<br>5.80                              | 164.0<br>6.46                              | 6.4<br>0.25                                  | 253.0<br>9.97  | 230.0<br>9.06  | 15.10<br>0.60  | 4.10<br>0.16   | 384            | 37.8           | 0.1472         | 21.92<br>48.32      |
| 82.550<br>3.2500 | 53.975<br>2.1250 | -6.6<br>-0.26    | 6.4<br>0.25                                    | 147.5<br>5.80                              | 164.0<br>6.46                              | 6.4<br>0.25                                  | 253.0<br>9.97  | 233.0<br>9.17  | 15.10<br>0.60  | 4.10<br>0.16   | 384            | 37.8           | 0.1472         | 23.08<br>50.88      |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 9.0<br>0.35                                    | 126.0<br>4.96                              | 143.0<br>5.63                              | 3.3<br>0.13                                  | 172.0<br>6.77  | 160.0<br>6.30  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.33<br>7.34        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                                    | 126.0<br>4.96                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 173.0<br>6.81  | 161.0<br>6.34  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.57<br>7.87        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 9.0<br>0.35                                    | 126.0<br>4.96                              | 143.0<br>5.63                              | 3.3<br>0.13                                  | 173.0<br>6.81  | 161.0<br>6.34  | 5.30<br>0.21   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.54<br>7.80        |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 7.0<br>0.28                                    | 131.0<br>5.16                              | 144.0<br>5.67                              | 3.3<br>0.13                                  | 201.5<br>7.94  | 192.0<br>7.56  | 4.90<br>0.19   | 2.80<br>0.11   | 367            | 47.8           | 0.1182         | 9.81<br>21.63       |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 5.6<br>0.22      | 3.3<br>0.13                                    | 121.0<br>4.76                              | 127.0<br>5.00                              | 3.0<br>0.12                                  | 158.0<br>6.22  | 151.0<br>5.94  | 2.20<br>0.09   | 2.40<br>0.09   | 161            | 57.2           | 0.1449         | 1.76<br>3.87        |
| 40.000<br>1.5748 | 30.162<br>1.1875 | 1.3<br>0.05      | 3.5<br>0.14                                    | 125.5<br>4.95                              | 132.0<br>5.20                              | 3.0<br>0.12                                  | 172.0<br>6.77  | 160.0<br>6.30  | 4.00<br>0.16   | 2.00<br>0.08   | 219            | 45.3           | 0.1153         | 3.37<br>7.44        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 126.0<br>4.96                              | 133.0<br>5.24                              | 3.3<br>0.13                                  | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.09<br>11.22       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 8.0<br>0.31                                    | 126.0<br>4.96                              | 141.0<br>5.55                              | 3.3<br>0.13                                  | 181.0<br>7.13  | 171.0<br>6.73  | 5.40<br>0.21   | 1.50<br>0.06   | 269            | 45.7           | 0.1156         | 5.02<br>11.06       |
| 31.750<br>1.2500 | 25.400<br>1.0000 | 5.3<br>0.21      | 3.5<br>0.14                                    | 125.0<br>4.92                              | 132.0<br>5.20                              | 0.8<br>0.03                                  | 172.0<br>6.77  | 165.0<br>6.50  | 5.10<br>0.20   | 2.30<br>0.09   | 163            | 51.7           | 0.1026         | 2.71<br>5.96        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | 5.3<br>0.21      | 3.5<br>0.14                                    | 125.0<br>4.92                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 172.0<br>6.77  | 163.0<br>6.42  | 5.10<br>0.20   | 2.30<br>0.09   | 163            | 51.7           | 0.1026         | 2.74<br>6.04        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | 5.3<br>0.21      | 8.0<br>0.31                                    | 125.0<br>4.92                              | 140.0<br>5.51                              | 3.3<br>0.13                                  | 172.0<br>6.77  | 163.0<br>6.42  | 5.10<br>0.20   | 2.30<br>0.09   | 163            | 51.7           | 0.1026         | 2.66<br>5.87        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                                    | 136.0<br>5.35                              | 142.0<br>5.59                              | 3.3<br>0.13                                  | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 68.5           | 0.1338         | 7.52<br>16.57       |
| 36.512<br>1.4375 | 27.783<br>1.0938 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 129.0<br>5.08                              | 134.0<br>5.28                              | 1.5<br>0.06                                  | 168.0<br>6.61  | 162.0<br>6.38  | 3.80<br>0.15   | 0.50<br>0.02   | 279            | 86.6           | 0.1575         | 2.70<br>5.96        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 7.9<br>0.31      | 3.3<br>0.13                                    | 127.0<br>5.00                              | 132.0<br>5.20                              | 3.3<br>0.13                                  | 163.0<br>6.42  | 156.0<br>6.14  | 2.70<br>0.11   | 1.20<br>0.05   | 170            | 70.6           | 0.1472         | 1.62<br>3.56        |
| 25.000<br>0.9843 | 19.500<br>0.7677 | 7.9<br>0.31      | 6.0<br>0.24                                    | 127.0<br>5.00                              | 139.0<br>5.47                              | 3.0<br>0.12                                  | 164.0<br>6.46  | 158.0<br>6.22  | 2.80<br>0.11   | 3.70<br>0.14   | 158            | 76.7           | 0.1451         | 1.60<br>3.53        |
| 25.000<br>0.9843 | 19.500<br>0.7677 | 7.9<br>0.31      | 3.0<br>0.12                                    | 127.0<br>5.00                              | 133.0<br>5.24                              | 3.0<br>0.12                                  | 164.0<br>6.46  | 158.0<br>6.22  | 2.80<br>0.11   | 3.70<br>0.14   | 158            | 76.7           | 0.1451         | 1.62<br>3.58        |
| 36.000<br>1.4173 | 26.000<br>1.0236 | 0.0<br>0.00      | 3.5<br>0.14                                    | 128.0<br>5.04                              | 135.0<br>5.31                              | 1.5<br>0.06                                  | 173.0<br>6.81  | 166.0<br>6.54  | 3.60<br>0.14   | 2.70<br>0.10   | 227            | 61.6           | 0.1084         | 2.93<br>6.46        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | 1.5<br>0.06      | 5.0<br>0.20                                    | 130.0<br>5.12                              | 141.0<br>5.55                              | 2.0<br>0.08                                  | 174.0<br>6.85  | 165.0<br>6.50  | 3.50<br>0.14   | 3.00<br>0.12   | 255            | 58.3           | 0.1169         | 3.26<br>7.19        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 4.0<br>0.16                                    | 137.0<br>5.39                              | 144.0<br>5.67                              | 3.3<br>0.13                                  | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 68.5           | 0.1338         | 7.51<br>16.55       |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.2<br>0.52     | 3.5<br>0.14                                    | 140.0<br>5.51                              | 145.0<br>5.71                              | 3.3<br>0.13                                  | 213.0<br>8.38  | 198.0<br>7.80  | 8.20<br>0.32   | 4.80<br>0.19   | 237            | 44.6           | 0.1311         | 8.92<br>19.66       |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 8.4<br>0.33      | 1.5<br>0.06                                    | 127.0<br>5.00                              | 129.0<br>5.08                              | 1.5<br>0.06                                  | 156.0<br>6.14  | 151.0<br>5.94  | 1.20<br>0.05   | 1.60<br>0.06   | 195            | 139            | 0.1509         | 1.21<br>2.66        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

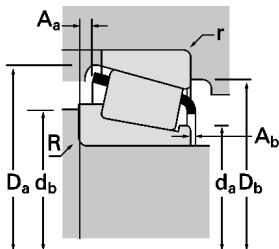
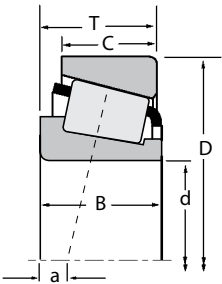




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 120.650<br>4.7500       | 166.688<br>6.5625  | 25.400<br>1.0000 | 134000<br>30200        | 0.46 | 1.31 | 34800<br>7820          | 27300<br>6140    | 1.27 | 231000<br>52000        | L724349     | L724310                |  |                |       |       |
| 120.650<br>4.7500       | 169.862<br>6.6875  | 25.400<br>1.0000 | 132000<br>29700        | 0.33 | 1.80 | 34300<br>7710          | 19500<br>4390    | 1.76 | 273000<br>61400        | L225842     | L225810                |  |                |       |       |
| 120.650<br>4.7500       | 172.242<br>6.7812  | 35.720<br>1.4063 | 226000<br>50900        | 0.33 | 1.80 | 58700<br>13200         | 33400<br>7510    | 1.76 | 422000<br>94900        | M224749     | M224711                |  |                |       |       |
| 120.650<br>4.7500       | 174.625<br>6.8750  | 35.720<br>1.4063 | 226000<br>50900        | 0.33 | 1.80 | 58700<br>13200         | 33400<br>7510    | 1.76 | 422000<br>94900        | M224749     | M224710                |  |                |       |       |
| 120.650<br>4.7500       | 174.625<br>6.8750  | 35.720<br>1.4063 | 226000<br>50900        | 0.33 | 1.80 | 58700<br>13200         | 33400<br>7510    | 1.76 | 422000<br>94900        | M224749     | M224712                |  |                |       |       |
| 120.650<br>4.7500       | 180.975<br>7.1250  | 25.400<br>1.0000 | 132000<br>29700        | 0.33 | 1.80 | 34300<br>7710          | 19500<br>4390    | 1.76 | 273000<br>61400        | L225842     | L225818                |  |                |       |       |
| 120.650<br>4.7500       | 182.562<br>7.1875  | 39.688<br>1.5625 | 248000<br>55800        | 0.31 | 1.97 | 64300<br>14500         | 33600<br>7550    | 1.91 | 493000<br>111000       | 48282       | 48220                  |  |                |       |       |
| 120.650<br>4.7500       | 190.500<br>7.5000  | 46.038<br>1.8125 | 335000<br>75300        | 0.43 | 1.41 | 86800<br>19500         | 63400<br>14300   | 1.37 | 543000<br>122000       | HM624749    | HM624710               |  |                |       |       |
| 120.650<br>4.7500       | 199.974<br>7.8730  | 46.038<br>1.8125 | 335000<br>75300        | 0.43 | 1.41 | 86800<br>19500         | 63400<br>14300   | 1.37 | 543000<br>122000       | HM624749    | HM624716               |  |                |       |       |
| 120.650<br>4.7500       | 206.375<br>8.1250  | 47.625<br>1.8750 | 350000<br>78700        | 0.46 | 1.31 | 90800<br>20400         | 71300<br>16000   | 1.27 | 593000<br>133000       | 795         | 792                    |  |                |       |       |
| 120.650<br>4.7500       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       | 95475       | 95925                  |  |                |       |       |
| 120.650<br>4.7500       | 254.000<br>10.0000 | 77.788<br>3.0625 | 843000<br>189000       | 0.32 | 1.87 | 218000<br>49100        | 120000<br>27000  | 1.82 | 1240000<br>279000      | HH228340    | HH228310               |  |                |       |       |
| 120.650<br>4.7500       | 259.974<br>10.2352 | 77.788<br>3.0625 | 843000<br>189000       | 0.32 | 1.87 | 218000<br>49100        | 120000<br>27000  | 1.82 | 1240000<br>279000      | HH228340    | HH228318               |  |                |       |       |
| 120.650<br>4.7500       | 273.050<br>10.7500 | 82.550<br>3.2500 | 832000<br>187000       | 0.63 | 0.95 | 216000<br>48500        | 234000<br>52500  | 0.92 | 1080000<br>243000      | HH926749    | HH926710               |  |                |       |       |
| 123.825<br>4.8750       | 182.562<br>7.1875  | 39.688<br>1.5625 | 248000<br>55800        | 0.31 | 1.97 | 64300<br>14500         | 33600<br>7550    | 1.91 | 493000<br>111000       | 48286       | 48220                  |  |                |       |       |
| 124.943<br>4.9190       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       | 95491       | 95925                  |  |                |       |       |
| 125.000<br>4.9213       | 175.000<br>6.8898  | 25.400<br>1.0000 | 139000<br>31200        | 0.48 | 1.26 | 36000<br>8100          | 29400<br>6600    | 1.23 | 246000<br>55300        | JL725346    | JL725316               |  |                |       |       |
| 125.298<br>4.9330       | 228.600<br>9.0000  | 53.975<br>2.1250 | 458000<br>103000       | 0.74 | 0.81 | 119000<br>26700        | 150000<br>33700  | 0.79 | 673000<br>151000       | HM926745    | HM926710               |  |                |       |       |
| 127.000<br>5.0000       | 165.895<br>6.5313  | 18.258<br>0.7188 | 83500<br>18800         | 0.33 | 1.80 | 21600<br>4870          | 12300<br>2770    | 1.76 | 153000<br>34400        | LL225749    | LL225710               |  |                |       |       |
| 127.000<br>5.0000       | 169.862<br>6.6875  | 25.400<br>1.0000 | 132000<br>29700        | 0.33 | 1.80 | 34300<br>7710          | 19500<br>4390    | 1.76 | 273000<br>61400        | L225849     | L225810                |  |                |       |       |
| 127.000<br>5.0000       | 171.450<br>6.7500  | 25.400<br>1.0000 | 139000<br>31200        | 0.48 | 1.26 | 36000<br>8100          | 29400<br>6600    | 1.23 | 246000<br>55300        | L725349     | L725311                |  |                |       |       |
| 127.000<br>5.0000       | 174.625<br>6.8750  | 36.512<br>1.4375 | 204000<br>45800        | 0.31 | 1.95 | 52900<br>11900         | 27800<br>6250    | 1.90 | 413000<br>92900        | LM125748    | LM125711               |  |                |       |       |
| 127.000<br>5.0000       | 180.975<br>7.1250  | 25.400<br>1.0000 | 132000<br>29700        | 0.33 | 1.80 | 34300<br>7710          | 19500<br>4390    | 1.76 | 273000<br>61400        | L225849     | L225818                |  |                |       |       |
| 127.000<br>5.0000       | 182.562<br>7.1875  | 39.688<br>1.5625 | 248000<br>55800        | 0.31 | 1.97 | 64300<br>14500         | 33600<br>7550    | 1.91 | 493000<br>111000       | 48290       | 48220                  |  |                |       |       |
| 127.000<br>5.0000       | 196.850<br>7.7500  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       | 67388       | 67322                  |  |                |       |       |
| 127.000<br>5.0000       | 203.200<br>8.0000  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       | 67388       | 67320                  |  |                |       |       |
| 127.000<br>5.0000       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000       | 74500       | 74850                  |  |                |       |       |
| 127.000<br>5.0000       | 228.600<br>9.0000  | 53.975<br>2.1250 | 348000<br>78300        | 0.74 | 0.81 | 90200<br>20300         | 114000<br>25600  | 0.79 | 486000<br>109000       | 97500       | 97900                  |  |                |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 7.9<br>0.31      | 3.3<br>0.13                | 128.0<br>5.04                     | 133.0<br>5.24            | 3.3<br>0.13                         | 161.0<br>6.34  | 154.0<br>6.06  | 2.70<br>0.11   | 1.20<br>0.05   | 170            | 70.6           | 0.1472         | 1.48<br>3.27        |
| 26.195<br>1.0313 | 20.638<br>0.8125 | 2.5<br>0.10      | 1.5<br>0.06                | 129.0<br>5.08                     | 131.0<br>5.16            | 1.5<br>0.06                         | 164.0<br>6.46  | 160.0<br>6.30  | 0.70<br>0.03   | 1.60<br>0.06   | 253            | 134            | 0.1511         | 1.86<br>4.11        |
| 36.512<br>1.4375 | 27.783<br>1.0938 | -3.6<br>-0.14    | 3.5<br>0.14                | 129.0<br>5.08                     | 135.0<br>5.31            | 1.5<br>0.06                         | 167.0<br>6.57  | 162.0<br>6.38  | 3.80<br>0.15   | 0.50<br>0.02   | 279            | 86.6           | 0.1575         | 2.52<br>5.57        |
| 36.512<br>1.4375 | 27.783<br>1.0938 | -3.6<br>-0.14    | 3.5<br>0.14                | 129.0<br>5.08                     | 135.0<br>5.31            | 1.5<br>0.06                         | 168.0<br>6.61  | 162.0<br>6.38  | 3.80<br>0.15   | 0.50<br>0.02   | 279            | 86.6           | 0.1575         | 2.67<br>5.88        |
| 36.512<br>1.4375 | 27.783<br>1.0938 | -3.6<br>-0.14    | 3.5<br>0.14                | 129.0<br>5.08                     | 135.0<br>5.31            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.80<br>0.15   | 0.50<br>0.02   | 279            | 86.6           | 0.1575         | 2.67<br>5.88        |
| 26.195<br>1.0313 | 20.638<br>0.8125 | 2.5<br>0.10      | 1.5<br>0.06                | 129.0<br>5.08                     | 131.0<br>5.16            | 1.5<br>0.06                         | 166.0<br>6.54  | 164.0<br>6.46  | 0.70<br>0.03   | 1.60<br>0.06   | 253            | 134            | 0.1511         | 2.35<br>5.18        |
| 38.100<br>1.5000 | 33.338<br>1.3125 | -5.6<br>-0.22    | 3.5<br>0.14                | 131.0<br>5.16                     | 137.0<br>5.39            | 3.3<br>0.13                         | 176.0<br>6.93  | 168.0<br>6.61  | 1.90<br>0.07   | 3.20<br>0.13   | 353            | 91.3           | 0.1138         | 3.64<br>8.03        |
| 46.038<br>1.8125 | 34.925<br>1.3750 | -3.8<br>-0.15    | 3.5<br>0.14                | 132.0<br>5.20                     | 138.0<br>5.43            | 1.5<br>0.06                         | 184.0<br>7.24  | 174.0<br>6.85  | 3.70<br>0.15   | 2.60<br>0.10   | 279            | 51.5           | 0.1178         | 4.60<br>10.15       |
| 46.038<br>1.8125 | 34.925<br>1.3750 | -3.8<br>-0.15    | 3.5<br>0.14                | 132.0<br>5.20                     | 138.0<br>5.43            | 1.5<br>0.06                         | 185.0<br>7.28  | 178.0<br>7.01  | 3.70<br>0.15   | 2.60<br>0.10   | 279            | 51.5           | 0.1178         | 5.40<br>11.90       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | -1.8<br>-0.07    | 3.3<br>0.13                | 134.0<br>5.28                     | 139.0<br>5.47            | 3.3<br>0.13                         | 198.0<br>7.80  | 186.0<br>7.32  | 5.30<br>0.21   | 2.80<br>0.11   | 326            | 56.2           | 0.1269         | 6.32<br>13.94       |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.4<br>0.25                | 137.0<br>5.39                     | 149.0<br>5.87            | 3.3<br>0.13                         | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 12.35<br>27.22      |
| 82.550<br>3.2500 | 61.912<br>2.4375 | -23.4<br>-0.92   | 9.7<br>0.38                | 142.0<br>5.59                     | 158.0<br>6.22            | 6.4<br>0.25                         | 233.5<br>9.20  | 223.0<br>8.78  | 7.10<br>0.28   | 0.00<br>0.00   | 530            | 44.8           | 0.1329         | 18.50<br>40.79      |
| 82.550<br>3.2500 | 61.912<br>2.4375 | -23.4<br>-0.92   | 9.7<br>0.38                | 142.0<br>5.59                     | 158.0<br>6.22            | 4.0<br>0.16                         | 233.5<br>9.20  | 228.0<br>8.98  | 7.10<br>0.28   | 0.00<br>0.00   | 530            | 44.8           | 0.1329         | 19.74<br>43.52      |
| 82.550<br>3.2500 | 53.975<br>2.1250 | -6.6<br>-0.26    | 6.4<br>0.25                | 147.5<br>5.80                     | 168.0<br>6.61            | 6.4<br>0.25                         | 253.0<br>9.97  | 230.0<br>9.06  | 15.10<br>0.60  | 4.10<br>0.16   | 384            | 37.8           | 0.1472         | 21.16<br>46.65      |
| 38.100<br>1.5000 | 33.338<br>1.3125 | -5.6<br>-0.22    | 3.5<br>0.14                | 133.0<br>5.24                     | 139.0<br>5.47            | 3.3<br>0.13                         | 176.0<br>6.93  | 168.0<br>6.61  | 1.90<br>0.07   | 3.20<br>0.13   | 353            | 91.3           | 0.1138         | 3.46<br>7.63        |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.4<br>0.25                | 140.0<br>5.51                     | 152.0<br>5.98            | 3.3<br>0.13                         | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 11.93<br>26.31      |
| 25.400<br>1.0000 | 18.288<br>0.7200 | 9.1<br>0.36      | 3.3<br>0.13                | 133.0<br>5.24                     | 138.0<br>5.43            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 3.00<br>0.12   | 1.50<br>0.06   | 187            | 77.6           | 0.1535         | 1.69<br>3.72        |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.5<br>0.53     | 3.5<br>0.14                | 143.0<br>5.63                     | 154.0<br>6.06            | 3.3<br>0.13                         | 219.0<br>8.63  | 200.0<br>7.87  | 9.00<br>0.36   | 6.40<br>0.25   | 295            | 39             | 0.1416         | 8.74<br>19.27       |
| 17.462<br>0.6875 | 13.495<br>0.5313 | 6.1<br>0.24      | 1.5<br>0.06                | 133.0<br>5.24                     | 135.0<br>5.31            | 1.5<br>0.06                         | 160.0<br>6.30  | 158.0<br>6.22  | 1.30<br>0.05   | 2.10<br>0.08   | 164            | 141            | 0.1297         | 0.92<br>2.02        |
| 26.195<br>1.0313 | 20.638<br>0.8125 | 2.5<br>0.10      | 1.5<br>0.06                | 134.0<br>5.28                     | 136.0<br>5.35            | 1.5<br>0.06                         | 164.0<br>6.46  | 160.0<br>6.30  | 0.70<br>0.03   | 1.60<br>0.06   | 253            | 106            | 0.1511         | 1.61<br>3.55        |
| 25.400<br>1.0000 | 18.288<br>0.7200 | 9.1<br>0.36      | 3.3<br>0.13                | 134.0<br>5.28                     | 139.0<br>5.47            | 3.3<br>0.13                         | 167.0<br>6.57  | 160.0<br>6.30  | 3.00<br>0.12   | 1.50<br>0.06   | 187            | 77.6           | 0.1535         | 1.50<br>3.30        |
| 36.512<br>1.4375 | 31.750<br>1.2500 | -4.3<br>-0.17    | 3.3<br>0.13                | 135.0<br>5.31                     | 140.0<br>5.51            | 3.3<br>0.13                         | 168.0<br>6.61  | 161.0<br>6.34  | 2.20<br>0.09   | 0.60<br>0.02   | 315            | 134            | 0.1594         | 2.54<br>5.60        |
| 26.195<br>1.0313 | 20.638<br>0.8125 | 2.5<br>0.10      | 1.5<br>0.06                | 134.0<br>5.28                     | 136.0<br>5.35            | 1.5<br>0.06                         | 166.0<br>6.54  | 164.0<br>6.46  | 0.70<br>0.03   | 1.60<br>0.06   | 253            | 106            | 0.1511         | 2.10<br>4.63        |
| 38.100<br>1.5000 | 33.338<br>1.3125 | -5.6<br>-0.22    | 3.5<br>0.14                | 135.0<br>5.31                     | 141.0<br>5.55            | 3.3<br>0.13                         | 176.0<br>6.93  | 168.0<br>6.61  | 1.90<br>0.07   | 3.20<br>0.13   | 353            | 91.3           | 0.1138         | 3.27<br>7.22        |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                | 138.0<br>5.43                     | 144.0<br>5.67            | 3.3<br>0.13                         | 189.0<br>7.44  | 180.0<br>7.09  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 5.01<br>11.05       |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                | 138.0<br>5.43                     | 144.0<br>5.67            | 3.3<br>0.13                         | 191.0<br>7.52  | 183.0<br>7.20  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 5.61<br>12.37       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 141.0<br>5.55                     | 148.0<br>5.83            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 68.5           | 0.1338         | 7.01<br>15.45       |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.2<br>0.52     | 3.5<br>0.14                | 143.5<br>5.65                     | 151.0<br>5.94            | 3.3<br>0.13                         | 213.0<br>8.38  | 197.0<br>7.76  | 8.20<br>0.32   | 4.80<br>0.19   | 237            | 44.6           | 0.1311         | 8.24<br>18.17       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

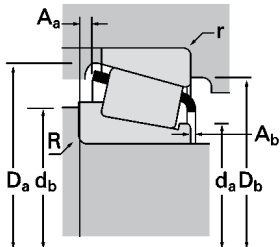
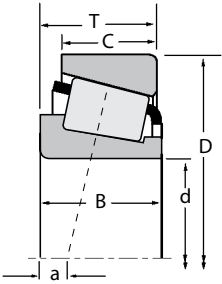
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |          |          |       |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|----------|----------|-------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> | Static   | Inner    | Outer |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |          |          |       |
| 127.000<br>5.0000       | 228.600<br>9.0000  | 53.975<br>2.1250 | 458000<br>103000       | 0.74 | 0.81 | 119000<br>26700        | 150000<br>33700  | 0.79 | 673000<br>151000       |             |                        | HM926747 | HM926710 |       |
| 127.000<br>5.0000       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95500    | 95925    |       |
| 127.000<br>5.0000       | 244.475<br>9.6250  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95500    | 95962    |       |
| 127.000<br>5.0000       | 250.825<br>9.8750  | 63.500<br>2.5000 | 590000<br>133000       | 0.37 | 1.63 | 153000<br>34400        | 96200<br>21600   | 1.59 | 867000<br>195000       |             |                        | EE116050 | 116098   |       |
| 127.000<br>5.0000       | 254.000<br>10.0000 | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000      |             |                        | 99500    | 99100    |       |
| 127.000<br>5.0000       | 254.000<br>10.0000 | 77.788<br>3.0625 | 843000<br>189000       | 0.32 | 1.87 | 218000<br>49100        | 120000<br>27000  | 1.82 | 1240000<br>279000      |             |                        | HH228349 | HH228310 |       |
| 127.000<br>5.0000       | 288.925<br>11.3750 | 82.550<br>3.2500 | 977000<br>220000       | 0.32 | 1.88 | 253000<br>56900        | 138000<br>31100  | 1.83 | 1340000<br>302000      |             |                        | HH231637 | HH231610 |       |
| 127.000<br>5.0000       | 295.275<br>11.6250 | 82.550<br>3.2500 | 977000<br>220000       | 0.32 | 1.88 | 253000<br>56900        | 138000<br>31100  | 1.83 | 1340000<br>302000      |             |                        | HH231637 | HH231615 |       |
| 127.000<br>5.0000       | 304.800<br>12.0000 | 88.900<br>3.5000 | 904000<br>203000       | 0.73 | 0.82 | 234000<br>52700        | 292000<br>65700  | 0.80 | 1250000<br>282000      |             |                        | HH932132 | HH932110 |       |
| 127.000<br>5.0000       | 311.150<br>12.2500 | 88.900<br>3.5000 | 904000<br>203000       | 0.73 | 0.82 | 234000<br>52700        | 292000<br>65700  | 0.80 | 1250000<br>282000      |             |                        | HH932132 | HH932115 |       |
| 127.792<br>5.0312       | 228.600<br>9.0000  | 53.975<br>2.1250 | 458000<br>103000       | 0.74 | 0.81 | 119000<br>26700        | 150000<br>33700  | 0.79 | 673000<br>151000       |             |                        | HM926749 | HM926710 |       |
| 128.588<br>5.0625       | 190.500<br>7.5000  | 34.925<br>1.3750 | 164000<br>36900        | 0.65 | 0.92 | 42500<br>9560          | 47500<br>10700   | 0.89 | 300000<br>67400        |             |                        | 48506    | 48750    |       |
| 128.588<br>5.0625       | 206.375<br>8.1250  | 47.625<br>1.8750 | 350000<br>78700        | 0.46 | 1.31 | 90800<br>20400         | 71300<br>16000   | 1.27 | 593000<br>133000       |             |                        | 799      | 792      |       |
| 129.975<br>5.1171       | 234.975<br>9.2510  | 64.798<br>2.5511 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95512    | 95929    |       |
| 130.000<br>5.1181       | 185.000<br>7.2835  | 29.000<br>1.1417 | 181000<br>40800        | 0.47 | 1.27 | 47000<br>10600         | 38100<br>8560    | 1.24 | 283000<br>63600        |             |                        | JP13049A | JP13010  |       |
| 130.000<br>5.1181       | 185.000<br>7.2835  | 29.000<br>1.1417 | 181000<br>40800        | 0.47 | 1.27 | 47000<br>10600         | 38100<br>8560    | 1.24 | 283000<br>63600        |             |                        | JP13049  | JP13010  |       |
| 130.000<br>5.1181       | 206.375<br>8.1250  | 47.625<br>1.8750 | 350000<br>78700        | 0.46 | 1.31 | 90800<br>20400         | 71300<br>16000   | 1.27 | 593000<br>133000       |             |                        | 797      | 792      |       |
| 130.000<br>5.1181       | 230.000<br>9.0551  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95512X   | 95905    |       |
| 130.000<br>5.1181       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95512X   | 95925    |       |
| 130.000<br>5.1181       | 234.975<br>9.2510  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000       |             |                        | 95512X   | 95928    |       |
| 130.175<br>5.1250       | 196.850<br>7.7500  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       |             |                        | 67389    | 67322    |       |
| 130.175<br>5.1250       | 203.200<br>8.0000  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       |             |                        | 67389    | 67320    |       |
| 130.175<br>5.1250       | 206.375<br>8.1250  | 47.625<br>1.8750 | 350000<br>78700        | 0.46 | 1.31 | 90800<br>20400         | 71300<br>16000   | 1.27 | 593000<br>133000       |             |                        | 799A     | 792      |       |
| 133.350<br>5.2500       | 173.038<br>6.8125  | 19.050<br>0.7500 | 89300<br>20100         | 0.35 | 1.72 | 23100<br>5200          | 13800<br>3100    | 1.68 | 170000<br>38300        |             |                        | LL327049 | LL327010 |       |
| 133.350<br>5.2500       | 177.008<br>6.9688  | 25.400<br>1.0000 | 136000<br>30600        | 0.35 | 1.72 | 35300<br>7940          | 21000<br>4730    | 1.68 | 289000<br>65000        |             |                        | L327249  | L327210  |       |
| 133.350<br>5.2500       | 190.500<br>7.5000  | 39.688<br>1.5625 | 262000<br>58900        | 0.32 | 1.87 | 67900<br>15300         | 37300<br>8390    | 1.82 | 542000<br>122000       |             |                        | 48385    | 48320    |       |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       |             |                        | 67390    | 67322    |       |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000       |             |                        | 67391    | 67322    |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.5<br>0.53     | 3.5<br>0.14                                    | 143.0<br>5.63                              | 156.0<br>6.14                              | 3.3<br>0.13                                  | 219.0<br>8.63  | 200.0<br>7.87  | 9.00<br>0.36   | 6.40<br>0.25   | 295            | 39             | 0.1416         | 8.61<br>18.98       |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.4<br>0.25                                    | 142.0<br>5.59                              | 154.0<br>6.06                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 53.8           | 0.1323         | 11.73<br>25.86      |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.4<br>0.25                                    | 142.0<br>5.59                              | 154.0<br>6.06                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 213.0<br>8.39  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 53.8           | 0.1323         | 13.08<br>28.83      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -13.5<br>-0.53   | 3.3<br>0.13                                    | 144.0<br>5.67                              | 148.0<br>5.83                              | 4.8<br>0.19                                  | 224.0<br>8.82  | 220.0<br>8.66  | 8.50<br>0.34   | 1.60<br>0.06   | 417            | 57.3           | 0.1279         | 13.61<br>30.00      |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48   | 6.4<br>0.25                                    | 149.0<br>5.87                              | 159.0<br>6.26                              | 3.3<br>0.13                                  | 238.0<br>9.37  | 227.0<br>8.94  | 9.70<br>0.38   | 3.50<br>0.14   | 556            | 73.5           | 0.1459         | 15.44<br>34.03      |
| 82.550<br>3.2500 | 61.912<br>2.4375 | -23.4<br>-0.92   | 9.7<br>0.38                                    | 148.0<br>5.83                              | 164.0<br>6.46                              | 6.4<br>0.25                                  | 233.5<br>9.20  | 223.0<br>8.78  | 7.10<br>0.28   | 0.00<br>0.00   | 530            | 44.8           | 0.1329         | 17.70<br>39.02      |
| 87.312<br>3.4375 | 57.150<br>2.2500 | -26.7<br>-1.05   | 13.5<br>0.53                                   | 150.0<br>5.91                              | 174.0<br>6.85                              | 6.4<br>0.25                                  | 263.5<br>10.38 | 255.0<br>10.04 | 12.70<br>0.50  | 1.10<br>0.04   | 601            | 57.7           | 0.1083         | 25.21<br>55.57      |
| 87.312<br>3.4375 | 57.150<br>2.2500 | -26.7<br>-1.05   | 13.5<br>0.53                                   | 150.0<br>5.91                              | 174.0<br>6.85                              | 6.4<br>0.25                                  | 263.5<br>10.38 | 258.0<br>10.16 | 12.70<br>0.50  | 1.10<br>0.04   | 601            | 57.7           | 0.1083         | 27.02<br>59.58      |
| 82.550<br>3.2500 | 57.150<br>2.2500 | 1.8<br>0.07      | 6.4<br>0.25                                    | 172.0<br>6.77                              | 182.0<br>7.17                              | 6.4<br>0.25                                  | 288.0<br>11.34 | 260.0<br>10.24 | 21.50<br>0.85  | 8.90<br>0.35   | 514            | 55.6           | 0.1333         | 29.48<br>65.00      |
| 82.550<br>3.2500 | 57.150<br>2.2500 | 1.8<br>0.07      | 6.4<br>0.25                                    | 172.0<br>6.77                              | 182.0<br>7.17                              | 6.4<br>0.25                                  | 288.0<br>11.34 | 262.0<br>10.31 | 21.50<br>0.85  | 8.90<br>0.35   | 514            | 55.6           | 0.1333         | 30.73<br>67.75      |
| 49.428<br>1.9460 | 38.100<br>1.5000 | 13.5<br>0.53     | 3.5<br>0.14                                    | 143.0<br>5.63                              | 156.0<br>6.14                              | 3.3<br>0.13                                  | 219.0<br>8.63  | 200.0<br>7.87  | 9.00<br>0.36   | 6.40<br>0.25   | 295            | 39             | 0.1416         | 8.55<br>18.84       |
| 31.750<br>1.2500 | 25.400<br>1.0000 | 16.5<br>0.65     | 3.5<br>0.14                                    | 138.0<br>5.43                              | 144.0<br>5.67                              | 3.3<br>0.13                                  | 183.0<br>7.20  | 170.0<br>6.69  | 4.40<br>0.18   | 0.80<br>0.03   | 218            | 71.4           | 0.1783         | 3.07<br>6.76        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | -1.8<br>-0.07    | 3.3<br>0.13                                    | 140.0<br>5.51                              | 146.0<br>5.75                              | 3.3<br>0.13                                  | 198.0<br>7.80  | 186.0<br>7.32  | 5.30<br>0.21   | 2.80<br>0.11   | 326            | 61.9           | 0.1269         | 5.74<br>12.66       |
| 63.500<br>2.5000 | 49.950<br>1.9665 | -14.0<br>-0.55   | 6.4<br>0.25                                    | 145.0<br>5.71                              | 157.0<br>6.18                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 208.0<br>8.19  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 11.52<br>25.41      |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 8.9<br>0.35      | 6.0<br>0.24                                    | 137.0<br>5.39                              | 149.0<br>5.87                              | 3.0<br>0.12                                  | 179.0<br>7.05  | 172.0<br>6.77  | 2.40<br>0.09   | 4.10<br>0.16   | 192            | 60.3           | 0.1064         | 2.15<br>4.73        |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 8.9<br>0.35      | 3.0<br>0.12                                    | 137.0<br>5.39                              | 143.0<br>5.63                              | 3.0<br>0.12                                  | 179.0<br>7.05  | 172.0<br>6.77  | 2.40<br>0.09   | 4.10<br>0.16   | 192            | 60.3           | 0.1064         | 2.16<br>4.76        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | -1.8<br>-0.07    | 3.5<br>0.14                                    | 141.0<br>5.55                              | 148.0<br>5.83                              | 3.3<br>0.13                                  | 198.0<br>7.80  | 186.0<br>7.32  | 5.30<br>0.21   | 2.80<br>0.11   | 326            | 61.9           | 0.1269         | 5.63<br>12.42       |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.0<br>0.24                                    | 145.0<br>5.71                              | 156.0<br>6.14                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 207.0<br>8.15  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 10.71<br>23.60      |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.0<br>0.24                                    | 145.0<br>5.71                              | 156.0<br>6.14                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 11.43<br>25.21      |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 6.0<br>0.24                                    | 145.0<br>5.71                              | 156.0<br>6.14                              | 3.3<br>0.13                                  | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 11.41<br>25.14      |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 141.0<br>5.55                              | 146.0<br>5.75                              | 3.3<br>0.13                                  | 189.0<br>7.44  | 180.0<br>7.09  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 4.78<br>10.54       |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 141.0<br>5.55                              | 146.0<br>5.75                              | 3.3<br>0.13                                  | 191.0<br>7.52  | 183.0<br>7.20  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 5.38<br>11.86       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | -1.8<br>-0.07    | 3.5<br>0.14                                    | 142.0<br>5.59                              | 148.0<br>5.83                              | 3.3<br>0.13                                  | 198.0<br>7.80  | 186.0<br>7.32  | 5.30<br>0.21   | 2.80<br>0.11   | 326            | 61.9           | 0.1269         | 5.62<br>12.39       |
| 17.462<br>0.6875 | 14.288<br>0.5625 | 7.6<br>0.30      | 1.5<br>0.06                                    | 139.0<br>5.47                              | 141.0<br>5.55                              | 1.5<br>0.06                                  | 167.0<br>6.57  | 164.0<br>6.46  | 1.40<br>0.06   | 1.90<br>0.08   | 188            | 146            | 0.1377         | 1.00<br>2.21        |
| 26.195<br>1.0313 | 20.638<br>0.8125 | 4.1<br>0.16      | 1.5<br>0.06                                    | 140.0<br>5.51                              | 142.0<br>5.59                              | 1.5<br>0.06                                  | 171.0<br>6.73  | 167.0<br>6.57  | 0.80<br>0.03   | 1.70<br>0.07   | 280            | 156            | 0.1585         | 1.71<br>3.78        |
| 39.688<br>1.5625 | 33.338<br>1.3125 | -4.1<br>-0.16    | 3.5<br>0.14                                    | 142.0<br>5.59                              | 148.0<br>5.83                              | 3.3<br>0.13                                  | 184.0<br>7.24  | 177.0<br>6.97  | 2.80<br>0.11   | 1.20<br>0.05   | 404            | 95.6           | 0.1209         | 3.56<br>7.85        |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                                    | 143.0<br>5.63                              | 149.0<br>5.87                              | 3.3<br>0.13                                  | 189.0<br>7.44  | 180.0<br>7.09  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 4.55<br>10.02       |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 8.0<br>0.31                                    | 143.0<br>5.63                              | 157.0<br>6.18                              | 3.3<br>0.13                                  | 189.0<br>7.44  | 180.0<br>7.09  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 4.53<br>10.00       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

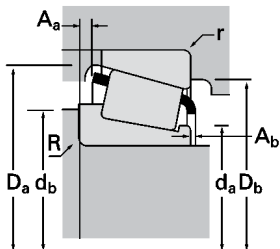
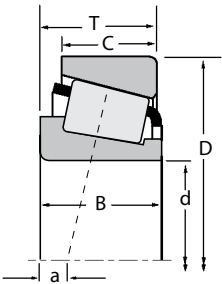
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   |          | Part Number |       |       |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|-------------------|----------|-------------|-------|-------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            |          |             | Inner | Outer |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>    |          |             |       |       |
| 133.350<br>5.2500       | 203.200<br>8.0000  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000  | 67390    | 67320       |       |       |
| 133.350<br>5.2500       | 203.200<br>8.0000  | 46.038<br>1.8125 | 340000<br>76500        | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000  | 67391    | 67320       |       |       |
| 133.350<br>5.2500       | 214.975<br>8.4636  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74525    | 74845       |       |       |
| 133.350<br>5.2500       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74525    | 74850       |       |       |
| 133.350<br>5.2500       | 215.900<br>8.5000  | 53.975<br>2.1250 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74525    | 74853       |       |       |
| 133.350<br>5.2500       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000  | 95525    | 95925       |       |       |
| 133.350<br>5.2500       | 234.950<br>9.2500  | 63.500<br>2.5000 | 582000<br>131000       | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000  | 95528    | 95925       |       |       |
| 136.525<br>5.3750       | 190.500<br>7.5000  | 39.688<br>1.5625 | 262000<br>58900        | 0.32 | 1.87 | 67900<br>15300         | 37300<br>8390    | 1.82 | 542000<br>122000  | 48393    | 48320       |       |       |
| 136.525<br>5.3750       | 203.200<br>8.0000  | 39.688<br>1.5625 | 262000<br>58900        | 0.32 | 1.87 | 67900<br>15300         | 37300<br>8390    | 1.82 | 542000<br>122000  | 48393    | 48328       |       |       |
| 136.525<br>5.3750       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74537    | 74850       |       |       |
| 136.525<br>5.3750       | 217.488<br>8.5625  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74537    | 74856       |       |       |
| 136.525<br>5.3750       | 228.600<br>9.0000  | 57.150<br>2.2500 | 482000<br>108000       | 0.42 | 1.43 | 125000<br>28100        | 90000<br>20200   | 1.39 | 809000<br>182000  | 896      | 892         |       |       |
| 139.700<br>5.5000       | 187.325<br>7.3750  | 28.575<br>1.1250 | 177000<br>39800        | 0.36 | 1.69 | 45900<br>10300         | 27900<br>6270    | 1.65 | 375000<br>84300   | LM328448 | LM328410    |       |       |
| 139.700<br>5.5000       | 214.975<br>8.4636  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74550    | 74845       |       |       |
| 139.700<br>5.5000       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74550    | 74850       |       |       |
| 139.700<br>5.5000       | 215.900<br>8.5000  | 47.625<br>1.8750 | 354000<br>79500        | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74550A   | 74850       |       |       |
| 139.700<br>5.5000       | 222.250<br>8.7500  | 34.925<br>1.3750 | 229000<br>51400        | 0.44 | 1.37 | 59300<br>13300         | 44400<br>9970    | 1.34 | 342000<br>77000   | 73551    | 73875       |       |       |
| 139.700<br>5.5000       | 228.600<br>9.0000  | 57.150<br>2.2500 | 482000<br>108000       | 0.42 | 1.43 | 125000<br>28100        | 90000<br>20200   | 1.39 | 809000<br>182000  | 898      | 892         |       |       |
| 139.700<br>5.5000       | 228.600<br>9.0000  | 57.150<br>2.2500 | 482000<br>108000       | 0.42 | 1.43 | 125000<br>28100        | 90000<br>20200   | 1.39 | 809000<br>182000  | 898A     | 892         |       |       |
| 139.700<br>5.5000       | 236.538<br>9.3125  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231132 | HM231110    |       |       |
| 139.700<br>5.5000       | 241.300<br>9.5000  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231132 | HM231115    |       |       |
| 139.700<br>5.5000       | 254.000<br>10.0000 | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99550    | 99100       |       |       |
| 139.700<br>5.5000       | 288.925<br>11.3750 | 82.550<br>3.2500 | 977000<br>220000       | 0.32 | 1.88 | 253000<br>56900        | 138000<br>31100  | 1.83 | 1340000<br>302000 | HH231649 | HH231610    |       |       |
| 139.700<br>5.5000       | 295.275<br>11.6250 | 82.550<br>3.2500 | 977000<br>220000       | 0.32 | 1.88 | 253000<br>56900        | 138000<br>31100  | 1.83 | 1340000<br>302000 | HH231649 | HH231615    |       |       |
| 139.700<br>5.5000       | 307.975<br>12.1250 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000 | HH234031 | HH234010    |       |       |
| 139.700<br>5.5000       | 307.975<br>12.1250 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000 | HH234032 | HH234010    |       |       |
| 140.000<br>5.5118       | 195.000<br>7.6772  | 29.000<br>1.1417 | 188000<br>42300        | 0.50 | 1.19 | 48800<br>11000         | 42000<br>9440    | 1.16 | 304000<br>68400   | JP14049  | JP14010     |       |       |
| 142.875<br>5.6250       | 193.675<br>7.6250  | 28.575<br>1.1250 | 182000<br>40900        | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600   | 36686    | 36620       |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                          |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                | Bearing        |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 3.5<br>0.14                | 143.0<br>5.63            | 149.0<br>5.87            | 3.3<br>0.13                         | 191.0<br>7.52  | 183.0<br>7.20  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 5.14<br>11.34       |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25    | 8.0<br>0.31                | 143.0<br>5.63            | 157.0<br>6.18            | 3.3<br>0.13                         | 191.0<br>7.52  | 183.0<br>7.20  | 4.20<br>0.17   | 1.30<br>0.05   | 384            | 70.1           | 0.1220         | 5.13<br>11.31       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 146.0<br>5.75            | 152.0<br>5.98            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 6.41<br>14.14       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 146.0<br>5.75            | 152.0<br>5.98            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 6.52<br>14.38       |
| 47.625<br>1.8750 | 47.625<br>1.8750 | 2.3<br>0.09      | 3.5<br>0.14                | 146.0<br>5.75            | 152.0<br>5.98            | 3.3<br>0.13                         | 209.0<br>8.23  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 7.20<br>15.86       |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 9.7<br>0.38                | 148.0<br>5.83            | 166.0<br>6.54            | 3.3<br>0.13                         | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 53.8           | 0.1323         | 10.99<br>24.23      |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 4.8<br>0.19                | 148.0<br>5.83            | 157.0<br>6.18            | 3.3<br>0.13                         | 217.0<br>8.54  | 209.0<br>8.23  | 6.40<br>0.25   | 3.80<br>0.15   | 454            | 59.3           | 0.1323         | 11.11<br>24.50      |
| 39.688<br>1.5625 | 33.338<br>1.3125 | -4.1<br>-0.16    | 3.5<br>0.14                | 144.0<br>5.67            | 151.0<br>5.94            | 3.3<br>0.13                         | 184.0<br>7.24  | 177.0<br>6.97  | 2.80<br>0.11   | 1.20<br>0.05   | 404            | 95.6           | 0.1209         | 3.35<br>7.38        |
| 39.688<br>1.5625 | 33.338<br>1.3125 | -4.1<br>-0.16    | 3.5<br>0.14                | 144.0<br>5.67            | 151.0<br>5.94            | 3.3<br>0.13                         | 186.0<br>7.32  | 182.0<br>7.17  | 2.80<br>0.11   | 1.20<br>0.05   | 404            | 95.6           | 0.1209         | 4.37<br>9.64        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 148.0<br>5.83            | 155.0<br>6.10            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 68.5           | 0.1338         | 6.27<br>13.82       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 148.0<br>5.83            | 155.0<br>6.10            | 3.3<br>0.13                         | 209.0<br>8.23  | 197.0<br>7.76  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 68.5           | 0.1338         | 6.40<br>14.10       |
| 57.150<br>2.2500 | 44.450<br>1.7500 | -6.1<br>-0.24    | 3.5<br>0.14                | 150.0<br>5.91            | 156.0<br>6.14            | 3.3<br>0.13                         | 216.0<br>8.50  | 205.0<br>8.07  | 6.40<br>0.25   | 1.40<br>0.05   | 430            | 78.2           | 0.1355         | 8.95<br>19.72       |
| 29.370<br>1.1563 | 23.020<br>0.9063 | 3.6<br>0.14      | 1.5<br>0.06                | 147.0<br>5.79            | 149.0<br>5.87            | 1.5<br>0.06                         | 182.0<br>7.17  | 176.0<br>6.93  | 1.20<br>0.05   | 1.90<br>0.08   | 336            | 179            | 0.1700         | 2.20<br>4.85        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 151.0<br>5.94            | 158.0<br>6.22            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 5.91<br>13.02       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 3.5<br>0.14                | 151.0<br>5.94            | 158.0<br>6.22            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 6.01<br>13.26       |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 6.4<br>0.25                | 154.0<br>6.06            | 166.0<br>6.54            | 3.3<br>0.13                         | 208.0<br>8.19  | 196.0<br>7.72  | 4.80<br>0.19   | 2.00<br>0.08   | 363            | 63.3           | 0.1338         | 6.00<br>13.23       |
| 31.623<br>1.2450 | 23.812<br>0.9375 | 6.4<br>0.25      | 3.5<br>0.14                | 150.0<br>5.91            | 156.0<br>6.14            | 3.3<br>0.13                         | 207.0<br>8.15  | 204.0<br>8.03  | 5.70<br>0.23   | 3.90<br>0.15   | 244            | 82             | 0.1122         | 4.26<br>9.40        |
| 57.150<br>2.2500 | 44.450<br>1.7500 | -6.1<br>-0.24    | 3.5<br>0.14                | 153.0<br>6.02            | 160.0<br>6.30            | 3.3<br>0.13                         | 216.0<br>8.50  | 205.0<br>8.07  | 6.40<br>0.25   | 1.40<br>0.05   | 430            | 78.2           | 0.1355         | 8.64<br>19.04       |
| 57.150<br>2.2500 | 44.450<br>1.7500 | -6.1<br>-0.24    | 6.4<br>0.25                | 153.0<br>6.02            | 165.0<br>6.50            | 3.3<br>0.13                         | 216.0<br>8.50  | 205.0<br>8.07  | 6.40<br>0.25   | 1.40<br>0.05   | 430            | 78.2           | 0.1355         | 8.59<br>18.93       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                | 156.0<br>6.14            | 160.0<br>6.30            | 3.3<br>0.13                         | 224.0<br>8.82  | 217.0<br>8.54  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 9.90<br>21.82       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                | 156.0<br>6.14            | 160.0<br>6.30            | 3.3<br>0.13                         | 224.0<br>8.82  | 219.0<br>8.62  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 10.52<br>23.19      |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48   | 7.0<br>0.28                | 156.0<br>6.14            | 170.0<br>6.69            | 3.3<br>0.13                         | 238.0<br>9.37  | 227.0<br>8.94  | 9.70<br>0.38   | 3.50<br>0.14   | 556            | 73.5           | 0.1459         | 14.00<br>30.87      |
| 87.312<br>3.4375 | 57.150<br>2.2500 | -26.7<br>-1.05   | 9.7<br>0.38                | 161.0<br>6.34            | 177.0<br>6.97            | 6.4<br>0.25                         | 263.5<br>10.38 | 255.0<br>10.04 | 12.70<br>0.50  | 1.10<br>0.04   | 601            | 57.7           | 0.1083         | 23.53<br>51.87      |
| 87.312<br>3.4375 | 57.150<br>2.2500 | -26.7<br>-1.05   | 9.7<br>0.38                | 161.0<br>6.34            | 177.0<br>6.97            | 6.4<br>0.25                         | 263.5<br>10.38 | 258.0<br>10.16 | 12.70<br>0.50  | 1.10<br>0.04   | 601            | 57.7           | 0.1083         | 25.34<br>55.87      |
| 93.662<br>3.6875 | 66.675<br>2.6250 | -26.4<br>-1.04   | 9.7<br>0.38                | 168.0<br>6.61            | 180.0<br>7.09            | 6.8<br>0.27                         | 285.5<br>11.24 | 276.0<br>10.87 | 12.50<br>0.49  | -0.90<br>-0.04 | 718            | 62.1           | 0.1157         | 30.78<br>67.85      |
| 93.662<br>3.6875 | 66.675<br>2.6250 | -26.4<br>-1.04   | 9.7<br>0.38                | 168.0<br>6.61            | 180.0<br>7.09            | 6.8<br>0.27                         | 285.5<br>11.24 | 276.0<br>10.87 | 10.50<br>0.42  | 1.10<br>0.04   | 718            | 62.1           | 0.1157         | 29.48<br>64.99      |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 11.9<br>0.47     | 3.0<br>0.12                | 148.0<br>5.83            | 153.0<br>6.02            | 3.0<br>0.12                         | 189.0<br>7.44  | 182.0<br>7.17  | 2.60<br>0.10   | 4.10<br>0.16   | 220            | 68.1           | 0.1133         | 2.29<br>5.06        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19      | 1.5<br>0.06                | 151.0<br>5.94            | 153.0<br>6.02            | 1.5<br>0.06                         | 188.0<br>7.40  | 182.0<br>7.17  | 1.20<br>0.05   | 2.70<br>0.11   | 366            | 152            | 0.1768         | 2.43<br>5.35        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

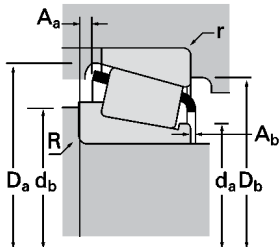
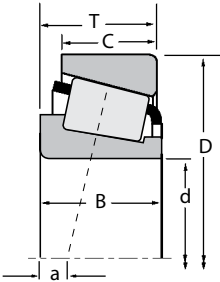
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |  |                |       |       |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--|----------------|-------|-------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | C <sub>0</sub> | Inner | Outer |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |  |                |       |       |
| 142.875<br>5.6250       | 200.025<br>7.8750  | 41.275<br>1.6250 | 265000<br>59600        | 0.34 | 1.78 | 68800<br>15500         | 39600<br>8900    | 1.74 | 560000<br>126000       | 48684       | 48620                  |  |                |       |       |
| 142.875<br>5.6250       | 200.025<br>7.8750  | 41.275<br>1.6250 | 265000<br>59600        | 0.34 | 1.78 | 68800<br>15500         | 39600<br>8900    | 1.74 | 560000<br>126000       | 48685       | 48620                  |  |                |       |       |
| 142.875<br>5.6250       | 222.250<br>8.7500  | 34.925<br>1.3750 | 229000<br>51400        | 0.44 | 1.37 | 59300<br>13300         | 44400<br>9970    | 1.34 | 342000<br>77000        | 73562       | 73875                  |  |                |       |       |
| 142.875<br>5.6250       | 236.538<br>9.3125  | 57.150<br>2.2500 | 477000<br>107000       | 0.44 | 1.36 | 124000<br>27800        | 93600<br>21000   | 1.32 | 810000<br>182000       | 82562A      | 82931                  |  |                |       |       |
| 142.875<br>5.6250       | 241.300<br>9.5000  | 57.150<br>2.2500 | 477000<br>107000       | 0.44 | 1.36 | 124000<br>27800        | 93600<br>21000   | 1.32 | 810000<br>182000       | 82562A      | 82950                  |  |                |       |       |
| 142.875<br>5.6250       | 241.300<br>9.5000  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000       | HM231136    | HM231115               |  |                |       |       |
| 146.050<br>5.7500       | 188.120<br>7.4063  | 22.225<br>0.8750 | 105000<br>23500        | 0.38 | 1.57 | 27200<br>6100          | 17700<br>3990    | 1.53 | 214000<br>48200        | LL529749    | LL529710               |  |                |       |       |
| 146.050<br>5.7500       | 193.675<br>7.6250  | 28.575<br>1.1250 | 182000<br>40900        | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600        | 36690       | 36620                  |  |                |       |       |
| 146.050<br>5.7500       | 193.675<br>7.6250  | 28.575<br>1.1250 | 182000<br>40900        | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600        | 36691       | 36620                  |  |                |       |       |
| 146.050<br>5.7500       | 203.200<br>8.0000  | 28.575<br>1.1250 | 182000<br>40900        | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600        | 36690       | 36626                  |  |                |       |       |
| 146.050<br>5.7500       | 203.200<br>8.0000  | 45.100<br>1.7756 | 309000<br>69500        | 0.33 | 1.80 | 80100<br>18000         | 45600<br>10300   | 1.76 | 573000<br>129000       | M229349A    | M229310                |  |                |       |       |
| 146.050<br>5.7500       | 203.200<br>8.0000  | 45.100<br>1.7756 | 309000<br>69500        | 0.33 | 1.80 | 80100<br>18000         | 45600<br>10300   | 1.76 | 573000<br>129000       | M229349     | M229310                |  |                |       |       |
| 146.050<br>5.7500       | 236.538<br>9.3125  | 57.150<br>2.2500 | 477000<br>107000       | 0.44 | 1.36 | 124000<br>27800        | 93600<br>21000   | 1.32 | 810000<br>182000       | 82576       | 82931                  |  |                |       |       |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 57.150<br>2.2500 | 477000<br>107000       | 0.44 | 1.36 | 124000<br>27800        | 93600<br>21000   | 1.32 | 810000<br>182000       | 82576       | 82950                  |  |                |       |       |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000       | HM231140    | HM231115               |  |                |       |       |
| 146.050<br>5.7500       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000       | 81575       | 81962                  |  |                |       |       |
| 146.050<br>5.7500       | 254.000<br>10.0000 | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000      | 99575       | 99100                  |  |                |       |       |
| 146.050<br>5.7500       | 268.288<br>10.5625 | 74.612<br>2.9375 | 726000<br>163000       | 0.39 | 1.55 | 188000<br>42300        | 125000<br>28100  | 1.51 | 1170000<br>263000      | EE107057    | 107105                 |  |                |       |       |
| 146.050<br>5.7500       | 304.800<br>12.0000 | 60.325<br>2.3750 | 718000<br>161000       | 0.33 | 1.80 | 186000<br>41800        | 106000<br>23800  | 1.76 | 871000<br>196000       | EE750576    | 751200                 |  |                |       |       |
| 146.050<br>5.7500       | 304.800<br>12.0000 | 88.900<br>3.5000 | 904000<br>203000       | 0.73 | 0.82 | 234000<br>52700        | 292000<br>65700  | 0.80 | 1250000<br>282000      | HH932145    | HH932110               |  |                |       |       |
| 146.050<br>5.7500       | 307.975<br>12.1250 | 88.900<br>3.5000 | 975000<br>219000       | 0.33 | 1.84 | 253000<br>56800        | 141000<br>31700  | 1.79 | 1480000<br>333000      | EE450577    | 451212                 |  |                |       |       |
| 146.050<br>5.7500       | 307.975<br>12.1250 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000      | HH230400    | HH234010               |  |                |       |       |
| 146.050<br>5.7500       | 311.150<br>12.2500 | 88.900<br>3.5000 | 904000<br>203000       | 0.73 | 0.82 | 234000<br>52700        | 292000<br>65700  | 0.80 | 1250000<br>282000      | HH932145    | HH932115               |  |                |       |       |
| 149.225<br>5.8750       | 236.538<br>9.3125  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000       | HM231148    | HM231110               |  |                |       |       |
| 149.225<br>5.8750       | 236.538<br>9.3125  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000       | HM231149    | HM231110               |  |                |       |       |
| 149.225<br>5.8750       | 241.300<br>9.5000  | 57.150<br>2.2500 | 553000<br>124000       | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000       | HM231149    | HM231115               |  |                |       |       |
| 149.225<br>5.8750       | 254.000<br>10.0000 | 67.945<br>2.6750 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000      | 99587       | 99100                  |  |                |       |       |
| 150.000<br>5.9055       | 203.200<br>8.0000  | 28.580<br>1.1250 | 179000<br>40300        | 0.46 | 1.31 | 46500<br>10500         | 36500<br>8210    | 1.27 | 339000<br>76100        | JL730646    | L730610                |  |                |       |       |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
(3) Negative value indicates effective center inside cone backface.  
(4) These maximum fillet radii will be cleared by the bearing corners.  
(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            |                                            | Housing          |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 39.688<br>1.5625 | 34.130<br>1.3437 | -3.0<br>-0.12    | 8.0<br>0.31                                    | 151.0<br>5.94                              | 166.0<br>6.54                              | 3.3<br>0.13      | 193.0<br>7.60  | 185.0<br>7.28  | 2.80<br>0.11   | 2.50<br>0.10   | 440            | 115            | 0.1261         | 3.74<br>8.25        |
| 39.688<br>1.5625 | 34.130<br>1.3437 | -3.0<br>-0.12    | 3.5<br>0.14                                    | 151.0<br>5.94                              | 158.0<br>6.22                              | 3.3<br>0.13      | 193.0<br>7.60  | 185.0<br>7.28  | 2.80<br>0.11   | 2.50<br>0.10   | 440            | 115            | 0.1261         | 3.84<br>8.46        |
| 31.623<br>1.2450 | 23.812<br>0.9375 | 6.4<br>0.25      | 3.5<br>0.14                                    | 152.0<br>5.98                              | 159.0<br>6.26                              | 3.3<br>0.13      | 207.0<br>8.15  | 204.0<br>8.03  | 5.70<br>0.23   | 3.90<br>0.15   | 244            | 82             | 0.1122         | 4.09<br>9.01        |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -3.6<br>-0.14    | 8.0<br>0.31                                    | 157.0<br>6.18                              | 172.0<br>6.77                              | 3.3<br>0.13      | 226.0<br>8.90  | 213.0<br>8.39  | 5.80<br>0.23   | 2.10<br>0.08   | 460            | 81.1           | 0.1405         | 9.43<br>20.78       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -3.6<br>-0.14    | 8.0<br>0.31                                    | 157.0<br>6.18                              | 172.0<br>6.77                              | 3.3<br>0.13      | 226.0<br>8.90  | 215.0<br>8.46  | 5.80<br>0.23   | 2.10<br>0.08   | 460            | 81.1           | 0.1405         | 10.05<br>22.15      |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                                    | 158.0<br>6.22                              | 162.0<br>6.38                              | 3.3<br>0.13      | 224.0<br>8.82  | 219.0<br>8.62  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 10.20<br>22.50      |
| 20.638<br>0.8125 | 16.670<br>0.6563 | 9.4<br>0.37      | 1.5<br>0.06                                    | 152.0<br>5.98                              | 155.0<br>6.10                              | 1.5<br>0.06      | 182.0<br>7.17  | 179.0<br>7.05  | 0.50<br>0.02   | 1.80<br>0.07   | 248            | 186            | 0.1557         | 1.42<br>3.12        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19      | 1.5<br>0.06                                    | 153.0<br>6.02                              | 155.0<br>6.10                              | 1.5<br>0.06      | 188.0<br>7.40  | 182.0<br>7.17  | 1.20<br>0.05   | 2.70<br>0.11   | 366            | 121            | 0.1768         | 2.27<br>5.00        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19      | 4.8<br>0.19                                    | 153.0<br>6.02                              | 162.0<br>6.38                              | 1.5<br>0.06      | 188.0<br>7.40  | 182.0<br>7.17  | 1.20<br>0.05   | 2.70<br>0.11   | 366            | 152            | 0.1768         | 2.23<br>4.91        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19      | 1.5<br>0.06                                    | 153.0<br>6.02                              | 155.0<br>6.10                              | 1.5<br>0.06      | 190.0<br>7.48  | 186.0<br>7.32  | 1.20<br>0.05   | 2.70<br>0.11   | 366            | 121            | 0.1768         | 2.80<br>6.17        |
| 40.000<br>1.5748 | 38.100<br>1.5000 | -2.5<br>-0.10    | 5.0<br>0.20                                    | 154.0<br>6.06                              | 164.0<br>6.46                              | 3.5<br>0.14      | 197.0<br>7.76  | 187.0<br>7.36  | 1.50<br>0.06   | 2.80<br>0.11   | 402            | 98             | 0.1220         | 3.99<br>8.79        |
| 40.000<br>1.5748 | 38.100<br>1.5000 | -2.5<br>-0.10    | 3.5<br>0.14                                    | 154.0<br>6.06                              | 160.0<br>6.30                              | 3.5<br>0.14      | 197.0<br>7.76  | 187.0<br>7.36  | 1.50<br>0.06   | 2.80<br>0.11   | 402            | 98             | 0.1220         | 4.00<br>8.81        |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 160.0<br>6.30                              | 166.0<br>6.54                              | 3.3<br>0.13      | 226.0<br>8.90  | 213.0<br>8.39  | 5.80<br>0.23   | 2.10<br>0.08   | 460            | 81.1           | 0.1405         | 9.20<br>20.28       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -3.6<br>-0.14    | 3.5<br>0.14                                    | 160.0<br>6.30                              | 166.0<br>6.54                              | 3.3<br>0.13      | 226.0<br>8.90  | 215.0<br>8.46  | 5.80<br>0.23   | 2.10<br>0.08   | 460            | 81.1           | 0.1405         | 9.82<br>21.65       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                                    | 160.0<br>6.30                              | 164.0<br>6.46                              | 3.3<br>0.13      | 224.0<br>8.82  | 219.0<br>8.62  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 9.88<br>21.79       |
| 50.005<br>1.9687 | 33.338<br>1.3125 | -5.3<br>-0.21    | 3.5<br>0.14                                    | 161.0<br>6.34                              | 166.0<br>6.54                              | 3.3<br>0.13      | 229.0<br>9.02  | 225.0<br>8.86  | 8.30<br>0.33   | -0.10<br>0.00  | 413            | 98.4           | 0.1250         | 8.19<br>18.06       |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48   | 7.0<br>0.28                                    | 162.0<br>6.38                              | 175.0<br>6.89                              | 3.3<br>0.13      | 238.0<br>9.37  | 227.0<br>8.94  | 9.70<br>0.38   | 3.50<br>0.14   | 556            | 73.5           | 0.1459         | 13.25<br>29.22      |
| 74.612<br>2.9375 | 57.150<br>2.2500 | -15.0<br>-0.59   | 6.4<br>0.25                                    | 166.0<br>6.54                              | 176.0<br>6.93                              | 6.4<br>0.25      | 249.5<br>9.82  | 237.0<br>9.33  | 7.70<br>0.30   | 3.00<br>0.12   | 606            | 76.3           | 0.1163         | 17.37<br>38.30      |
| 61.912<br>2.4375 | 41.275<br>1.6250 | -10.7<br>-0.42   | 3.3<br>0.13                                    | 172.0<br>6.77                              | 167.0<br>6.57                              | 6.4<br>0.25      | 272.0<br>10.71 | 270.0<br>10.63 | 6.70<br>0.26   | 3.50<br>0.14   | 431            | 54.4           | 0.0974         | 17.64<br>38.90      |
| 82.550<br>3.2500 | 57.150<br>2.2500 | 1.8<br>0.07      | 6.4<br>0.25                                    | 174.5<br>6.87                              | 195.0<br>7.68                              | 6.4<br>0.25      | 288.0<br>11.34 | 260.0<br>10.24 | 21.50<br>0.85  | 8.90<br>0.35   | 514            | 55.6           | 0.1333         | 26.84<br>59.16      |
| 93.662<br>3.6875 | 61.912<br>2.4375 | -28.2<br>-1.11   | 9.7<br>0.38                                    | 172.0<br>6.77                              | 185.0<br>7.28                              | 6.8<br>0.27      | 275.0<br>10.82 | 269.0<br>10.59 | 17.90<br>0.70  | -2.80<br>-0.11 | 747            | 76.3           | 0.1176         | 29.59<br>65.24      |
| 93.662<br>3.6875 | 66.675<br>2.6250 | -26.4<br>-1.04   | 9.7<br>0.38                                    | 173.0<br>6.81                              | 186.0<br>7.32                              | 6.8<br>0.27      | 285.5<br>11.24 | 276.0<br>10.87 | 10.50<br>0.42  | 0.80<br>0.03   | 718            | 62.1           | 0.1157         | 28.43<br>62.67      |
| 82.550<br>3.2500 | 57.150<br>2.2500 | 1.8<br>0.07      | 6.4<br>0.25                                    | 174.5<br>6.87                              | 195.0<br>7.68                              | 6.4<br>0.25      | 288.0<br>11.34 | 262.0<br>10.31 | 21.50<br>0.85  | 8.90<br>0.35   | 514            | 55.6           | 0.1333         | 28.08<br>61.91      |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 6.4<br>0.25                                    | 163.0<br>6.42                              | 172.0<br>6.77                              | 3.3<br>0.13      | 224.0<br>8.82  | 217.0<br>8.54  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 8.88<br>19.59       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                                    | 163.0<br>6.42                              | 167.0<br>6.57                              | 3.3<br>0.13      | 224.0<br>8.82  | 217.0<br>8.54  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 8.94<br>19.70       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45   | 3.5<br>0.14                                    | 163.0<br>6.42                              | 167.0<br>6.57                              | 3.3<br>0.13      | 224.0<br>8.82  | 219.0<br>8.62  | 4.30<br>0.17   | 3.70<br>0.14   | 533            | 85.9           | 0.1327         | 9.56<br>21.07       |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48   | 7.0<br>0.28                                    | 165.0<br>6.50                              | 178.0<br>7.01                              | 3.3<br>0.13      | 238.0<br>9.37  | 227.0<br>8.94  | 9.70<br>0.38   | 3.50<br>0.14   | 556            | 73.5           | 0.1459         | 12.87<br>28.37      |
| 28.575<br>1.1250 | 21.438<br>0.8440 | 11.4<br>0.45     | 3.3<br>0.13                                    | 158.0<br>6.22                              | 164.0<br>6.46                              | 3.3<br>0.13      | 198.0<br>7.80  | 190.0<br>7.48  | 2.40<br>0.10   | 1.40<br>0.06   | 295            | 103            | 0.1763         | 2.49<br>5.48        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

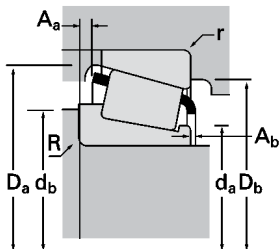
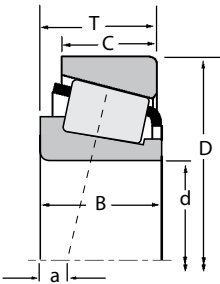
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer    |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |          |
| 150.000<br>5.9055       | 205.000<br>8.0709  | 28.580<br>1.1250 | 179000<br>40300        | 0.46 | 1.31 | 46500<br>10500         | 36500<br>8210    | 1.27 | 339000<br>76100   | JL730646    | JL730612 |
| 150.000<br>5.9055       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81590       | 81962    |
| 150.000<br>5.9055       | 245.000<br>9.6457  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81590       | 81964    |
| 150.812<br>5.9375       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81593       | 81962    |
| 152.400<br>6.0000       | 192.088<br>7.5625  | 25.000<br>0.9843 | 132000<br>29700        | 0.42 | 1.44 | 34200<br>7690          | 24400<br>5480    | 1.40 | 277000<br>62200   | L630349     | L630310  |
| 152.400<br>6.0000       | 203.200<br>8.0000  | 28.575<br>1.1250 | 179000<br>40300        | 0.46 | 1.31 | 46500<br>10500         | 36500<br>8210    | 1.27 | 339000<br>76100   | L730649     | L730610  |
| 152.400<br>6.0000       | 203.200<br>8.0000  | 41.275<br>1.6250 | 262000<br>59000        | 0.35 | 1.73 | 68000<br>15300         | 40400<br>9090    | 1.68 | 556000<br>125000  | LM330448    | LM330410 |
| 152.400<br>6.0000       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81600       | 81962    |
| 152.400<br>6.0000       | 249.974<br>9.8415  | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99600       | 99097    |
| 152.400<br>6.0000       | 250.000<br>9.8425  | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99600       | 99098X   |
| 152.400<br>6.0000       | 254.000<br>10.0000 | 66.675<br>2.6250 | 611000<br>137000       | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99600       | 99100    |
| 152.400<br>6.0000       | 268.288<br>10.5625 | 74.612<br>2.9375 | 726000<br>163000       | 0.39 | 1.55 | 188000<br>42300        | 125000<br>28100  | 1.51 | 1170000<br>263000 | EE107060    | 107105   |
| 152.400<br>6.0000       | 285.750<br>11.2500 | 76.200<br>3.0000 | 701000<br>158000       | 0.40 | 1.49 | 182000<br>40800        | 125000<br>28100  | 1.45 | 1060000<br>237000 | EE217060    | 217112   |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 88.900<br>3.5000 | 975000<br>219000       | 0.33 | 1.84 | 253000<br>56800        | 141000<br>31700  | 1.79 | 1480000<br>333000 | EE450601    | 451212   |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000 | HH234048    | HH234010 |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000 | HH234049    | HH234010 |
| 152.400<br>6.0000       | 317.500<br>12.5000 | 88.900<br>3.5000 | 1130000<br>254000      | 0.33 | 1.84 | 293000<br>65900        | 164000<br>36800  | 1.79 | 1580000<br>354000 | HH234049    | HH234018 |
| 155.575<br>6.1250       | 330.200<br>13.0000 | 85.725<br>3.3750 | 960000<br>216000       | 0.81 | 0.74 | 249000<br>56000        | 345000<br>77500  | 0.72 | 1400000<br>316000 | H936340     | H936310  |
| 155.575<br>6.1250       | 336.550<br>13.2500 | 85.725<br>3.3750 | 960000<br>216000       | 0.81 | 0.74 | 249000<br>56000        | 345000<br>77500  | 0.72 | 1400000<br>316000 | H936340     | H936313  |
| 155.575<br>6.1250       | 342.900<br>13.5000 | 85.725<br>3.3750 | 960000<br>216000       | 0.81 | 0.74 | 249000<br>56000        | 345000<br>77500  | 0.72 | 1400000<br>316000 | H936340     | H936316  |
| 158.750<br>6.2500       | 205.583<br>8.0938  | 23.812<br>0.9375 | 136000<br>30600        | 0.37 | 1.61 | 35300<br>7930          | 22500<br>5060    | 1.57 | 280000<br>63000   | L432348     | L432310  |
| 158.750<br>6.2500       | 225.425<br>8.8750  | 41.275<br>1.6250 | 281000<br>63100        | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000  | 46780       | 46720    |
| 158.750<br>6.2500       | 285.750<br>11.2500 | 76.200<br>3.0000 | 701000<br>158000       | 0.40 | 1.49 | 182000<br>40800        | 125000<br>28100  | 1.45 | 1060000<br>237000 | EE217062X   | 217112   |
| 158.750<br>6.2500       | 304.800<br>12.0000 | 66.675<br>2.6250 | 591000<br>133000       | 0.36 | 1.67 | 153000<br>34500        | 94500<br>21200   | 1.62 | 867000<br>195000  | EE280626    | 281200   |
| 159.951<br>6.2973       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81629       | 81962    |
| 159.951<br>6.2973       | 244.475<br>9.6250  | 47.625<br>1.8750 | 372000<br>83600        | 0.35 | 1.71 | 96400<br>21700         | 58100<br>13100   | 1.66 | 595000<br>134000  | 81630       | 81962    |
| 160.000<br>6.2992       | 240.000<br>9.4488  | 46.000<br>1.8110 | 393000<br>88400        | 0.44 | 1.37 | 102000<br>22900        | 76300<br>17200   | 1.34 | 759000<br>171000  | JM734445    | JM734410 |
| 160.325<br>6.3120       | 288.925<br>11.3750 | 63.500<br>2.5000 | 763000<br>171000       | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000 | HM237532    | HM237510 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing                 |                         |                       | Dimensions, mm (inches)    |                                   |                          |                                     |                       |                       | Cage                 |                       | Factors        |                |                | Weight<br>kg (lbs.)   |
|-------------------------|-------------------------|-----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|-----------------------|-----------------------|----------------------|-----------------------|----------------|----------------|----------------|-----------------------|
|                         |                         |                       | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                       |                       |                      |                       |                |                |                |                       |
| B                       | C                       | a <sup>(3)</sup>      | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>        | D <sub>b</sub>        | A <sub>a</sub>       | A <sub>b</sub>        | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                       |
| <b>28.575</b><br>1.1250 | <b>21.438</b><br>0.8440 | <b>11.4</b><br>0.45   | <b>3.3</b><br>0.13         | <b>158.0</b><br>6.22              | <b>164.0</b><br>6.46     | <b>3.3</b><br>0.13                  | <b>198.0</b><br>7.80  | <b>190.0</b><br>7.48  | <b>2.40</b><br>0.10  | <b>1.40</b><br>0.06   | <b>295</b>     | <b>103</b>     | <b>0.1763</b>  | <b>2.61</b><br>5.76   |
| <b>50.005</b><br>1.9687 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>163.0</b><br>6.42              | <b>169.0</b><br>6.65     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>-0.10</b><br>0.00  | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>7.87</b><br>17.36  |
| <b>50.005</b><br>1.9687 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>163.0</b><br>6.42              | <b>169.0</b><br>6.65     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>-0.10</b><br>0.00  | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>7.92</b><br>17.46  |
| <b>50.005</b><br>1.9687 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>164.0</b><br>6.46              | <b>169.0</b><br>6.65     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>-0.10</b><br>0.00  | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>7.80</b><br>17.21  |
| <b>24.000</b><br>0.9449 | <b>19.000</b><br>0.7480 | <b>10.2</b><br>0.40   | <b>2.0</b><br>0.08         | <b>158.0</b><br>6.22              | <b>162.0</b><br>6.38     | <b>2.0</b><br>0.08                  | <b>187.0</b><br>7.36  | <b>183.0</b><br>7.20  | <b>1.90</b><br>0.08  | <b>2.50</b><br>0.10   | <b>293</b>     | <b>164</b>     | <b>0.1698</b>  | <b>1.56</b><br>3.44   |
| <b>28.575</b><br>1.1250 | <b>21.438</b><br>0.8440 | <b>11.4</b><br>0.45   | <b>3.3</b><br>0.13         | <b>160.0</b><br>6.30              | <b>165.0</b><br>6.50     | <b>3.3</b><br>0.13                  | <b>198.0</b><br>7.80  | <b>190.0</b><br>7.48  | <b>2.40</b><br>0.10  | <b>1.40</b><br>0.06   | <b>295</b>     | <b>103</b>     | <b>0.1763</b>  | <b>2.35</b><br>5.18   |
| <b>41.275</b><br>1.6250 | <b>34.925</b><br>1.3750 | <b>-1.8</b><br>-0.07  | <b>3.3</b><br>0.13         | <b>162.0</b><br>6.37              | <b>166.0</b><br>6.54     | <b>3.3</b><br>0.13                  | <b>197.0</b><br>7.76  | <b>189.0</b><br>7.44  | <b>2.90</b><br>0.11  | <b>0.90</b><br>0.04   | <b>456</b>     | <b>135</b>     | <b>0.1289</b>  | <b>3.51</b><br>7.74   |
| <b>50.005</b><br>1.9687 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>165.0</b><br>6.50              | <b>171.0</b><br>6.73     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>-0.10</b><br>0.00  | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>7.64</b><br>16.84  |
| <b>66.675</b><br>2.6250 | <b>53.400</b><br>2.1024 | <b>-12.2</b><br>-0.48 | <b>7.0</b><br>0.28         | <b>169.5</b><br>6.68              | <b>181.0</b><br>7.13     | <b>3.0</b><br>0.12                  | <b>240.0</b><br>9.44  | <b>226.0</b><br>8.90  | <b>9.70</b><br>0.38  | <b>3.50</b><br>0.14   | <b>556</b>     | <b>66.7</b>    | <b>0.1459</b>  | <b>12.05</b><br>26.56 |
| <b>66.675</b><br>2.6250 | <b>47.625</b><br>1.8750 | <b>-12.2</b><br>-0.48 | <b>7.0</b><br>0.28         | <b>169.5</b><br>6.68              | <b>181.0</b><br>7.13     | <b>3.3</b><br>0.13                  | <b>238.0</b><br>9.37  | <b>226.0</b><br>8.90  | <b>9.70</b><br>0.38  | <b>3.50</b><br>0.14   | <b>556</b>     | <b>66.7</b>    | <b>0.1459</b>  | <b>11.85</b><br>26.13 |
| <b>66.675</b><br>2.6250 | <b>47.625</b><br>1.8750 | <b>-12.2</b><br>-0.48 | <b>7.0</b><br>0.28         | <b>169.5</b><br>6.68              | <b>181.0</b><br>7.13     | <b>3.3</b><br>0.13                  | <b>238.0</b><br>9.37  | <b>227.0</b><br>8.94  | <b>9.70</b><br>0.38  | <b>3.50</b><br>0.14   | <b>556</b>     | <b>66.7</b>    | <b>0.1459</b>  | <b>12.47</b><br>27.50 |
| <b>74.612</b><br>2.9375 | <b>57.150</b><br>2.2500 | <b>-15.0</b><br>-0.59 | <b>6.4</b><br>0.25         | <b>171.0</b><br>6.73              | <b>181.0</b><br>7.13     | <b>6.4</b><br>0.25                  | <b>249.5</b><br>9.82  | <b>237.0</b><br>9.33  | <b>7.70</b><br>0.30  | <b>3.00</b><br>0.12   | <b>606</b>     | <b>76.3</b>    | <b>0.1163</b>  | <b>16.50</b><br>36.38 |
| <b>73.025</b><br>2.8750 | <b>55.562</b><br>2.1875 | <b>-15.0</b><br>-0.59 | <b>1.5</b><br>0.06         | <b>171.0</b><br>6.73              | <b>171.0</b><br>6.73     | <b>6.4</b><br>0.25                  | <b>260.5</b><br>10.25 | <b>251.0</b><br>9.88  | <b>15.00</b><br>0.59 | <b>1.70</b><br>0.07   | <b>556</b>     | <b>71.8</b>    | <b>0.1140</b>  | <b>19.41</b><br>42.80 |
| <b>93.662</b><br>3.6875 | <b>61.912</b><br>2.4375 | <b>-28.2</b><br>-1.11 | <b>9.7</b><br>0.38         | <b>177.0</b><br>6.97              | <b>189.0</b><br>7.44     | <b>6.8</b><br>0.27                  | <b>275.0</b><br>10.82 | <b>269.0</b><br>10.59 | <b>17.90</b><br>0.70 | <b>-2.80</b><br>-0.11 | <b>747</b>     | <b>76.3</b>    | <b>0.1176</b>  | <b>28.50</b><br>62.82 |
| <b>93.662</b><br>3.6875 | <b>66.675</b><br>2.6250 | <b>-26.4</b><br>-1.04 | <b>9.7</b><br>0.38         | <b>179.0</b><br>7.05              | <b>191.0</b><br>7.52     | <b>6.8</b><br>0.27                  | <b>285.5</b><br>11.24 | <b>276.0</b><br>10.87 | <b>12.50</b><br>0.49 | <b>-0.90</b><br>-0.04 | <b>718</b>     | <b>62.1</b>    | <b>0.1157</b>  | <b>28.63</b><br>63.11 |
| <b>93.662</b><br>3.6875 | <b>66.675</b><br>2.6250 | <b>-26.4</b><br>-1.04 | <b>9.7</b><br>0.38         | <b>179.0</b><br>7.05              | <b>191.0</b><br>7.52     | <b>6.8</b><br>0.27                  | <b>285.5</b><br>11.24 | <b>276.0</b><br>10.87 | <b>10.50</b><br>0.42 | <b>0.80</b><br>0.03   | <b>718</b>     | <b>62.1</b>    | <b>0.1157</b>  | <b>27.33</b><br>60.25 |
| <b>93.662</b><br>3.6875 | <b>66.675</b><br>2.6250 | <b>-26.4</b><br>-1.04 | <b>9.7</b><br>0.38         | <b>179.0</b><br>7.05              | <b>191.0</b><br>7.52     | <b>6.8</b><br>0.27                  | <b>285.5</b><br>11.24 | <b>280.0</b><br>11.02 | <b>10.50</b><br>0.42 | <b>0.80</b><br>0.03   | <b>718</b>     | <b>62.1</b>    | <b>0.1157</b>  | <b>29.75</b><br>65.59 |
| <b>79.375</b><br>3.1250 | <b>53.975</b><br>2.1250 | <b>16.8</b><br>0.66   | <b>6.4</b><br>0.25         | <b>192.5</b><br>7.58              | <b>209.0</b><br>8.23     | <b>6.4</b><br>0.25                  | <b>311.5</b><br>12.26 | <b>282.0</b><br>11.10 | <b>18.40</b><br>0.72 | <b>9.20</b><br>0.36   | <b>638</b>     | <b>69.1</b>    | <b>0.1475</b>  | <b>31.49</b><br>69.42 |
| <b>79.375</b><br>3.1250 | <b>53.975</b><br>2.1250 | <b>16.8</b><br>0.66   | <b>6.4</b><br>0.25         | <b>192.5</b><br>7.58              | <b>209.0</b><br>8.23     | <b>6.4</b><br>0.25                  | <b>311.0</b><br>12.24 | <b>285.0</b><br>11.22 | <b>18.40</b><br>0.72 | <b>9.20</b><br>0.36   | <b>638</b>     | <b>69.1</b>    | <b>0.1475</b>  | <b>32.89</b><br>72.51 |
| <b>79.375</b><br>3.1250 | <b>53.975</b><br>2.1250 | <b>16.8</b><br>0.66   | <b>6.4</b><br>0.25         | <b>192.5</b><br>7.58              | <b>209.0</b><br>8.23     | <b>6.4</b><br>0.25                  | <b>311.5</b><br>12.26 | <b>287.0</b><br>11.30 | <b>18.40</b><br>0.72 | <b>9.20</b><br>0.36   | <b>638</b>     | <b>69.1</b>    | <b>0.1475</b>  | <b>34.32</b><br>75.66 |
| <b>23.812</b><br>0.9375 | <b>18.258</b><br>0.7188 | <b>9.4</b><br>0.37    | <b>4.8</b><br>0.19         | <b>166.0</b><br>6.54              | <b>174.0</b><br>6.85     | <b>1.5</b><br>0.06                  | <b>199.0</b><br>7.83  | <b>195.0</b><br>7.68  | <b>2.00</b><br>0.08  | <b>1.20</b><br>0.05   | <b>320</b>     | <b>177</b>     | <b>0.1683</b>  | <b>1.85</b><br>4.09   |
| <b>39.688</b><br>1.5625 | <b>33.338</b><br>1.3125 | <b>2.5</b><br>0.10    | <b>3.5</b><br>0.14         | <b>169.0</b><br>6.65              | <b>176.0</b><br>6.93     | <b>3.3</b><br>0.13                  | <b>218.0</b><br>8.58  | <b>209.0</b><br>8.23  | <b>4.00</b><br>0.16  | <b>2.00</b><br>0.08   | <b>572</b>     | <b>133</b>     | <b>0.1432</b>  | <b>5.15</b><br>11.34  |
| <b>73.025</b><br>2.8750 | <b>55.562</b><br>2.1875 | <b>-15.0</b><br>-0.59 | <b>13.5</b><br>0.53        | <b>176.0</b><br>6.93              | <b>200.0</b><br>7.87     | <b>6.4</b><br>0.25                  | <b>260.5</b><br>10.25 | <b>251.0</b><br>9.88  | <b>15.00</b><br>0.59 | <b>1.70</b><br>0.07   | <b>556</b>     | <b>71.8</b>    | <b>0.1140</b>  | <b>18.84</b><br>41.54 |
| <b>69.106</b><br>2.7207 | <b>42.862</b><br>1.6875 | <b>-12.2</b><br>-0.48 | <b>6.4</b><br>0.25         | <b>180.0</b><br>7.09              | <b>192.0</b><br>7.56     | <b>3.3</b><br>0.13                  | <b>282.5</b><br>11.12 | <b>279.0</b><br>10.98 | <b>15.20</b><br>0.60 | <b>0.90</b><br>0.04   | <b>591</b>     | <b>86</b>      | <b>0.1115</b>  | <b>19.79</b><br>43.62 |
| <b>50.005</b><br>1.9687 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>165.0</b><br>6.50              | <b>176.0</b><br>6.93     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>-0.10</b><br>0.00  | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>7.03</b><br>15.49  |
| <b>46.830</b><br>1.8437 | <b>33.338</b><br>1.3125 | <b>-5.3</b><br>-0.21  | <b>3.5</b><br>0.14         | <b>171.0</b><br>6.73              | <b>176.0</b><br>6.93     | <b>3.3</b><br>0.13                  | <b>229.0</b><br>9.02  | <b>225.0</b><br>8.86  | <b>8.30</b><br>0.33  | <b>3.10</b><br>0.12   | <b>413</b>     | <b>98.4</b>    | <b>0.1250</b>  | <b>6.88</b><br>15.18  |
| <b>44.500</b><br>1.7520 | <b>37.000</b><br>1.4567 | <b>5.1</b><br>0.20    | <b>3.0</b><br>0.12         | <b>173.0</b><br>6.81              | <b>178.0</b><br>7.01     | <b>2.5</b><br>0.10                  | <b>232.0</b><br>9.13  | <b>222.0</b><br>8.74  | <b>2.70</b><br>0.11  | <b>4.00</b><br>0.16   | <b>548</b>     | <b>117</b>     | <b>0.1164</b>  | <b>7.16</b><br>15.78  |
| <b>63.500</b><br>2.5000 | <b>47.625</b><br>1.8750 | <b>-11.7</b><br>-0.46 | <b>7.0</b><br>0.28         | <b>181.0</b><br>7.13              | <b>192.0</b><br>7.56     | <b>3.3</b><br>0.13                  | <b>271.5</b><br>10.68 | <b>266.0</b><br>10.47 | <b>5.80</b><br>0.23  | <b>4.10</b><br>0.16   | <b>751</b>     | <b>101</b>     | <b>0.1168</b>  | <b>17.34</b><br>38.23 |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

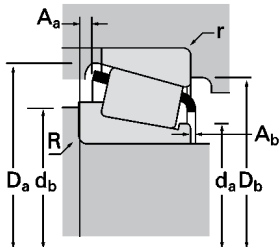
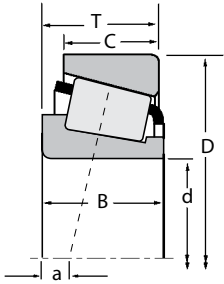
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |        |       |       |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--------|-------|-------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> | Static | Inner | Outer |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |        |       |       |
| 165.100<br>6.5000       | 215.900<br>8.5000  | 26.195<br>1.0313  | 165000<br>37200        | 0.36 | 1.65 | 42900<br>9640          | 26800<br>6010    | 1.60 | 335000<br>75300        | L433749     | L433710                |        |       |       |
| 165.100<br>6.5000       | 225.425<br>8.8750  | 41.275<br>1.6250  | 281000<br>63100        | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000       | 46790       | 46720                  |        |       |       |
| 165.100<br>6.5000       | 225.425<br>8.8750  | 41.275<br>1.6250  | 281000<br>63100        | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000       | 46790A      | 46720                  |        |       |       |
| 165.100<br>6.5000       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000       | 67780       | 67720                  |        |       |       |
| 165.100<br>6.5000       | 254.000<br>10.0000 | 46.038<br>1.8125  | 389000<br>87400        | 0.37 | 1.62 | 101000<br>22700        | 63800<br>14300   | 1.58 | 644000<br>145000       | 86650       | 86100                  |        |       |       |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 63.500<br>2.5000  | 611000<br>137000       | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000      | 94649       | 94113                  |        |       |       |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 63.500<br>2.5000  | 763000<br>171000       | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000      | HM237535    | HM237510               |        |       |       |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 63.500<br>2.5000  | 763000<br>171000       | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000      | HM237536    | HM237510               |        |       |       |
| 165.100<br>6.5000       | 298.450<br>11.7500 | 82.550<br>3.2500  | 909000<br>204000       | 0.38 | 1.59 | 236000<br>53000        | 152000<br>34300  | 1.55 | 1520000<br>341000      | EE219065    | 219117                 |        |       |       |
| 165.100<br>6.5000       | 311.150<br>12.2500 | 82.550<br>3.2500  | 909000<br>204000       | 0.38 | 1.59 | 236000<br>53000        | 152000<br>34300  | 1.55 | 1520000<br>341000      | EE219065    | 219122                 |        |       |       |
| 165.100<br>6.5000       | 311.150<br>12.2500 | 82.550<br>3.2500  | 1040000<br>233000      | 0.33 | 1.81 | 269000<br>60400        | 152000<br>34200  | 1.77 | 1680000<br>378000      | H238140     | H238110                |        |       |       |
| 165.100<br>6.5000       | 336.550<br>13.2500 | 92.075<br>3.6250  | 1290000<br>291000      | 0.37 | 1.62 | 336000<br>75400        | 213000<br>47900  | 1.57 | 1930000<br>434000      | HH437549    | HH437510               |        |       |       |
| 165.100<br>6.5000       | 361.950<br>14.2500 | 106.362<br>4.1875 | 1420000<br>319000      | 0.33 | 1.79 | 367000<br>82600        | 211000<br>47300  | 1.74 | 1950000<br>439000      | EE108065    | 108142                 |        |       |       |
| 165.100<br>6.5000       | 365.049<br>14.3720 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000      | EE420651    | 421437                 |        |       |       |
| 166.687<br>6.5625       | 225.425<br>8.8750  | 41.275<br>1.6250  | 281000<br>63100        | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000       | 46792       | 46720                  |        |       |       |
| 168.275<br>6.6250       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000       | 67782       | 67720                  |        |       |       |
| 168.275<br>6.6250       | 330.200<br>13.0000 | 85.725<br>3.3750  | 960000<br>216000       | 0.81 | 0.74 | 249000<br>56000        | 345000<br>77500  | 0.72 | 1400000<br>316000      | H936349     | H936310                |        |       |       |
| 168.275<br>6.6250       | 342.900<br>13.5000 | 85.725<br>3.3750  | 960000<br>216000       | 0.81 | 0.74 | 249000<br>56000        | 345000<br>77500  | 0.72 | 1400000<br>316000      | H936349     | H936316                |        |       |       |
| 170.000<br>6.6929       | 230.000<br>9.0551  | 39.000<br>1.5354  | 310000<br>69700        | 0.38 | 1.57 | 80400<br>18100         | 52700<br>11900   | 1.52 | 590000<br>133000       | JHM534149   | JHM534110              |        |       |       |
| 170.000<br>6.6929       | 240.000<br>9.4488  | 46.000<br>1.8110  | 393000<br>88400        | 0.44 | 1.37 | 102000<br>22900        | 76300<br>17200   | 1.34 | 759000<br>171000       | JM734449    | JM734410               |        |       |       |
| 170.000<br>6.6929       | 254.000<br>10.0000 | 46.038<br>1.8125  | 389000<br>87400        | 0.37 | 1.62 | 101000<br>22700        | 63800<br>14300   | 1.58 | 644000<br>145000       | 86669       | 86100                  |        |       |       |
| 170.000<br>6.6929       | 254.000<br>10.0000 | 46.038<br>1.8125  | 438000<br>98500        | 0.32 | 1.88 | 114000<br>25500        | 62000<br>13900   | 1.83 | 740000<br>166000       | M235149     | M235113                |        |       |       |
| 171.450<br>6.7500       | 260.350<br>10.2500 | 66.675<br>2.6250  | 605000<br>136000       | 0.40 | 1.49 | 157000<br>35300        | 108000<br>24300  | 1.45 | 1180000<br>265000      | HM535349    | HM535310               |        |       |       |
| 174.625<br>6.8750       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000       | 67786       | 67720                  |        |       |       |
| 174.625<br>6.8750       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000       | 67787       | 67720                  |        |       |       |
| 174.625<br>6.8750       | 260.350<br>10.2500 | 53.975<br>2.1250  | 497000<br>112000       | 0.33 | 1.80 | 129000<br>29000        | 73400<br>16500   | 1.76 | 933000<br>210000       | M236845     | M236810                |        |       |       |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 63.500<br>2.5000  | 611000<br>137000       | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000      | 94687       | 94113                  |        |       |       |
| 174.625<br>6.8750       | 298.450<br>11.7500 | 82.550<br>3.2500  | 909000<br>204000       | 0.38 | 1.59 | 236000<br>53000        | 152000<br>34300  | 1.55 | 1520000<br>341000      | EE219068    | 219117                 |        |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                | Cage           |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 26.195<br>1.0313  | 20.638<br>0.8125 | 8.6<br>0.34      | 1.5<br>0.06                | 172.0<br>6.77                     | 174.0<br>6.85            | 1.5<br>0.06                         | 209.0<br>8.23  | 205.0<br>8.07  | 2.50<br>0.10   | 1.40<br>0.06   | 365            | 168            | 0.1748         | 2.35<br>5.18        |
| 39.688<br>1.5625  | 33.338<br>1.3125 | 2.5<br>0.10      | 3.5<br>0.14                | 174.0<br>6.85                     | 181.0<br>7.13            | 3.3<br>0.13                         | 218.0<br>8.58  | 209.0<br>8.23  | 4.00<br>0.16   | 2.00<br>0.08   | 572            | 175            | 0.1432         | 4.64<br>10.24       |
| 39.687<br>1.5625  | 33.338<br>1.3125 | 2.5<br>0.10      | 8.0<br>0.31                | 174.0<br>6.85                     | 189.0<br>7.44            | 3.3<br>0.13                         | 218.0<br>8.58  | 209.0<br>8.23  | 4.00<br>0.16   | 2.00<br>0.08   | 572            | 154            | 0.1432         | 4.54<br>10.01       |
| 47.625<br>1.8750  | 38.100<br>1.5000 | 4.8<br>0.19      | 3.5<br>0.14                | 179.0<br>7.05                     | 185.0<br>7.28            | 3.3<br>0.13                         | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 7.95<br>17.53       |
| 46.038<br>1.8125  | 33.338<br>1.3125 | -1.5<br>-0.06    | 4.8<br>0.19                | 176.0<br>6.93                     | 185.0<br>7.28            | 3.3<br>0.13                         | 239.0<br>9.41  | 234.0<br>9.21  | 6.90<br>0.27   | 1.90<br>0.08   | 466            | 112            | 0.1041         | 7.55<br>16.65       |
| 63.500<br>2.5000  | 47.625<br>1.8750 | -0.8<br>-0.03    | 7.0<br>0.28                | 186.0<br>7.32                     | 197.0<br>7.76            | 3.3<br>0.13                         | 272.0<br>10.71 | 259.0<br>10.20 | 6.80<br>0.27   | 5.20<br>0.21   | 692            | 93.8           | 0.1287         | 16.98<br>37.44      |
| 63.500<br>2.5000  | 47.625<br>1.8750 | -11.7<br>-0.46   | 7.0<br>0.28                | 184.0<br>7.24                     | 195.0<br>7.68            | 3.3<br>0.13                         | 271.5<br>10.68 | 266.0<br>10.47 | 5.80<br>0.23   | 4.10<br>0.16   | 751            | 101            | 0.1168         | 16.73<br>36.89      |
| 63.500<br>2.5000  | 47.625<br>1.8750 | -11.7<br>-0.46   | 7.0<br>0.28                | 187.0<br>7.36                     | 195.0<br>7.68            | 3.3<br>0.13                         | 271.5<br>10.68 | 266.0<br>10.47 | 5.80<br>0.23   | 4.10<br>0.16   | 751            | 101            | 0.1168         | 16.72<br>36.85      |
| 82.550<br>3.2500  | 63.500<br>2.5000 | -15.2<br>-0.60   | 6.4<br>0.25                | 185.0<br>7.28                     | 196.0<br>7.72            | 6.4<br>0.25                         | 282.0<br>11.10 | 269.0<br>10.59 | 10.00<br>0.39  | 0.20<br>0.01   | 841            | 94.9           | 0.1286         | 23.74<br>52.33      |
| 82.550<br>3.2500  | 63.500<br>2.5000 | -15.2<br>-0.60   | 6.4<br>0.25                | 185.0<br>7.28                     | 196.0<br>7.72            | 6.4<br>0.25                         | 282.0<br>11.10 | 275.0<br>10.83 | 10.00<br>0.39  | 0.20<br>0.01   | 841            | 94.9           | 0.1286         | 26.75<br>58.97      |
| 82.550<br>3.2500  | 65.088<br>2.5625 | -18.5<br>-0.73   | 6.4<br>0.25                | 188.0<br>7.40                     | 198.0<br>7.80            | 6.4<br>0.25                         | 288.5<br>11.36 | 280.0<br>11.02 | 8.20<br>0.32   | 2.10<br>0.08   | 914            | 92.1           | 0.1265         | 27.13<br>59.80      |
| 95.250<br>3.7500  | 69.850<br>2.7500 | -21.3<br>-0.84   | 3.3<br>0.13                | 196.0<br>7.72                     | 196.0<br>7.72            | 6.4<br>0.25                         | 308.0<br>12.12 | 297.0<br>11.69 | 11.70<br>0.46  | 1.00<br>0.04   | 910            | 75             | 0.1310         | 37.04<br>81.66      |
| 104.775<br>4.1250 | 76.200<br>3.0000 | -32.8<br>-1.29   | 13.5<br>0.53               | 194.0<br>7.64                     | 215.0<br>8.46            | 3.3<br>0.13                         | 329.0<br>12.95 | 323.0<br>12.72 | 16.90<br>0.66  | 5.60<br>0.22   | 942            | 71.4           | 0.1274         | 47.23<br>104.13     |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 9.7<br>0.38                | 199.0<br>7.83                     | 215.0<br>8.46            | 3.3<br>0.13                         | 334.5<br>13.16 | 329.0<br>12.95 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 44.52<br>98.14      |
| 39.687<br>1.5625  | 33.338<br>1.3125 | 2.5<br>0.10      | 3.5<br>0.14                | 175.0<br>6.89                     | 182.0<br>7.17            | 3.3<br>0.13                         | 218.0<br>8.58  | 209.0<br>8.23  | 4.00<br>0.16   | 2.00<br>0.08   | 572            | 154            | 0.1432         | 4.51<br>9.95        |
| 47.625<br>1.8750  | 38.100<br>1.5000 | 4.8<br>0.19      | 3.5<br>0.14                | 181.0<br>7.13                     | 187.0<br>7.36            | 3.3<br>0.13                         | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 7.64<br>16.85       |
| 79.375<br>3.1250  | 53.975<br>2.1250 | 16.8<br>0.66     | 6.4<br>0.25                | 192.5<br>7.58                     | 218.0<br>8.58            | 6.4<br>0.25                         | 311.5<br>12.26 | 282.0<br>11.10 | 18.40<br>0.72  | 9.20<br>0.36   | 638            | 69.1           | 0.1475         | 29.48<br>64.99      |
| 79.375<br>3.1250  | 53.975<br>2.1250 | 16.8<br>0.66     | 6.4<br>0.25                | 192.5<br>7.58                     | 218.0<br>8.58            | 6.4<br>0.25                         | 311.5<br>12.26 | 287.0<br>11.30 | 18.40<br>0.72  | 9.20<br>0.36   | 638            | 69.1           | 0.1475         | 32.31<br>71.22      |
| 38.000<br>1.4961  | 31.000<br>1.2205 | 4.6<br>0.18      | 3.0<br>0.12                | 178.0<br>7.01                     | 184.0<br>7.24            | 2.5<br>0.10                         | 224.0<br>8.82  | 217.0<br>8.54  | 1.00<br>0.04   | 3.40<br>0.13   | 480            | 89.8           | 0.1350         | 4.29<br>9.46        |
| 44.500<br>1.7520  | 37.000<br>1.4567 | 5.1<br>0.20      | 3.0<br>0.12                | 180.0<br>7.09                     | 185.0<br>7.28            | 2.5<br>0.10                         | 232.0<br>9.13  | 222.0<br>8.74  | 2.70<br>0.11   | 4.00<br>0.16   | 548            | 117            | 0.1164         | 6.25<br>13.79       |
| 46.038<br>1.8125  | 33.338<br>1.3125 | -1.5<br>-0.06    | 4.8<br>0.19                | 180.0<br>7.09                     | 189.0<br>7.44            | 3.3<br>0.13                         | 239.0<br>9.41  | 234.0<br>9.21  | 6.90<br>0.27   | 1.90<br>0.08   | 466            | 112            | 0.1041         | 7.09<br>15.63       |
| 46.038<br>1.8125  | 33.338<br>1.3125 | -4.6<br>-0.18    | 4.8<br>0.19                | 182.0<br>7.17                     | 189.0<br>7.44            | 3.3<br>0.13                         | 240.0<br>9.45  | 235.0<br>9.25  | 4.90<br>0.19   | 3.00<br>0.12   | 531            | 107            | 0.1037         | 7.30<br>16.09       |
| 66.675<br>2.6250  | 52.388<br>2.0625 | -8.6<br>-0.34    | 3.5<br>0.14                | 188.0<br>7.40                     | 192.0<br>7.56            | 3.3<br>0.13                         | 250.0<br>9.84  | 236.0<br>9.29  | 6.00<br>0.24   | 2.10<br>0.08   | 750            | 116            | 0.1263         | 12.16<br>26.80      |
| 47.625<br>1.8750  | 38.100<br>1.5000 | 4.8<br>0.19      | 8.0<br>0.31                | 185.0<br>7.28                     | 200.0<br>7.87            | 3.3<br>0.13                         | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 6.89<br>15.20       |
| 47.625<br>1.8750  | 38.100<br>1.5000 | 4.8<br>0.19      | 3.5<br>0.14                | 185.0<br>7.28                     | 192.0<br>7.56            | 3.3<br>0.13                         | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 7.00<br>15.44       |
| 53.975<br>2.1250  | 41.275<br>1.6250 | -6.6<br>-0.26    | 3.5<br>0.14                | 189.0<br>7.44                     | 193.0<br>7.60            | 3.3<br>0.13                         | 249.0<br>9.80  | 241.0<br>9.49  | 4.60<br>0.18   | 3.20<br>0.13   | 691            | 100            | 0.1150         | 9.41<br>20.75       |
| 63.500<br>2.5000  | 47.625<br>1.8750 | -0.8<br>-0.03    | 7.0<br>0.28                | 193.0<br>7.60                     | 204.0<br>8.03            | 3.3<br>0.13                         | 272.0<br>10.71 | 259.0<br>10.20 | 6.80<br>0.27   | 5.20<br>0.21   | 692            | 93.8           | 0.1287         | 15.72<br>34.65      |
| 82.550<br>3.2500  | 63.500<br>2.5000 | -15.2<br>-0.60   | 6.4<br>0.25                | 193.0<br>7.60                     | 204.0<br>8.03            | 6.4<br>0.25                         | 282.0<br>11.10 | 269.0<br>10.59 | 10.00<br>0.39  | 0.20<br>0.01   | 841            | 94.9           | 0.1286         | 22.09<br>48.70      |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

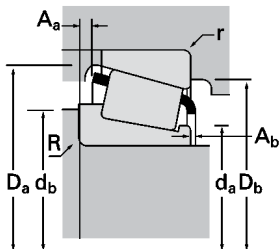
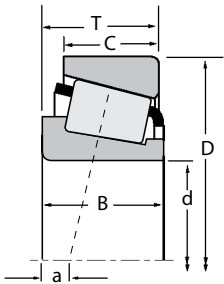
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |           |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|-----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer     |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |           |
| 174.625<br>6.8750       | 311.150<br>12.2500 | 82.550<br>3.2500  | 909000<br>204000       | 0.38 | 1.59 | 236000<br>53000        | 152000<br>34300  | 1.55 | 1520000<br>341000 | EE219068    | 219122    |
| 174.625<br>6.8750       | 311.150<br>12.2500 | 82.550<br>3.2500  | 1040000<br>233000      | 0.33 | 1.81 | 269000<br>60400        | 152000<br>34200  | 1.77 | 1680000<br>378000 | H238148     | H238110   |
| 177.800<br>7.0000       | 215.900<br>8.5000  | 20.638<br>0.8125  | 113000<br>25500        | 0.45 | 1.33 | 29400<br>6600          | 22600<br>5090    | 1.30 | 252000<br>56600   | LL735449    | LL735410  |
| 177.800<br>7.0000       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000  | 67790       | 67720     |
| 177.800<br>7.0000       | 247.650<br>9.7500  | 47.625<br>1.8750  | 375000<br>84300        | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000  | 67791       | 67720     |
| 177.800<br>7.0000       | 260.350<br>10.2500 | 53.975<br>2.1250  | 497000<br>112000       | 0.33 | 1.80 | 129000<br>29000        | 73400<br>16500   | 1.76 | 933000<br>210000  | M236848     | M236810   |
| 177.800<br>7.0000       | 260.350<br>10.2500 | 53.975<br>2.1250  | 497000<br>112000       | 0.33 | 1.80 | 129000<br>29000        | 73400<br>16500   | 1.76 | 933000<br>210000  | M236849     | M236810   |
| 177.800<br>7.0000       | 269.875<br>10.6250 | 55.562<br>2.1875  | 508000<br>114000       | 0.33 | 1.80 | 132000<br>29600        | 74900<br>16800   | 1.76 | 999000<br>225000  | M238840     | M238810   |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 63.500<br>2.5000  | 611000<br>137000       | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000 | 94700       | 94113     |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 63.500<br>2.5000  | 763000<br>171000       | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000 | HM237545    | HM237510  |
| 177.800<br>7.0000       | 298.450<br>11.7500 | 63.500<br>2.5000  | 611000<br>137000       | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000 | 94700       | 94118     |
| 177.800<br>7.0000       | 319.964<br>12.5970 | 88.900<br>3.5000  | 1030000<br>231000      | 0.32 | 1.88 | 267000<br>59900        | 145000<br>32700  | 1.83 | 1580000<br>356000 | H239640     | H239610   |
| 177.800<br>7.0000       | 320.675<br>12.6250 | 88.900<br>3.5000  | 1030000<br>231000      | 0.32 | 1.88 | 267000<br>59900        | 145000<br>32700  | 1.83 | 1580000<br>356000 | H239640     | H239612   |
| 177.800<br>7.0000       | 327.025<br>12.8750 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470078X   | 470128    |
| 177.800<br>7.0000       | 330.200<br>13.0000 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470073    | 470130    |
| 177.800<br>7.0000       | 330.200<br>13.0000 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470078X   | 470130    |
| 177.800<br>7.0000       | 336.550<br>13.2500 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470073    | 470132    |
| 177.800<br>7.0000       | 355.600<br>14.0000 | 61.912<br>2.4375  | 811000<br>182000       | 0.40 | 1.50 | 210000<br>47300        | 144000<br>32300  | 1.46 | 1080000<br>243000 | EE780705    | 781400    |
| 177.800<br>7.0000       | 360.000<br>14.1732 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420701    | 421417    |
| 177.800<br>7.0000       | 365.049<br>14.3720 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420701    | 421437    |
| 177.800<br>7.0000       | 368.300<br>14.5000 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420701    | 421450    |
| 177.800<br>7.0000       | 428.625<br>16.8750 | 106.362<br>4.1875 | 1280000<br>289000      | 0.76 | 0.79 | 333000<br>74900        | 432000<br>97200  | 0.77 | 1700000<br>382000 | EE350701    | 351687    |
| 179.975<br>7.0856       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93708       | 93125     |
| 180.000<br>7.0866       | 250.000<br>9.8425  | 47.000<br>1.8504  | 401000<br>90100        | 0.48 | 1.25 | 104000<br>23400        | 85500<br>19200   | 1.22 | 786000<br>177000  | JM736149A   | JM736110  |
| 180.000<br>7.0866       | 250.000<br>9.8425  | 47.000<br>1.8504  | 401000<br>90100        | 0.48 | 1.25 | 104000<br>23400        | 85500<br>19200   | 1.22 | 786000<br>177000  | JM736149    | JM736110  |
| 184.150<br>7.2500       | 234.950<br>9.2500  | 34.000<br>1.3386  | 263000<br>59100        | 0.33 | 1.79 | 68100<br>15300         | 39100<br>8780    | 1.74 | 550000<br>124000  | LM236749    | LM236710  |
| 184.150<br>7.2500       | 235.229<br>9.2610  | 34.000<br>1.3386  | 263000<br>59100        | 0.33 | 1.79 | 68100<br>15300         | 39100<br>8780    | 1.74 | 550000<br>124000  | LM236749    | LM236710A |
| 184.150<br>7.2500       | 236.538<br>9.3125  | 26.192<br>1.0312  | 161000<br>36100        | 0.40 | 1.49 | 41700<br>9360          | 28700<br>6440    | 1.45 | 337000<br>75700   | LL537649    | LL537610  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                  |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 82.550<br>3.2500 | 63.500<br>2.5000 | -15.2<br>-0.60   | 6.4<br>0.25                                    | 193.0<br>7.60                              | 204.0<br>8.03                              | 6.4<br>0.25      | 282.0<br>11.10 | 275.0<br>10.83 | 10.00<br>0.39  | 0.20<br>0.01   | 841            | 94.9           | 0.1286         | 25.10<br>55.34      |
| 82.550<br>3.2500 | 65.088<br>2.5625 | -18.5<br>-0.73   | 6.4<br>0.25                                    | 195.0<br>7.68                              | 205.0<br>8.07                              | 6.4<br>0.25      | 288.5<br>11.36 | 280.0<br>11.02 | 8.20<br>0.32   | 2.10<br>0.08   | 914            | 92.1           | 0.1265         | 25.48<br>56.18      |
| 20.638<br>0.8125 | 15.083<br>0.5938 | 17.8<br>0.70     | 1.5<br>0.06                                    | 184.0<br>7.24                              | 186.0<br>7.32                              | 1.5<br>0.06      | 212.0<br>8.35  | 207.0<br>8.15  | 1.30<br>0.05   | 1.60<br>0.06   | 346            | 241            | 0.1825         | 1.44<br>3.18        |
| 47.625<br>1.8750 | 38.100<br>1.5000 | 4.8<br>0.19      | 3.5<br>0.14                                    | 188.0<br>7.40                              | 194.0<br>7.64                              | 3.3<br>0.13      | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 6.68<br>14.72       |
| 47.625<br>1.8750 | 38.100<br>1.5000 | 4.8<br>0.19      | 10.5<br>0.41                                   | 188.0<br>7.40                              | 208.0<br>8.19                              | 3.3<br>0.13      | 240.0<br>9.45  | 229.0<br>9.02  | 4.80<br>0.19   | 1.80<br>0.07   | 622            | 122            | 0.1214         | 6.46<br>14.25       |
| 53.975<br>2.1250 | 41.275<br>1.6250 | -6.6<br>-0.26    | 8.0<br>0.31                                    | 191.0<br>7.52                              | 204.0<br>8.03                              | 3.3<br>0.13      | 249.0<br>9.80  | 241.0<br>9.49  | 4.60<br>0.18   | 3.20<br>0.13   | 691            | 100            | 0.1150         | 8.93<br>19.68       |
| 53.975<br>2.1250 | 41.275<br>1.6250 | -6.6<br>-0.26    | 3.5<br>0.14                                    | 191.0<br>7.52                              | 195.0<br>7.68                              | 3.3<br>0.13      | 249.0<br>9.80  | 241.0<br>9.49  | 4.60<br>0.18   | 3.20<br>0.13   | 691            | 100            | 0.1150         | 9.04<br>19.93       |
| 55.562<br>2.1875 | 42.862<br>1.6875 | -6.1<br>-0.24    | 3.5<br>0.14                                    | 194.0<br>7.64                              | 198.0<br>7.80                              | 3.3<br>0.13      | 256.0<br>10.08 | 250.0<br>9.84  | 5.90<br>0.23   | 2.10<br>0.08   | 788            | 118            | 0.1201         | 10.95<br>24.15      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -0.8<br>-0.03    | 7.0<br>0.28                                    | 195.0<br>7.68                              | 207.0<br>8.15                              | 3.3<br>0.13      | 272.0<br>10.71 | 259.0<br>10.20 | 6.80<br>0.27   | 5.20<br>0.21   | 692            | 93.8           | 0.1287         | 15.28<br>33.68      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -11.7<br>-0.46   | 7.0<br>0.28                                    | 194.0<br>7.64                              | 205.0<br>8.07                              | 3.3<br>0.13      | 271.5<br>10.68 | 266.0<br>10.47 | 5.80<br>0.23   | 4.10<br>0.16   | 751            | 101            | 0.1168         | 15.03<br>33.12      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -0.8<br>-0.03    | 7.0<br>0.28                                    | 195.0<br>7.68                              | 207.0<br>8.15                              | 3.3<br>0.13      | 272.0<br>10.71 | 263.0<br>10.35 | 6.80<br>0.27   | 5.20<br>0.21   | 692            | 93.8           | 0.1287         | 16.91<br>37.29      |
| 85.725<br>3.3750 | 65.088<br>2.5625 | -22.4<br>-0.88   | 3.5<br>0.14                                    | 198.0<br>7.80                              | 202.0<br>7.95                              | 4.8<br>0.19      | 300.5<br>11.84 | 293.0<br>11.54 | 11.50<br>0.45  | 2.80<br>0.11   | 906            | 90.3           | 0.1242         | 27.52<br>60.68      |
| 85.725<br>3.3750 | 65.088<br>2.5625 | -22.4<br>-0.88   | 3.5<br>0.14                                    | 198.0<br>7.80                              | 202.0<br>7.95                              | 4.8<br>0.19      | 300.5<br>11.84 | 293.0<br>11.54 | 11.50<br>0.45  | 2.80<br>0.11   | 906            | 90.3           | 0.1242         | 27.71<br>61.08      |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 9.7<br>0.38                                    | 201.0<br>7.91                              | 217.0<br>8.54                              | 6.4<br>0.25      | 306.5<br>12.07 | 294.0<br>11.57 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 30.42<br>67.07      |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 13.5<br>0.53                                   | 201.0<br>7.91                              | 225.0<br>8.86                              | 6.4<br>0.25      | 306.5<br>12.07 | 295.0<br>11.61 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 31.28<br>68.95      |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 9.7<br>0.38                                    | 201.0<br>7.91                              | 217.0<br>8.54                              | 6.4<br>0.25      | 306.5<br>12.07 | 295.0<br>11.61 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 31.48<br>69.40      |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 13.5<br>0.53                                   | 201.0<br>7.91                              | 225.0<br>8.86                              | 6.4<br>0.25      | 306.5<br>12.07 | 298.0<br>11.73 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 32.93<br>72.60      |
| 60.325<br>2.3750 | 41.275<br>1.6250 | -0.3<br>-0.01    | 4.8<br>0.19                                    | 209.0<br>8.23                              | 207.0<br>8.15                              | 4.8<br>0.19      | 321.0<br>12.64 | 320.0<br>12.60 | 7.80<br>0.30   | 5.50<br>0.22   | 646            | 79.4           | 0.1185         | 24.23<br>53.41      |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 12.7<br>0.50                                   | 208.0<br>8.19                              | 231.0<br>9.09                              | 3.3<br>0.13      | 334.5<br>13.16 | 327.0<br>12.87 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 40.54<br>89.37      |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 12.7<br>0.50                                   | 208.0<br>8.19                              | 231.0<br>9.09                              | 3.3<br>0.13      | 334.5<br>13.16 | 329.0<br>12.95 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 41.96<br>92.51      |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 12.7<br>0.50                                   | 208.0<br>8.19                              | 231.0<br>9.09                              | 3.3<br>0.13      | 334.5<br>13.16 | 331.0<br>13.03 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 42.89<br>94.56      |
| 95.250<br>3.7500 | 61.912<br>2.4375 | 13.0<br>0.51     | 6.4<br>0.25                                    | 221.0<br>8.70                              | 230.0<br>9.06                              | 6.4<br>0.25      | 383.0<br>15.08 | 365.0<br>14.37 | 21.10<br>0.83  | 16.00<br>0.63  | 828            | 77.3           | 0.1568         | 62.57<br>137.95     |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 3.5<br>0.14                                    | 204.0<br>8.03                              | 209.0<br>8.23                              | 3.3<br>0.13      | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 21.19<br>46.71      |
| 45.000<br>1.7717 | 37.000<br>1.4567 | 8.9<br>0.35      | 9.5<br>0.37                                    | 190.0<br>7.48                              | 209.0<br>8.23                              | 2.5<br>0.10      | 242.5<br>9.55  | 232.0<br>9.13  | 3.40<br>0.13   | 4.10<br>0.16   | 589            | 128            | 0.1227         | 6.60<br>14.54       |
| 45.000<br>1.7717 | 37.000<br>1.4567 | 8.9<br>0.35      | 3.0<br>0.12                                    | 190.5<br>7.50                              | 196.0<br>7.72                              | 2.5<br>0.10      | 242.5<br>9.55  | 232.0<br>9.13  | 3.40<br>0.13   | 4.10<br>0.16   | 589            | 128            | 0.1227         | 6.64<br>14.64       |
| 33.000<br>1.2992 | 28.000<br>1.1024 | 5.1<br>0.20      | 2.0<br>0.08                                    | 191.0<br>7.52                              | 195.0<br>7.68                              | 2.0<br>0.08      | 229.0<br>9.02  | 224.0<br>8.82  | 0.40<br>0.02   | 3.60<br>0.14   | 559            | 173            | 0.1353         | 3.34<br>7.37        |
| 33.000<br>1.2992 | 28.000<br>1.1024 | 5.1<br>0.20      | 2.0<br>0.08                                    | 191.0<br>7.52                              | 195.0<br>7.68                              | 2.0<br>0.08      | 229.0<br>9.02  | 224.0<br>8.82  | 0.40<br>0.02   | 3.60<br>0.14   | 559            | 173            | 0.1353         | 3.37<br>7.42        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 13.7<br>0.54     | 1.5<br>0.06                                    | 192.0<br>7.56                              | 194.0<br>7.64                              | 1.5<br>0.06      | 230.0<br>9.06  | 225.0<br>8.86  | 3.20<br>0.12   | 1.40<br>0.06   | 418            | 211            | 0.1293         | 2.59<br>5.71        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

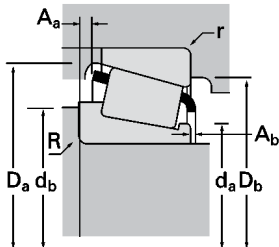
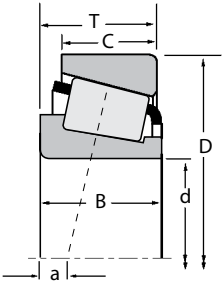




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |           |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|-----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer     |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |           |
| 184.150<br>7.2500       | 266.700<br>10.5000 | 47.625<br>1.8750  | 386000<br>86700        | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67883       | 67820     |
| 187.325<br>7.3750       | 266.700<br>10.5000 | 47.625<br>1.8750  | 386000<br>86700        | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67884       | 67820     |
| 187.325<br>7.3750       | 269.875<br>10.6250 | 55.562<br>2.1875  | 508000<br>114000       | 0.33 | 1.80 | 132000<br>29600        | 74900<br>16800   | 1.76 | 999000<br>225000  | M238849     | M238810   |
| 187.325<br>7.3750       | 282.575<br>11.1250 | 50.800<br>2.0000  | 398000<br>89400        | 0.42 | 1.44 | 103000<br>23200        | 73300<br>16500   | 1.41 | 692000<br>156000  | 87737       | 87111     |
| 187.325<br>7.3750       | 320.675<br>12.6250 | 88.900<br>3.5000  | 1030000<br>231000      | 0.32 | 1.88 | 267000<br>59900        | 145000<br>32700  | 1.83 | 1580000<br>356000 | H239649     | H239612   |
| 190.000<br>7.4803       | 260.000<br>10.2362 | 46.000<br>1.8110  | 399000<br>89700        | 0.48 | 1.26 | 103000<br>23300        | 84500<br>19000   | 1.22 | 807000<br>181000  | JM738249    | JM738210  |
| 190.000<br>7.4803       | 269.875<br>10.6250 | 55.560<br>2.1875  | 508000<br>114000       | 0.33 | 1.80 | 132000<br>29600        | 74900<br>16800   | 1.76 | 999000<br>225000  | JM238848    | M238810   |
| 190.078<br>7.4834       | 289.992<br>11.4170 | 46.000<br>1.8110  | 386000<br>86700        | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67886       | 67835     |
| 190.500<br>7.5000       | 266.700<br>10.5000 | 47.625<br>1.8750  | 386000<br>86700        | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67885       | 67820     |
| 190.500<br>7.5000       | 282.575<br>11.1250 | 50.800<br>2.0000  | 398000<br>89400        | 0.42 | 1.44 | 103000<br>23200        | 73300<br>16500   | 1.41 | 692000<br>156000  | 87750       | 87111     |
| 190.500<br>7.5000       | 284.162<br>11.1875 | 55.562<br>2.1875  | 565000<br>127000       | 0.36 | 1.68 | 147000<br>33000        | 89700<br>20200   | 1.63 | 1060000<br>239000 | 82788       | 82722     |
| 190.500<br>7.5000       | 288.925<br>11.3750 | 55.562<br>2.1875  | 565000<br>127000       | 0.36 | 1.68 | 147000<br>33000        | 89700<br>20200   | 1.63 | 1060000<br>239000 | 82788       | 82720     |
| 190.500<br>7.5000       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93750       | 93125     |
| 190.500<br>7.5000       | 327.025<br>12.8750 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470075    | 470128    |
| 190.500<br>7.5000       | 330.200<br>13.0000 | 63.500<br>2.5000  | 664000<br>149000       | 0.38 | 1.56 | 172000<br>38700        | 113000<br>25500  | 1.52 | 1050000<br>235000 | EE210753    | 211300    |
| 190.500<br>7.5000       | 336.550<br>13.2500 | 90.488<br>3.5625  | 997000<br>224000       | 0.37 | 1.64 | 258000<br>58100        | 162000<br>36300  | 1.60 | 1580000<br>354000 | EE470075    | 470132    |
| 190.500<br>7.5000       | 336.550<br>13.2500 | 98.425<br>3.8750  | 1130000<br>254000      | 0.58 | 1.04 | 293000<br>65800        | 289000<br>64900  | 1.01 | 2050000<br>460000 | HH840249    | HH840210  |
| 190.500<br>7.5000       | 360.000<br>14.1732 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420751    | 421417    |
| 190.500<br>7.5000       | 365.049<br>14.3720 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420751    | 421437    |
| 190.500<br>7.5000       | 368.300<br>14.5000 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420751    | 421450    |
| 190.500<br>7.5000       | 428.625<br>16.8750 | 106.362<br>4.1875 | 1280000<br>289000      | 0.76 | 0.79 | 333000<br>74900        | 432000<br>97200  | 0.77 | 1700000<br>382000 | EE350750    | 351687    |
| 192.088<br>7.5625       | 266.700<br>10.5000 | 47.625<br>1.8750  | 386000<br>86700        | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67887       | 67820     |
| 193.675<br>7.6250       | 282.575<br>11.1250 | 50.800<br>2.0000  | 398000<br>89400        | 0.42 | 1.44 | 103000<br>23200        | 73300<br>16500   | 1.41 | 692000<br>156000  | 87762       | 87111     |
| 196.850<br>7.7500       | 257.175<br>10.1250 | 39.688<br>1.5625  | 295000<br>66300        | 0.45 | 1.34 | 76400<br>17200         | 58400<br>13100   | 1.31 | 718000<br>161000  | LM739749    | LM739710  |
| 196.850<br>7.7500       | 266.700<br>10.5000 | 39.688<br>1.5625  | 295000<br>66300        | 0.45 | 1.34 | 76400<br>17200         | 58400<br>13100   | 1.31 | 718000<br>161000  | LM739749    | LM739719  |
| 196.850<br>7.7500       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93775       | 93125     |
| 200.000<br>7.8740       | 300.000<br>11.8110 | 65.000<br>2.5591  | 682000<br>153000       | 0.52 | 1.15 | 177000<br>39700        | 158000<br>35500  | 1.12 | 1280000<br>287000 | JHM840449   | JHM840410 |
| 200.025<br>7.8750       | 292.100<br>11.5000 | 57.945<br>2.2813  | 588000<br>132000       | 0.33 | 1.80 | 152000<br>34300        | 86800<br>19500   | 1.76 | 1170000<br>263000 | M241543     | M241510   |

(1) Based on  $1 \times 10^6$  revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                          |                          |                                     |                |                |                | Cage           |                |                | Factors        |                 |  | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|--|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                | G <sub>1</sub> |                |                |                | G <sub>2</sub> | C <sub>g</sub>  |  |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                 |  |                     |
| 46.833<br>1.8438 | 38.100<br>1.5000 | 10.2<br>0.40     | 3.5<br>0.14                | 198.0<br>7.80            | 204.0<br>8.03            | 3.3<br>0.13                         | 259.0<br>10.20 | 246.0<br>9.69  | 5.10<br>0.20   | 1.80<br>0.07   | 728            | 147            | 0.1310         | 8.61<br>18.98   |  |                     |
| 46.833<br>1.8438 | 38.100<br>1.5000 | 10.2<br>0.40     | 3.5<br>0.14                | 201.0<br>7.91            | 206.0<br>8.11            | 3.3<br>0.13                         | 259.0<br>10.20 | 246.0<br>9.69  | 5.10<br>0.20   | 1.80<br>0.07   | 728            | 147            | 0.1310         | 8.27<br>18.23   |  |                     |
| 55.562<br>2.1875 | 42.862<br>1.6875 | -6.1<br>-0.24    | 3.5<br>0.14                | 201.0<br>7.91            | 205.0<br>8.07            | 3.3<br>0.13                         | 256.0<br>10.08 | 250.0<br>9.84  | 5.90<br>0.23   | 2.10<br>0.08   | 788            | 118            | 0.1201         | 9.77<br>21.53   |  |                     |
| 47.625<br>1.8750 | 36.512<br>1.4375 | 3.8<br>0.15      | 3.5<br>0.14                | 201.0<br>7.91            | 207.0<br>8.15            | 3.3<br>0.13                         | 266.5<br>10.50 | 261.0<br>10.28 | 8.80<br>0.34   | 2.60<br>0.10   | 575            | 131            | 0.1155         | 9.78<br>21.56   |  |                     |
| 85.725<br>3.3750 | 65.088<br>2.5625 | -22.4<br>-0.88   | 5.5<br>0.22                | 205.0<br>8.07            | 214.0<br>8.43            | 4.8<br>0.19                         | 300.5<br>11.84 | 293.0<br>11.54 | 11.50<br>0.45  | 2.80<br>0.11   | 906            | 90.3           | 0.1242         | 25.83<br>56.94  |  |                     |
| 44.000<br>1.7323 | 36.500<br>1.4370 | 10.9<br>0.43     | 3.0<br>0.12                | 200.0<br>7.87            | 206.0<br>8.11            | 2.5<br>0.10                         | 252.0<br>9.92  | 242.0<br>9.53  | 3.20<br>0.13   | 4.00<br>0.16   | 653            | 147            | 0.1265         | 6.83<br>15.06   |  |                     |
| 55.562<br>2.1875 | 42.862<br>1.6875 | -6.1<br>-0.24    | 3.0<br>0.12                | 203.0<br>7.99            | 206.0<br>8.11            | 3.3<br>0.13                         | 256.0<br>10.08 | 250.0<br>9.84  | 5.90<br>0.23   | 2.10<br>0.08   | 788            | 118            | 0.1201         | 9.48<br>20.89   |  |                     |
| 46.000<br>1.8110 | 35.999<br>1.4173 | 10.7<br>0.42     | 6.4<br>0.25                | 203.0<br>7.99            | 214.0<br>8.43            | 3.3<br>0.13                         | 259.0<br>10.20 | 256.0<br>10.08 | 4.60<br>0.18   | 2.10<br>0.08   | 728            | 147            | 0.1310         | 10.57<br>23.29  |  |                     |
| 46.833<br>1.8438 | 38.100<br>1.5000 | 10.2<br>0.40     | 3.5<br>0.14                | 203.0<br>7.99            | 209.0<br>8.23            | 3.3<br>0.13                         | 259.0<br>10.20 | 246.0<br>9.69  | 5.10<br>0.20   | 1.80<br>0.07   | 728            | 147            | 0.1310         | 7.92<br>17.47   |  |                     |
| 47.625<br>1.8750 | 36.512<br>1.4375 | 3.8<br>0.15      | 3.5<br>0.14                | 203.0<br>7.99            | 209.0<br>8.23            | 3.3<br>0.13                         | 266.5<br>10.50 | 261.0<br>10.28 | 8.80<br>0.34   | 2.60<br>0.10   | 575            | 131            | 0.1155         | 9.43<br>20.79   |  |                     |
| 55.562<br>2.1875 | 42.862<br>1.6875 | -2.8<br>-0.11    | 3.5<br>0.14                | 203.0<br>7.99            | 210.0<br>8.27            | 3.3<br>0.13                         | 271.0<br>10.67 | 263.0<br>10.35 | 5.20<br>0.21   | 2.30<br>0.09   | 805            | 111            | 0.1238         | 11.55<br>25.46  |  |                     |
| 55.562<br>2.1875 | 42.862<br>1.6875 | -2.8<br>-0.11    | 3.5<br>0.14                | 203.0<br>7.99            | 210.0<br>8.27            | 3.3<br>0.13                         | 271.0<br>10.67 | 265.0<br>10.43 | 5.20<br>0.21   | 2.30<br>0.09   | 805            | 111            | 0.1238         | 12.27<br>27.04  |  |                     |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                | 212.0<br>8.35            | 218.0<br>8.58            | 3.3<br>0.13                         | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 19.65<br>43.32  |  |                     |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 6.4<br>0.25                | 210.0<br>8.27            | 220.0<br>8.66            | 6.4<br>0.25                         | 306.5<br>12.07 | 294.0<br>11.57 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 27.89<br>61.49  |  |                     |
| 61.912<br>2.4375 | 42.862<br>1.6875 | -4.6<br>-0.18    | 7.0<br>0.28                | 210.0<br>8.27            | 221.0<br>8.70            | 3.3<br>0.13                         | 300.0<br>11.81 | 299.0<br>11.77 | 11.60<br>0.46  | 4.00<br>0.16   | 737            | 116            | 0.1227         | 19.85<br>43.75  |  |                     |
| 92.075<br>3.6250 | 63.500<br>2.5000 | -21.8<br>-0.86   | 6.4<br>0.25                | 210.0<br>8.27            | 220.0<br>8.66            | 6.4<br>0.25                         | 306.5<br>12.07 | 298.0<br>11.73 | *<br>*         | *<br>*         | 914            | 105            | 0.1304         | 30.61<br>67.48  |  |                     |
| 95.250<br>3.7500 | 73.025<br>2.8750 | -5.6<br>-0.22    | 6.4<br>0.25                | 215.5<br>8.49            | 234.0<br>9.21            | 6.4<br>0.25                         | 318.0<br>12.52 | 290.0<br>11.42 | 14.50<br>0.57  | 5.10<br>0.20   | 1090           | 104            | 0.1605         | 35.46<br>78.18  |  |                     |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 6.4<br>0.25                | 218.0<br>8.58            | 227.0<br>8.94            | 3.3<br>0.13                         | 334.5<br>13.16 | 327.0<br>12.87 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 38.26<br>84.34  |  |                     |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 6.4<br>0.25                | 218.0<br>8.58            | 227.0<br>8.94            | 3.3<br>0.13                         | 334.5<br>13.16 | 329.0<br>12.95 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 39.68<br>87.48  |  |                     |
| 88.897<br>3.4999 | 63.500<br>2.5000 | -15.5<br>-0.61   | 6.4<br>0.25                | 218.0<br>8.58            | 227.0<br>8.94            | 3.3<br>0.13                         | 334.5<br>13.16 | 331.0<br>13.03 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 40.61<br>89.53  |  |                     |
| 95.250<br>3.7500 | 61.912<br>2.4375 | 13.0<br>0.51     | 6.4<br>0.25                | 237.0<br>9.33            | 240.0<br>9.45            | 6.4<br>0.25                         | 383.0<br>15.08 | 365.0<br>14.37 | 21.10<br>0.83  | 16.00<br>0.63  | 828            | 77.3           | 0.1568         | 59.74<br>131.70 |  |                     |
| 46.833<br>1.8438 | 38.100<br>1.5000 | 10.2<br>0.40     | 10.5<br>0.41               | 204.0<br>8.03            | 223.0<br>8.78            | 3.3<br>0.13                         | 259.0<br>10.20 | 246.0<br>9.69  | 5.10<br>0.20   | 1.80<br>0.07   | 728            | 147            | 0.1310         | 7.52<br>16.58   |  |                     |
| 47.625<br>1.8750 | 36.512<br>1.4375 | 3.8<br>0.15      | 3.5<br>0.14                | 206.0<br>8.11            | 211.0<br>8.31            | 3.3<br>0.13                         | 266.5<br>10.50 | 261.0<br>10.28 | 8.80<br>0.34   | 2.60<br>0.10   | 575            | 131            | 0.1155         | 9.07<br>20.00   |  |                     |
| 39.688<br>1.5625 | 30.162<br>1.1875 | 11.4<br>0.45     | 3.5<br>0.14                | 206.0<br>8.11            | 213.0<br>8.39            | 3.3<br>0.13                         | 251.0<br>9.88  | 239.0<br>9.41  | 3.40<br>0.14   | 2.10<br>0.08   | 762            | 232            | 0.1296         | 5.26<br>11.60   |  |                     |
| 39.688<br>1.5625 | 30.162<br>1.1875 | 11.4<br>0.45     | 3.5<br>0.14                | 206.0<br>8.11            | 213.0<br>8.39            | 3.3<br>0.13                         | 252.0<br>9.92  | 243.0<br>9.57  | 3.40<br>0.14   | 2.10<br>0.08   | 762            | 232            | 0.1296         | 6.16<br>13.58   |  |                     |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                | 216.0<br>8.50            | 223.0<br>8.78            | 3.3<br>0.13                         | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 18.69<br>41.20  |  |                     |
| 62.000<br>2.4409 | 51.000<br>2.0079 | 8.1<br>0.32      | 3.5<br>0.14                | 215.0<br>8.46            | 223.0<br>8.78            | 2.5<br>0.10                         | 289.0<br>11.37 | 273.0<br>10.75 | 4.80<br>0.19   | 6.10<br>0.24   | 854            | 126            | 0.1428         | 15.39<br>33.92  |  |                     |
| 57.945<br>2.2813 | 46.038<br>1.8125 | -4.8<br>-0.19    | 3.5<br>0.14                | 215.0<br>8.46            | 219.0<br>8.62            | 3.3<br>0.13                         | 279.0<br>10.98 | 272.0<br>10.71 | 4.80<br>0.19   | 2.00<br>0.08   | 954            | 128            | 0.1279         | 12.50<br>27.55  |  |                     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

B

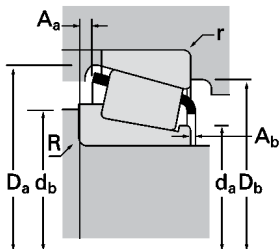
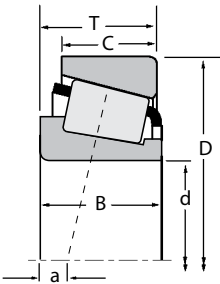




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer    |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |          |
| 200.025<br>7.8750       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93787       | 93125    |
| 200.025<br>7.8750       | 317.500<br>12.5000 | 68.262<br>2.6875  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93787       | 93126    |
| 200.025<br>7.8750       | 320.000<br>12.5984 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93787       | J93129A  |
| 200.025<br>7.8750       | 355.600<br>14.0000 | 69.850<br>2.7500  | 781000<br>175000       | 0.33 | 1.82 | 202000<br>45500        | 114000<br>25700  | 1.77 | 1400000<br>314000 | EE130787    | 131400   |
| 200.025<br>7.8750       | 384.175<br>15.1250 | 112.712<br>4.4375 | 1640000<br>369000      | 0.33 | 1.80 | 426000<br>95700        | 242000<br>54500  | 1.76 | 3110000<br>699000 | H247535     | H247510  |
| 200.025<br>7.8750       | 393.700<br>15.5000 | 111.125<br>4.3750 | 1650000<br>370000      | 0.30 | 2.01 | 427000<br>96000        | 218000<br>49100  | 1.96 | 2600000<br>585000 | HH144642    | HH144614 |
| 201.612<br>7.9375       | 365.049<br>14.3720 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420793    | 421437   |
| 201.612<br>7.9375       | 368.300<br>14.5000 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420793    | 421450   |
| 203.200<br>8.0000       | 261.142<br>10.2812 | 28.575<br>1.1250  | 192000<br>43200        | 0.41 | 1.47 | 49900<br>11200         | 34900<br>7850    | 1.43 | 405000<br>91100   | LL641149    | LL641110 |
| 203.200<br>8.0000       | 276.225<br>10.8750 | 42.862<br>1.6875  | 406000<br>91300        | 0.32 | 1.88 | 105000<br>23700        | 57500<br>12900   | 1.83 | 811000<br>182000  | LM241149    | LM241110 |
| 203.200<br>8.0000       | 282.575<br>11.1250 | 46.038<br>1.8125  | 393000<br>88300        | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67983       | 67920    |
| 203.200<br>8.0000       | 292.100<br>11.5000 | 57.945<br>2.2813  | 588000<br>132000       | 0.33 | 1.80 | 152000<br>34300        | 86800<br>19500   | 1.76 | 1170000<br>263000 | M241547C    | M241510  |
| 203.200<br>8.0000       | 292.100<br>11.5000 | 57.945<br>2.2813  | 588000<br>132000       | 0.33 | 1.80 | 152000<br>34300        | 86800<br>19500   | 1.76 | 1170000<br>263000 | M241547     | M241510  |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 53.975<br>2.1250  | 518000<br>116000       | 0.31 | 1.91 | 134000<br>30200        | 72000<br>16200   | 1.86 | 900000<br>202000  | EE132083    | 132125   |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93800       | 93125    |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93800A      | 93125    |
| 203.200<br>8.0000       | 360.000<br>14.1732 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420801    | 421417   |
| 203.200<br>8.0000       | 365.049<br>14.3720 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420801    | 421437   |
| 203.200<br>8.0000       | 368.300<br>14.5000 | 92.075<br>3.6250  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420801    | 421450   |
| 203.200<br>8.0000       | 406.400<br>16.0000 | 92.075<br>3.6250  | 1040000<br>234000      | 0.80 | 0.75 | 270000<br>60700        | 369000<br>82900  | 0.73 | 1460000<br>328000 | EE114080    | 114160   |
| 203.200<br>8.0000       | 482.600<br>19.0000 | 117.475<br>4.6250 | 1410000<br>317000      | 0.87 | 0.69 | 366000<br>82200        | 542000<br>122000 | 0.67 | 2010000<br>453000 | EE380080    | 380190   |
| 204.788<br>8.0625       | 292.100<br>11.5000 | 57.945<br>2.2813  | 588000<br>132000       | 0.33 | 1.80 | 152000<br>34300        | 86800<br>19500   | 1.76 | 1170000<br>263000 | M241549     | M241510  |
| 204.788<br>8.0625       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93806A      | 93125    |
| 206.375<br>8.1250       | 282.575<br>11.1250 | 46.038<br>1.8125  | 393000<br>88300        | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67985       | 67920    |
| 206.375<br>8.1250       | 317.500<br>12.5000 | 53.975<br>2.1250  | 518000<br>116000       | 0.31 | 1.91 | 134000<br>30200        | 72000<br>16200   | 1.86 | 900000<br>202000  | EE132084    | 132125   |
| 206.375<br>8.1250       | 336.550<br>13.2500 | 98.425<br>3.8750  | 1250000<br>282000      | 0.33 | 1.80 | 325000<br>73100        | 185000<br>41600  | 1.76 | 2320000<br>522000 | H242649     | H242610  |
| 209.550<br>8.2500       | 279.400<br>11.0000 | 46.038<br>1.8125  | 393000<br>88300        | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67989       | 67919    |
| 209.550<br>8.2500       | 282.575<br>11.1250 | 46.038<br>1.8125  | 393000<br>88300        | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67989       | 67920    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                                    | 219.0<br>8.62                              | 225.0<br>8.86                              | 3.3<br>0.13                                  | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 18.20<br>40.11      |
| 63.500<br>2.5000  | 50.800<br>2.0000 | 7.9<br>0.31      | 4.3<br>0.17                                    | 219.0<br>8.62                              | 225.0<br>8.86                              | 3.3<br>0.13                                  | 300.0<br>11.81 | 285.0<br>11.22 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 19.10<br>42.10      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                                    | 219.0<br>8.62                              | 225.0<br>8.86                              | 3.3<br>0.13                                  | 298.0<br>11.73 | 287.0<br>11.30 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 18.64<br>41.10      |
| 69.850<br>2.7500  | 49.212<br>1.9375 | -9.9<br>-0.39    | 6.8<br>0.27                                    | 226.0<br>8.90                              | 236.0<br>9.29                              | 1.5<br>0.06                                  | 330.5<br>13.01 | 329.0<br>12.95 | 12.30<br>0.48  | 3.30<br>0.13   | 1160           | 168            | 0.1358         | 28.09<br>61.93      |
| 112.712<br>4.4375 | 90.488<br>3.5625 | -27.9<br>-1.10   | 6.4<br>0.25                                    | 231.0<br>9.09                              | 241.0<br>9.49                              | 6.4<br>0.25                                  | 362.0<br>14.26 | 346.0<br>13.62 | 10.20<br>0.40  | 2.80<br>0.11   | 1960           | 148            | 0.1638         | 60.18<br>132.67     |
| 111.125<br>4.3750 | 84.138<br>3.3125 | -33.8<br>-1.33   | 6.4<br>0.25                                    | 226.0<br>8.90                              | 235.0<br>9.25                              | 6.4<br>0.25                                  | 356.5<br>14.04 | 352.0<br>13.86 | 15.60<br>0.62  | 1.40<br>0.06   | 1470           | 128            | 0.1429         | 58.68<br>129.37     |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 3.3<br>0.13                                    | 226.0<br>8.90                              | 229.0<br>9.02                              | 3.3<br>0.13                                  | 334.5<br>13.16 | 329.0<br>12.95 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 37.37<br>82.39      |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 3.3<br>0.13                                    | 226.0<br>8.90                              | 229.0<br>9.02                              | 3.3<br>0.13                                  | 334.5<br>13.16 | 331.0<br>13.03 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 38.30<br>84.44      |
| 27.783<br>1.0938  | 21.433<br>0.8438 | 15.7<br>0.62     | 1.5<br>0.06                                    | 212.0<br>8.35                              | 214.0<br>8.43                              | 1.5<br>0.06                                  | 254.0<br>10.00 | 249.0<br>9.80  | 3.10<br>0.12   | 1.70<br>0.07   | 522            | 231            | 0.1398         | 3.47<br>7.64        |
| 42.862<br>1.6875  | 34.133<br>1.3438 | 1.8<br>0.07      | 3.5<br>0.14                                    | 214.0<br>8.43                              | 220.0<br>8.66                              | 3.3<br>0.13                                  | 267.0<br>10.51 | 260.0<br>10.24 | 2.80<br>0.11   | 1.30<br>0.05   | 774            | 182            | 0.1170         | 6.96<br>15.35       |
| 46.038<br>1.8125  | 36.512<br>1.4375 | 16.0<br>0.63     | 3.5<br>0.14                                    | 216.0<br>8.50                              | 222.0<br>8.74                              | 3.3<br>0.13                                  | 275.0<br>10.83 | 260.0<br>10.24 | 4.50<br>0.18   | 1.70<br>0.07   | 820            | 172            | 0.1388         | 8.65<br>19.06       |
| 57.945<br>2.2813  | 46.038<br>1.8125 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 217.0<br>8.54                              | 221.0<br>8.70                              | 3.3<br>0.13                                  | 279.0<br>10.98 | 272.0<br>10.71 | 4.80<br>0.19   | 2.00<br>0.08   | 954            | 128            | 0.1279         | 12.04<br>26.55      |
| 57.945<br>2.2813  | 46.038<br>1.8125 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 217.0<br>8.54                              | 221.0<br>8.70                              | 3.3<br>0.13                                  | 279.0<br>10.98 | 272.0<br>10.71 | 4.80<br>0.19   | 2.00<br>0.08   | 954            | 128            | 0.1279         | 12.04<br>26.55      |
| 53.975<br>2.1250  | 34.925<br>1.3750 | -6.1<br>-0.24    | 4.0<br>0.16                                    | 218.0<br>8.58                              | 225.0<br>8.86                              | 3.3<br>0.13                                  | 293.0<br>11.54 | 294.0<br>11.57 | 10.80<br>0.42  | 3.20<br>0.13   | 798            | 125            | 0.1174         | 13.87<br>30.57      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                                    | 222.0<br>8.74                              | 227.0<br>8.94                              | 3.3<br>0.13                                  | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 17.70<br>39.01      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 8.0<br>0.31                                    | 222.0<br>8.74                              | 234.0<br>9.21                              | 3.3<br>0.13                                  | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 17.58<br>38.77      |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 3.3<br>0.13                                    | 227.0<br>8.94                              | 230.0<br>9.06                              | 3.3<br>0.13                                  | 334.5<br>13.16 | 327.0<br>12.87 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 35.59<br>78.47      |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 3.3<br>0.13                                    | 227.0<br>8.94                              | 230.0<br>9.06                              | 3.3<br>0.13                                  | 334.5<br>13.16 | 329.0<br>12.95 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 37.02<br>81.62      |
| 88.897<br>3.4999  | 63.500<br>2.5000 | -15.5<br>-0.61   | 3.3<br>0.13                                    | 227.0<br>8.94                              | 230.0<br>9.06                              | 3.3<br>0.13                                  | 334.5<br>13.16 | 331.0<br>13.03 | 19.10<br>0.75  | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 37.95<br>83.67      |
| 85.725<br>3.3750  | 57.150<br>2.2500 | 24.9<br>0.98     | 6.4<br>0.25                                    | 237.0<br>9.33                              | 246.0<br>9.69                              | 6.4<br>0.25                                  | 373.5<br>14.71 | 349.0<br>13.74 | 19.00<br>0.75  | 10.60<br>0.42  | 795            | 80.2           | 0.1571         | 44.72<br>98.58      |
| 95.250<br>3.7500  | 73.025<br>2.8750 | 34.3<br>1.35     | 6.4<br>0.25                                    | 274.0<br>10.79                             | 280.0<br>11.02                             | 6.4<br>0.25                                  | 428.5<br>16.87 | 402.0<br>15.83 | 22.30<br>0.88  | 16.90<br>0.67  | 1100           | 104            | 0.1792         | 88.54<br>195.20     |
| 57.945<br>2.2813  | 46.038<br>1.8125 | -4.8<br>-0.19    | 3.5<br>0.14                                    | 219.0<br>8.62                              | 223.0<br>8.78                              | 3.3<br>0.13                                  | 279.0<br>10.98 | 272.0<br>10.71 | 4.80<br>0.19   | 2.00<br>0.08   | 954            | 128            | 0.1279         | 11.81<br>26.04      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                                    | 223.0<br>8.78                              | 229.0<br>9.02                              | 3.3<br>0.13                                  | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 17.44<br>38.46      |
| 46.038<br>1.8125  | 36.512<br>1.4375 | 16.0<br>0.63     | 3.5<br>0.14                                    | 219.0<br>8.62                              | 224.0<br>8.82                              | 3.3<br>0.13                                  | 275.0<br>10.83 | 260.0<br>10.24 | 4.50<br>0.18   | 1.70<br>0.07   | 820            | 172            | 0.1388         | 8.28<br>18.25       |
| 53.975<br>2.1250  | 34.925<br>1.3750 | -6.1<br>-0.24    | 4.0<br>0.16                                    | 220.0<br>8.66                              | 227.0<br>8.94                              | 3.3<br>0.13                                  | 293.0<br>11.54 | 294.0<br>11.57 | 10.80<br>0.42  | 3.20<br>0.13   | 798            | 125            | 0.1174         | 13.44<br>29.62      |
| 100.012<br>3.9375 | 77.788<br>3.0625 | -25.4<br>-1.00   | 3.3<br>0.13                                    | 227.0<br>8.94                              | 231.0<br>9.09                              | 3.3<br>0.13                                  | 318.0<br>12.51 | 306.0<br>12.05 | 11.20<br>0.44  | 1.80<br>0.07   | 1400           | 135            | 0.1465         | 33.01<br>72.76      |
| 46.038<br>1.8125  | 36.512<br>1.4375 | 16.0<br>0.63     | 3.5<br>0.14                                    | 221.0<br>8.70                              | 227.0<br>8.94                              | 3.3<br>0.13                                  | 273.0<br>10.75 | 259.0<br>10.20 | 4.50<br>0.18   | 1.70<br>0.07   | 820            | 172            | 0.1388         | 7.48<br>16.49       |
| 46.038<br>1.8125  | 36.512<br>1.4375 | 16.0<br>0.63     | 3.5<br>0.14                                    | 221.0<br>8.70                              | 227.0<br>8.94                              | 3.3<br>0.13                                  | 275.0<br>10.83 | 260.0<br>10.24 | 4.50<br>0.18   | 1.70<br>0.07   | 820            | 172            | 0.1388         | 7.91<br>17.43       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

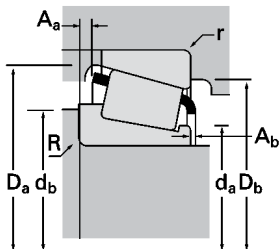
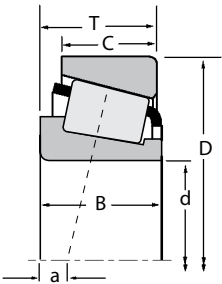
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer    |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |          |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93825       | 93125    |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 63.500<br>2.5000  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93825A      | 93125    |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 68.262<br>2.6875  | 677000<br>152000       | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93825       | 93126    |
| 209.550<br>8.2500       | 355.600<br>14.0000 | 68.262<br>2.6875  | 703000<br>158000       | 0.59 | 1.02 | 182000<br>41000        | 184000<br>41400  | 0.99 | 1420000<br>319000 | 96825       | 96140    |
| 212.725<br>8.3750       | 285.750<br>11.2500 | 46.038<br>1.8125  | 398000<br>89500        | 0.48 | 1.25 | 103000<br>23200        | 85000<br>19100   | 1.21 | 892000<br>200000  | LM742745    | LM742710 |
| 215.900<br>8.5000       | 285.750<br>11.2500 | 46.038<br>1.8125  | 398000<br>89500        | 0.48 | 1.25 | 103000<br>23200        | 85000<br>19100   | 1.21 | 892000<br>200000  | LM742749AA  | LM742710 |
| 215.900<br>8.5000       | 285.750<br>11.2500 | 46.038<br>1.8125  | 398000<br>89500        | 0.48 | 1.25 | 103000<br>23200        | 85000<br>19100   | 1.21 | 892000<br>200000  | LM742749    | LM742710 |
| 215.900<br>8.5000       | 288.925<br>11.3750 | 46.038<br>1.8125  | 398000<br>89500        | 0.48 | 1.25 | 103000<br>23200        | 85000<br>19100   | 1.21 | 892000<br>200000  | LM742749    | LM742714 |
| 215.900<br>8.5000       | 290.010<br>11.4177 | 31.750<br>1.2500  | 221000<br>49800        | 0.39 | 1.56 | 57400<br>12900         | 37900<br>8510    | 1.52 | 453000<br>102000  | 543085      | 543114   |
| 215.900<br>8.5000       | 355.600<br>14.0000 | 69.850<br>2.7500  | 781000<br>175000       | 0.33 | 1.82 | 202000<br>45500        | 114000<br>25700  | 1.77 | 1400000<br>314000 | EE130851    | 131400   |
| 215.900<br>8.5000       | 360.000<br>14.1732 | 82.550<br>3.2500  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420850    | 421417   |
| 215.900<br>8.5000       | 365.049<br>14.3720 | 82.550<br>3.2500  | 1080000<br>243000      | 0.40 | 1.49 | 280000<br>63000        | 193000<br>43300  | 1.45 | 1820000<br>409000 | EE420850    | 421437   |
| 219.969<br>8.6602       | 290.010<br>11.4177 | 31.750<br>1.2500  | 221000<br>49800        | 0.39 | 1.56 | 57400<br>12900         | 37900<br>8510    | 1.52 | 453000<br>102000  | 543086      | 543114   |
| 220.662<br>8.6875       | 314.325<br>12.3750 | 61.912<br>2.4375  | 636000<br>143000       | 0.33 | 1.80 | 165000<br>37100        | 93900<br>21100   | 1.76 | 1240000<br>279000 | M244249A    | M244210  |
| 220.663<br>8.6875       | 314.325<br>12.3750 | 61.912<br>2.4375  | 682000<br>153000       | 0.33 | 1.80 | 177000<br>39700        | 101000<br>22600  | 1.76 | 1370000<br>308000 | M244249     | M244210  |
| 223.838<br>8.8125       | 295.275<br>11.6250 | 46.038<br>1.8125  | 403000<br>90700        | 0.50 | 1.20 | 105000<br>23500        | 89200<br>20100   | 1.17 | 919000<br>207000  | LM844049    | LM844010 |
| 225.425<br>8.8750       | 355.600<br>14.0000 | 69.850<br>2.7500  | 781000<br>175000       | 0.33 | 1.82 | 202000<br>45500        | 114000<br>25700  | 1.77 | 1400000<br>314000 | EE130889    | 131400   |
| 225.425<br>8.8750       | 400.050<br>15.7500 | 88.900<br>3.5000  | 1100000<br>248000      | 0.44 | 1.36 | 286000<br>64200        | 215000<br>48300  | 1.33 | 1920000<br>432000 | EE430888    | 431575   |
| 228.397<br>8.9920       | 431.800<br>17.0000 | 92.075<br>3.6250  | 1090000<br>245000      | 0.88 | 0.68 | 282000<br>63500        | 427000<br>96000  | 0.66 | 1600000<br>361000 | EE113089    | 113170   |
| 228.460<br>8.9945       | 431.800<br>17.0000 | 92.075<br>3.6250  | 1090000<br>245000      | 0.88 | 0.68 | 282000<br>63500        | 427000<br>96000  | 0.66 | 1600000<br>361000 | EE113091    | 113170   |
| 228.600<br>9.0000       | 320.675<br>12.6250 | 50.800<br>2.0000  | 431000<br>97000        | 0.49 | 1.23 | 112000<br>25100        | 93200<br>21000   | 1.20 | 821000<br>185000  | 88900       | 88126    |
| 228.600<br>9.0000       | 327.025<br>12.8750 | 52.388<br>2.0625  | 431000<br>97000        | 0.49 | 1.23 | 112000<br>25100        | 93200<br>21000   | 1.20 | 821000<br>185000  | 88900       | 88128    |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 68.262<br>2.6875  | 703000<br>158000       | 0.59 | 1.02 | 182000<br>41000        | 184000<br>41400  | 0.99 | 1420000<br>319000 | 96900       | 96140    |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 69.850<br>2.7500  | 781000<br>175000       | 0.33 | 1.82 | 202000<br>45500        | 114000<br>25700  | 1.77 | 1400000<br>314000 | EE130902    | 131400   |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 69.850<br>2.7500  | 932000<br>210000       | 0.47 | 1.27 | 242000<br>54300        | 196000<br>44000  | 1.24 | 1690000<br>380000 | HM746646    | HM746610 |
| 228.600<br>9.0000       | 358.775<br>14.1250 | 71.438<br>2.8125  | 896000<br>202000       | 0.33 | 1.80 | 232000<br>52200        | 132000<br>29700  | 1.76 | 1850000<br>416000 | M249732     | M249710  |
| 228.600<br>9.0000       | 400.050<br>15.7500 | 88.900<br>3.5000  | 1100000<br>248000      | 0.44 | 1.36 | 286000<br>64200        | 215000<br>48300  | 1.33 | 1920000<br>432000 | EE430900    | 431575   |
| 228.600<br>9.0000       | 488.950<br>19.2500 | 123.825<br>4.8750 | 1750000<br>394000      | 0.94 | 0.64 | 455000<br>102000       | 730000<br>164000 | 0.62 | 2510000<br>564000 | HH949549    | HH949510 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            |                                            | Housing          |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 4.3<br>0.17                                    | 227.0<br>8.93                              | 233.0<br>9.17                              | 3.3<br>0.13      | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 16.67<br>36.76      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 7.9<br>0.31      | 12.7<br>0.50                                   | 227.0<br>8.93                              | 250.0<br>9.84                              | 3.3<br>0.13      | 300.0<br>11.81 | 286.0<br>11.26 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 16.29<br>35.91      |
| 63.500<br>2.5000  | 50.800<br>2.0000 | 7.9<br>0.31      | 4.3<br>0.17                                    | 227.0<br>8.93                              | 233.0<br>9.17                              | 3.3<br>0.13      | 300.0<br>11.81 | 285.0<br>11.22 | 9.20<br>0.36   | 4.20<br>0.17   | 912            | 126            | 0.1460         | 17.57<br>38.74      |
| 66.675<br>2.6250  | 47.625<br>1.8750 | 17.0<br>0.67     | 7.0<br>0.28                                    | 235.0<br>9.25                              | 246.0<br>9.69                              | 3.3<br>0.13      | 334.0<br>13.15 | 318.0<br>12.52 | 12.00<br>0.47  | 3.80<br>0.15   | 1140           | 160            | 0.1626         | 26.64<br>58.73      |
| 46.038<br>1.8125  | 34.925<br>1.3750 | 14.2<br>0.56     | 3.5<br>0.14                                    | 225.0<br>8.86                              | 230.0<br>9.06                              | 3.3<br>0.13      | 279.0<br>10.98 | 266.0<br>10.47 | 5.10<br>0.20   | 2.00<br>0.08   | 867            | 225            | 0.1388         | 7.93<br>17.47       |
| 46.038<br>1.8125  | 34.925<br>1.3750 | 14.2<br>0.56     | 9.0<br>0.35                                    | 227.0<br>8.94                              | 243.0<br>9.57                              | 3.3<br>0.13      | 279.0<br>10.98 | 266.0<br>10.47 | 5.10<br>0.20   | 2.00<br>0.08   | 867            | 225            | 0.1388         | 7.51<br>16.56       |
| 46.038<br>1.8125  | 34.925<br>1.3750 | 14.2<br>0.56     | 3.5<br>0.14                                    | 227.0<br>8.94                              | 233.0<br>9.17                              | 3.3<br>0.13      | 279.0<br>10.98 | 266.0<br>10.47 | 5.10<br>0.20   | 2.00<br>0.08   | 867            | 225            | 0.1388         | 7.54<br>16.62       |
| 46.038<br>1.8125  | 34.925<br>1.3750 | 14.2<br>0.56     | 3.5<br>0.14                                    | 227.0<br>8.94                              | 233.0<br>9.17                              | 3.3<br>0.13      | 280.0<br>11.02 | 267.0<br>10.51 | 5.10<br>0.20   | 2.00<br>0.08   | 867            | 225            | 0.1388         | 7.93<br>17.48       |
| 31.750<br>1.2500  | 22.225<br>0.8750 | 13.0<br>0.51     | 3.5<br>0.14                                    | 226.0<br>8.90                              | 232.0<br>9.13                              | 3.3<br>0.13      | 276.0<br>10.87 | 272.0<br>10.71 | 4.10<br>0.16   | 2.80<br>0.11   | 608            | 217            | 0.1135         | 5.38<br>11.87       |
| 69.850<br>2.7500  | 49.212<br>1.9375 | -9.9<br>-0.39    | 6.8<br>0.27                                    | 237.0<br>9.33                              | 248.0<br>9.76                              | 1.5<br>0.06      | 330.5<br>13.01 | 329.0<br>12.95 | 12.30<br>0.48  | 3.30<br>0.13   | 1160           | 168            | 0.1358         | 25.25<br>55.66      |
| 79.372<br>3.1249  | 63.500<br>2.5000 | -6.1<br>-0.24    | 1.5<br>0.06                                    | 236.0<br>9.29                              | 236.0<br>9.29                              | 3.3<br>0.13      | 334.5<br>13.16 | 327.0<br>12.87 | 9.60<br>0.38   | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 30.87<br>68.06      |
| 79.372<br>3.1249  | 63.500<br>2.5000 | -6.1<br>-0.24    | 1.5<br>0.06                                    | 236.0<br>9.29                              | 236.0<br>9.29                              | 3.3<br>0.13      | 334.5<br>13.16 | 329.0<br>12.95 | 9.60<br>0.38   | 2.40<br>0.10   | 1150           | 128            | 0.1450         | 32.30<br>71.21      |
| 31.750<br>1.2500  | 22.225<br>0.8750 | 13.0<br>0.51     | 3.5<br>0.14                                    | 229.0<br>9.02                              | 235.0<br>9.25                              | 3.3<br>0.13      | 276.0<br>10.87 | 272.0<br>10.71 | 4.10<br>0.16   | 2.80<br>0.11   | 608            | 217            | 0.1135         | 5.04<br>11.10       |
| 66.675<br>2.6250  | 49.212<br>1.9375 | -4.6<br>-0.18    | 1.5<br>0.06                                    | 235.0<br>9.25                              | 235.0<br>9.25                              | 3.3<br>0.13      | 300.0<br>11.81 | 293.0<br>11.54 | 3.30<br>0.13   | 0.30<br>0.01   | 1070           | 132            | 0.1327         | 14.89<br>32.83      |
| 61.912<br>2.4375  | 49.212<br>1.9375 | -4.6<br>-0.18    | 6.4<br>0.25                                    | 235.0<br>9.25                              | 245.0<br>9.65                              | 3.3<br>0.13      | 300.0<br>11.81 | 293.0<br>11.54 | 5.00<br>0.20   | 2.40<br>0.10   | 1150           | 141            | 0.1360         | 14.51<br>31.99      |
| 46.038<br>1.8125  | 34.925<br>1.3750 | 17.0<br>0.67     | 3.5<br>0.14                                    | 235.0<br>9.25                              | 241.0<br>9.49                              | 3.3<br>0.13      | 288.0<br>11.34 | 275.0<br>10.83 | 2.30<br>0.21   | 1.90<br>0.08   | 927            | 269            | 0.1434         | 8.02<br>17.69       |
| 69.850<br>2.7500  | 49.212<br>1.9375 | -9.9<br>-0.39    | 6.8<br>0.27                                    | 244.0<br>9.61                              | 255.0<br>10.04                             | 1.5<br>0.06      | 330.5<br>13.01 | 329.0<br>12.95 | 12.30<br>0.48  | 3.30<br>0.13   | 1160           | 168            | 0.1358         | 23.44<br>51.67      |
| 87.312<br>3.4375  | 63.500<br>2.5000 | -4.8<br>-0.19    | 1.5<br>0.06                                    | 251.0<br>9.88                              | 251.0<br>9.88                              | 3.3<br>0.13      | 364.0<br>14.34 | 360.0<br>14.17 | 14.80<br>0.58  | 1.50<br>0.06   | 1350           | 143            | 0.1572         | 43.79<br>96.54      |
| 85.725<br>3.3750  | 49.212<br>1.9375 | 41.4<br>1.63     | 6.4<br>0.25                                    | 267.0<br>10.51                             | 274.0<br>10.79                             | 6.4<br>0.25      | 397.5<br>15.64 | 375.0<br>14.76 | 19.40<br>0.77  | 11.50<br>0.45  | 967            | 98.1           | 0.1723         | 48.70<br>107.36     |
| 85.725<br>3.3750  | 49.212<br>1.9375 | 41.4<br>1.63     | 6.4<br>0.25                                    | 267.0<br>10.51                             | 274.0<br>10.79                             | 6.4<br>0.25      | 397.5<br>15.64 | 375.0<br>14.76 | 19.40<br>0.77  | 11.50<br>0.45  | 967            | 98.1           | 0.1723         | 48.70<br>107.36     |
| 49.212<br>1.9375  | 33.338<br>1.3125 | 14.2<br>0.56     | 6.4<br>0.25                                    | 242.0<br>9.53                              | 253.0<br>9.96                              | 3.3<br>0.13      | 309.0<br>12.17 | 299.0<br>11.77 | 11.20<br>0.44  | 2.70<br>0.10   | 800            | 189            | 0.1352         | 10.94<br>24.12      |
| 49.212<br>1.9375  | 34.925<br>1.3750 | 14.2<br>0.56     | 6.4<br>0.25                                    | 242.0<br>9.53                              | 253.0<br>9.96                              | 3.3<br>0.13      | 309.0<br>12.17 | 302.0<br>11.89 | 11.20<br>0.44  | 2.70<br>0.10   | 800            | 189            | 0.1352         | 12.02<br>26.49      |
| 66.675<br>2.6250  | 47.625<br>1.8750 | 17.0<br>0.67     | 7.0<br>0.28                                    | 249.0<br>9.80                              | 260.0<br>10.24                             | 3.3<br>0.13      | 334.0<br>13.15 | 318.0<br>12.52 | 12.00<br>0.47  | 3.80<br>0.15   | 1140           | 160            | 0.1626         | 23.21<br>51.17      |
| 69.850<br>2.7500  | 49.212<br>1.9375 | -9.9<br>-0.39    | 6.8<br>0.27                                    | 247.0<br>9.72                              | 257.0<br>10.12                             | 1.5<br>0.06      | 330.5<br>13.01 | 329.0<br>12.95 | 12.30<br>0.48  | 3.30<br>0.13   | 1160           | 168            | 0.1358         | 22.82<br>50.31      |
| 69.850<br>2.7500  | 50.800<br>2.0000 | 6.9<br>0.27      | 6.4<br>0.25                                    | 248.0<br>9.76                              | 258.0<br>10.16                             | 6.4<br>0.25      | 339.0<br>13.34 | 324.0<br>12.76 | 6.10<br>0.24   | 4.40<br>0.17   | 1190           | 149            | 0.1542         | 25.23<br>55.63      |
| 71.438<br>2.8125  | 53.975<br>2.1250 | -6.9<br>-0.27    | 3.5<br>0.14                                    | 251.0<br>9.88                              | 256.0<br>10.08                             | 3.3<br>0.13      | 343.0<br>13.50 | 335.0<br>13.19 | 8.00<br>0.32   | 3.00<br>0.12   | 1630           | 168            | 0.1526         | 26.73<br>58.94      |
| 87.312<br>3.4375  | 63.500<br>2.5000 | -4.8<br>-0.19    | 10.5<br>0.41                                   | 253.0<br>9.96                              | 271.0<br>10.67                             | 3.3<br>0.13      | 364.0<br>14.34 | 360.0<br>14.17 | 14.80<br>0.58  | 1.50<br>0.06   | 1350           | 143            | 0.1572         | 42.71<br>94.16      |
| 111.125<br>4.3750 | 73.025<br>2.8750 | 39.9<br>1.57     | 6.4<br>0.25                                    | 280.0<br>11.02                             | 297.0<br>11.69                             | 6.4<br>0.25      | 456.0<br>17.95 | 416.0<br>16.38 | 21.50<br>0.85  | 11.80<br>0.46  | 1300           | 91.5           | 0.1931         | 94.73<br>208.84     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

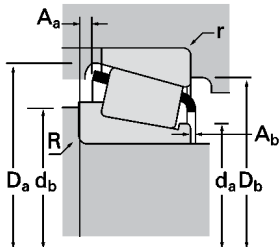
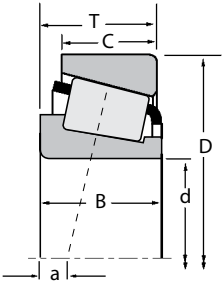
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer    |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |          |
| 228.600<br>9.0000       | 508.000<br>20.0000 | 117.475<br>4.6250 | 1430000<br>322000      | 0.94 | 0.64 | 371000<br>83500        | 596000<br>134000 | 0.62 | 2100000<br>473000 | EE390090    | 390200   |
| 231.775<br>9.1250       | 268.288<br>10.5625 | 22.500<br>0.8858  | 135000<br>30400        | 0.33 | 1.80 | 35100<br>7890          | 20000<br>4490    | 1.76 | 349000<br>78500   | LL244549    | LL244510 |
| 231.775<br>9.1250       | 336.550<br>13.2500 | 65.088<br>2.5625  | 773000<br>174000       | 0.33 | 1.80 | 200000<br>45100        | 114000<br>25700  | 1.76 | 1570000<br>352000 | M246942     | M246910  |
| 234.950<br>9.2500       | 311.150<br>12.2500 | 46.038<br>1.8125  | 432000<br>97200        | 0.36 | 1.66 | 112000<br>25200        | 69600<br>15600   | 1.61 | 926000<br>208000  | LM446349    | LM446310 |
| 234.950<br>9.2500       | 314.325<br>12.3750 | 49.212<br>1.9375  | 509000<br>114000       | 0.40 | 1.51 | 132000<br>29700        | 89700<br>20200   | 1.47 | 1040000<br>233000 | LM545849A   | LM545810 |
| 234.950<br>9.2500       | 314.325<br>12.3750 | 49.212<br>1.9375  | 479000<br>108000       | 0.40 | 1.51 | 124000<br>27900        | 84400<br>19000   | 1.47 | 949000<br>213000  | LM545849E   | LM545810 |
| 234.950<br>9.2500       | 320.675<br>12.6250 | 50.800<br>2.0000  | 431000<br>97000        | 0.49 | 1.23 | 112000<br>25100        | 93200<br>21000   | 1.20 | 821000<br>185000  | 88925       | 88126    |
| 234.950<br>9.2500       | 327.025<br>12.8750 | 52.388<br>2.0625  | 431000<br>97000        | 0.49 | 1.23 | 112000<br>25100        | 93200<br>21000   | 1.20 | 821000<br>185000  | 88925       | 88128    |
| 234.950<br>9.2500       | 355.600<br>14.0000 | 68.262<br>2.6875  | 703000<br>158000       | 0.59 | 1.02 | 182000<br>41000        | 184000<br>41400  | 0.99 | 1420000<br>319000 | 96925       | 96140    |
| 234.950<br>9.2500       | 381.000<br>15.0000 | 74.612<br>2.9375  | 982000<br>221000       | 0.33 | 1.80 | 255000<br>57200        | 145000<br>32600  | 1.76 | 2030000<br>455000 | M252330     | M252310  |
| 234.950<br>9.2500       | 384.175<br>15.1250 | 112.712<br>4.4375 | 1740000<br>390000      | 0.33 | 1.80 | 450000<br>101000       | 256000<br>57600  | 1.76 | 3370000<br>757000 | H247548     | H247510  |
| 234.950<br>9.2500       | 384.175<br>15.1250 | 112.712<br>4.4375 | 1640000<br>369000      | 0.33 | 1.80 | 426000<br>95700        | 242000<br>54500  | 1.76 | 3110000<br>699000 | H247549     | H247510  |
| 235.077<br>9.2500       | 314.325<br>12.3750 | 49.212<br>1.9375  | 479000<br>108000       | 0.40 | 1.51 | 124000<br>27900        | 84400<br>19000   | 1.47 | 949000<br>213000  | LM545847    | LM545810 |
| 236.538<br>9.3125       | 320.675<br>12.6250 | 44.450<br>1.7500  | 431000<br>97000        | 0.49 | 1.23 | 112000<br>25100        | 93200<br>21000   | 1.20 | 821000<br>185000  | 88931       | 88126    |
| 237.330<br>9.3437       | 336.550<br>13.2500 | 65.088<br>2.5625  | 722000<br>162000       | 0.33 | 1.80 | 187000<br>42100        | 107000<br>24000  | 1.76 | 1420000<br>319000 | M246948     | M246910  |
| 237.330<br>9.3437       | 336.550<br>13.2500 | 65.088<br>2.5625  | 773000<br>174000       | 0.33 | 1.80 | 200000<br>45100        | 114000<br>25700  | 1.76 | 1570000<br>352000 | M246949     | M246910  |
| 237.330<br>9.3437       | 358.775<br>14.1250 | 71.438<br>2.8125  | 896000<br>202000       | 0.33 | 1.80 | 232000<br>52200        | 132000<br>29700  | 1.76 | 1850000<br>416000 | M249736     | M249710  |
| 241.300<br>9.5000       | 349.148<br>13.7460 | 57.150<br>2.2500  | 647000<br>146000       | 0.35 | 1.70 | 168000<br>37700        | 101000<br>22800  | 1.65 | 1250000<br>282000 | EE127095    | 127135   |
| 241.300<br>9.5000       | 355.600<br>14.0000 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170950    | 171400   |
| 241.300<br>9.5000       | 355.600<br>14.0000 | 57.150<br>2.2500  | 647000<br>146000       | 0.35 | 1.70 | 168000<br>37700        | 101000<br>22800  | 1.65 | 1250000<br>282000 | EE127095    | 127140   |
| 241.300<br>9.5000       | 365.049<br>14.3720 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170950    | 171436   |
| 241.300<br>9.5000       | 368.300<br>14.5000 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170950    | 171450   |
| 241.300<br>9.5000       | 368.300<br>14.5000 | 68.262<br>2.6875  | 828000<br>186000       | 0.34 | 1.75 | 215000<br>48200        | 126000<br>28400  | 1.70 | 1530000<br>345000 | EE125095    | 125145   |
| 241.300<br>9.5000       | 393.700<br>15.5000 | 73.817<br>2.9062  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275095    | 275155   |
| 241.300<br>9.5000       | 406.400<br>16.0000 | 69.850<br>2.7500  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275095    | 275160   |
| 241.300<br>9.5000       | 444.500<br>17.5000 | 101.600<br>4.0000 | 1560000<br>350000      | 0.34 | 1.78 | 403000<br>90700        | 233000<br>52400  | 1.73 | 2420000<br>544000 | EE923095    | 923175   |
| 241.300<br>9.5000       | 488.950<br>19.2500 | 120.650<br>4.7500 | 2070000<br>465000      | 0.31 | 1.92 | 537000<br>121000       | 287000<br>64600  | 1.87 | 3310000<br>744000 | EE295950    | 295193   |
| 241.300<br>9.5000       | 508.000<br>20.0000 | 117.475<br>4.6250 | 1430000<br>322000      | 0.94 | 0.64 | 371000<br>83500        | 596000<br>134000 | 0.62 | 2100000<br>473000 | EE390095    | 390200   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 95.250<br>3.7500  | 73.025<br>2.8750 | 49.5<br>1.95     | 6.4<br>0.25                                    | 277.0<br>10.91                             | 287.0<br>11.30                             | 6.4<br>0.25                                  | 456.0<br>17.96 | 423.0<br>16.65 | 22.50<br>0.88  | 19.20<br>0.76  | 1260           | 106            | 0.1909         | 94.81<br>209.02     |
| 21.500<br>0.8465  | 18.500<br>0.7283 | 15.7<br>0.62     | 2.0<br>0.08                                    | 237.0<br>9.33                              | 241.0<br>9.49                              | 2.0<br>0.08                                  | 263.0<br>10.35 | 259.0<br>10.20 | 0.30<br>0.01   | 2.40<br>0.09   | 694            | 584            | 0.1422         | 1.86<br>4.09        |
| 65.088<br>2.5625  | 50.800<br>2.0000 | -4.8<br>-0.19    | 6.4<br>0.25                                    | 249.0<br>9.80                              | 258.0<br>10.16                             | 3.3<br>0.13                                  | 322.0<br>12.68 | 313.0<br>12.32 | 5.20<br>0.20   | 3.30<br>0.13   | 1350           | 198            | 0.1436         | 18.41<br>40.59      |
| 46.038<br>1.8125  | 33.338<br>1.3125 | 6.6<br>0.26      | 3.5<br>0.14                                    | 246.0<br>9.69                              | 252.0<br>9.92                              | 3.3<br>0.13                                  | 301.0<br>11.85 | 294.0<br>11.57 | 5.50<br>0.22   | 1.60<br>0.06   | 1010           | 243            | 0.1328         | 8.68<br>19.14       |
| 49.212<br>1.9375  | 36.512<br>1.4375 | 8.4<br>0.33      | 6.4<br>0.25                                    | 246.0<br>9.69                              | 258.0<br>10.16                             | 3.3<br>0.13                                  | 306.0<br>12.05 | 296.0<br>11.65 | 4.50<br>0.18   | 2.80<br>0.11   | 997            | 163            | 0.1367         | 9.86<br>21.74       |
| 53.975<br>2.1250  | 36.512<br>1.4375 | 8.4<br>0.33      | 3.5<br>0.14                                    | 247.0<br>9.72                              | 252.0<br>9.92                              | 3.3<br>0.13                                  | 306.0<br>12.05 | 296.0<br>11.65 | 4.30<br>0.17   | 0.00<br>0.00   | 938            | 176            | 0.1338         | 10.17<br>22.42      |
| 49.212<br>1.9375  | 33.338<br>1.3125 | 14.2<br>0.56     | 6.4<br>0.25                                    | 246.0<br>9.69                              | 258.0<br>10.16                             | 3.3<br>0.13                                  | 309.0<br>12.17 | 299.0<br>11.77 | 11.20<br>0.44  | 2.70<br>0.10   | 800            | 189            | 0.1352         | 10.05<br>22.15      |
| 49.212<br>1.9375  | 34.925<br>1.3750 | 14.2<br>0.56     | 6.4<br>0.25                                    | 246.0<br>9.69                              | 258.0<br>10.16                             | 3.3<br>0.13                                  | 309.0<br>12.17 | 302.0<br>11.89 | 11.20<br>0.44  | 2.70<br>0.10   | 800            | 189            | 0.1352         | 11.12<br>24.52      |
| 66.675<br>2.6250  | 47.625<br>1.8750 | 17.0<br>0.67     | 7.0<br>0.28                                    | 254.0<br>10.00                             | 265.0<br>10.43                             | 3.3<br>0.13                                  | 334.0<br>13.15 | 318.0<br>12.52 | 12.00<br>0.47  | 3.80<br>0.15   | 1140           | 160            | 0.1626         | 22.00<br>48.50      |
| 74.612<br>2.9375  | 57.150<br>2.2500 | -6.6<br>-0.26    | 6.4<br>0.25                                    | 261.0<br>10.28                             | 271.0<br>10.67                             | 3.3<br>0.13                                  | 363.5<br>14.32 | 356.0<br>14.02 | 8.30<br>0.33   | 3.50<br>0.14   | 1840           | 226            | 0.1588         | 33.39<br>73.60      |
| 112.712<br>4.4375 | 90.488<br>3.5625 | -27.9<br>-1.10   | 6.4<br>0.25                                    | 259.0<br>10.20                             | 269.0<br>10.59                             | 6.4<br>0.25                                  | 362.0<br>14.26 | 346.0<br>13.62 | 8.60<br>0.34   | 4.40<br>0.17   | 2080           | 156            | 0.1671         | 49.18<br>108.42     |
| 112.712<br>4.4375 | 90.488<br>3.5625 | -27.9<br>-1.10   | 6.4<br>0.25                                    | 259.0<br>10.20                             | 269.0<br>10.59                             | 6.4<br>0.25                                  | 362.0<br>14.26 | 346.0<br>13.62 | 10.20<br>0.40  | 2.80<br>0.11   | 1960           | 148            | 0.1638         | 49.65<br>109.45     |
| 53.975<br>2.1250  | 36.512<br>1.4375 | 8.4<br>0.33      | 3.5<br>0.14                                    | 247.0<br>9.72                              | 252.0<br>9.92                              | 3.3<br>0.13                                  | 306.0<br>12.05 | 296.0<br>11.65 | 4.30<br>0.17   | 0.00<br>0.00   | 938            | 176            | 0.1338         | 10.14<br>22.34      |
| 44.450<br>1.7500  | 33.338<br>1.3125 | 20.6<br>0.81     | 3.5<br>0.14                                    | 247.0<br>9.72                              | 254.0<br>10.00                             | 3.3<br>0.13                                  | 309.0<br>12.17 | 299.0<br>11.77 | 4.80<br>0.19   | 1.10<br>0.04   | 800            | 189            | 0.1352         | 9.32<br>20.56       |
| 69.850<br>2.7500  | 50.800<br>2.0000 | -4.8<br>-0.19    | 6.4<br>0.25                                    | 253.0<br>9.96                              | 263.0<br>10.35                             | 3.3<br>0.13                                  | 322.0<br>12.68 | 313.0<br>12.32 | 4.30<br>0.17   | 1.20<br>0.05   | 1260           | 174            | 0.1401         | 17.78<br>39.21      |
| 65.088<br>2.5625  | 50.800<br>2.0000 | -4.8<br>-0.19    | 6.4<br>0.25                                    | 253.0<br>9.96                              | 262.0<br>10.31                             | 3.3<br>0.13                                  | 322.0<br>12.68 | 313.0<br>12.32 | 5.20<br>0.20   | 3.30<br>0.13   | 1350           | 198            | 0.1436         | 17.37<br>38.29      |
| 71.438<br>2.8125  | 53.975<br>2.1250 | -6.9<br>-0.27    | 6.4<br>0.25                                    | 258.0<br>10.16                             | 267.0<br>10.51                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 8.00<br>0.32   | 3.00<br>0.12   | 1630           | 168            | 0.1526         | 24.87<br>54.82      |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 2.5<br>0.10      | 6.4<br>0.25                                    | 257.0<br>10.12                             | 267.0<br>10.51                             | 3.3<br>0.13                                  | 329.0<br>12.95 | 325.0<br>12.80 | 6.50<br>0.25   | 1.60<br>0.06   | 1180           | 164            | 0.1392         | 16.53<br>36.44      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 260.0<br>10.24                             | 269.0<br>10.59                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 334.0<br>13.15 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 15.41<br>33.98      |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 2.5<br>0.10      | 6.4<br>0.25                                    | 257.0<br>10.12                             | 267.0<br>10.51                             | 3.3<br>0.13                                  | 329.0<br>12.95 | 327.0<br>12.87 | 6.50<br>0.25   | 1.60<br>0.06   | 1180           | 164            | 0.1392         | 17.77<br>39.18      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 260.0<br>10.24                             | 269.0<br>10.59                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 338.0<br>13.31 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 16.80<br>37.05      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 260.0<br>10.24                             | 269.0<br>10.59                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 340.0<br>13.39 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 17.29<br>38.12      |
| 68.262<br>2.6875  | 53.975<br>2.1250 | -2.3<br>-0.09    | 6.4<br>0.25                                    | 257.0<br>10.12                             | 269.0<br>10.59                             | 3.3<br>0.13                                  | 344.0<br>13.54 | 341.0<br>13.43 | 7.70<br>0.30   | 0.10<br>0.00   | 1310           | 221            | 0.1432         | 24.20<br>53.35      |
| 69.850<br>2.7500  | 50.005<br>1.9687 | 2.5<br>0.10      | 6.4<br>0.25                                    | 268.0<br>10.55                             | 278.0<br>10.94                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 366.0<br>14.41 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 31.84<br>70.19      |
| 69.850<br>2.7500  | 46.038<br>1.8125 | 2.5<br>0.10      | 6.4<br>0.25                                    | 268.0<br>10.55                             | 278.0<br>10.94                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 373.0<br>14.69 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 33.95<br>74.84      |
| 100.012<br>3.9375 | 76.200<br>3.0000 | -19.3<br>-0.76   | 6.4<br>0.25                                    | 268.0<br>10.55                             | 277.0<br>10.91                             | 4.8<br>0.19                                  | 407.0<br>16.02 | 403.0<br>15.87 | 12.30<br>0.48  | 2.10<br>0.08   | 1630           | 136            | 0.1531         | 62.00<br>136.69     |
| 120.650<br>4.7500 | 92.075<br>3.6250 | -31.0<br>-1.22   | 6.4<br>0.25                                    | 276.0<br>10.87                             | 285.0<br>11.22                             | 6.4<br>0.25                                  | 450.5<br>17.74 | 444.0<br>17.48 | 18.70<br>0.73  | 4.00<br>0.16   | 2250           | 172            | 0.1664         | 98.39<br>216.91     |
| 95.250<br>3.7500  | 73.025<br>2.8750 | 49.5<br>1.95     | 6.4<br>0.25                                    | 288.0<br>11.34                             | 297.0<br>11.69                             | 6.4<br>0.25                                  | 456.0<br>17.96 | 423.0<br>16.65 | 22.50<br>0.88  | 18.90<br>0.74  | 1260           | 106            | 0.1909         | 91.31<br>201.31     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

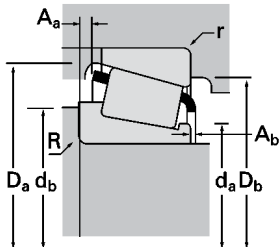
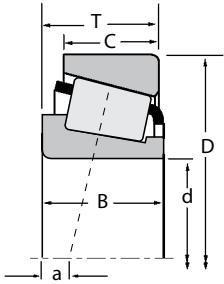
Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            |             |          |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>    | Inner       | Outer    |
| 244.475<br>9.6250       | 381.000<br>15.0000 | 79.375<br>3.1250  | 889000<br>200000       | 0.52 | 1.16 | 231000<br>51800        | 204000<br>45800  | 1.13 | 1690000<br>381000 | EE126097    | 126150   |
| 247.650<br>9.7500       | 304.800<br>12.0000 | 22.225<br>0.8750  | 146000<br>32700        | 0.32 | 1.85 | 37800<br>8490          | 21000<br>4720    | 1.80 | 373000<br>83900   | 28880       | 28820    |
| 247.650<br>9.7500       | 346.075<br>13.6250 | 63.500<br>2.5000  | 787000<br>177000       | 0.34 | 1.75 | 204000<br>45900        | 120000<br>27000  | 1.70 | 1620000<br>365000 | M348449     | M348410  |
| 247.650<br>9.7500       | 355.600<br>14.0000 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170975    | 171400   |
| 247.650<br>9.7500       | 365.049<br>14.3720 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170975    | 171436   |
| 247.650<br>9.7500       | 368.300<br>14.5000 | 50.800<br>2.0000  | 549000<br>123000       | 0.36 | 1.65 | 142000<br>32000        | 88500<br>19900   | 1.61 | 1030000<br>231000 | EE170975    | 171450   |
| 247.650<br>9.7500       | 381.000<br>15.0000 | 74.612<br>2.9375  | 982000<br>221000       | 0.33 | 1.80 | 255000<br>57200        | 145000<br>32600  | 1.76 | 2030000<br>455000 | M252337     | M252310  |
| 247.650<br>9.7500       | 406.400<br>16.0000 | 115.888<br>4.5625 | 1930000<br>433000      | 0.33 | 1.80 | 499000<br>112000       | 284000<br>63900  | 1.76 | 3770000<br>846000 | HH249949    | HH249910 |
| 249.250<br>9.8130       | 381.000<br>15.0000 | 79.375<br>3.1250  | 889000<br>200000       | 0.52 | 1.16 | 231000<br>51800        | 204000<br>45800  | 1.13 | 1690000<br>381000 | EE126098    | 126150   |
| 254.000<br>10.0000      | 323.850<br>12.7500 | 22.225<br>0.8750  | 148000<br>33300        | 0.35 | 1.73 | 38400<br>8630          | 22800<br>5120    | 1.69 | 391000<br>87800   | 29875       | 29820    |
| 254.000<br>10.0000      | 358.775<br>14.1250 | 71.438<br>2.8125  | 896000<br>202000       | 0.33 | 1.80 | 232000<br>52200        | 132000<br>29700  | 1.76 | 1850000<br>416000 | M249749     | M249710  |
| 254.000<br>10.0000      | 358.775<br>14.1250 | 71.438<br>2.8125  | 896000<br>202000       | 0.33 | 1.80 | 232000<br>52200        | 132000<br>29700  | 1.76 | 1850000<br>416000 | M249749X    | M249710  |
| 254.000<br>10.0000      | 365.125<br>14.3750 | 58.738<br>2.3125  | 666000<br>150000       | 0.37 | 1.60 | 173000<br>38800        | 111000<br>24900  | 1.56 | 1330000<br>299000 | EE134100    | 134143   |
| 254.000<br>10.0000      | 368.300<br>14.5000 | 58.738<br>2.3125  | 666000<br>150000       | 0.37 | 1.60 | 173000<br>38800        | 111000<br>24900  | 1.56 | 1330000<br>299000 | EE134100    | 134145   |
| 254.000<br>10.0000      | 393.700<br>15.5000 | 73.817<br>2.9062  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275100    | 275155   |
| 254.000<br>10.0000      | 400.050<br>15.7500 | 57.150<br>2.2500  | 782000<br>176000       | 0.33 | 1.81 | 203000<br>45600        | 115000<br>25900  | 1.76 | 1390000<br>313000 | EE251001    | 251575   |
| 254.000<br>10.0000      | 406.400<br>16.0000 | 69.850<br>2.7500  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275100    | 275160   |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 86.121<br>3.3906  | 1280000<br>288000      | 0.33 | 1.80 | 332000<br>74700        | 189000<br>42500  | 1.76 | 2020000<br>455000 | HM252343    | HM252310 |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 86.121<br>3.3906  | 1320000<br>297000      | 0.33 | 1.80 | 343000<br>77000        | 195000<br>43900  | 1.76 | 2110000<br>475000 | HM252344    | HM252310 |
| 254.000<br>10.0000      | 533.400<br>21.0000 | 133.350<br>5.2500 | 2100000<br>471000      | 0.94 | 0.64 | 543000<br>122000       | 872000<br>196000 | 0.62 | 3090000<br>694000 | HH953749    | HH953710 |
| 257.175<br>10.1250      | 342.900<br>13.5000 | 57.150<br>2.2500  | 667000<br>150000       | 0.35 | 1.73 | 173000<br>38900        | 103000<br>23100  | 1.68 | 1430000<br>321000 | M349549A    | M349510  |
| 257.175<br>10.1250      | 342.900<br>13.5000 | 57.150<br>2.2500  | 667000<br>150000       | 0.35 | 1.73 | 173000<br>38900        | 103000<br>23100  | 1.68 | 1430000<br>321000 | M349549     | M349510  |
| 260.350<br>10.2500      | 365.125<br>14.3750 | 58.738<br>2.3125  | 666000<br>150000       | 0.37 | 1.60 | 173000<br>38800        | 111000<br>24900  | 1.56 | 1330000<br>299000 | EE134102    | 134143   |
| 260.350<br>10.2500      | 368.300<br>14.5000 | 58.738<br>2.3125  | 666000<br>150000       | 0.37 | 1.60 | 173000<br>38800        | 111000<br>24900  | 1.56 | 1330000<br>299000 | EE134102    | 134145   |
| 260.350<br>10.2500      | 400.050<br>15.7500 | 69.850<br>2.7500  | 811000<br>182000       | 0.39 | 1.52 | 210000<br>47300        | 142000<br>31900  | 1.48 | 1450000<br>326000 | EE221026    | 221575   |
| 260.350<br>10.2500      | 419.100<br>16.5000 | 85.725<br>3.3750  | 1100000<br>248000      | 0.60 | 0.99 | 286000<br>64200        | 296000<br>66500  | 0.97 | 2010000<br>451000 | EE435102    | 435165   |
| 260.350<br>10.2500      | 422.275<br>16.6250 | 86.121<br>3.3906  | 1280000<br>288000      | 0.33 | 1.80 | 332000<br>74700        | 189000<br>42500  | 1.76 | 2020000<br>455000 | HM252348    | HM252310 |
| 260.350<br>10.2500      | 422.275<br>16.6250 | 86.121<br>3.3906  | 1320000<br>297000      | 0.33 | 1.80 | 343000<br>77000        | 195000<br>43900  | 1.76 | 2110000<br>475000 | HM252349    | HM252310 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            |                                            | Housing                                      |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 76.200<br>3.0000  | 57.150<br>2.2500 | 9.7<br>0.38      | 6.4<br>0.25                                    | 266.0<br>10.47                             | 275.0<br>10.83                             | 4.8<br>0.19                                  | 358.0<br>14.09 | 343.0<br>13.50 | 13.10<br>0.52  | 2.00<br>0.08   | 1320           | 169            | 0.1640         | 30.30<br>66.80      |
| 22.225<br>0.8750  | 15.875<br>0.6250 | 17.3<br>0.68     | 1.5<br>0.06                                    | 256.0<br>10.08                             | 258.0<br>10.16                             | 1.5<br>0.06                                  | 294.0<br>11.57 | 291.0<br>11.46 | 1.70<br>0.06   | 1.90<br>0.07   | 807            | 572            | 0.1479         | 3.18<br>7.01        |
| 63.500<br>2.5000  | 50.800<br>2.0000 | -1.3<br>-0.05    | 6.4<br>0.25                                    | 263.0<br>10.35                             | 273.0<br>10.75                             | 6.4<br>0.25                                  | 332.0<br>13.07 | 321.0<br>12.64 | 4.00<br>0.16   | 3.60<br>0.14   | 1450           | 213            | 0.1483         | 17.51<br>38.60      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 264.0<br>10.39                             | 274.0<br>10.79                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 334.0<br>13.15 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 14.44<br>31.83      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 264.0<br>10.39                             | 274.0<br>10.79                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 338.0<br>13.31 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 15.83<br>34.90      |
| 50.800<br>2.0000  | 33.338<br>1.3125 | 5.8<br>0.23      | 6.4<br>0.25                                    | 264.0<br>10.39                             | 274.0<br>10.79                             | 3.3<br>0.13                                  | 337.0<br>13.27 | 340.0<br>13.39 | 8.60<br>0.34   | 3.30<br>0.13   | 1070           | 172            | 0.1354         | 16.32<br>35.98      |
| 74.612<br>2.9375  | 57.150<br>2.2500 | -6.6<br>-0.26    | 6.4<br>0.25                                    | 270.0<br>10.63                             | 280.0<br>11.02                             | 3.3<br>0.13                                  | 363.5<br>14.32 | 356.0<br>14.02 | 8.30<br>0.33   | 3.50<br>0.14   | 1840           | 226            | 0.1588         | 30.47<br>67.16      |
| 117.475<br>4.6250 | 93.662<br>3.6875 | -28.7<br>-1.13   | 6.4<br>0.25                                    | 275.0<br>10.83                             | 284.0<br>11.18                             | 6.4<br>0.25                                  | 383.0<br>15.08 | 366.0<br>14.41 | 9.00<br>0.35   | 4.10<br>0.16   | 2370           | 173            | 0.1746         | 57.93<br>127.71     |
| 76.200<br>3.0000  | 57.150<br>2.2500 | 9.7<br>0.38      | 6.4<br>0.25                                    | 269.0<br>10.59                             | 279.0<br>10.98                             | 4.8<br>0.19                                  | 358.0<br>14.09 | 343.0<br>13.50 | 13.10<br>0.52  | 2.00<br>0.08   | 1320           | 169            | 0.1640         | 29.19<br>64.36      |
| 22.225<br>0.8750  | 15.875<br>0.6250 | 21.1<br>0.83     | 1.5<br>0.06                                    | 266.0<br>10.47                             | 267.0<br>10.51                             | 1.5<br>0.06                                  | 312.0<br>12.28 | 310.0<br>12.20 | 1.70<br>0.07   | 1.90<br>0.07   | 907            | 657            | 0.1567         | 4.26<br>9.39        |
| 71.438<br>2.8125  | 53.975<br>2.1250 | -6.9<br>-0.27    | 3.5<br>0.14                                    | 270.0<br>10.63                             | 274.0<br>10.79                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 8.00<br>0.32   | 3.00<br>0.12   | 1630           | 168            | 0.1526         | 21.35<br>47.07      |
| 71.438<br>2.8125  | 53.975<br>2.1250 | -6.9<br>-0.27    | 3.5<br>0.14                                    | 270.0<br>10.63                             | 274.0<br>10.79                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 8.00<br>0.32   | 3.00<br>0.12   | 1630           | 168            | 0.1526         | 21.35<br>47.07      |
| 58.738<br>2.3125  | 42.862<br>1.6875 | 5.1<br>0.20      | 6.4<br>0.25                                    | 272.0<br>10.71                             | 281.0<br>11.06                             | 6.4<br>0.25                                  | 347.0<br>13.66 | 339.0<br>13.35 | 8.30<br>0.32   | 1.70<br>0.07   | 1330           | 187            | 0.1474         | 18.11<br>39.93      |
| 58.738<br>2.3125  | 42.862<br>1.6875 | 5.1<br>0.20      | 6.4<br>0.25                                    | 272.0<br>10.71                             | 281.0<br>11.06                             | 6.4<br>0.25                                  | 347.0<br>13.66 | 340.0<br>13.39 | 8.30<br>0.32   | 1.70<br>0.07   | 1330           | 187            | 0.1474         | 18.72<br>41.28      |
| 69.850<br>2.7500  | 50.005<br>1.9687 | 2.5<br>0.10      | 6.4<br>0.25                                    | 277.0<br>10.91                             | 287.0<br>11.30                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 366.0<br>14.41 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 29.13<br>64.23      |
| 55.562<br>2.1875  | 41.275<br>1.6250 | 3.3<br>0.13      | 3.3<br>0.13                                    | 272.0<br>10.71                             | 278.0<br>10.94                             | 1.5<br>0.06                                  | 369.0<br>14.53 | 371.0<br>14.61 | 6.30<br>0.25   | 5.30<br>0.21   | 1320           | 218            | 0.1413         | 24.88<br>54.85      |
| 69.850<br>2.7500  | 46.038<br>1.8125 | 2.5<br>0.10      | 6.4<br>0.25                                    | 277.0<br>10.91                             | 287.0<br>11.30                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 373.0<br>14.69 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 31.24<br>68.88      |
| 79.771<br>3.1406  | 66.675<br>2.6250 | -9.4<br>-0.37    | 6.8<br>0.27                                    | 281.0<br>11.06                             | 287.0<br>11.30                             | 3.3<br>0.13                                  | 399.5<br>15.73 | 392.0<br>15.43 | 13.00<br>0.51  | 4.80<br>0.19   | 1500           | 148            | 0.1482         | 41.60<br>91.71      |
| 79.771<br>3.1406  | 66.675<br>2.6250 | -9.4<br>-0.37    | 6.8<br>0.27                                    | 281.0<br>11.06                             | 287.0<br>11.30                             | 3.3<br>0.13                                  | 399.5<br>15.73 | 392.0<br>15.43 | 10.50<br>0.41  | 6.10<br>0.24   | 1550           | 152            | 0.1498         | 41.76<br>92.06      |
| 120.650<br>4.7500 | 77.788<br>3.0625 | 45.5<br>1.79     | 6.4<br>0.25                                    | 306.5<br>12.06                             | 328.0<br>12.91                             | 6.4<br>0.25                                  | 495.5<br>19.51 | 455.0<br>17.91 | 21.80<br>0.86  | 14.20<br>0.56  | 1670           | 104            | 0.2101         | 120.15<br>264.88    |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 2.5<br>0.10      | 10.7<br>0.42                                   | 269.0<br>10.59                             | 289.0<br>11.38                             | 3.3<br>0.13                                  | 333.0<br>13.11 | 322.0<br>12.68 | 4.80<br>0.19   | 3.00<br>0.12   | 1420           | 193            | 0.1475         | 13.33<br>29.40      |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 2.5<br>0.10      | 6.4<br>0.25                                    | 269.0<br>10.59                             | 281.0<br>11.06                             | 3.3<br>0.13                                  | 333.0<br>13.11 | 322.0<br>12.68 | 4.80<br>0.19   | 3.00<br>0.12   | 1420           | 193            | 0.1475         | 13.57<br>29.92      |
| 58.738<br>2.3125  | 42.862<br>1.6875 | 5.1<br>0.20      | 6.4<br>0.25                                    | 276.0<br>10.87                             | 286.0<br>11.26                             | 6.4<br>0.25                                  | 347.0<br>13.66 | 339.0<br>13.35 | 8.30<br>0.32   | 1.70<br>0.07   | 1330           | 187            | 0.1474         | 16.93<br>37.32      |
| 58.738<br>2.3125  | 42.862<br>1.6875 | 5.1<br>0.20      | 6.4<br>0.25                                    | 276.0<br>10.87                             | 286.0<br>11.26                             | 6.4<br>0.25                                  | 347.0<br>13.66 | 340.0<br>13.39 | 8.30<br>0.32   | 1.70<br>0.07   | 1330           | 187            | 0.1474         | 17.54<br>38.67      |
| 67.470<br>2.6563  | 46.038<br>1.8125 | 0.8<br>0.03      | 9.7<br>0.38                                    | 280.0<br>11.02                             | 296.0<br>11.65                             | 6.4<br>0.25                                  | 371.5<br>14.63 | 366.0<br>14.41 | 14.30<br>0.56  | 5.60<br>0.22   | 1320           | 207            | 0.1497         | 26.68<br>58.82      |
| 84.138<br>3.3125  | 61.912<br>2.4375 | 19.8<br>0.78     | 6.4<br>0.25                                    | 285.0<br>11.22                             | 295.0<br>11.61                             | 3.3<br>0.13                                  | 395.0<br>15.56 | 376.0<br>14.80 | 14.10<br>0.55  | 2.00<br>0.08   | 1480           | 123            | 0.1787         | 41.85<br>92.26      |
| 79.771<br>3.1406  | 66.675<br>2.6250 | -9.4<br>-0.37    | 6.8<br>0.27                                    | 285.0<br>11.22                             | 292.0<br>11.50                             | 3.3<br>0.13                                  | 399.5<br>15.73 | 392.0<br>15.43 | 13.00<br>0.51  | 4.80<br>0.19   | 1500           | 148            | 0.1482         | 40.16<br>88.54      |
| 79.771<br>3.1406  | 66.675<br>2.6250 | -9.4<br>-0.37    | 6.8<br>0.27                                    | 285.0<br>11.22                             | 292.0<br>11.50                             | 3.3<br>0.13                                  | 399.5<br>15.73 | 392.0<br>15.43 | 10.50<br>0.41  | 6.10<br>0.24   | 1550           | 152            | 0.1498         | 40.16<br>88.53      |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

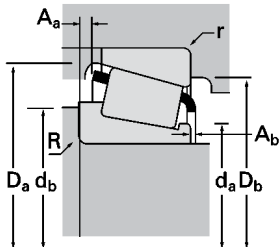
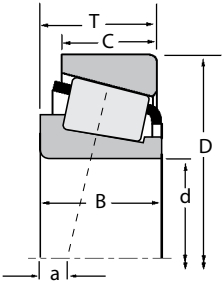
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static            | Inner       | Outer    |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |          |
| 260.350<br>10.2500      | 488.950<br>19.2500 | 120.650<br>4.7500 | 2070000<br>465000      | 0.31 | 1.92 | 537000<br>121000       | 287000<br>64600  | 1.87 | 3310000<br>744000 | EE295102    | 295193   |
| 263.525<br>10.3750      | 325.438<br>12.8125 | 28.575<br>1.1250  | 217000<br>48800        | 0.37 | 1.64 | 56300<br>12700         | 35200<br>7920    | 1.60 | 554000<br>125000  | 38880       | 38820    |
| 263.525<br>10.3750      | 355.600<br>14.0000 | 57.150<br>2.2500  | 688000<br>155000       | 0.36 | 1.67 | 178000<br>40100        | 110000<br>24700  | 1.62 | 1510000<br>339000 | LM451345    | LM451310 |
| 266.560<br>10.4945      | 325.438<br>12.8125 | 29.500<br>1.1614  | 210000<br>47100        | 0.37 | 1.64 | 54400<br>12200         | 34000<br>7650    | 1.60 | 527000<br>118000  | 38884       | 38820    |
| 266.700<br>10.5000      | 323.850<br>12.7500 | 22.225<br>0.8750  | 148000<br>33300        | 0.35 | 1.73 | 38400<br>8630          | 22800<br>5120    | 1.69 | 391000<br>87800   | 29880       | 29820    |
| 266.700<br>10.5000      | 325.438<br>12.8125 | 28.575<br>1.1250  | 217000<br>48800        | 0.37 | 1.64 | 56300<br>12700         | 35200<br>7920    | 1.60 | 554000<br>125000  | 38885       | 38820    |
| 266.700<br>10.5000      | 355.600<br>14.0000 | 57.150<br>2.2500  | 688000<br>155000       | 0.36 | 1.67 | 178000<br>40100        | 110000<br>24700  | 1.62 | 1510000<br>339000 | LM451349A   | LM451310 |
| 266.700<br>10.5000      | 355.600<br>14.0000 | 57.150<br>2.2500  | 688000<br>155000       | 0.36 | 1.67 | 178000<br>40100        | 110000<br>24700  | 1.62 | 1510000<br>339000 | LM451349    | LM451310 |
| 266.700<br>10.5000      | 393.700<br>15.5000 | 73.817<br>2.9062  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275105    | 275155   |
| 266.700<br>10.5000      | 406.400<br>16.0000 | 69.850<br>2.7500  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275105    | 275160   |
| 266.700<br>10.5000      | 444.500<br>17.5000 | 120.650<br>4.7500 | 1790000<br>402000      | 0.58 | 1.04 | 464000<br>104000       | 457000<br>103000 | 1.01 | 3520000<br>791000 | H852849     | H852810  |
| 269.875<br>10.6250      | 381.000<br>15.0000 | 74.612<br>2.9375  | 982000<br>221000       | 0.33 | 1.80 | 255000<br>57200        | 145000<br>32600  | 1.76 | 2030000<br>455000 | M252349     | M252310  |
| 273.050<br>10.7500      | 393.700<br>15.5000 | 73.817<br>2.9062  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275108    | 275155   |
| 273.050<br>10.7500      | 406.400<br>16.0000 | 69.850<br>2.7500  | 865000<br>195000       | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275108    | 275160   |
| 276.225<br>10.8750      | 352.425<br>13.8750 | 36.512<br>1.4375  | 326000<br>73400        | 0.54 | 1.11 | 84600<br>19000         | 78000<br>17500   | 1.08 | 750000<br>169000  | L853049     | L853010  |
| 279.400<br>11.0000      | 317.500<br>12.5000 | 24.384<br>0.9600  | 159000<br>35800        | 0.35 | 1.73 | 41200<br>9270          | 24400<br>5500    | 1.69 | 467000<br>105000  | LL352149    | LL352110 |
| 279.400<br>11.0000      | 469.900<br>18.5000 | 95.250<br>3.7500  | 1380000<br>310000      | 0.38 | 1.59 | 357000<br>80300        | 231000<br>52000  | 1.55 | 2350000<br>527000 | EE722110    | 722185   |
| 279.400<br>11.0000      | 488.950<br>19.2500 | 120.650<br>4.7500 | 2070000<br>465000      | 0.31 | 1.92 | 537000<br>121000       | 287000<br>64600  | 1.87 | 3310000<br>744000 | EE295110    | 295193   |
| 279.982<br>11.0229      | 380.009<br>14.9610 | 65.088<br>2.5625  | 708000<br>159000       | 0.43 | 1.39 | 184000<br>41300        | 136000<br>30500  | 1.35 | 1720000<br>387000 | LM654642    | LM654611 |
| 280.000<br>11.0236      | 406.400<br>16.0000 | 69.850<br>2.7500  | 851000<br>191000       | 0.39 | 1.55 | 221000<br>49600        | 146000<br>32800  | 1.51 | 1660000<br>374000 | EE128112    | 128160   |
| 280.192<br>11.0312      | 400.050<br>15.7500 | 52.388<br>2.0625  | 590000<br>133000       | 0.41 | 1.47 | 153000<br>34400        | 107000<br>24000  | 1.43 | 1180000<br>266000 | EE101103    | 101575   |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 52.388<br>2.0625  | 590000<br>133000       | 0.41 | 1.47 | 153000<br>34400        | 107000<br>24000  | 1.43 | 1180000<br>266000 | EE101103    | 101600   |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 69.850<br>2.7500  | 906000<br>204000       | 0.39 | 1.55 | 235000<br>52800        | 155000<br>34900  | 1.51 | 1820000<br>409000 | EE128110    | 128160   |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 69.850<br>2.7500  | 851000<br>191000       | 0.39 | 1.55 | 221000<br>49600        | 146000<br>32800  | 1.51 | 1660000<br>374000 | EE128111    | 128160   |
| 285.750<br>11.2500      | 354.012<br>13.9375 | 33.338<br>1.3125  | 253000<br>56800        | 0.49 | 1.22 | 65500<br>14700         | 55200<br>12400   | 1.19 | 596000<br>134000  | 545112      | 545139   |
| 285.750<br>11.2500      | 358.775<br>14.1250 | 33.338<br>1.3125  | 253000<br>56800        | 0.49 | 1.22 | 65500<br>14700         | 55200<br>12400   | 1.19 | 596000<br>134000  | 545112      | 545141   |
| 288.925<br>11.3750      | 406.400<br>16.0000 | 77.788<br>3.0625  | 1170000<br>262000      | 0.34 | 1.77 | 302000<br>68000        | 175000<br>39300  | 1.73 | 2520000<br>567000 | M255449     | M255410  |
| 292.100<br>11.5000      | 374.650<br>14.7500 | 47.625<br>1.8750  | 510000<br>115000       | 0.40 | 1.49 | 132000<br>29700        | 90900<br>20400   | 1.45 | 1150000<br>258000 | L555249     | L555210  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 120.650<br>4.7500 | 92.075<br>3.6250 | -31.0<br>-1.22   | 6.4<br>0.25                                    | 290.0<br>11.42                             | 299.0<br>11.77                             | 6.4<br>0.25                                  | 450.5<br>17.74 | 444.0<br>17.48 | 18.70<br>0.73  | 4.00<br>0.16   | 2250           | 172            | 0.1664         | 91.30<br>201.28     |
| 28.575<br>1.1250  | 25.400<br>1.0000 | 20.3<br>0.80     | 1.5<br>0.06                                    | 275.0<br>10.83                             | 275.0<br>10.83                             | 1.5<br>0.06                                  | 315.0<br>12.40 | 312.0<br>12.28 | 1.30<br>0.05   | 1.30<br>0.05   | 1030           | 496            | 0.1676         | 5.15<br>11.35       |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 5.1<br>0.20      | 3.5<br>0.14                                    | 279.0<br>10.98                             | 283.0<br>11.14                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 5.90<br>0.23   | 3.40<br>0.13   | 1550           | 212            | 0.1536         | 15.43<br>34.02      |
| 33.470<br>1.3177  | 25.400<br>1.0000 | 19.6<br>0.77     | 1.5<br>0.06                                    | 275.0<br>10.83                             | 277.0<br>10.91                             | 1.5<br>0.06                                  | 315.0<br>12.40 | 312.0<br>12.28 | 0.50<br>0.02   | -0.80<br>-0.03 | 993            | 480            | 0.1656         | 5.35<br>11.79       |
| 22.225<br>0.8750  | 15.875<br>0.6250 | 21.1<br>0.83     | 1.5<br>0.06                                    | 275.0<br>10.83                             | 277.0<br>10.91                             | 1.5<br>0.06                                  | 312.0<br>12.28 | 310.0<br>12.20 | 1.70<br>0.07   | 1.90<br>0.07   | 907            | 657            | 0.1567         | 3.36<br>7.40        |
| 28.575<br>1.1250  | 25.400<br>1.0000 | 20.3<br>0.80     | 1.5<br>0.06                                    | 277.0<br>10.91                             | 277.0<br>10.91                             | 1.5<br>0.06                                  | 315.0<br>12.40 | 312.0<br>12.28 | 1.30<br>0.05   | 1.30<br>0.05   | 1030           | 496            | 0.1676         | 4.85<br>10.70       |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 5.1<br>0.20      | 10.5<br>0.41                                   | 281.0<br>11.06                             | 299.0<br>11.77                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 5.90<br>0.23   | 3.40<br>0.13   | 1550           | 212            | 0.1536         | 14.52<br>32.00      |
| 57.150<br>2.2500  | 44.450<br>1.7500 | 5.1<br>0.20      | 3.5<br>0.14                                    | 281.0<br>11.06                             | 285.0<br>11.22                             | 3.3<br>0.13                                  | 343.0<br>13.50 | 335.0<br>13.19 | 5.90<br>0.23   | 3.40<br>0.13   | 1550           | 212            | 0.1536         | 14.84<br>32.72      |
| 69.850<br>2.7500  | 50.005<br>1.9687 | 2.5<br>0.10      | 6.4<br>0.25                                    | 287.0<br>11.30                             | 296.0<br>11.65                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 366.0<br>14.41 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 26.29<br>57.96      |
| 69.850<br>2.7500  | 46.038<br>1.8125 | 2.5<br>0.10      | 6.4<br>0.25                                    | 287.0<br>11.30                             | 296.0<br>11.65                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 373.0<br>14.69 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 28.40<br>62.61      |
| 117.475<br>4.6250 | 88.900<br>3.5000 | -0.5<br>-0.02    | 6.4<br>0.25                                    | 297.0<br>11.69                             | 315.0<br>12.40                             | 6.4<br>0.25                                  | 422.5<br>16.63 | 390.0<br>15.35 | 19.20<br>0.76  | 4.10<br>0.16   | 2250           | 171            | 0.2040         | 72.32<br>159.43     |
| 74.612<br>2.9375  | 57.150<br>2.2500 | -6.6<br>-0.26    | 6.4<br>0.25                                    | 287.0<br>11.30                             | 296.0<br>11.65                             | 3.3<br>0.13                                  | 363.5<br>14.32 | 356.0<br>14.02 | 8.30<br>0.33   | 3.50<br>0.14   | 1840           | 226            | 0.1588         | 25.28<br>55.74      |
| 69.850<br>2.7500  | 50.005<br>1.9687 | 2.5<br>0.10      | 6.4<br>0.25                                    | 291.0<br>11.46                             | 301.0<br>11.85                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 366.0<br>14.41 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 24.82<br>54.71      |
| 69.850<br>2.7500  | 46.038<br>1.8125 | 2.5<br>0.10      | 6.4<br>0.25                                    | 291.0<br>11.46                             | 301.0<br>11.85                             | 6.4<br>0.25                                  | 378.0<br>14.89 | 373.0<br>14.69 | 14.40<br>0.57  | 3.30<br>0.13   | 1450           | 201            | 0.1555         | 26.92<br>59.36      |
| 34.925<br>1.3750  | 23.812<br>0.9375 | 35.1<br>1.38     | 3.5<br>0.14                                    | 288.0<br>11.34                             | 293.0<br>11.54                             | 3.3<br>0.13                                  | 342.0<br>13.46 | 332.0<br>13.07 | 6.00<br>0.24   | 3.40<br>0.14   | 1060           | 350            | 0.1517         | 7.67<br>16.91       |
| 24.384<br>0.9600  | 18.288<br>0.7200 | 20.3<br>0.80     | 1.5<br>0.06                                    | 286.0<br>11.26                             | 288.0<br>11.34                             | 1.5<br>0.06                                  | 312.0<br>12.28 | 309.0<br>12.17 | 1.80<br>0.07   | 2.10<br>0.08   | 1130           | 860            | 0.1688         | 2.58<br>5.69        |
| 93.662<br>3.6875  | 69.850<br>2.7500 | -7.6<br>-0.30    | 9.7<br>0.38                                    | 314.0<br>12.36                             | 321.0<br>12.64                             | 3.3<br>0.13                                  | 433.0<br>17.04 | 430.0<br>16.93 | 16.80<br>0.66  | 0.40<br>0.02   | 1890           | 143            | 0.1669         | 58.94<br>129.95     |
| 120.650<br>4.7500 | 92.075<br>3.6250 | -31.0<br>-1.22   | 1.3<br>0.05                                    | 304.0<br>11.97                             | 303.0<br>11.93                             | 6.4<br>0.25                                  | 450.5<br>17.74 | 444.0<br>17.48 | 18.70<br>0.73  | 4.00<br>0.16   | 2250           | 172            | 0.1664         | 83.81<br>184.76     |
| 65.088<br>2.5625  | 49.212<br>1.9375 | 11.4<br>0.45     | 3.5<br>0.14                                    | 298.0<br>11.73                             | 302.0<br>11.89                             | 3.3<br>0.13                                  | 368.0<br>14.49 | 356.0<br>14.02 | 7.90<br>0.31   | 0.70<br>0.03   | 1920           | 265            | 0.1744         | 20.64<br>45.51      |
| 67.673<br>2.6643  | 53.975<br>2.1250 | 6.6<br>0.26      | 6.4<br>0.25                                    | 307.0<br>12.09                             | 308.0<br>12.13                             | 3.3<br>0.13                                  | 384.0<br>15.12 | 378.0<br>14.88 | 8.20<br>0.32   | 0.90<br>0.04   | 1620           | 240            | 0.1592         | 27.03<br>59.58      |
| 50.211<br>1.9768  | 34.925<br>1.3750 | 15.7<br>0.62     | 6.8<br>0.27                                    | 307.0<br>12.09                             | 309.0<br>12.17                             | 3.3<br>0.13                                  | 376.0<br>14.80 | 374.0<br>14.72 | 7.70<br>0.30   | 5.30<br>0.21   | 1380           | 227            | 0.1527         | 18.74<br>41.31      |
| 50.211<br>1.9768  | 34.925<br>1.3750 | 15.7<br>0.62     | 6.8<br>0.27                                    | 307.0<br>12.09                             | 309.0<br>12.17                             | 3.3<br>0.13                                  | 376.0<br>14.80 | 377.0<br>14.84 | 7.70<br>0.30   | 5.30<br>0.21   | 1380           | 227            | 0.1527         | 19.83<br>43.72      |
| 67.673<br>2.6643  | 53.975<br>2.1250 | 6.6<br>0.26      | 6.8<br>0.27                                    | 307.0<br>12.09                             | 309.0<br>12.17                             | 3.3<br>0.13                                  | 384.0<br>15.12 | 378.0<br>14.88 | 6.90<br>0.27   | 1.50<br>0.06   | 1730           | 255            | 0.1628         | 26.81<br>59.09      |
| 67.673<br>2.6643  | 53.975<br>2.1250 | 6.6<br>0.26      | 6.8<br>0.27                                    | 307.0<br>12.09                             | 309.0<br>12.17                             | 3.3<br>0.13                                  | 384.0<br>15.12 | 378.0<br>14.88 | 8.20<br>0.32   | 0.90<br>0.04   | 1620           | 240            | 0.1592         | 26.96<br>59.43      |
| 31.750<br>1.2500  | 22.225<br>0.8750 | 32.8<br>1.29     | 3.5<br>0.14                                    | 298.0<br>11.73                             | 302.0<br>11.89                             | 3.3<br>0.13                                  | 345.0<br>13.58 | 338.0<br>13.31 | 5.70<br>0.22   | 2.90<br>0.11   | 1020           | 477            | 0.1446         | 6.28<br>13.84       |
| 31.750<br>1.2500  | 22.225<br>0.8750 | 32.8<br>1.29     | 3.5<br>0.14                                    | 298.0<br>11.73                             | 302.0<br>11.89                             | 3.3<br>0.13                                  | 345.0<br>13.58 | 340.0<br>13.39 | 5.70<br>0.22   | 2.90<br>0.11   | 1020           | 477            | 0.1446         | 6.74<br>14.86       |
| 77.788<br>3.0625  | 60.325<br>2.3750 | -4.1<br>-0.16    | 6.4<br>0.25                                    | 310.0<br>12.20                             | 316.0<br>12.44                             | 3.3<br>0.13                                  | 388.0<br>15.27 | 379.0<br>14.92 | 5.80<br>0.23   | 3.90<br>0.16   | 2300           | 287            | 0.1722         | 29.40<br>64.81      |
| 47.625<br>1.8750  | 34.925<br>1.3750 | 17.5<br>0.69     | 3.5<br>0.14                                    | 305.0<br>12.01                             | 309.0<br>12.17                             | 3.3<br>0.13                                  | 362.0<br>14.25 | 355.0<br>13.98 | 5.50<br>0.22   | 2.30<br>0.09   | 1480           | 340            | 0.1553         | 11.78<br>25.97      |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

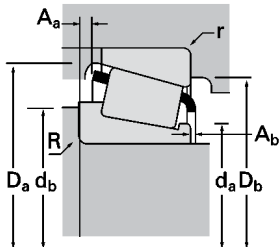
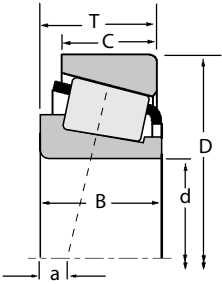
Continued on next page.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                   |      |                    | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|-------------------|------|--------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                   |      | Static             | Inner       | Outer    |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub>  | K    |                    |             |          |
| 292.100<br>11.5000      | 393.700<br>15.5000 | 63.500<br>2.5000  | 468000<br>105000       | 0.61 | 0.98 | 121000<br>27300        | 127000<br>28500   | 0.96 | 997000<br>224000   | 84115       | 84155    |
| 292.100<br>11.5000      | 469.900<br>18.5000 | 95.250<br>3.7500  | 1380000<br>310000      | 0.38 | 1.59 | 357000<br>80300        | 231000<br>52000   | 1.55 | 2350000<br>527000  | EE722115    | 722185   |
| 292.100<br>11.5000      | 558.800<br>22.0000 | 136.525<br>5.3750 | 2640000<br>594000      | 0.40 | 1.52 | 685000<br>154000       | 464000<br>104000  | 1.48 | 4100000<br>923000  | EE790114    | 790221   |
| 298.450<br>11.7500      | 444.500<br>17.5000 | 63.500<br>2.5000  | 758000<br>170000       | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600   | 1.55 | 1390000<br>312000  | EE291175    | 291750   |
| 299.975<br>11.8100      | 495.300<br>19.5000 | 141.288<br>5.5625 | 2810000<br>632000      | 0.33 | 1.80 | 729000<br>164000       | 415000<br>93300   | 1.76 | 5650000<br>1270000 | HH258248    | HH258210 |
| 300.038<br>11.8125      | 422.275<br>16.6250 | 82.550<br>3.2500  | 1270000<br>286000      | 0.34 | 1.78 | 330000<br>74100        | 190000<br>42700   | 1.73 | 2770000<br>622000  | HM256849    | HM256810 |
| 304.800<br>12.0000      | 393.700<br>15.5000 | 50.800<br>2.0000  | 575000<br>129000       | 0.36 | 1.67 | 149000<br>33500        | 91600<br>20600    | 1.63 | 1310000<br>295000  | L357049     | L357010  |
| 304.800<br>12.0000      | 406.400<br>16.0000 | 63.500<br>2.5000  | 754000<br>170000       | 0.44 | 1.36 | 196000<br>44000        | 148000<br>33200   | 1.32 | 1740000<br>392000  | LM757049AA  | LM757010 |
| 304.800<br>12.0000      | 406.400<br>16.0000 | 63.500<br>2.5000  | 754000<br>170000       | 0.44 | 1.36 | 196000<br>44000        | 148000<br>33200   | 1.32 | 1740000<br>392000  | LM757049    | LM757010 |
| 304.800<br>12.0000      | 438.048<br>17.2460 | 76.200<br>3.0000  | 879000<br>198000       | 0.42 | 1.44 | 228000<br>51200        | 162000<br>36500   | 1.40 | 1780000<br>401000  | EE129120X   | 129172   |
| 304.800<br>12.0000      | 444.500<br>17.5000 | 63.500<br>2.5000  | 758000<br>170000       | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600   | 1.55 | 1390000<br>312000  | EE291201    | 291749   |
| 304.800<br>12.0000      | 444.500<br>17.5000 | 63.500<br>2.5000  | 758000<br>170000       | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600   | 1.55 | 1390000<br>312000  | EE291201    | 291750   |
| 304.800<br>12.0000      | 495.300<br>19.5000 | 76.200<br>3.0000  | 1320000<br>298000      | 0.40 | 1.49 | 343000<br>77200        | 236000<br>53100   | 1.45 | 2090000<br>471000  | EE941205    | 941950   |
| 304.800<br>12.0000      | 495.300<br>19.5000 | 95.250<br>3.7500  | 1440000<br>324000      | 0.40 | 1.49 | 374000<br>84000        | 257000<br>57800   | 1.45 | 2550000<br>573000  | EE724120    | 724195   |
| 304.800<br>12.0000      | 499.948<br>19.6830 | 101.600<br>4.0000 | 1140000<br>257000      | 1.17 | 0.51 | 296000<br>66600        | 594000<br>134000  | 0.50 | 1890000<br>424000  | M959442     | M959410  |
| 304.800<br>12.0000      | 558.800<br>22.0000 | 136.525<br>5.3750 | 2640000<br>594000      | 0.40 | 1.52 | 685000<br>154000       | 464000<br>104000  | 1.48 | 4100000<br>923000  | EE790120    | 790221   |
| 312.738<br>12.3125      | 358.775<br>14.1250 | 22.225<br>0.8750  | 131000<br>29500        | 0.82 | 0.73 | 34000<br>7640          | 47900<br>10800    | 0.71 | 383000<br>86100    | LL957049    | LL957010 |
| 314.325<br>12.3750      | 495.300<br>19.5000 | 120.650<br>4.7500 | 1920000<br>432000      | 0.58 | 1.04 | 498000<br>112000       | 491000<br>110000  | 1.01 | 3950000<br>889000  | H859049     | H859010  |
| 317.500<br>12.5000      | 444.500<br>17.5000 | 63.500<br>2.5000  | 758000<br>170000       | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600   | 1.55 | 1390000<br>312000  | EE291250    | 291749   |
| 317.500<br>12.5000      | 444.500<br>17.5000 | 63.500<br>2.5000  | 758000<br>170000       | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600   | 1.55 | 1390000<br>312000  | EE291250    | 291750   |
| 317.500<br>12.5000      | 447.675<br>17.6250 | 85.725<br>3.3750  | 1320000<br>297000      | 0.33 | 1.79 | 342000<br>76900        | 196000<br>44100   | 1.74 | 2790000<br>628000  | HM259048    | HM259010 |
| 317.500<br>12.5000      | 447.675<br>17.6250 | 85.725<br>3.3750  | 1430000<br>322000      | 0.33 | 1.79 | 372000<br>83600        | 213000<br>47900   | 1.74 | 3140000<br>706000  | HM259049    | HM259010 |
| 317.500<br>12.5000      | 596.900<br>23.5000 | 136.525<br>5.3750 | 2830000<br>636000      | 0.42 | 1.42 | 733000<br>165000       | 530000<br>119000  | 1.38 | 4600000<br>1030000 | EE720125    | 720236   |
| 317.500<br>12.5000      | 622.300<br>24.5000 | 147.638<br>5.8125 | 2700000<br>607000      | 0.94 | 0.64 | 700000<br>157000       | 1120000<br>253000 | 0.62 | 4130000<br>927000  | H961649     | H961610  |
| 323.850<br>12.7500      | 381.000<br>15.0000 | 28.575<br>1.1250  | 239000<br>53700        | 0.44 | 1.36 | 61900<br>13900         | 46600<br>10500    | 1.33 | 672000<br>151000   | LL758744    | LL758715 |
| 325.438<br>12.8125      | 596.900<br>23.5000 | 136.525<br>5.3750 | 2830000<br>636000      | 0.42 | 1.42 | 733000<br>165000       | 530000<br>119000  | 1.38 | 4600000<br>1030000 | EE720128    | 720236   |
| 330.200<br>13.0000      | 415.925<br>16.3750 | 47.625<br>1.8750  | 475000<br>107000       | 0.50 | 1.20 | 123000<br>27700        | 105000<br>23600   | 1.17 | 1180000<br>266000  | L860049     | L860010  |
| 330.200<br>13.0000      | 482.600<br>19.0000 | 66.675<br>2.6250  | 878000<br>197000       | 0.42 | 1.44 | 228000<br>51200        | 162000<br>36500   | 1.40 | 1770000<br>398000  | EE203130    | 203190   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                   |                  | Dimensions, mm (inches)                        |                                            |                                            |                  |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|-------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                   |                  | Shaft                                          |                                            | Housing                                    |                  |                |                |                |                |                |                |                |                     |
| B                 | C                 | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 50.800<br>2.0000  | 44.450<br>1.7500  | 36.6<br>1.44     | 3.5<br>0.14                                    | 309.0<br>12.17                             | 313.0<br>12.32                             | 6.4<br>0.25      | 378.0<br>14.88 | 363.0<br>14.29 | 13.90<br>0.55  | 2.80<br>0.11   | 1230           | 302            | 0.1660         | 18.03<br>39.75      |
| 93.662<br>3.6875  | 69.850<br>2.7500  | -7.6<br>-0.30    | 9.7<br>0.38                                    | 324.0<br>12.76                             | 330.0<br>12.99                             | 3.3<br>0.13      | 433.0<br>17.04 | 430.0<br>16.93 | 16.80<br>0.66  | 0.40<br>0.02   | 1890           | 143            | 0.1669         | 54.75<br>120.70     |
| 136.525<br>5.3750 | 98.425<br>3.8750  | -24.4<br>-0.96   | 6.4<br>0.25                                    | 329.0<br>12.95                             | 335.0<br>13.19                             | 6.4<br>0.25      | 514.0<br>20.24 | 501.0<br>19.72 | 20.00<br>0.79  | 7.30<br>0.29   | 2660           | 170            | 0.1898         | 132.40<br>291.88    |
| 61.912<br>2.4375  | 39.688<br>1.5625  | 7.6<br>0.30      | 8.0<br>0.31                                    | 320.0<br>12.60                             | 332.0<br>13.07                             | 1.5<br>0.06      | 415.0<br>16.34 | 416.0<br>16.38 | 11.40<br>0.45  | 7.00<br>0.28   | 1580           | 245            | 0.1557         | 29.43<br>64.87      |
| 141.288<br>5.5625 | 114.300<br>4.5000 | -34.5<br>-1.36   | 6.4<br>0.25                                    | 332.0<br>13.07                             | 342.0<br>13.46                             | 6.4<br>0.25      | 467.5<br>18.40 | 448.0<br>17.64 | 10.70<br>0.42  | 7.70<br>0.30   | 3850           | 220            | 0.2048         | 106.33<br>234.41    |
| 82.550<br>3.2500  | 63.500<br>2.5000  | -5.6<br>-0.22    | 6.4<br>0.25                                    | 319.0<br>12.56                             | 328.0<br>12.91                             | 3.3<br>0.13      | 403.5<br>15.88 | 394.0<br>15.51 | 7.40<br>0.29   | 3.50<br>0.14   | 2550           | 282            | 0.1779         | 33.74<br>74.39      |
| 50.800<br>2.0000  | 38.100<br>1.5000  | 12.7<br>0.50     | 6.4<br>0.25                                    | 319.0<br>12.56                             | 329.0<br>12.95                             | 3.3<br>0.13      | 380.0<br>14.96 | 374.0<br>14.72 | 5.60<br>0.22   | 1.90<br>0.08   | 1750           | 301            | 0.1585         | 14.35<br>31.64      |
| 63.500<br>2.5000  | 47.625<br>1.8750  | 16.3<br>0.64     | 12.7<br>0.50                                   | 322.0<br>12.68                             | 344.0<br>13.54                             | 3.3<br>0.13      | 393.0<br>15.47 | 380.0<br>14.96 | 6.90<br>0.27   | 2.50<br>0.10   | 1990           | 260            | 0.1775         | 21.36<br>47.09      |
| 63.500<br>2.5000  | 47.625<br>1.8750  | 16.3<br>0.64     | 6.4<br>0.25                                    | 322.0<br>12.68                             | 331.0<br>13.03                             | 3.3<br>0.13      | 393.0<br>15.47 | 380.0<br>14.96 | 6.90<br>0.27   | 2.50<br>0.10   | 1990           | 260            | 0.1775         | 21.44<br>47.26      |
| 76.992<br>3.0312  | 53.975<br>2.1250  | 7.4<br>0.29      | 6.4<br>0.25                                    | 328.0<br>12.91                             | 334.0<br>13.15                             | 4.8<br>0.19      | 411.5<br>16.20 | 406.0<br>15.98 | 15.00<br>0.59  | -2.00<br>-0.08 | 1880           | 273            | 0.1711         | 33.00<br>72.75      |
| 61.912<br>2.4375  | 39.688<br>1.5625  | 7.6<br>0.30      | 8.0<br>0.31                                    | 324.0<br>12.76                             | 337.0<br>13.27                             | 3.3<br>0.13      | 415.0<br>16.34 | 415.0<br>16.34 | 11.40<br>0.45  | 7.00<br>0.28   | 1580           | 245            | 0.1557         | 27.92<br>61.55      |
| 61.912<br>2.4375  | 39.688<br>1.5625  | 7.6<br>0.30      | 8.0<br>0.31                                    | 324.0<br>12.76                             | 337.0<br>13.27                             | 1.5<br>0.06      | 415.0<br>16.34 | 416.0<br>16.38 | 11.40<br>0.45  | 7.00<br>0.28   | 1580           | 245            | 0.1557         | 27.96<br>61.65      |
| 74.612<br>2.9375  | 53.975<br>2.1250  | 9.1<br>0.36      | 6.4<br>0.25                                    | 329.0<br>12.95                             | 339.0<br>13.35                             | 3.3<br>0.13      | 463.0<br>18.22 | 459.0<br>18.07 | 10.30<br>0.40  | 5.90<br>0.23   | 1770           | 187            | 0.1657         | 48.34<br>106.57     |
| 92.075<br>3.6250  | 69.850<br>2.7500  | -1.5<br>-0.06    | 16.0<br>0.63                                   | 330.0<br>12.99                             | 359.0<br>14.13                             | 6.4<br>0.25      | 459.0<br>18.07 | 450.0<br>17.72 | 17.30<br>0.68  | 2.20<br>0.09   | 2180           | 166            | 0.1783         | 62.33<br>137.41     |
| 79.375<br>3.1250  | 53.975<br>2.1250  | 105.4<br>4.15    | 6.4<br>0.25                                    | 344.0<br>13.54                             | 353.0<br>13.90                             | 6.4<br>0.25      | 481.0<br>18.94 | 438.0<br>17.24 | *<br>*         | *<br>*         | 1520           | 157            | 0.2137         | 63.02<br>138.93     |
| 136.525<br>5.3750 | 98.425<br>3.8750  | -24.4<br>-0.96   | 1.3<br>0.05                                    | 335.0<br>13.19                             | 335.0<br>13.19                             | 6.4<br>0.25      | 514.0<br>20.24 | 501.0<br>19.72 | 20.00<br>0.79  | 7.30<br>0.29   | 2660           | 170            | 0.1898         | 126.22<br>278.25    |
| 20.638<br>0.8125  | 14.288<br>0.5625  | 79.5<br>3.13     | 2.3<br>0.09                                    | 322.0<br>12.68                             | 325.0<br>12.80                             | 1.5<br>0.06      | 354.0<br>13.94 | 346.0<br>13.62 | 3.10<br>0.12   | 2.10<br>0.08   | 990            | 809            | 0.2091         | 3.06<br>6.75        |
| 119.062<br>4.6875 | 88.900<br>3.5000  | 8.4<br>0.33      | 6.4<br>0.25                                    | 344.5<br>13.57                             | 361.0<br>14.21                             | 6.4<br>0.25      | 473.0<br>18.62 | 439.0<br>17.28 | 17.80<br>0.70  | 3.60<br>0.14   | 2950           | 250            | 0.2225         | 83.09<br>183.19     |
| 61.912<br>2.4375  | 39.688<br>1.5625  | 7.6<br>0.30      | 8.0<br>0.31                                    | 334.0<br>13.15                             | 346.0<br>13.62                             | 3.3<br>0.13      | 415.0<br>16.34 | 415.0<br>16.34 | 11.40<br>0.45  | 7.00<br>0.28   | 1580           | 245            | 0.1557         | 24.90<br>54.90      |
| 61.912<br>2.4375  | 39.688<br>1.5625  | 7.6<br>0.30      | 8.0<br>0.31                                    | 334.0<br>13.15                             | 346.0<br>13.62                             | 1.5<br>0.06      | 415.0<br>16.34 | 416.0<br>16.38 | 11.40<br>0.45  | 7.00<br>0.28   | 1580           | 245            | 0.1557         | 24.95<br>55.00      |
| 85.725<br>3.3750  | 68.262<br>2.6875  | -4.8<br>-0.19    | 3.5<br>0.14                                    | 337.0<br>13.27                             | 341.0<br>13.43                             | 3.3<br>0.13      | 427.5<br>16.84 | 418.0<br>16.46 | 6.40<br>0.25   | 3.70<br>0.15   | 2710           | 281            | 0.1809         | 40.55<br>89.39      |
| 85.725<br>3.3750  | 68.262<br>2.6875  | -4.8<br>-0.19    | 3.5<br>0.14                                    | 337.0<br>13.27                             | 341.0<br>13.43                             | 3.3<br>0.13      | 427.5<br>16.84 | 418.0<br>16.46 | 6.80<br>0.27   | 3.70<br>0.15   | 2940           | 304            | 0.1863         | 40.26<br>88.76      |
| 136.525<br>5.3750 | 98.425<br>3.8750  | -16.8<br>-0.66   | 19.8<br>0.78                                   | 353.0<br>13.90                             | 390.0<br>15.35                             | 6.4<br>0.25      | 547.5<br>21.55 | 534.0<br>21.02 | 20.40<br>0.80  | 7.90<br>0.31   | 3160           | 183            | 0.2053         | 152.24<br>335.63    |
| 131.762<br>5.1875 | 82.550<br>3.2500  | 60.5<br>2.38     | 14.3<br>0.56                                   | 373.0<br>14.69                             | 410.0<br>16.14                             | 12.7<br>0.50     | 581.5<br>22.90 | 531.0<br>20.91 | 25.10<br>0.99  | 17.60<br>0.69  | 2500           | 149            | 0.2401         | 169.68<br>374.08    |
| 28.575<br>1.1250  | 20.638<br>0.8125  | 35.1<br>1.38     | 3.5<br>0.14                                    | 333.0<br>13.11                             | 339.0<br>13.35                             | 3.3<br>0.13      | 373.0<br>14.69 | 365.0<br>14.37 | 2.80<br>0.11   | 2.50<br>0.10   | 1500           | 792            | 0.2007         | 5.27<br>11.61       |
| 136.525<br>5.3750 | 98.425<br>3.8750  | -16.8<br>-0.66   | 6.4<br>0.25                                    | 359.0<br>14.13                             | 369.0<br>14.53                             | 6.4<br>0.25      | 547.5<br>21.55 | 534.0<br>21.02 | 20.40<br>0.80  | 8.20<br>0.32   | 3160           | 183            | 0.2053         | 147.98<br>326.23    |
| 47.625<br>1.8750  | 34.925<br>1.3750  | 35.3<br>1.39     | 3.5<br>0.14                                    | 345.0<br>13.58                             | 349.0<br>13.74                             | 3.3<br>0.13      | 402.0<br>15.83 | 394.0<br>15.51 | 7.30<br>0.29   | 0.10<br>0.00   | 1820           | 479            | 0.1774         | 14.01<br>30.88      |
| 63.500<br>2.5000  | 44.450<br>1.7500  | 16.3<br>0.64     | 6.8<br>0.27                                    | 354.0<br>13.94                             | 364.0<br>14.33                             | 6.8<br>0.27      | 456.0<br>17.96 | 448.0<br>17.68 | 15.50<br>0.61  | 5.80<br>0.23   | 2140           | 336            | 0.1778         | 35.76<br>78.83      |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

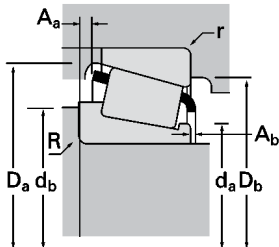
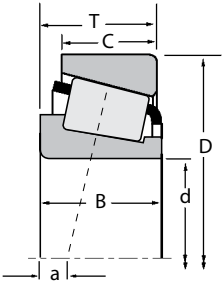




# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                        | Part Number |                        |        |       |       |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|------------------------|-------------|------------------------|--------|-------|-------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> | Static | Inner | Outer |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>         |             |                        |        |       |       |
| 330.200<br>13.0000      | 482.600<br>19.0000 | 85.725<br>3.3750  | 1230000<br>276000      | 0.39 | 1.54 | 318000<br>71400        | 213000<br>47800  | 1.49 | 2320000<br>523000      | EE526130    | 526190                 |        |       |       |
| 333.375<br>13.1250      | 469.900<br>18.5000 | 90.488<br>3.5625  | 1570000<br>353000      | 0.33 | 1.79 | 407000<br>91400        | 233000<br>52400  | 1.74 | 3460000<br>777000      | HM261049    | HM261010               |        |       |       |
| 342.900<br>13.5000      | 450.850<br>17.7500 | 66.675<br>2.6250  | 953000<br>214000       | 0.35 | 1.70 | 247000<br>55600        | 149000<br>33500  | 1.66 | 2210000<br>497000      | LM361649    | LM361610               |        |       |       |
| 342.900<br>13.5000      | 457.098<br>17.9960 | 66.675<br>2.6250  | 807000<br>181000       | 0.71 | 0.84 | 209000<br>47000        | 255000<br>57400  | 0.82 | 1940000<br>436000      | LM961548    | LM961510               |        |       |       |
| 342.900<br>13.5000      | 457.098<br>17.9960 | 68.262<br>2.6875  | 807000<br>181000       | 0.71 | 0.84 | 209000<br>47000        | 255000<br>57400  | 0.82 | 1940000<br>436000      | LM961548    | LM961511               |        |       |       |
| 346.075<br>13.6250      | 469.900<br>18.5000 | 60.325<br>2.3750  | 537000<br>121000       | 0.50 | 1.20 | 139000<br>31300        | 119000<br>26800  | 1.17 | 1110000<br>250000      | EE161363    | 161850                 |        |       |       |
| 346.075<br>13.6250      | 482.600<br>19.0000 | 60.325<br>2.3750  | 537000<br>121000       | 0.50 | 1.20 | 139000<br>31300        | 119000<br>26800  | 1.17 | 1110000<br>250000      | EE161363    | 161900                 |        |       |       |
| 346.075<br>13.6250      | 482.600<br>19.0000 | 66.675<br>2.6250  | 878000<br>197000       | 0.42 | 1.44 | 228000<br>51200        | 162000<br>36500  | 1.40 | 1770000<br>398000      | EE203136    | 203190                 |        |       |       |
| 346.075<br>13.6250      | 482.600<br>19.0000 | 66.675<br>2.6250  | 878000<br>197000       | 0.42 | 1.44 | 228000<br>51200        | 162000<br>36500  | 1.40 | 1770000<br>398000      | EE203137    | 203190                 |        |       |       |
| 346.075<br>13.6250      | 488.950<br>19.2500 | 95.250<br>3.7500  | 1590000<br>358000      | 0.33 | 1.79 | 413000<br>92900        | 237000<br>53200  | 1.74 | 3440000<br>774000      | HM262748    | HM262710               |        |       |       |
| 346.075<br>13.6250      | 488.950<br>19.2500 | 95.250<br>3.7500  | 1690000<br>381000      | 0.33 | 1.79 | 439000<br>98700        | 252000<br>56600  | 1.74 | 3760000<br>845000      | HM262749    | HM262710               |        |       |       |
| 349.250<br>13.7500      | 501.650<br>19.7500 | 90.488<br>3.5625  | 1320000<br>298000      | 0.37 | 1.63 | 343000<br>77200        | 216000<br>48500  | 1.59 | 2780000<br>626000      | EE333137    | 333197                 |        |       |       |
| 354.012<br>13.9375      | 469.900<br>18.5000 | 60.325<br>2.3750  | 537000<br>121000       | 0.50 | 1.20 | 139000<br>31300        | 119000<br>26800  | 1.17 | 1110000<br>250000      | EE161394    | 161850                 |        |       |       |
| 354.012<br>13.9375      | 482.600<br>19.0000 | 60.325<br>2.3750  | 537000<br>121000       | 0.50 | 1.20 | 139000<br>31300        | 119000<br>26800  | 1.17 | 1110000<br>250000      | EE161394    | 161900                 |        |       |       |
| 355.600<br>14.0000      | 444.500<br>17.5000 | 60.325<br>2.3750  | 718000<br>162000       | 0.31 | 1.95 | 186000<br>41900        | 98000<br>22000   | 1.90 | 1970000<br>444000      | L163149     | L163110                |        |       |       |
| 355.600<br>14.0000      | 501.650<br>19.7500 | 74.612<br>2.9375  | 899000<br>202000       | 0.44 | 1.36 | 233000<br>52400        | 176000<br>39500  | 1.33 | 1870000<br>420000      | EE231400    | 231975                 |        |       |       |
| 355.600<br>14.0000      | 501.650<br>19.7500 | 90.488<br>3.5625  | 1320000<br>298000      | 0.37 | 1.63 | 343000<br>77200        | 216000<br>48500  | 1.59 | 2780000<br>626000      | EE333140    | 333197                 |        |       |       |
| 361.950<br>14.2500      | 406.400<br>16.0000 | 23.812<br>0.9375  | 194000<br>43600        | 0.40 | 1.49 | 50300<br>11300         | 34600<br>7780    | 1.45 | 574000<br>129000       | LL562749    | LL562710               |        |       |       |
| 368.250<br>14.4980      | 523.875<br>20.6250 | 101.600<br>4.0000 | 1940000<br>437000      | 0.33 | 1.80 | 504000<br>113000       | 287000<br>64500  | 1.76 | 4340000<br>977000      | HM265049    | HM265010               |        |       |       |
| 371.475<br>14.6250      | 501.650<br>19.7500 | 74.612<br>2.9375  | 899000<br>202000       | 0.44 | 1.36 | 233000<br>52400        | 176000<br>39500  | 1.33 | 1870000<br>420000      | EE231462    | 231975                 |        |       |       |
| 374.650<br>14.7500      | 431.800<br>17.0000 | 28.575<br>1.1250  | 249000<br>56000        | 0.33 | 1.80 | 64500<br>14500         | 36700<br>8260    | 1.76 | 745000<br>167000       | LL264648    | LL264610               |        |       |       |
| 381.000<br>15.0000      | 479.425<br>18.8750 | 49.212<br>1.9375  | 582000<br>131000       | 0.50 | 1.21 | 151000<br>33900        | 128000<br>28800  | 1.18 | 1380000<br>311000      | L865547     | L865512                |        |       |       |
| 381.000<br>15.0000      | 508.000<br>20.0000 | 63.500<br>2.5000  | 646000<br>145000       | 0.53 | 1.13 | 167000<br>37600        | 153000<br>34300  | 1.10 | 1480000<br>332000      | EE192150    | 192200                 |        |       |       |
| 381.000<br>15.0000      | 522.288<br>20.5625 | 85.725<br>3.3750  | 1360000<br>306000      | 0.39 | 1.56 | 353000<br>79400        | 233000<br>52400  | 1.51 | 2950000<br>663000      | LM565949    | LM565910               |        |       |       |
| 381.000<br>15.0000      | 546.100<br>21.5000 | 104.775<br>4.1250 | 1940000<br>436000      | 0.33 | 1.80 | 502000<br>113000       | 286000<br>64300  | 1.76 | 4210000<br>946000      | HM266446    | HM266410               |        |       |       |
| 381.000<br>15.0000      | 546.100<br>21.5000 | 104.775<br>4.1250 | 2100000<br>473000      | 0.33 | 1.80 | 545000<br>123000       | 311000<br>69800  | 1.76 | 4730000<br>1060000     | HM266447    | HM266410               |        |       |       |
| 381.000<br>15.0000      | 590.550<br>23.2500 | 114.300<br>4.5000 | 2440000<br>549000      | 0.33 | 1.80 | 633000<br>142000       | 360000<br>81000  | 1.76 | 5550000<br>1250000     | M268730     | M268710                |        |       |       |
| 384.175<br>15.1250      | 441.325<br>17.3750 | 28.575<br>1.1250  | 228000<br>51200        | 0.34 | 1.76 | 59100<br>13300         | 34400<br>7740    | 1.72 | 667000<br>150000       | LL365348    | LL365310               |        |       |       |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                 | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 80.167<br>3.1562  | 60.325<br>2.3750 | 4.8<br>0.19      | 6.4<br>0.25                                    | 351.0<br>13.82                             | 360.0<br>14.17                             | 3.3<br>0.13                                  | 454.0<br>17.87 | 449.0<br>17.68 | 14.50<br>0.57  | 3.10<br>0.12   | 2280           | 287            | 0.1790         | 44.95<br>99.10      |
| 90.488<br>3.5625  | 71.438<br>2.8125 | -6.1<br>-0.24    | 6.4<br>0.25                                    | 357.0<br>14.06                             | 363.0<br>14.29                             | 3.3<br>0.13                                  | 449.5<br>17.69 | 439.0<br>17.28 | 7.70<br>0.30   | 3.30<br>0.13   | 3310           | 324            | 0.1935         | 46.58<br>102.69     |
| 66.675<br>2.6250  | 52.388<br>2.0625 | 8.9<br>0.35      | 8.5<br>0.33                                    | 360.0<br>14.17                             | 373.0<br>14.69                             | 3.5<br>0.14                                  | 435.0<br>17.13 | 425.0<br>16.73 | 4.70<br>0.19   | 4.90<br>0.19   | 2730           | 433            | 0.1833         | 26.40<br>58.19      |
| 63.500<br>2.5000  | 46.038<br>1.8125 | 56.4<br>2.22     | 3.3<br>0.13                                    | 363.0<br>14.29                             | 367.0<br>14.45                             | 3.3<br>0.13                                  | 443.0<br>17.44 | 423.0<br>16.65 | 12.60<br>0.50  | 4.90<br>0.19   | 2280           | 300            | 0.2146         | 28.02<br>61.77      |
| 63.500<br>2.5000  | 47.625<br>1.8750 | 56.4<br>2.22     | 3.3<br>0.13                                    | 363.0<br>14.29                             | 367.0<br>14.45                             | 3.3<br>0.13                                  | 443.0<br>17.44 | 423.0<br>16.65 | 12.60<br>0.50  | 4.90<br>0.19   | 2280           | 300            | 0.2146         | 28.49<br>62.80      |
| 55.562<br>2.1875  | 38.100<br>1.5000 | 33.8<br>1.33     | 7.0<br>0.28                                    | 368.0<br>14.49                             | 379.0<br>14.92                             | 6.4<br>0.25                                  | 455.0<br>17.91 | 445.0<br>17.52 | 14.40<br>0.57  | 3.80<br>0.15   | 1730           | 299            | 0.1741         | 25.15<br>55.44      |
| 55.562<br>2.1875  | 38.100<br>1.5000 | 33.8<br>1.33     | 7.0<br>0.28                                    | 368.0<br>14.49                             | 379.0<br>14.92                             | 6.4<br>0.25                                  | 455.0<br>17.91 | 451.0<br>17.76 | 14.40<br>0.57  | 3.80<br>0.15   | 1730           | 299            | 0.1741         | 27.97<br>61.67      |
| 63.500<br>2.5000  | 44.450<br>1.7500 | 16.3<br>0.64     | 6.8<br>0.27                                    | 366.0<br>14.41                             | 376.0<br>14.80                             | 6.8<br>0.27                                  | 456.0<br>17.96 | 449.0<br>17.68 | 15.50<br>0.61  | 5.80<br>0.23   | 2140           | 336            | 0.1778         | 31.56<br>69.58      |
| 63.500<br>2.5000  | 44.450<br>1.7500 | 16.3<br>0.64     | 12.7<br>0.50                                   | 366.0<br>14.41                             | 388.0<br>15.28                             | 6.8<br>0.27                                  | 456.0<br>17.96 | 449.0<br>17.68 | 15.50<br>0.61  | 5.80<br>0.23   | 2140           | 336            | 0.1778         | 31.06<br>68.48      |
| 95.250<br>3.7500  | 74.612<br>2.9375 | -6.4<br>-0.25    | 6.4<br>0.25                                    | 367.0<br>14.45                             | 377.0<br>14.84                             | 3.3<br>0.13                                  | 467.0<br>18.39 | 456.0<br>17.95 | 9.30<br>0.37   | 3.00<br>0.12   | 3430           | 322            | 0.1956         | 54.00<br>119.06     |
| 95.250<br>3.7500  | 74.612<br>2.9375 | -6.4<br>-0.25    | 6.4<br>0.25                                    | 367.0<br>14.45                             | 377.0<br>14.84                             | 3.3<br>0.13                                  | 467.0<br>18.39 | 456.0<br>17.95 | 8.60<br>0.34   | 3.50<br>0.14   | 3650           | 342            | 0.1999         | 53.41<br>117.74     |
| 84.138<br>3.3125  | 69.850<br>2.7500 | 3.6<br>0.14      | 6.4<br>0.25                                    | 372.0<br>14.65                             | 382.0<br>15.04                             | 3.3<br>0.13                                  | 478.5<br>18.83 | 470.0<br>18.50 | 12.00<br>0.47  | 3.00<br>0.12   | 3040           | 337            | 0.1928         | 52.69<br>116.15     |
| 55.562<br>2.1875  | 38.100<br>1.5000 | 33.8<br>1.33     | 7.0<br>0.28                                    | 374.0<br>14.72                             | 385.0<br>15.16                             | 6.4<br>0.25                                  | 455.0<br>17.91 | 445.0<br>17.52 | 14.40<br>0.57  | 3.80<br>0.15   | 1730           | 299            | 0.1741         | 23.25<br>51.25      |
| 55.562<br>2.1875  | 38.100<br>1.5000 | 33.8<br>1.33     | 7.0<br>0.28                                    | 374.0<br>14.72                             | 385.0<br>15.16                             | 6.4<br>0.25                                  | 455.0<br>17.91 | 451.0<br>17.76 | 14.40<br>0.57  | 3.80<br>0.15   | 1730           | 299            | 0.1741         | 26.07<br>57.48      |
| 60.325<br>2.3750  | 47.625<br>1.8750 | 7.1<br>0.28      | 3.5<br>0.14                                    | 370.0<br>14.57                             | 374.0<br>14.72                             | 3.3<br>0.13                                  | 430.0<br>16.93 | 422.0<br>16.61 | 5.20<br>0.20   | 2.30<br>0.09   | 3210           | 621            | 0.1838         | 20.56<br>45.32      |
| 66.675<br>2.6250  | 50.800<br>2.0000 | 19.6<br>0.77     | 6.4<br>0.25                                    | 379.0<br>14.92                             | 388.0<br>15.28                             | 3.3<br>0.13                                  | 481.0<br>18.94 | 472.0<br>18.58 | 19.00<br>0.75  | 5.90<br>0.23   | 2390           | 366            | 0.1874         | 39.04<br>86.07      |
| 84.138<br>3.3125  | 69.850<br>2.7500 | 3.6<br>0.14      | 6.4<br>0.25                                    | 377.0<br>14.84                             | 387.0<br>15.24                             | 3.3<br>0.13                                  | 478.5<br>18.83 | 470.0<br>18.50 | 12.00<br>0.47  | 3.00<br>0.12   | 3040           | 337            | 0.1928         | 50.37<br>111.04     |
| 23.812<br>0.9375  | 17.462<br>0.6875 | 37.8<br>1.49     | 2.3<br>0.09                                    | 371.0<br>14.61                             | 372.0<br>14.65                             | 1.5<br>0.06                                  | 401.0<br>15.79 | 396.0<br>15.59 | 1.10<br>0.04   | 2.40<br>0.09   | 1670           | 1060           | 0.2005         | 3.68<br>8.11        |
| 101.600<br>4.0000 | 79.375<br>3.1250 | -8.4<br>-0.33    | 6.4<br>0.25                                    | 394.0<br>15.51                             | 400.0<br>15.75                             | 6.4<br>0.25                                  | 498.5<br>19.63 | 487.0<br>19.17 | 9.30<br>0.36   | 3.70<br>0.14   | 4300           | 372            | 0.2106         | 66.03<br>145.57     |
| 66.675<br>2.6250  | 50.800<br>2.0000 | 19.6<br>0.77     | 6.4<br>0.25                                    | 390.0<br>15.35                             | 400.0<br>15.75                             | 3.3<br>0.13                                  | 481.0<br>18.94 | 472.0<br>18.58 | 19.00<br>0.75  | 5.90<br>0.23   | 2390           | 366            | 0.1874         | 34.31<br>75.63      |
| 28.575<br>1.1250  | 20.638<br>0.8125 | 27.9<br>1.10     | 3.5<br>0.14                                    | 384.0<br>15.12                             | 389.0<br>15.31                             | 3.3<br>0.13                                  | 424.0<br>16.69 | 417.0<br>16.42 | 1.90<br>0.08   | 2.90<br>0.12   | 2160           | 1050           | 0.2055         | 6.08<br>13.40       |
| 47.625<br>1.8750  | 34.925<br>1.3750 | 42.9<br>1.69     | 6.4<br>0.25                                    | 395.0<br>15.55                             | 407.0<br>16.02                             | 3.3<br>0.13                                  | 465.0<br>18.31 | 456.0<br>17.95 | 6.60<br>0.26   | 2.70<br>0.11   | 2260           | 529            | 0.1897         | 18.40<br>40.57      |
| 58.738<br>2.3125  | 38.100<br>1.5000 | 39.4<br>1.55     | 6.4<br>0.25                                    | 400.0<br>15.75                             | 410.0<br>16.14                             | 3.3<br>0.13                                  | 482.0<br>18.98 | 478.0<br>18.82 | 18.00<br>0.71  | 3.90<br>0.15   | 2290           | 398            | 0.1951         | 29.40<br>64.81      |
| 84.138<br>3.3125  | 61.912<br>2.4375 | 8.9<br>0.35      | 6.4<br>0.25                                    | 402.0<br>15.83                             | 411.0<br>16.18                             | 3.3<br>0.13                                  | 499.5<br>19.67 | 493.0<br>19.41 | 12.30<br>0.49  | 3.10<br>0.12   | 3380           | 378            | 0.2028         | 49.21<br>108.48     |
| 104.775<br>4.1250 | 82.550<br>3.2500 | -7.1<br>-0.28    | 6.4<br>0.25                                    | 405.0<br>15.94                             | 415.0<br>16.34                             | 6.4<br>0.25                                  | 520.0<br>20.47 | 507.0<br>19.96 | 9.10<br>0.36   | 5.40<br>0.21   | 4380           | 279            | 0.2116         | 76.52<br>168.68     |
| 104.775<br>4.1250 | 82.550<br>3.2500 | -7.1<br>-0.28    | 6.4<br>0.25                                    | 405.0<br>15.94                             | 415.0<br>16.34                             | 6.4<br>0.25                                  | 520.0<br>20.47 | 507.0<br>19.96 | 8.90<br>0.35   | 4.90<br>0.19   | 4760           | 301            | 0.2178         | 76.63<br>168.95     |
| 114.300<br>4.5000 | 88.900<br>3.5000 | -9.4<br>-0.37    | 6.4<br>0.25                                    | 415.0<br>16.34                             | 425.0<br>16.73                             | 6.4<br>0.25                                  | 562.5<br>22.14 | 549.0<br>21.61 | 10.60<br>0.42  | 6.00<br>0.24   | 5750           | 421            | 0.2319         | 114.19<br>251.73    |
| 28.575<br>1.1250  | 20.638<br>0.8125 | 30.0<br>1.18     | 3.5<br>0.14                                    | 393.0<br>15.47                             | 399.0<br>15.71                             | 3.3<br>0.13                                  | 433.0<br>17.05 | 427.0<br>16.81 | 2.00<br>0.08   | 3.00<br>0.12   | 2060           | 1160           | 0.2033         | 6.14<br>13.55       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

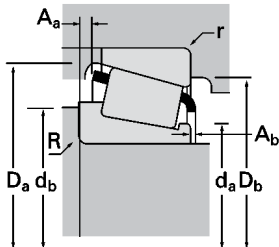
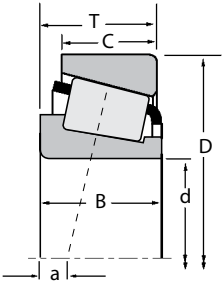
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                   |      |                        | Part Number |                        |  |        |  |             |  |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|-------------------|------|------------------------|-------------|------------------------|--|--------|--|-------------|--|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                   |      | Dynamic <sup>(2)</sup> |             | Factors <sup>(5)</sup> |  | Static |  | Part Number |  |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub>  | K    | C <sub>0</sub>         | Inner       | Outer                  |  |        |  |             |  |
| 384.175<br>15.1250      | 546.100<br>21.5000 | 104.775<br>4.1250 | 1940000<br>436000      | 0.33 | 1.80 | 502000<br>113000       | 286000<br>64300   | 1.76 | 4210000<br>946000      | HM266448    | HM266410               |  |        |  |             |  |
| 384.175<br>15.1250      | 546.100<br>21.5000 | 104.775<br>4.1250 | 2100000<br>473000      | 0.33 | 1.80 | 545000<br>123000       | 311000<br>69800   | 1.76 | 4730000<br>1060000     | HM266449    | HM266410               |  |        |  |             |  |
| 385.762<br>15.1875      | 514.350<br>20.2500 | 82.550<br>3.2500  | 1330000<br>298000      | 0.42 | 1.43 | 344000<br>77300        | 246000<br>55400   | 1.40 | 3160000<br>710000      | LM665949    | LM665910               |  |        |  |             |  |
| 387.248<br>15.2460      | 546.100<br>21.5000 | 87.312<br>3.4375  | 1600000<br>359000      | 0.42 | 1.44 | 414000<br>93000        | 296000<br>66500   | 1.40 | 3940000<br>886000      | M667935     | M667911                |  |        |  |             |  |
| 393.700<br>15.5000      | 546.100<br>21.5000 | 76.200<br>3.0000  | 928000<br>209000       | 0.48 | 1.26 | 241000<br>54100        | 196000<br>44100   | 1.23 | 2010000<br>451000      | EE234154    | 234215                 |  |        |  |             |  |
| 403.225<br>15.8750      | 460.375<br>18.1250 | 28.575<br>1.1250  | 225000<br>50600        | 0.40 | 1.49 | 58400<br>13100         | 40200<br>9030     | 1.45 | 708000<br>159000       | LL566848    | LL566810               |  |        |  |             |  |
| 406.400<br>16.0000      | 508.000<br>20.0000 | 61.912<br>2.4375  | 842000<br>189000       | 0.37 | 1.64 | 218000<br>49100        | 137000<br>30700   | 1.60 | 2230000<br>502000      | L467549     | L467510                |  |        |  |             |  |
| 406.400<br>16.0000      | 546.100<br>21.5000 | 76.200<br>3.0000  | 928000<br>209000       | 0.48 | 1.26 | 241000<br>54100        | 196000<br>44100   | 1.23 | 2010000<br>451000      | EE234160    | 234215                 |  |        |  |             |  |
| 406.400<br>16.0000      | 546.100<br>21.5000 | 87.312<br>3.4375  | 1600000<br>359000      | 0.42 | 1.44 | 414000<br>93000        | 296000<br>66500   | 1.40 | 3940000<br>886000      | M667944     | M667911                |  |        |  |             |  |
| 406.400<br>16.0000      | 549.275<br>21.6250 | 85.725<br>3.3750  | 1400000<br>316000      | 0.41 | 1.47 | 364000<br>81800        | 254000<br>57100   | 1.43 | 3130000<br>704000      | LM567949    | LM567910               |  |        |  |             |  |
| 406.400<br>16.0000      | 558.800<br>22.0000 | 65.088<br>2.5625  | 928000<br>209000       | 0.48 | 1.26 | 241000<br>54100        | 196000<br>44100   | 1.23 | 2010000<br>451000      | EE234160    | 234220                 |  |        |  |             |  |
| 406.400<br>16.0000      | 762.000<br>30.0000 | 180.975<br>7.1250 | 4100000<br>922000      | 0.94 | 0.64 | 1060000<br>239000      | 1710000<br>384000 | 0.62 | 6840000<br>1540000     | H969249     | H969210                |  |        |  |             |  |
| 409.575<br>16.1250      | 546.100<br>21.5000 | 87.312<br>3.4375  | 1440000<br>325000      | 0.42 | 1.44 | 374000<br>84200        | 268000<br>60100   | 1.40 | 3420000<br>768000      | M667948     | M667911                |  |        |  |             |  |
| 415.925<br>16.3750      | 590.550<br>23.2500 | 114.300<br>4.5000 | 2440000<br>549000      | 0.33 | 1.80 | 633000<br>142000       | 360000<br>81000   | 1.76 | 5550000<br>1250000     | M268749     | M268710                |  |        |  |             |  |
| 430.212<br>16.9375      | 603.250<br>23.7500 | 76.200<br>3.0000  | 963000<br>216000       | 0.52 | 1.14 | 250000<br>56100        | 224000<br>50400   | 1.11 | 2190000<br>491000      | EE241693    | 242375                 |  |        |  |             |  |
| 431.800<br>17.0000      | 533.400<br>21.0000 | 46.038<br>1.8125  | 612000<br>138000       | 0.31 | 1.96 | 159000<br>35700        | 83000<br>18700    | 1.91 | 1520000<br>342000      | 80385       | 80325                  |  |        |  |             |  |
| 431.800<br>17.0000      | 552.450<br>21.7500 | 44.450<br>1.7500  | 614000<br>138000       | 0.32 | 1.88 | 159000<br>35800        | 86900<br>19500    | 1.83 | 1550000<br>348000      | 80170       | 80217                  |  |        |  |             |  |
| 431.800<br>17.0000      | 565.150<br>22.2500 | 44.450<br>1.7500  | 614000<br>138000       | 0.32 | 1.88 | 159000<br>35800        | 86900<br>19500    | 1.83 | 1550000<br>348000      | 80170       | 80222                  |  |        |  |             |  |
| 431.800<br>17.0000      | 571.500<br>22.5000 | 74.612<br>2.9375  | 1210000<br>271000      | 0.55 | 1.10 | 312000<br>70200        | 292000<br>65700   | 1.07 | 2810000<br>632000      | LM869448    | LM869410               |  |        |  |             |  |
| 431.800<br>17.0000      | 603.250<br>23.7500 | 76.200<br>3.0000  | 963000<br>216000       | 0.52 | 1.14 | 250000<br>56100        | 224000<br>50400   | 1.11 | 2190000<br>491000      | EE241701    | 242375                 |  |        |  |             |  |
| 447.675<br>17.6250      | 552.450<br>21.7500 | 44.450<br>1.7500  | 614000<br>138000       | 0.32 | 1.88 | 159000<br>35800        | 86900<br>19500    | 1.83 | 1550000<br>348000      | 80176       | 80217                  |  |        |  |             |  |
| 447.675<br>17.6250      | 552.450<br>21.7500 | 44.450<br>1.7500  | 606000<br>136000       | 0.36 | 1.65 | 157000<br>35300        | 98200<br>22100    | 1.60 | 1510000<br>340000      | LL469949    | LL469910               |  |        |  |             |  |
| 447.675<br>17.6250      | 565.150<br>22.2500 | 44.450<br>1.7500  | 614000<br>138000       | 0.32 | 1.88 | 159000<br>35800        | 86900<br>19500    | 1.83 | 1550000<br>348000      | 80176       | 80222                  |  |        |  |             |  |
| 450.850<br>17.7500      | 603.250<br>23.7500 | 85.725<br>3.3750  | 1460000<br>328000      | 0.45 | 1.32 | 379000<br>85100        | 294000<br>66000   | 1.29 | 3440000<br>773000      | LM770945    | LM770910               |  |        |  |             |  |
| 457.073<br>17.9950      | 573.088<br>22.5625 | 74.612<br>2.9375  | 1210000<br>271000      | 0.40 | 1.49 | 313000<br>70300        | 215000<br>48400   | 1.45 | 3170000<br>713000      | L570648     | L570610                |  |        |  |             |  |
| 457.200<br>18.0000      | 552.450<br>21.7500 | 44.450<br>1.7500  | 614000<br>138000       | 0.32 | 1.88 | 159000<br>35800        | 86900<br>19500    | 1.83 | 1550000<br>348000      | 80180       | 80217                  |  |        |  |             |  |
| 457.200<br>18.0000      | 573.088<br>22.5625 | 74.612<br>2.9375  | 1210000<br>271000      | 0.40 | 1.49 | 313000<br>70300        | 215000<br>48400   | 1.45 | 3170000<br>713000      | L570649     | L570610                |  |        |  |             |  |
| 457.200<br>18.0000      | 596.900<br>23.5000 | 76.200<br>3.0000  | 1210000<br>272000      | 0.40 | 1.48 | 313000<br>70500        | 217000<br>48800   | 1.44 | 2890000<br>649000      | EE244180    | 244235                 |  |        |  |             |  |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.  
 (3) Negative value indicates effective center inside cone backface.  
 (4) These maximum fillet radii will be cleared by the bearing corners.  
 (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                   |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|-------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                   |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                 | C                 | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 104.775<br>4.1250 | 82.550<br>3.2500  | -7.1<br>-0.28    | 6.4<br>0.25                | 407.0<br>16.02                    | 417.0<br>16.42           | 6.4<br>0.25                         | 520.0<br>20.47 | 507.0<br>19.96 | 9.10<br>0.36   | 5.40<br>0.21   | 4380           | 279            | 0.2116         | 74.95<br>165.23     |
| 104.775<br>4.1250 | 82.550<br>3.2500  | -7.1<br>-0.28    | 6.4<br>0.25                | 407.0<br>16.02                    | 417.0<br>16.42           | 6.4<br>0.25                         | 520.0<br>20.47 | 507.0<br>19.96 | 8.90<br>0.35   | 4.90<br>0.19   | 4760           | 301            | 0.2178         | 75.07<br>165.50     |
| 82.550<br>3.2500  | 63.500<br>2.5000  | 16.3<br>0.64     | 6.4<br>0.25                | 406.0<br>15.98                    | 415.0<br>16.34           | 3.3<br>0.13                         | 495.0<br>19.49 | 482.0<br>18.98 | 9.40<br>0.37   | 2.80<br>0.11   | 3740           | 480            | 0.2155         | 44.79<br>98.74      |
| 87.312<br>3.4375  | 68.262<br>2.6875  | 17.8<br>0.70     | 6.4<br>0.25                | 414.0<br>16.30                    | 424.0<br>16.69           | 6.4<br>0.25                         | 527.0<br>20.74 | 510.0<br>20.08 | 8.10<br>0.32   | 2.70<br>0.11   | 4640           | 498            | 0.2316         | 63.17<br>139.27     |
| 61.120<br>2.4063  | 55.562<br>2.1875  | 35.6<br>1.40     | 6.4<br>0.25                | 416.0<br>16.38                    | 426.0<br>16.77           | 6.4<br>0.25                         | 515.5<br>20.30 | 504.0<br>19.84 | 13.90<br>0.55  | 6.10<br>0.24   | 2780           | 448            | 0.2018         | 44.70<br>98.54      |
| 28.575<br>1.1250  | 20.638<br>0.8125  | 41.4<br>1.63     | 3.5<br>0.14                | 414.0<br>16.30                    | 418.0<br>16.46           | 3.3<br>0.13                         | 452.0<br>17.80 | 445.0<br>17.52 | 2.10<br>0.08   | 2.00<br>0.08   | 2300           | 1580           | 0.2225         | 6.54<br>14.41       |
| 61.912<br>2.4375  | 47.625<br>1.8750  | 20.3<br>0.80     | 3.3<br>0.13                | 423.0<br>16.65                    | 426.0<br>16.77           | 3.3<br>0.13                         | 492.0<br>19.37 | 483.0<br>19.02 | 6.20<br>0.24   | 2.70<br>0.11   | 3720           | 673            | 0.2038         | 26.32<br>58.03      |
| 61.120<br>2.4063  | 55.562<br>2.1875  | 35.6<br>1.40     | 6.4<br>0.25                | 425.0<br>16.73                    | 435.0<br>17.13           | 6.4<br>0.25                         | 515.5<br>20.30 | 504.0<br>19.84 | 13.90<br>0.55  | 6.10<br>0.24   | 2780           | 448            | 0.2018         | 40.88<br>90.12      |
| 87.312<br>3.4375  | 68.262<br>2.6875  | 17.8<br>0.70     | 6.4<br>0.25                | 428.0<br>16.85                    | 438.0<br>17.24           | 6.4<br>0.25                         | 527.0<br>20.74 | 510.0<br>20.08 | 8.10<br>0.32   | 2.20<br>0.08   | 4640           | 498            | 0.2316         | 55.01<br>121.28     |
| 84.138<br>3.3125  | 61.912<br>2.4375  | 15.5<br>0.61     | 6.4<br>0.25                | 427.0<br>16.81                    | 437.0<br>17.20           | 3.3<br>0.13                         | 526.5<br>20.72 | 519.0<br>20.43 | 12.70<br>0.50  | 3.20<br>0.12   | 3800           | 427            | 0.2143         | 53.68<br>118.34     |
| 61.120<br>2.4063  | 44.450<br>1.7500  | 35.6<br>1.40     | 6.4<br>0.25                | 425.0<br>16.73                    | 435.0<br>17.13           | 6.4<br>0.25                         | 516.0<br>20.31 | 516.0<br>20.31 | 13.90<br>0.55  | 6.10<br>0.24   | 2780           | 448            | 0.2018         | 40.30<br>88.84      |
| 161.925<br>6.3750 | 107.950<br>4.2500 | 79.2<br>3.12     | 12.7<br>0.50               | 463.5<br>18.24                    | 513.0<br>20.20           | 12.7<br>0.50                        | 719.5<br>28.32 | 657.0<br>25.87 | 25.80<br>1.02  | 20.50<br>0.81  | 4610           | 207            | 0.2945         | 313.78<br>691.76    |
| 87.312<br>3.4375  | 68.262<br>2.6875  | 17.8<br>0.70     | 6.4<br>0.25                | 431.0<br>16.97                    | 440.0<br>17.32           | 6.4<br>0.25                         | 527.0<br>20.74 | 510.0<br>20.08 | 9.40<br>0.37   | 3.10<br>0.12   | 4200           | 453            | 0.2235         | 53.52<br>117.98     |
| 114.300<br>4.5000 | 88.900<br>3.5000  | -9.4<br>-0.37    | 6.4<br>0.25                | 441.0<br>17.36                    | 451.0<br>17.76           | 6.4<br>0.25                         | 562.5<br>22.14 | 549.0<br>21.61 | 10.60<br>0.42  | 6.00<br>0.24   | 5750           | 421            | 0.2319         | 94.63<br>208.62     |
| 73.025<br>2.8750  | 50.800<br>2.0000  | 47.0<br>1.85     | 6.4<br>0.25                | 455.0<br>17.91                    | 465.0<br>18.31           | 6.4<br>0.25                         | 563.0<br>22.16 | 558.0<br>21.97 | 18.70<br>0.74  | -1.50<br>-0.06 | 3350           | 551            | 0.2207         | 59.19<br>130.50     |
| 46.038<br>1.8125  | 34.925<br>1.3750  | 23.4<br>0.92     | 3.3<br>0.13                | 446.0<br>17.56                    | 450.0<br>17.72           | 3.3<br>0.13                         | 510.0<br>20.08 | 510.0<br>20.08 | 4.20<br>0.16   | 1.20<br>0.05   | 3210           | 801            | 0.1815         | 20.48<br>45.14      |
| 44.450<br>1.7500  | 31.750<br>1.2500  | 26.2<br>1.03     | 3.3<br>0.13                | 452.0<br>17.80                    | 456.0<br>17.95           | 3.3<br>0.13                         | 531.0<br>20.91 | 531.0<br>20.91 | 5.90<br>0.23   | 4.40<br>0.17   | 3440           | 868            | 0.1880         | 25.03<br>55.18      |
| 44.450<br>1.7500  | 31.750<br>1.2500  | 26.2<br>1.03     | 3.3<br>0.13                | 452.0<br>17.80                    | 456.0<br>17.95           | 3.3<br>0.13                         | 531.0<br>20.91 | 537.0<br>21.14 | 5.90<br>0.23   | 4.40<br>0.17   | 3440           | 868            | 0.1880         | 27.80<br>61.28      |
| 74.612<br>2.9375  | 52.388<br>2.0625  | 50.0<br>1.97     | 3.3<br>0.13                | 453.0<br>17.83                    | 457.0<br>17.99           | 3.3<br>0.13                         | 549.0<br>21.61 | 537.0<br>21.14 | 11.40<br>0.45  | -0.10<br>0.00  | 3720           | 491            | 0.2326         | 47.54<br>104.81     |
| 73.025<br>2.8750  | 50.800<br>2.0000  | 47.0<br>1.85     | 6.4<br>0.25                | 457.0<br>17.99                    | 466.0<br>18.35           | 6.4<br>0.25                         | 563.0<br>22.16 | 558.0<br>21.97 | 18.70<br>0.74  | -1.50<br>-0.06 | 3350           | 551            | 0.2207         | 58.58<br>129.14     |
| 44.450<br>1.7500  | 31.750<br>1.2500  | 26.2<br>1.03     | 3.3<br>0.13                | 464.0<br>18.27                    | 467.0<br>18.39           | 3.3<br>0.13                         | 531.0<br>20.91 | 531.0<br>20.91 | 5.90<br>0.23   | 4.40<br>0.17   | 3440           | 868            | 0.1880         | 21.22<br>46.77      |
| 41.618<br>1.6385  | 32.545<br>1.2813  | 35.1<br>1.38     | 3.3<br>0.13                | 462.0<br>18.19                    | 466.0<br>18.35           | 3.3<br>0.13                         | 525.0<br>20.67 | 528.0<br>20.79 | 3.70<br>0.15   | 5.00<br>0.20   | 3160           | 930            | 0.1912         | 20.72<br>45.69      |
| 44.450<br>1.7500  | 31.750<br>1.2500  | 26.2<br>1.03     | 3.3<br>0.13                | 464.0<br>18.27                    | 467.0<br>18.39           | 3.3<br>0.13                         | 531.0<br>20.91 | 537.0<br>21.14 | 5.90<br>0.23   | 4.40<br>0.17   | 3440           | 868            | 0.1880         | 23.98<br>52.87      |
| 84.138<br>3.3125  | 60.325<br>2.3750  | 30.5<br>1.20     | 6.4<br>0.25                | 474.0<br>18.66                    | 484.0<br>19.06           | 3.3<br>0.13                         | 579.5<br>22.82 | 570.0<br>22.44 | 13.40<br>0.53  | 3.30<br>0.13   | 4660           | 537            | 0.2366         | 64.28<br>141.70     |
| 74.612<br>2.9375  | 57.150<br>2.2500  | 27.2<br>1.07     | 6.4<br>0.25                | 475.0<br>18.70                    | 485.0<br>19.09           | 6.4<br>0.25                         | 558.0<br>21.97 | 543.0<br>21.38 | 7.40<br>0.29   | 3.60<br>0.14   | 4970           | 560            | 0.2321         | 41.71<br>91.95      |
| 44.450<br>1.7500  | 31.750<br>1.2500  | 26.2<br>1.03     | 3.3<br>0.13                | 471.0<br>18.54                    | 474.0<br>18.66           | 3.3<br>0.13                         | 531.0<br>20.91 | 531.0<br>20.91 | 5.90<br>0.23   | 4.40<br>0.17   | 3440           | 868            | 0.1880         | 18.85<br>41.57      |
| 74.612<br>2.9375  | 57.150<br>2.2500  | 27.2<br>1.07     | 6.4<br>0.25                | 475.0<br>18.70                    | 485.0<br>19.09           | 6.4<br>0.25                         | 558.0<br>21.97 | 543.0<br>21.38 | 7.40<br>0.29   | 3.60<br>0.14   | 4970           | 560            | 0.2321         | 41.64<br>91.80      |
| 73.025<br>2.8750  | 53.975<br>2.1250  | 26.7<br>1.05     | 9.7<br>0.38                | 478.0<br>18.82                    | 494.0<br>19.45           | 3.3<br>0.13                         | 570.5<br>22.47 | 567.0<br>22.32 | 13.80<br>0.54  | 4.00<br>0.16   | 4410           | 627            | 0.2233         | 49.15<br>108.35     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

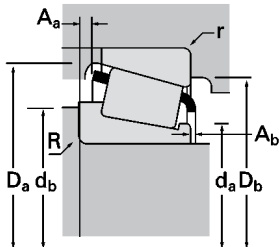
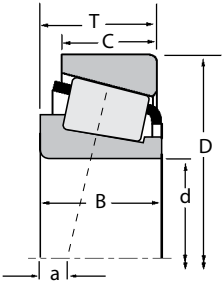
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                     | Part Number |          |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|---------------------|-------------|----------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | Static              |             |          |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    | C <sub>0</sub>      | Inner       | Outer    |
| 457.200<br>18.0000      | 603.250<br>23.7500 | 85.725<br>3.3750  | 1460000<br>328000      | 0.45 | 1.32 | 379000<br>85100        | 294000<br>66000  | 1.29 | 3440000<br>773000   | LM770949    | LM770910 |
| 457.200<br>18.0000      | 615.950<br>24.2500 | 85.725<br>3.3750  | 1660000<br>373000      | 0.33 | 1.80 | 430000<br>96700        | 245000<br>55000  | 1.76 | 4100000<br>921000   | LM272235    | LM272210 |
| 457.200<br>18.0000      | 730.148<br>28.7460 | 120.650<br>4.7500 | 2770000<br>623000      | 0.39 | 1.53 | 718000<br>161000       | 483000<br>109000 | 1.49 | 4870000<br>1100000  | EE671801    | 672873   |
| 476.250<br>18.7500      | 565.150<br>22.2500 | 41.275<br>1.6250  | 460000<br>103000       | 0.47 | 1.28 | 119000<br>26800        | 95900<br>21600   | 1.24 | 1400000<br>315000   | LL771948    | LL771911 |
| 479.425<br>18.8750      | 679.450<br>26.7500 | 128.588<br>5.0625 | 3190000<br>717000      | 0.33 | 1.80 | 827000<br>186000       | 471000<br>106000 | 1.76 | 7400000<br>1660000  | M272749     | M272710  |
| 482.600<br>19.0000      | 615.950<br>24.2500 | 53.975<br>2.1250  | 643000<br>145000       | 0.35 | 1.72 | 167000<br>37500        | 99700<br>22400   | 1.67 | 1710000<br>384000   | 80480       | 80425    |
| 482.600<br>19.0000      | 615.950<br>24.2500 | 85.725<br>3.3750  | 1660000<br>373000      | 0.33 | 1.80 | 430000<br>96700        | 245000<br>55000  | 1.76 | 4100000<br>921000   | LM272249    | LM272210 |
| 482.600<br>19.0000      | 634.873<br>24.9950 | 80.962<br>3.1875  | 1440000<br>323000      | 0.34 | 1.75 | 373000<br>83900        | 219000<br>49200  | 1.70 | 3660000<br>822000   | EE243190    | 243250   |
| 488.950<br>19.2500      | 634.873<br>24.9950 | 84.138<br>3.3125  | 1590000<br>357000      | 0.47 | 1.27 | 412000<br>92700        | 334000<br>75000  | 1.24 | 3870000<br>871000   | LM772748    | LM772710 |
| 488.950<br>19.2500      | 660.400<br>26.0000 | 93.662<br>3.6875  | 2030000<br>455000      | 0.31 | 1.95 | 525000<br>118000       | 276000<br>62000  | 1.90 | 4590000<br>1030000  | EE640192    | 640260   |
| 498.323<br>19.6190      | 634.873<br>24.9950 | 80.962<br>3.1875  | 1440000<br>323000      | 0.34 | 1.75 | 373000<br>83900        | 219000<br>49200  | 1.70 | 3660000<br>822000   | EE243197    | 243250   |
| 498.323<br>19.6190      | 634.873<br>24.9950 | 80.962<br>3.1875  | 1570000<br>352000      | 0.34 | 1.75 | 406000<br>91200        | 238000<br>53500  | 1.70 | 4130000<br>927000   | EE243198    | 243250   |
| 498.475<br>19.6250      | 634.873<br>24.9950 | 80.962<br>3.1875  | 1570000<br>352000      | 0.34 | 1.75 | 406000<br>91200        | 238000<br>53500  | 1.70 | 4130000<br>927000   | EE243195    | 243250   |
| 498.475<br>19.6250      | 634.873<br>24.9950 | 80.962<br>3.1875  | 1440000<br>323000      | 0.34 | 1.75 | 373000<br>83900        | 219000<br>49200  | 1.70 | 3660000<br>822000   | EE243196    | 243250   |
| 508.000<br>20.0000      | 838.200<br>33.0000 | 146.050<br>5.7500 | 3540000<br>796000      | 0.48 | 1.25 | 918000<br>206000       | 754000<br>169000 | 1.22 | 6530000<br>1470000  | EE426200    | 426330   |
| 533.400<br>21.0000      | 635.000<br>25.0000 | 50.800<br>2.0000  | 762000<br>171000       | 0.41 | 1.48 | 198000<br>44400        | 137000<br>30900  | 1.44 | 2040000<br>459000   | LL575343    | LL575310 |
| 536.575<br>21.1250      | 761.873<br>29.9950 | 146.050<br>5.7500 | 3930000<br>884000      | 0.33 | 1.80 | 1020000<br>229000      | 580000<br>130000 | 1.76 | 9250000<br>2080000  | M276449     | M276410  |
| 539.750<br>21.2500      | 635.000<br>25.0000 | 50.800<br>2.0000  | 762000<br>171000       | 0.41 | 1.48 | 198000<br>44400        | 137000<br>30900  | 1.44 | 2040000<br>459000   | LL575349    | LL575310 |
| 549.097<br>21.6180      | 692.150<br>27.2500 | 80.962<br>3.1875  | 1490000<br>335000      | 0.38 | 1.59 | 386000<br>86800        | 249000<br>55900  | 1.55 | 3970000<br>892000   | L476548     | L476510  |
| 549.275<br>21.6250      | 692.150<br>27.2500 | 80.962<br>3.1875  | 1490000<br>335000      | 0.38 | 1.59 | 386000<br>86800        | 249000<br>55900  | 1.55 | 3970000<br>892000   | L476549     | L476510  |
| 558.800<br>22.0000      | 736.600<br>29.0000 | 104.775<br>4.1250 | 2520000<br>567000      | 0.35 | 1.73 | 653000<br>147000       | 387000<br>87100  | 1.69 | 6370000<br>1430000  | LM377449    | LM377410 |
| 571.500<br>22.5000      | 812.800<br>32.0000 | 155.575<br>6.1250 | 4440000<br>999000      | 0.33 | 1.80 | 1150000<br>259000      | 656000<br>147000 | 1.76 | 10600000<br>2370000 | M278749     | M278710  |
| 584.200<br>23.0000      | 685.800<br>27.0000 | 49.212<br>1.9375  | 783000<br>176000       | 0.44 | 1.37 | 203000<br>45600        | 152000<br>34100  | 1.34 | 2280000<br>513000   | LL778149    | LL778110 |
| 596.900<br>23.5000      | 685.800<br>27.0000 | 31.750<br>1.2500  | 337000<br>75800        | 0.53 | 1.14 | 87400<br>19600         | 78800<br>17700   | 1.11 | 963000<br>217000    | 680235      | 680270   |
| 602.945<br>23.7380      | 787.400<br>31.0000 | 93.662<br>3.6875  | 2230000<br>502000      | 0.37 | 1.62 | 579000<br>130000       | 367000<br>82600  | 1.58 | 5620000<br>1260000  | EE649237    | 649310   |
| 609.346<br>23.9900      | 787.400<br>31.0000 | 93.662<br>3.6875  | 2230000<br>502000      | 0.37 | 1.62 | 579000<br>130000       | 367000<br>82600  | 1.58 | 5620000<br>1260000  | EE649238    | 649310   |
| 609.396<br>23.9920      | 762.000<br>30.0000 | 95.250<br>3.7500  | 1940000<br>437000      | 0.49 | 1.23 | 503000<br>113000       | 420000<br>94400  | 1.20 | 5470000<br>1230000  | L879946     | L879910  |
| 609.600<br>24.0000      | 762.000<br>30.0000 | 95.250<br>3.7500  | 1940000<br>437000      | 0.49 | 1.23 | 503000<br>113000       | 420000<br>94400  | 1.20 | 5470000<br>1230000  | L879947     | L879910  |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

| Bearing           |                   |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|-------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                   |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                 | C                 | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 84.138<br>3.3125  | 60.325<br>2.3750  | 30.5<br>1.20     | 6.4<br>0.25                                    | 479.0<br>18.86                             | 489.0<br>19.25                             | 3.3<br>0.13                                  | 579.5<br>22.82 | 570.0<br>22.44 | 13.40<br>0.53  | 3.30<br>0.13   | 4660           | 537            | 0.2366         | 61.29<br>135.12     |
| 85.725<br>3.3750  | 66.675<br>2.6250  | 12.4<br>0.49     | 6.4<br>0.25                                    | 483.0<br>19.02                             | 493.0<br>19.41                             | 6.4<br>0.25                                  | 596.5<br>23.48 | 585.0<br>23.03 | 8.10<br>0.32   | 4.00<br>0.16   | 6040           | 665            | 0.2333         | 71.13<br>156.81     |
| 114.300<br>4.5000 | 82.550<br>3.2500  | 5.3<br>0.21      | 9.7<br>0.38                                    | 491.0<br>19.33                             | 507.0<br>19.96                             | 6.4<br>0.25                                  | 680.5<br>26.79 | 675.0<br>26.57 | 19.80<br>0.78  | 10.20<br>0.40  | 4970           | 343            | 0.2315         | 163.93<br>361.40    |
| 41.275<br>1.6250  | 31.750<br>1.2500  | 58.4<br>2.30     | 3.3<br>0.13                                    | 491.0<br>19.33                             | 495.0<br>19.49                             | 3.3<br>0.13                                  | 549.0<br>21.61 | 543.0<br>21.38 | 3.50<br>0.14   | 1.30<br>0.05   | 3790           | 1240           | 0.2189         | 19.28<br>42.51      |
| 128.588<br>5.0625 | 101.600<br>4.0000 | -8.9<br>-0.35    | 6.4<br>0.25                                    | 507.0<br>19.96                             | 516.0<br>20.31                             | 6.4<br>0.25                                  | 648.0<br>25.52 | 633.0<br>24.92 | 9.90<br>0.39   | 7.60<br>0.30   | 8110           | 508            | 0.2598         | 141.63<br>312.24    |
| 46.038<br>1.8125  | 41.275<br>1.6250  | 36.6<br>1.44     | 3.3<br>0.13                                    | 501.0<br>19.72                             | 504.0<br>19.84                             | 3.3<br>0.13                                  | 579.0<br>22.80 | 582.0<br>22.91 | 6.20<br>0.24   | 2.90<br>0.12   | 4150           | 1070           | 0.2056         | 34.81<br>76.74      |
| 85.725<br>3.3750  | 66.675<br>2.6250  | 12.4<br>0.49     | 6.4<br>0.25                                    | 501.0<br>19.72                             | 513.0<br>20.20                             | 6.4<br>0.25                                  | 596.5<br>23.48 | 585.0<br>23.03 | 8.10<br>0.32   | 4.00<br>0.16   | 6040           | 665            | 0.2333         | 58.43<br>128.81     |
| 80.962<br>3.1875  | 63.500<br>2.5000  | 19.0<br>0.75     | 6.4<br>0.25                                    | 510.0<br>20.08                             | 516.0<br>20.31                             | 3.3<br>0.13                                  | 609.5<br>24.00 | 603.0<br>23.74 | 8.10<br>0.32   | 2.50<br>0.10   | 6060           | 726            | 0.2350         | 66.08<br>145.67     |
| 84.138<br>3.3125  | 61.912<br>2.4375  | 40.9<br>1.61     | 6.4<br>0.25                                    | 510.0<br>20.08                             | 522.0<br>20.55                             | 3.3<br>0.13                                  | 613.5<br>24.15 | 600.0<br>23.62 | 10.30<br>0.40  | 2.90<br>0.12   | 5450           | 602            | 0.2525         | 64.08<br>141.27     |
| 94.458<br>3.7188  | 69.850<br>2.7500  | 4.8<br>0.19      | 6.4<br>0.25                                    | 513.0<br>20.20                             | 522.0<br>20.55                             | 6.4<br>0.25                                  | 630.5<br>24.82 | 624.0<br>24.57 | 10.50<br>0.41  | 4.60<br>0.18   | 6320           | 601            | 0.2310         | 83.41<br>183.89     |
| 80.962<br>3.1875  | 63.500<br>2.5000  | 19.0<br>0.75     | 6.4<br>0.25                                    | 522.0<br>20.55                             | 528.0<br>20.79                             | 3.3<br>0.13                                  | 609.5<br>24.00 | 603.0<br>23.74 | 8.10<br>0.32   | 2.50<br>0.10   | 6060           | 726            | 0.2350         | 58.40<br>128.74     |
| 80.962<br>3.1875  | 63.500<br>2.5000  | 19.0<br>0.75     | 6.4<br>0.25                                    | 522.0<br>20.55                             | 528.0<br>20.79                             | 3.3<br>0.13                                  | 609.5<br>24.00 | 603.0<br>23.74 | 9.20<br>0.36   | 1.60<br>0.06   | 6590           | 788            | 0.2422         | 57.63<br>127.06     |
| 80.962<br>3.1875  | 63.500<br>2.5000  | 19.0<br>0.75     | 6.4<br>0.25                                    | 522.0<br>20.55                             | 528.0<br>20.79                             | 3.3<br>0.13                                  | 609.5<br>24.00 | 603.0<br>23.74 | 9.20<br>0.36   | 1.60<br>0.06   | 6590           | 788            | 0.2422         | 57.56<br>126.89     |
| 80.962<br>3.1875  | 63.500<br>2.5000  | 19.0<br>0.75     | 6.4<br>0.25                                    | 522.0<br>20.55                             | 528.0<br>20.79                             | 3.3<br>0.13                                  | 609.5<br>24.00 | 603.0<br>23.74 | 8.10<br>0.32   | 2.50<br>0.10   | 6060           | 726            | 0.2350         | 58.32<br>128.58     |
| 139.700<br>5.5000 | 104.775<br>4.1250 | 23.9<br>0.94     | 9.7<br>0.38                                    | 552.0<br>21.73                             | 564.0<br>22.20                             | 9.7<br>0.38                                  | 768.0<br>30.23 | 759.0<br>29.88 | 21.50<br>0.85  | 8.30<br>0.33   | 6650           | 435            | 0.2722         | 276.10<br>608.68    |
| 50.800<br>2.0000  | 38.100<br>1.5000  | 50.8<br>2.00     | 6.4<br>0.25                                    | 549.0<br>21.61                             | 558.0<br>21.97                             | 6.4<br>0.25                                  | 621.0<br>24.45 | 612.0<br>24.09 | 4.60<br>0.18   | 2.80<br>0.11   | 4810           | 1200           | 0.2270         | 28.27<br>62.33      |
| 146.050<br>5.7500 | 114.300<br>4.5000 | -9.7<br>-0.38    | 6.4<br>0.25                                    | 570.0<br>22.44                             | 576.0<br>22.68                             | 6.4<br>0.25                                  | 725.5<br>28.57 | 711.0<br>27.99 | 13.30<br>0.52  | 5.50<br>0.22   | 10600          | 614            | 0.2839         | 202.61<br>446.67    |
| 50.800<br>2.0000  | 38.100<br>1.5000  | 50.8<br>2.00     | 6.4<br>0.25                                    | 555.0<br>21.85                             | 564.0<br>22.20                             | 6.4<br>0.25                                  | 621.0<br>24.45 | 612.0<br>24.09 | 4.60<br>0.18   | 2.80<br>0.11   | 4810           | 1200           | 0.2270         | 26.14<br>57.62      |
| 80.962<br>3.1875  | 61.912<br>2.4375  | 32.3<br>1.27     | 6.4<br>0.25                                    | 570.0<br>22.44                             | 579.0<br>22.80                             | 6.4<br>0.25                                  | 666.0<br>26.22 | 657.0<br>25.87 | 8.60<br>0.34   | 2.60<br>0.10   | 7260           | 889            | 0.2567         | 67.26<br>148.29     |
| 80.962<br>3.1875  | 61.912<br>2.4375  | 32.3<br>1.27     | 6.4<br>0.25                                    | 570.0<br>22.44                             | 579.0<br>22.80                             | 6.4<br>0.25                                  | 666.0<br>26.22 | 657.0<br>25.87 | 8.60<br>0.34   | 2.60<br>0.10   | 7260           | 889            | 0.2567         | 67.17<br>148.08     |
| 104.775<br>4.1250 | 80.962<br>3.1875  | 15.7<br>0.62     | 6.4<br>0.25                                    | 585.0<br>23.03                             | 594.0<br>23.39                             | 6.4<br>0.25                                  | 708.0<br>27.87 | 696.0<br>27.40 | 9.00<br>0.35   | 5.50<br>0.22   | 9310           | 907            | 0.2735         | 113.21<br>249.58    |
| 155.575<br>6.1250 | 120.650<br>4.7500 | -11.4<br>-0.45   | 6.4<br>0.25                                    | 609.0<br>23.98                             | 615.0<br>24.21                             | 6.4<br>0.25                                  | 773.5<br>30.46 | 756.0<br>29.76 | 15.10<br>0.59  | 5.80<br>0.23   | 12400          | 669            | 0.2990         | 244.54<br>539.12    |
| 49.212<br>1.9375  | 34.925<br>1.3750  | 64.5<br>2.54     | 3.5<br>0.14                                    | 600.0<br>23.62                             | 603.0<br>23.74                             | 3.3<br>0.13                                  | 669.0<br>26.34 | 663.0<br>26.10 | 5.10<br>0.20   | 2.60<br>0.10   | 5980           | 1580           | 0.2494         | 28.83<br>63.57      |
| 31.750<br>1.2500  | 25.400<br>1.0000  | 96.0<br>3.78     | 3.5<br>0.14                                    | 615.0<br>24.21                             | 615.0<br>24.21                             | 3.3<br>0.13                                  | 669.0<br>26.34 | 663.0<br>26.10 | 1.80<br>0.07   | 1.50<br>-0.06  | 3740           | 1810           | 0.2225         | 16.76<br>36.95      |
| 93.662<br>3.6875  | 69.850<br>2.7500  | 31.5<br>1.24     | 6.4<br>0.25                                    | 630.0<br>24.80                             | 639.0<br>25.16                             | 6.4<br>0.25                                  | 755.5<br>29.74 | 747.0<br>29.41 | 11.20<br>0.44  | 6.20<br>0.24   | 9380           | 929            | 0.2790         | 110.72<br>244.10    |
| 93.662<br>3.6875  | 69.850<br>2.7500  | 31.5<br>1.24     | 6.4<br>0.25                                    | 633.0<br>24.92                             | 642.0<br>25.28                             | 6.4<br>0.25                                  | 755.5<br>29.74 | 747.0<br>29.41 | 11.20<br>0.44  | 6.20<br>0.24   | 9380           | 929            | 0.2790         | 106.26<br>234.25    |
| 92.075<br>3.6250  | 71.438<br>2.8125  | 57.9<br>2.28     | 6.4<br>0.25                                    | 633.0<br>24.92                             | 642.0<br>25.28                             | 6.4<br>0.25                                  | 741.0<br>29.17 | 720.0<br>28.35 | 11.70<br>0.46  | 5.10<br>0.20   | 9580           | 1010           | 0.3063         | 92.92<br>204.86     |
| 92.075<br>3.6250  | 71.438<br>2.8125  | 57.9<br>2.28     | 6.4<br>0.25                                    | 633.0<br>24.92                             | 642.0<br>25.28                             | 6.4<br>0.25                                  | 741.0<br>29.17 | 720.0<br>28.35 | 11.70<br>0.46  | 5.10<br>0.20   | 9580           | 1010           | 0.3063         | 92.78<br>204.55     |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

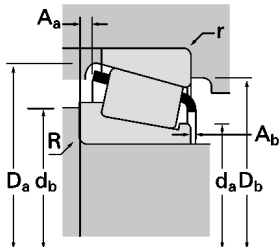
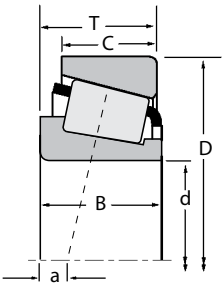
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# ROLLER BEARINGS

## TS SINGLE-ROW

B



| Dimensions, mm (inches) |                     |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                     | Part Number |          |
|-------------------------|---------------------|-------------------|------------------------|------|------|------------------------|------------------|------|---------------------|-------------|----------|
| d                       | D                   | T                 | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static              | Inner       | Outer    |
|                         |                     |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                     |             |          |
| 609.600<br>24.0000      | 774.700<br>30.5000  | 85.725<br>3.3750  | 1980000<br>444000      | 0.40 | 1.49 | 512000<br>115000       | 353000<br>79300  | 1.45 | 4620000<br>1040000  | L580049     | L580010  |
| 609.600<br>24.0000      | 787.400<br>31.0000  | 93.662<br>3.6875  | 2230000<br>502000      | 0.37 | 1.62 | 579000<br>130000       | 367000<br>82600  | 1.58 | 5620000<br>1260000  | EE649240    | 649310   |
| 615.950<br>24.2500      | 708.025<br>27.8750  | 41.275<br>1.6250  | 593000<br>133000       | 0.39 | 1.55 | 154000<br>34500        | 102000<br>22900  | 1.51 | 1840000<br>414000   | LL580049    | LL580010 |
| 635.000<br>25.0000      | 933.450<br>36.7500  | 179.388<br>7.0625 | 5750000<br>1290000     | 0.33 | 1.80 | 1490000<br>335000      | 848000<br>191000 | 1.76 | 13900000<br>3120000 | M281635     | M281610  |
| 660.235<br>25.9935      | 812.800<br>32.0000  | 95.250<br>3.7500  | 2170000<br>487000      | 0.33 | 1.80 | 561000<br>126000       | 320000<br>71900  | 1.76 | 5940000<br>1340000  | L281146     | L281110  |
| 660.400<br>26.0000      | 812.800<br>32.0000  | 95.250<br>3.7500  | 2170000<br>487000      | 0.33 | 1.80 | 561000<br>126000       | 320000<br>71900  | 1.76 | 5940000<br>1340000  | L281148     | L281110  |
| 660.400<br>26.0000      | 854.075<br>33.6250  | 85.725<br>3.3750  | 1920000<br>431000      | 0.35 | 1.71 | 496000<br>112000       | 299000<br>67100  | 1.66 | 4620000<br>1040000  | EE749260    | 749336   |
| 673.100<br>26.5000      | 793.750<br>31.2500  | 66.675<br>2.6250  | 1090000<br>244000      | 0.36 | 1.67 | 282000<br>63300        | 174000<br>39000  | 1.62 | 3140000<br>707000   | LL481448    | LL481411 |
| 679.450<br>26.7500      | 901.700<br>35.5000  | 142.875<br>5.6250 | 4290000<br>964000      | 0.33 | 1.80 | 1110000<br>250000      | 633000<br>142000 | 1.76 | 11000000<br>2480000 | LM281849    | LM281810 |
| 682.625<br>26.8750      | 965.200<br>38.0000  | 185.738<br>7.3125 | 6120000<br>1380000     | 0.33 | 1.80 | 1590000<br>357000      | 903000<br>203000 | 1.76 | 14900000<br>3340000 | M282249     | M282210  |
| 759.925<br>29.9183      | 889.000<br>35.0000  | 88.900<br>3.5000  | 2010000<br>452000      | 0.31 | 1.97 | 522000<br>117000       | 272000<br>61300  | 1.91 | 6230000<br>1400000  | L183448     | L183410  |
| 762.000<br>30.0000      | 889.000<br>35.0000  | 88.900<br>3.5000  | 2010000<br>452000      | 0.31 | 1.97 | 522000<br>117000       | 272000<br>61300  | 1.91 | 6230000<br>1400000  | L183449     | L183410  |
| 801.688<br>31.5625      | 914.400<br>36.0000  | 58.738<br>2.3125  | 1060000<br>239000      | 0.40 | 1.51 | 276000<br>62000        | 187000<br>42100  | 1.47 | 3460000<br>778000   | LL584449    | LL584410 |
| 838.200<br>33.0000      | 1041.400<br>41.0000 | 93.662<br>3.6875  | 2160000<br>487000      | 0.44 | 1.37 | 561000<br>126000       | 420000<br>94500  | 1.33 | 5930000<br>1330000  | EE763330    | 763410   |
| 1092.200<br>43.0000     | 1320.800<br>52.0000 | 95.250<br>3.7500  | 2280000<br>512000      | 0.57 | 1.05 | 591000<br>133000       | 577000<br>130000 | 1.02 | 6990000<br>1570000  | EE776430    | 776520   |

- (1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.
- (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.
- (3) Negative value indicates effective center inside cone backface.
- (4) These maximum fillet radii will be cleared by the bearing corners.
- (5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



| Bearing           |                   |                  | Dimensions, mm (inches)    |                          |                          |                                     |                 |                                     | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------------|-------------------|------------------|----------------------------|--------------------------|--------------------------|-------------------------------------|-----------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                   |                   |                  | max shaft<br>fillet radius | backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                 | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                     |
| B                 | C                 | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>           | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>  | D <sub>b</sub>                      | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 79.375<br>3.1250  | 60.325<br>2.3750  | 45.2<br>1.78     | 6.4<br>0.25                | 633.0<br>24.92           | 642.0<br>25.28           | 6.4<br>0.25                         | 749.5<br>29.51  | 741.0<br>29.17                      | -8.90<br>-0.35 | 3.80<br>0.15   | 7660           | 933            | 0.2671         | 82.53<br>181.94     |
| 93.662<br>3.6875  | 69.850<br>2.7500  | 31.5<br>1.24     | 6.4<br>0.25                | 633.0<br>24.92           | 642.0<br>25.28           | 6.4<br>0.25                         | 755.5<br>29.74  | 747.0<br>29.41                      | 11.20<br>0.44  | 6.20<br>0.24   | 9380           | 929            | 0.2790         | 106.08<br>233.86    |
| 41.275<br>1.6250  | 29.367<br>1.1562  | 61.7<br>2.43     | 3.5<br>0.14                | 630.0<br>24.80           | 633.0<br>24.92           | 3.3<br>0.13                         | 690.0<br>27.17  | 687.0<br>27.05                      | 3.10<br>0.12   | 2.80<br>0.11   | 6270           | 2020           | 0.2418         | 23.23<br>51.21      |
| 177.800<br>7.0000 | 141.288<br>5.5625 | -13.5<br>-0.53   | 12.0<br>0.47               | 687.0<br>27.05           | 699.0<br>27.52           | 6.4<br>0.25                         | 889.5<br>35.02  | 870.0<br>34.25                      | 17.90<br>0.71  | 9.60<br>0.38   | 17300          | 805            | 0.3335         | 401.62<br>885.40    |
| 95.250<br>3.7500  | 73.025<br>2.8750  | 27.9<br>1.10     | 6.4<br>0.25                | 681.0<br>26.81           | 693.0<br>27.28           | 6.4<br>0.25                         | 788.5<br>31.04  | 777.0<br>30.59                      | 9.00<br>0.35   | 4.50<br>0.18   | 11700          | 915            | 0.2888         | 98.70<br>217.60     |
| 95.250<br>3.7500  | 73.025<br>2.8750  | 27.9<br>1.10     | 6.4<br>0.25                | 681.0<br>26.81           | 693.0<br>27.28           | 6.4<br>0.25                         | 788.5<br>31.04  | 777.0<br>30.59                      | 9.00<br>0.35   | 4.50<br>0.18   | 11700          | 915            | 0.2888         | 98.58<br>217.32     |
| 85.468<br>3.3649  | 60.325<br>2.3750  | 39.4<br>1.55     | 9.7<br>0.38                | 687.0<br>27.05           | 702.0<br>27.64           | 6.4<br>0.25                         | 813.0<br>32.01  | 813.0<br>32.01                      | 11.70<br>0.46  | 2.30<br>0.09   | 9220           | 1360           | 0.2707         | 108.93<br>240.16    |
| 61.912<br>2.4375  | 49.212<br>1.9375  | 53.8<br>2.12     | 6.4<br>0.25                | 690.0<br>27.17           | 702.0<br>27.64           | 6.4<br>0.25                         | 771.0<br>30.35  | 765.0<br>30.12                      | 4.10<br>0.16   | 1.60<br>0.06   | 8760           | 1650           | 0.2659         | 51.77<br>114.12     |
| 142.875<br>5.6250 | 111.125<br>4.3750 | 6.9<br>0.27      | 9.7<br>0.38                | 714.0<br>28.11           | 726.0<br>28.58           | 6.4<br>0.25                         | 866.5<br>34.12  | 852.0<br>33.54                      | 12.80<br>0.50  | 7.40<br>0.29   | 16300          | 961            | 0.3252         | 235.16<br>518.42    |
| 185.738<br>7.3125 | 142.875<br>5.6250 | -15.2<br>-0.60   | 9.7<br>0.38                | 723.0<br>28.46           | 738.0<br>29.06           | 6.4<br>0.25                         | 919.5<br>36.21  | 900.0<br>35.43                      | 19.20<br>0.76  | 10.50<br>0.41  | 18800          | 842            | 0.3426         | 408.57<br>900.73    |
| 88.900<br>3.5000  | 72.000<br>2.8346  | 34.5<br>1.36     | 3.3<br>0.13                | 780.0<br>30.71           | 783.0<br>30.83           | 3.3<br>0.13                         | 872.0<br>34.33  | 864.0<br>34.02                      | 4.60<br>0.18   | 6.00<br>0.24   | 16100          | 2020           | 0.3102         | 89.99<br>198.38     |
| 88.900<br>3.5000  | 72.000<br>2.8346  | 34.5<br>1.36     | 3.3<br>0.13                | 780.0<br>30.71           | 783.0<br>30.83           | 3.3<br>0.13                         | 872.0<br>34.33  | 864.0<br>34.02                      | 4.60<br>0.18   | 6.00<br>0.24   | 16100          | 2020           | 0.3102         | 88.26<br>194.58     |
| 58.738<br>2.3125  | 41.275<br>1.6250  | 79.0<br>3.11     | 3.5<br>0.14                | 819.0<br>32.24           | 822.0<br>32.36           | 3.3<br>0.13                         | 894.0<br>35.20  | 888.0<br>34.96                      | 7.90<br>0.31   | 3.10<br>0.12   | 12400          | 2700           | 0.3058         | 52.69<br>116.16     |
| 88.900<br>3.5000  | 66.675<br>2.6250  | 83.1<br>3.27     | 6.4<br>0.25                | 870.0<br>34.25           | 876.0<br>34.49           | 6.4<br>0.25                         | 1001.0<br>39.41 | 996.0<br>39.21                      | 16.10<br>0.63  | 4.80<br>0.19   | 14700          | 1740           | 0.3374         | 154.58<br>340.78    |
| 88.900<br>3.5000  | 69.850<br>2.7500  | 175.8<br>6.92    | 6.4<br>0.25                | 1130.0<br>44.49          | 1135.0<br>44.69          | 6.4<br>0.25                         | 1273.5<br>50.14 | 1260.0<br>49.61                     | 15.60<br>0.61  | 4.90<br>0.19   | 23200          | 2940           | 0.4231         | 228.66<br>504.09    |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

**If you need a product other than those shown here,  
please contact your Timken representative.**



## **ROLLER BEARINGS**



### **NOTES**

**B**





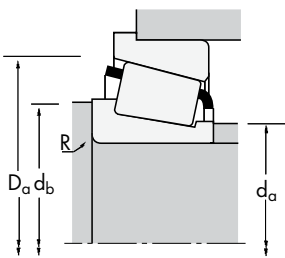
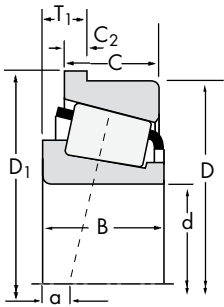


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Dynamic (1)    |      |      | Load Ratings, N (lbf.) |                  |      | Static         | Part Number    |         |
|-------------------------|------------------|------------------|----------------|------|------|------------------------|------------------|------|----------------|----------------|---------|
| d                       | D                | T <sub>1</sub>   | C <sub>1</sub> | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                | C <sub>0</sub> | Inner   |
| 7.938<br>0.3125         | 31.991<br>1.2595 | 4.458<br>0.1755  | 10600<br>2380  | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070   | A2031          | A2126-B |
| 9.525<br>0.3750         | 31.991<br>1.2595 | 4.458<br>0.1755  | 10600<br>2380  | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070   | A2037          | A2126-B |
| 11.987<br>0.4719        | 31.991<br>1.2595 | 4.458<br>0.1755  | 10600<br>2380  | 0.41 | 1.48 | 2750<br>618            | 1910<br>429      | 1.44 | 9230<br>2070   | A2047          | A2126-B |
| 12.700<br>0.5000        | 34.988<br>1.3775 | 4.630<br>0.1823  | 12200<br>2740  | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580  | A4050          | A4138-B |
| 14.987<br>0.5901        | 34.988<br>1.3775 | 4.630<br>0.1823  | 12200<br>2740  | 0.45 | 1.32 | 3160<br>710            | 2450<br>550      | 1.29 | 11500<br>2580  | A4059          | A4138-B |
| 15.875<br>0.6250        | 39.992<br>1.5745 | 4.851<br>0.1910  | 12400<br>2790  | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770  | A6062          | A6157-B |
| 15.875<br>0.6250        | 42.862<br>1.6875 | 6.350<br>0.2500  | 29100<br>6540  | 0.33 | 1.81 | 7550<br>1700           | 4280<br>962      | 1.76 | 29200<br>6560  | 17580          | 17520-B |
| 15.875<br>0.6250        | 47.000<br>1.8504 | 6.038<br>0.2377  | 24700<br>5560  | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720  | 05062          | 05185-B |
| 16.993<br>0.6690        | 39.992<br>1.5745 | 4.851<br>0.1910  | 12400<br>2790  | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770  | A6067          | A6157-B |
| 16.993<br>0.6690        | 47.000<br>1.8504 | 6.038<br>0.2377  | 24700<br>5560  | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720  | 05066          | 05185-B |
| 19.050<br>0.7500        | 39.992<br>1.5745 | 4.851<br>0.1910  | 12400<br>2790  | 0.53 | 1.14 | 3220<br>724            | 2900<br>653      | 1.11 | 12300<br>2770  | A6075          | A6157-B |
| 19.050<br>0.7500        | 47.000<br>1.8504 | 6.038<br>0.2377  | 24700<br>5560  | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720  | 05075          | 05185-B |
| 19.050<br>0.7500        | 47.000<br>1.8504 | 14.381<br>0.5662 | 24700<br>5560  | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720  | 05075X         | 05185-B |
| 19.050<br>0.7500        | 49.225<br>1.9380 | 6.998<br>0.2755  | 39700<br>8920  | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100  | 09067          | 09195AB |
| 19.050<br>0.7500        | 53.975<br>2.1250 | 10.317<br>0.4062 | 43000<br>9670  | 0.59 | 1.02 | 11200<br>2510          | 11300<br>2540    | 0.99 | 42500<br>9560  | 21075          | 21212-B |
| 19.050<br>0.7500        | 56.896<br>2.2400 | 7.455<br>0.2935  | 42000<br>9450  | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1775           | 1729-B  |
| 19.987<br>0.7869        | 47.000<br>1.8504 | 6.048<br>0.2381  | 24700<br>5560  | 0.36 | 1.68 | 6420<br>1440           | 3920<br>881      | 1.64 | 25400<br>5720  | 05079          | 05185-B |
| 20.000<br>0.7874        | 51.994<br>2.0470 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07079          | 07204-B |
| 20.625<br>0.8120        | 49.225<br>1.9380 | 8.809<br>0.3468  | 39700<br>8920  | 0.27 | 2.26 | 10300<br>2310          | 4680<br>1050     | 2.20 | 40500<br>9100  | 09081          | 09195AB |
| 20.638<br>0.8125        | 61.912<br>2.4375 | 9.525<br>0.3750  | 82000<br>18400 | 0.28 | 2.13 | 21300<br>4780          | 10300<br>2310    | 2.07 | 89800<br>20200 | 3660           | 3620-B  |
| 22.225<br>0.8750        | 50.005<br>1.9687 | 6.749<br>0.2657  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07087          | 07196-B |
| 22.225<br>0.8750        | 50.800<br>2.0000 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07087X         | 07210XB |
| 22.225<br>0.8750        | 51.994<br>2.0470 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07087          | 07204-B |
| 22.225<br>0.8750        | 56.896<br>2.2400 | 7.463<br>0.2938  | 42000<br>9450  | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1755           | 1729-B  |
| 22.225<br>0.8750        | 60.325<br>2.3750 | 7.938<br>0.3125  | 44800<br>10100 | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300 | 1975           | 1931-B  |
| 22.225<br>0.8750        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400 | 2684           | 2631-B  |
| 23.812<br>0.9375        | 51.994<br>2.0470 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650  | 07093          | 07204-B |
| 23.812<br>0.9375        | 56.896<br>2.2400 | 7.463<br>0.2938  | 42000<br>9450  | 0.31 | 1.95 | 10900<br>2450          | 5740<br>1290     | 1.90 | 45300<br>10200 | 1779           | 1729-B  |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                 |                                   |                |                          |                | Factors                             |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------|-----------------------------------|----------------|--------------------------|----------------|-------------------------------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius |                 | Shaft<br>backing<br>shoulder dia. |                | backing<br>shoulder dia. |                | Housing<br>backing<br>shoulder dia. |                | G <sub>1</sub> |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>  | R <sup>(4)</sup>                  | d <sub>a</sub> | d <sub>b</sub>           | D <sub>a</sub> | G <sub>1</sub>                      | G <sub>2</sub> |                | C <sub>g</sub>      |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 35.166<br>1.3845           | 2.388<br>0.0940 | 0.5<br>0.02                       | 12.5<br>0.49   | 13.0<br>0.51             | 30.0<br>1.18   | 1.7                                 | 3.17           | 0.0308         | 0.05<br>0.11        |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 35.166<br>1.3845           | 2.388<br>0.0940 | 1.3<br>0.05                       | 13.5<br>0.53   | 15.0<br>0.59             | 30.0<br>1.18   | 1.7                                 | 3.17           | 0.0308         | 0.05<br>0.11        |
| 10.785<br>0.4246 | 7.938<br>0.3125  | -3.0<br>-0.12    | 35.166<br>1.3845           | 2.388<br>0.0940 | 0.8<br>0.03                       | 15.5<br>0.61   | 16.5<br>0.65             | 30.0<br>1.18   | 1.7                                 | 3.17           | 0.0308         | 0.05<br>0.10        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 38.062<br>1.4985           | 2.362<br>0.0930 | 1.3<br>0.05                       | 17.0<br>0.67   | 18.5<br>0.73             | 33.5<br>1.32   | 2.3                                 | 4.12           | 0.0355         | 0.06<br>0.12        |
| 10.988<br>0.4326 | 8.730<br>0.3437  | -2.5<br>-0.10    | 38.062<br>1.4985           | 2.362<br>0.0930 | 0.8<br>0.03                       | 19.0<br>0.75   | 19.5<br>0.77             | 33.5<br>1.32   | 2.3                                 | 4.12           | 0.0355         | 0.05<br>0.12        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 43.066<br>1.6955           | 2.362<br>0.0930 | 1.3<br>0.05                       | 20.5<br>0.81   | 22.0<br>0.87             | 38.0<br>1.50   | 2.9                                 | 5.64           | 0.0404         | 0.08<br>0.17        |
| 16.670<br>0.6563 | 13.495<br>0.5313 | -5.8<br>-0.23    | 45.936<br>1.8085           | 3.175<br>0.1250 | 1.5<br>0.06                       | 21.0<br>0.83   | 23.0<br>0.91             | 40.5<br>1.59   | 5.3                                 | 4.53           | 0.0423         | 0.13<br>0.29        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 50.861<br>2.0024           | 2.769<br>0.1090 | 1.5<br>0.06                       | 21.0<br>0.83   | 23.5<br>0.93             | 44.5<br>1.75   | 5.8                                 | 5.55           | 0.0448         | 0.14<br>0.31        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 43.066<br>1.6955           | 2.362<br>0.0930 | 0.8<br>0.03                       | 21.0<br>0.83   | 22.0<br>0.87             | 38.0<br>1.50   | 2.9                                 | 5.64           | 0.0404         | 0.08<br>0.17        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 50.861<br>2.0024           | 2.769<br>0.1090 | 1.5<br>0.06                       | 22.0<br>0.87   | 24.5<br>0.96             | 44.5<br>1.75   | 5.8                                 | 5.55           | 0.0448         | 0.14<br>0.30        |
| 11.153<br>0.4391 | 9.525<br>0.3750  | -1.5<br>-0.06    | 43.066<br>1.6955           | 2.362<br>0.0930 | 1.0<br>0.04                       | 23.0<br>0.91   | 24.0<br>0.94             | 38.0<br>1.50   | 2.9                                 | 5.64           | 0.0404         | 0.07<br>0.16        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 50.861<br>2.0024           | 2.769<br>0.1090 | 1.3<br>0.05                       | 23.5<br>0.93   | 25.0<br>0.98             | 44.5<br>1.75   | 5.8                                 | 5.55           | 0.0448         | 0.13<br>0.29        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 50.861<br>2.0024           | 2.769<br>0.1090 | 1.5<br>0.06                       | 23.5<br>0.93   | 25.5<br>1.00             | 44.5<br>1.75   | 5.8                                 | 5.55           | 0.0448         | 0.13<br>0.29        |
| 19.050<br>0.7500 | 14.288<br>0.5625 | -7.4<br>-0.29    | 53.081<br>2.0898           | 3.251<br>0.1280 | 1.3<br>0.05                       | 24.0<br>0.94   | 25.5<br>1.00             | 46.5<br>1.83   | 8                                   | 4.05           | 0.0452         | 0.18<br>0.40        |
| 21.839<br>0.8598 | 15.875<br>0.6250 | -5.8<br>-0.23    | 57.841<br>2.2772           | 3.967<br>0.1562 | 1.5<br>0.06                       | 26.0<br>1.03   | 31.5<br>1.24             | 52.0<br>2.05   | 7                                   | 3.55           | 0.0558         | 0.26<br>0.57        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 60.757<br>2.3920           | 3.962<br>0.1560 | 1.5<br>0.06                       | 25.0<br>0.98   | 27.0<br>1.06             | 53.0<br>2.09   | 10.6                                | 5.39           | 0.0521         | 0.28<br>0.62        |
| 14.381<br>0.5662 | 11.112<br>0.4375 | -4.1<br>-0.16    | 50.861<br>2.0024           | 2.769<br>0.1090 | 1.5<br>0.06                       | 24.0<br>0.94   | 26.5<br>1.04             | 44.5<br>1.75   | 5.8                                 | 5.55           | 0.0448         | 0.13<br>0.28        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 55.855<br>2.1990           | 2.769<br>0.1090 | 1.5<br>0.06                       | 26.0<br>1.02   | 27.5<br>1.08             | 50.0<br>1.97   | 7.6                                 | 7.07           | 0.0509         | 0.17<br>0.38        |
| 21.539<br>0.8480 | 14.288<br>0.5625 | -9.1<br>-0.36    | 53.081<br>2.0898           | 3.251<br>0.1280 | 1.5<br>0.06                       | 25.5<br>1.00   | 27.5<br>1.08             | 46.5<br>1.83   | 8                                   | 4.05           | 0.0452         | 0.18<br>0.40        |
| 30.416<br>1.1975 | 23.812<br>0.9375 | -11.9<br>-0.47   | 66.571<br>2.6209           | 4.762<br>0.1875 | 2.3<br>0.09                       | 29.5<br>1.16   | 33.5<br>1.32             | 59.0<br>2.32   | 17                                  | 6.38           | 0.0592         | 0.48<br>1.07        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 53.871<br>2.1209           | 2.779<br>0.1094 | 1.3<br>0.05                       | 27.0<br>1.06   | 28.5<br>1.12             | 49.0<br>1.93   | 7.6                                 | 7.07           | 0.0509         | 0.13<br>0.30        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 54.762<br>2.1560           | 2.769<br>0.1090 | 1.5<br>0.06                       | 27.0<br>1.06   | 29.0<br>1.14             | 49.0<br>1.93   | 7.6                                 | 7.07           | 0.0509         | 0.15<br>0.34        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 55.855<br>2.1990           | 2.769<br>0.1090 | 1.3<br>0.05                       | 27.0<br>1.06   | 28.5<br>1.12             | 50.0<br>1.97   | 7.6                                 | 7.07           | 0.0509         | 0.16<br>0.36        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 60.757<br>2.3920           | 3.962<br>0.1560 | 1.3<br>0.05                       | 27.5<br>1.08   | 29.0<br>1.14             | 53.0<br>2.09   | 10.6                                | 5.39           | 0.0521         | 0.26<br>0.58        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 64.186<br>2.5270           | 3.967<br>0.1562 | 0.8<br>0.03                       | 28.0<br>1.10   | 29.0<br>1.14             | 57.0<br>2.24   | 12.5                                | 6.33           | 0.0565         | 0.31<br>0.68        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 1.5<br>0.06                       | 32.0<br>1.26   | 34.0<br>1.34             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.47<br>1.04        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 55.855<br>2.1990           | 2.769<br>0.1090 | 1.5<br>0.06                       | 28.5<br>1.12   | 30.5<br>1.20             | 50.0<br>1.97   | 7.6                                 | 7.07           | 0.0509         | 0.16<br>0.34        |
| 19.837<br>0.7810 | 15.875<br>0.6250 | -6.9<br>-0.27    | 60.757<br>2.3920           | 3.962<br>0.1560 | 0.8<br>0.03                       | 28.5<br>1.12   | 29.5<br>1.16             | 53.0<br>2.09   | 10.6                                | 5.39           | 0.0521         | 0.26<br>0.56        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



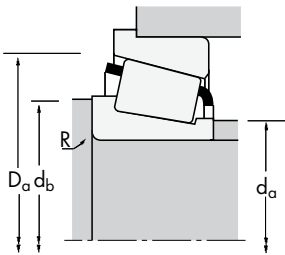
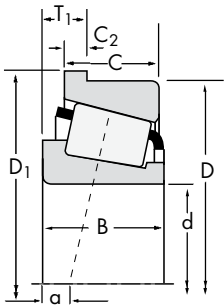


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Dynamic (1)    |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |         |
|-------------------------|------------------|------------------|----------------|------|------|------------------------|------------------|------|-----------------|----------------|---------|
| d                       | D                | T <sub>1</sub>   | C <sub>1</sub> | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner   |
| 23.812<br>0.9375        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26093          | 26283-B |
| 24.981<br>0.9835        | 50.005<br>1.9687 | 6.749<br>0.2657  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650   | 07098          | 07196-B |
| 24.981<br>0.9835        | 51.994<br>2.0470 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650   | 07098          | 07204-B |
| 25.400<br>1.0000        | 50.800<br>2.0000 | 5.080<br>0.2000  | 27000<br>6060  | 0.40 | 1.49 | 6990<br>1570           | 4810<br>1080     | 1.45 | 29600<br>6650   | 07100-SA       | 07210XB |
| 25.400<br>1.0000        | 57.150<br>2.2500 | 7.938<br>0.3125  | 42600<br>9570  | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15578          | 15520-B |
| 25.400<br>1.0000        | 58.738<br>2.3125 | 7.938<br>0.3125  | 44800<br>10100 | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1986           | 1932-B  |
| 25.400<br>1.0000        | 60.325<br>2.3750 | 7.938<br>0.3125  | 44800<br>10100 | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1986           | 1931-B  |
| 25.400<br>1.0000        | 65.088<br>2.5625 | 10.320<br>0.4063 | 50600<br>11400 | 0.73 | 0.82 | 13100<br>2950          | 16400<br>3690    | 0.80 | 55800<br>12500  | 23100          | 23256-B |
| 25.400<br>1.0000        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2687           | 2631-B  |
| 25.400<br>1.0000        | 68.262<br>2.6875 | 8.730<br>0.3437  | 59100<br>13300 | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02473          | 02420-B |
| 25.400<br>1.0000        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26100          | 26283-B |
| 25.400<br>1.0000        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3189           | 3120-B  |
| 25.400<br>1.0000        | 72.626<br>2.8593 | 12.700<br>0.5000 | 64600<br>14500 | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41100          | 41286-B |
| 26.975<br>1.0620        | 60.325<br>2.3750 | 7.938<br>0.3125  | 44800<br>10100 | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1987           | 1931-B  |
| 26.987<br>1.0625        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2688           | 2631-B  |
| 26.987<br>1.0625        | 72.626<br>2.8593 | 12.700<br>0.5000 | 64600<br>14500 | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41106          | 41286-B |
| 28.575<br>1.1250        | 57.150<br>2.2500 | 8.166<br>0.3215  | 42600<br>9570  | 0.35 | 1.73 | 11000<br>2480          | 6550<br>1470     | 1.69 | 50100<br>11300  | 15590          | 15520-B |
| 28.575<br>1.1250        | 60.325<br>2.3750 | 7.938<br>0.3125  | 44800<br>10100 | 0.33 | 1.82 | 11600<br>2610          | 6560<br>1470     | 1.77 | 50200<br>11300  | 1985           | 1931-B  |
| 28.575<br>1.1250        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2689           | 2631-B  |
| 28.575<br>1.1250        | 69.850<br>2.7500 | 8.733<br>0.3438  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2578           | 2523-B  |
| 28.575<br>1.1250        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26112          | 26283-B |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3192           | 3120-B  |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3198           | 3120-B  |
| 28.575<br>1.1250        | 72.626<br>2.8593 | 12.700<br>0.5000 | 64600<br>14500 | 0.60 | 1.00 | 16700<br>3760          | 17300<br>3880    | 0.97 | 64100<br>14400  | 41125          | 41286-B |
| 29.367<br>1.1562        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2690           | 2631-B  |
| 29.367<br>1.1562        | 66.421<br>2.6150 | 8.725<br>0.3435  | 71000<br>16000 | 0.25 | 2.36 | 18400<br>4140          | 8000<br>1800     | 2.30 | 81700<br>18400  | 2691           | 2631-B  |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 5.270<br>0.2075  | 40000<br>9000  | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17118          | 17244-B |
| 29.987<br>1.1806        | 68.262<br>2.6875 | 8.730<br>0.3437  | 59100<br>13300 | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02474A         | 02420-B |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                 |                                   |                |                          |                | Factors                             |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------|-----------------------------------|----------------|--------------------------|----------------|-------------------------------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius |                 | Shaft<br>backing<br>shoulder dia. |                | backing<br>shoulder dia. |                | Housing<br>backing<br>shoulder dia. |                | G <sub>1</sub> |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>  | R <sup>(4)</sup>                  | d <sub>a</sub> | d <sub>b</sub>           | D <sub>a</sub> | G <sub>1</sub>                      | G <sub>2</sub> |                | C <sub>g</sub>      |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 2.3<br>0.09                       | 31.0<br>1.22   | 35.0<br>1.38             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.44<br>0.96        |
| 14.260<br>0.5614 | 9.525<br>0.3750  | -2.8<br>-0.11    | 53.871<br>2.1209           | 2.779<br>0.1094 | 1.5<br>0.06                       | 29.0<br>1.14   | 31.0<br>1.22             | 49.0<br>1.93   | 7.6                                 | 7.07           | 0.0509         | 0.12<br>0.27        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 55.855<br>2.1990           | 2.769<br>0.1090 | 1.5<br>0.06                       | 29.0<br>1.14   | 31.0<br>1.22             | 50.0<br>1.97   | 7.6                                 | 7.07           | 0.0509         | 0.15<br>0.33        |
| 14.260<br>0.5614 | 12.700<br>0.5000 | -2.8<br>-0.11    | 54.762<br>2.1560           | 2.769<br>0.1090 | 3.3<br>0.13                       | 29.5<br>1.16   | 35.0<br>1.38             | 49.0<br>1.93   | 7.6                                 | 7.07           | 0.0509         | 0.14<br>0.30        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 61.016<br>2.4022           | 3.970<br>0.1563 | 1.3<br>0.05                       | 30.5<br>1.20   | 32.5<br>1.28             | 60.0<br>2.36   | 12.7                                | 10.3           | 0.0577         | 0.24<br>0.52        |
| 19.355<br>0.7620 | 15.080<br>0.5937 | -5.8<br>-0.23    | 62.598<br>2.4645           | 3.967<br>0.1562 | 1.3<br>0.05                       | 30.5<br>1.20   | 32.5<br>1.28             | 56.0<br>2.20   | 12.5                                | 6.33           | 0.0565         | 0.27<br>0.59        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 64.186<br>2.5270           | 3.967<br>0.1562 | 1.3<br>0.05                       | 30.5<br>1.20   | 32.5<br>1.28             | 57.0<br>2.24   | 12.5                                | 6.33           | 0.0565         | 0.29<br>0.64        |
| 21.463<br>0.8450 | 15.875<br>0.6250 | -2.3<br>-0.09    | 68.953<br>2.7147           | 3.970<br>0.1563 | 1.5<br>0.06                       | 34.5<br>1.36   | 39.0<br>1.54             | 63.0<br>2.48   | 11.3                                | 6.57           | 0.0700         | 0.38<br>0.83        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 1.3<br>0.05                       | 31.5<br>1.24   | 33.5<br>1.32             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.45<br>0.99        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 72.128<br>2.8397           | 3.967<br>0.1562 | 0.8<br>0.03                       | 33.5<br>1.32   | 34.5<br>1.36             | 65.0<br>2.56   | 17.5                                | 8.48           | 0.0681         | 0.48<br>1.06        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 1.5<br>0.06                       | 32.5<br>1.28   | 34.5<br>1.36             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.43<br>0.94        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875 | 0.8<br>0.03                       | 35.0<br>1.38   | 35.5<br>1.40             | 69.0<br>2.72   | 23.4                                | 8.76           | 0.0697         | 0.67<br>1.49        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 78.082<br>3.0741           | 5.555<br>0.2187 | 2.3<br>0.09                       | 36.5<br>1.44   | 41.0<br>1.61             | 70.0<br>2.76   | 13                                  | 5.83           | 0.0686         | 0.52<br>1.16        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 64.186<br>2.5270           | 3.967<br>0.1562 | 0.8<br>0.03                       | 31.5<br>1.24   | 32.5<br>1.28             | 57.0<br>2.24   | 12.5                                | 6.33           | 0.0565         | 0.28<br>0.62        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 1.5<br>0.06                       | 33.0<br>1.30   | 35.0<br>1.38             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.44<br>0.96        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 78.082<br>3.0741           | 5.555<br>0.2187 | 2.3<br>0.09                       | 36.5<br>1.44   | 42.0<br>1.65             | 70.0<br>2.76   | 13                                  | 5.83           | 0.0686         | 0.51<br>1.13        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -5.1<br>-0.20    | 61.016<br>2.4022           | 3.970<br>0.1563 | 3.5<br>0.14                       | 33.5<br>1.32   | 39.5<br>1.56             | 60.0<br>2.36   | 12.7                                | 10.3           | 0.0577         | 0.21<br>0.47        |
| 19.355<br>0.7620 | 15.875<br>0.6250 | -5.8<br>-0.23    | 64.186<br>2.5270           | 3.967<br>0.1562 | 0.8<br>0.03                       | 33.5<br>1.32   | 34.0<br>1.34             | 57.0<br>2.24   | 12.5                                | 6.33           | 0.0565         | 0.27<br>0.59        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 1.3<br>0.05                       | 34.0<br>1.34   | 36.0<br>1.42             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.42<br>0.93        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560 | 2.3<br>0.09                       | 35.0<br>1.38   | 39.0<br>1.54             | 66.0<br>2.60   | 23.6                                | 9.63           | 0.0656         | 0.49<br>1.09        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 1.5<br>0.06                       | 35.0<br>1.38   | 37.0<br>1.46             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.41<br>0.90        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875 | 3.5<br>0.14                       | 37.0<br>1.46   | 43.5<br>1.71             | 69.0<br>2.72   | 23.4                                | 8.76           | 0.0697         | 0.64<br>1.41        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875 | 1.3<br>0.05                       | 37.0<br>1.46   | 39.0<br>1.54             | 69.0<br>2.72   | 23.4                                | 8.76           | 0.0697         | 0.64<br>1.42        |
| 24.257<br>0.9550 | 17.462<br>0.6875 | -4.1<br>-0.16    | 78.082<br>3.0741           | 5.555<br>0.2187 | 4.8<br>0.19                       | 36.5<br>1.44   | 48.0<br>1.89             | 70.0<br>2.76   | 13                                  | 5.83           | 0.0686         | 0.49<br>1.09        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 3.5<br>0.14                       | 35.0<br>1.38   | 41.0<br>1.61             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.41<br>0.91        |
| 25.433<br>1.0013 | 19.050<br>0.7500 | -9.4<br>-0.37    | 70.282<br>2.7670           | 3.962<br>0.1560 | 0.8<br>0.03                       | 36.5<br>1.44   | 37.5<br>1.48             | 62.0<br>2.44   | 19.3                                | 8              | 0.0598         | 0.42<br>0.92        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 65.862<br>2.5930           | 3.556<br>0.1400 | 1.5<br>0.06                       | 34.5<br>1.36   | 37.0<br>1.46             | 59.0<br>2.32   | 11.8                                | 7.49           | 0.0579         | 0.24<br>0.53        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 72.128<br>2.8397           | 3.967<br>0.1562 | 0.8<br>0.03                       | 38.5<br>1.52   | 39.5<br>1.56             | 65.0<br>2.56   | 17.5                                | 8.48           | 0.0681         | 0.45<br>0.99        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B





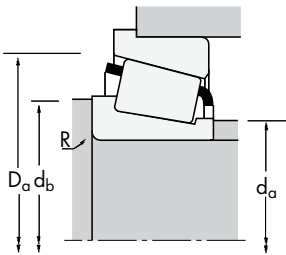
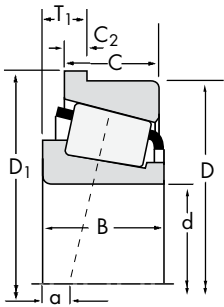


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Dynamic (1)    |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |            |
|-------------------------|------------------|------------------|----------------|------|------|------------------------|------------------|------|-----------------|----------------|------------|
| d                       | D                | T <sub>1</sub>   | C <sub>1</sub> | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner      |
| 29.987<br>1.1806        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26118          | 26283-B    |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 7.932<br>0.3123  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14117A         | 14276-B    |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 7.932<br>0.3123  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14118          | 14276-B    |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26118-S        | 26283-B    |
| 30.000<br>1.1811        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3190           | 3120-B     |
| 30.162<br>1.1875        | 62.000<br>2.4409 | 5.270<br>0.2075  | 40000<br>9000  | 0.38 | 1.57 | 10400<br>2330          | 6800<br>1530     | 1.53 | 44100<br>9910   | 17119          | 17244-B    |
| 30.162<br>1.1875        | 64.292<br>2.5312 | 8.763<br>0.3450  | 55700<br>12500 | 0.55 | 1.10 | 14500<br>3250          | 13500<br>3040    | 1.07 | 71700<br>16100  | M86649         | M86611-B   |
| 30.162<br>1.1875        | 69.850<br>2.7500 | 8.733<br>0.3438  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2558           | 2523-B     |
| 30.162<br>1.1875        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3187           | 3120-B     |
| 30.162<br>1.1875        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3191           | 3120-B     |
| 30.162<br>1.1875        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3474           | 3420-B     |
| 30.162<br>1.1875        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600 | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 334            | 332-B      |
| 30.162<br>1.1875        | 80.000<br>3.1496 | 9.100<br>0.3583  | 58800<br>13200 | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15600  | 28118          | 28315-B    |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 8.730<br>0.3437  | 46800<br>10500 | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15118          | 15250-B    |
| 31.750<br>1.2500        | 58.738<br>2.3125 | 6.736<br>0.2652  | 29300<br>6600  | 0.47 | 1.27 | 7610<br>1710           | 6170<br>1390     | 1.23 | 35000<br>7880   | 08125          | 08231-B    |
| 31.750<br>1.2500        | 58.877<br>2.3180 | 6.833<br>0.2690  | 36500<br>8210  | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000  | LM67048        | LM67010-BA |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 6.833<br>0.2690  | 36500<br>8210  | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000  | LM67047        | LM67010-B  |
| 31.750<br>1.2500        | 59.131<br>2.3280 | 15.875<br>0.6250 | 36500<br>8210  | 0.41 | 1.46 | 9460<br>2130           | 6680<br>1500     | 1.42 | 44600<br>10000  | LM67048        | LM67010-B  |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 7.841<br>0.3087  | 46800<br>10500 | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15123          | 15250-B    |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 8.730<br>0.3437  | 46800<br>10500 | 0.35 | 1.71 | 12100<br>2730          | 7280<br>1640     | 1.67 | 53900<br>12100  | 15125          | 15250-B    |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 8.730<br>0.3437  | 59100<br>13300 | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02475          | 02420-B    |
| 31.750<br>1.2500        | 68.262<br>2.6875 | 8.730<br>0.3437  | 59100<br>13300 | 0.42 | 1.44 | 15300<br>3440          | 10900<br>2450    | 1.40 | 70200<br>15800  | 02476          | 02420-B    |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 7.932<br>0.3123  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14125A         | 14276-B    |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 8.733<br>0.3438  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2580           | 2523-B     |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 8.733<br>0.3438  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2582           | 2523-B     |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3188           | 3120-B     |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3193           | 3120-B     |
| 31.750<br>1.2500        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3199           | 3120-B     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560                   | 1.5<br>0.06              | 36.0<br>1.42                        | 38.0<br>1.50   | 66.0<br>2.60   | 16.1           | 10.1           | 0.0630         | 0.40<br>0.88        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560                   | 3.5<br>0.14              | 40.0<br>1.57                        | 43.0<br>1.69   | 65.0<br>2.56   | 18             | 9.4            | 0.0668         | 0.37<br>0.82        |
| 19.202<br>0.7560 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560                   | 0.8<br>0.03              | 36.5<br>1.44                        | 37.0<br>1.46   | 65.0<br>2.56   | 18             | 9.4            | 0.0668         | 0.37<br>0.82        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560                   | 1.5<br>0.06              | 36.0<br>1.42                        | 38.0<br>1.50   | 66.0<br>2.60   | 16.1           | 10.1           | 0.0630         | 0.40<br>0.88        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 3.5<br>0.14              | 38.0<br>1.50                        | 44.5<br>1.75   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.62<br>1.37        |
| 16.566<br>0.6522 | 14.288<br>0.5625 | -3.6<br>-0.14    | 65.862<br>2.5930           | 3.556<br>0.1400                   | 1.5<br>0.06              | 34.5<br>1.36                        | 37.0<br>1.46   | 59.0<br>2.32   | 11.8           | 7.49           | 0.0579         | 0.24<br>0.53        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -3.3<br>-0.13    | 70.000<br>2.7559           | 4.000<br>0.1575                   | 1.5<br>0.06              | 38.0<br>1.50                        | 41.0<br>1.61   | 63.0<br>2.48   | 16.8           | 9.36           | 0.0736         | 0.36<br>0.79        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560                   | 2.3<br>0.09              | 36.5<br>1.44                        | 40.0<br>1.57   | 66.0<br>2.60   | 23.6           | 9.63           | 0.0656         | 0.48<br>1.05        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 0.8<br>0.03              | 38.5<br>1.52                        | 39.0<br>1.54   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.63<br>1.38        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 3.5<br>0.14              | 38.5<br>1.52                        | 44.5<br>1.75   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.62<br>1.37        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875                   | 0.8<br>0.03              | 40.0<br>1.57                        | 41.0<br>1.61   | 76.0<br>2.99   | 29.9           | 11.2           | 0.0781         | 0.79<br>1.73        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875                   | 0.8<br>0.03              | 38.0<br>1.50                        | 39.0<br>1.54   | 77.0<br>3.03   | 26.5           | 13             | 0.0676         | 0.60<br>1.32        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 83.858<br>3.3015           | 3.970<br>0.1563                   | 1.5<br>0.06              | 37.5<br>1.48                        | 40.0<br>1.57   | 73.0<br>2.87   | 20.7           | 12.5           | 0.0709         | 0.55<br>1.21        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 67.366<br>2.6522           | 3.967<br>0.1562                   | 3.5<br>0.14              | 35.5<br>1.40                        | 41.5<br>1.63   | 60.0<br>2.36   | 14.6           | 7.58           | 0.0606         | 0.31<br>0.67        |
| 15.080<br>0.5937 | 10.716<br>0.4219 | -1.3<br>-0.05    | 62.598<br>2.4645           | 2.769<br>0.1090                   | 1.0<br>0.04              | 36.0<br>1.42                        | 37.5<br>1.48   | 57.0<br>2.24   | 10.7           | 10.6           | 0.0601         | 0.17<br>0.38        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 61.773<br>2.4320           | 2.769<br>0.1090                   | 3.5<br>0.14              | 36.0<br>1.42                        | 42.5<br>1.67   | 57.0<br>2.24   | 12.8           | 9.93           | 0.0612         | 0.18<br>0.40        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 61.912<br>2.4375           | 2.769<br>0.1090                   | 2.3<br>0.09              | 36.0<br>1.42                        | 40.0<br>1.57   | 57.0<br>2.24   | 12.8           | 9.93           | 0.0612         | 0.19<br>0.41        |
| 16.764<br>0.6600 | 11.811<br>0.4650 | -3.0<br>-0.12    | 61.912<br>2.4375           | 2.769<br>0.1090                   | 3.5<br>0.14              | 36.0<br>1.42                        | 42.5<br>1.67   | 57.0<br>2.24   | 12.8           | 9.93           | 0.0612         | 0.18<br>0.39        |
| 19.050<br>0.7500 | 15.875<br>0.6250 | -4.8<br>-0.19    | 67.366<br>2.6522           | 3.967<br>0.1562                   | 0.0<br>0.00              | 36.5<br>1.44                        | 42.5<br>1.67   | 60.0<br>2.36   | 14.6           | 7.58           | 0.0606         | 0.28<br>0.62        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -5.8<br>-0.23    | 67.366<br>2.6522           | 3.967<br>0.1562                   | 3.5<br>0.14              | 36.5<br>1.44                        | 42.5<br>1.67   | 60.0<br>2.36   | 14.6           | 7.58           | 0.0606         | 0.29<br>0.65        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 72.128<br>2.8397           | 3.967<br>0.1562                   | 3.5<br>0.14              | 38.5<br>1.52                        | 44.5<br>1.75   | 65.0<br>2.56   | 17.5           | 8.48           | 0.0681         | 0.43<br>0.94        |
| 22.225<br>0.8750 | 17.462<br>0.6875 | -5.1<br>-0.20    | 72.128<br>2.8397           | 3.967<br>0.1562                   | 0.8<br>0.03              | 38.5<br>1.52                        | 39.0<br>1.54   | 65.0<br>2.56   | 17.5           | 8.48           | 0.0681         | 0.43<br>0.95        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560                   | 3.5<br>0.14              | 38.5<br>1.52                        | 44.5<br>1.75   | 65.0<br>2.56   | 18             | 9.4            | 0.0668         | 0.36<br>0.79        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560                   | 0.8<br>0.03              | 37.5<br>1.48                        | 38.5<br>1.52   | 66.0<br>2.60   | 23.6           | 9.63           | 0.0656         | 0.47<br>1.03        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560                   | 3.5<br>0.14              | 37.5<br>1.48                        | 44.0<br>1.73   | 66.0<br>2.60   | 23.6           | 9.63           | 0.0656         | 0.46<br>1.01        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 0.8<br>0.03              | 39.5<br>1.56                        | 40.0<br>1.57   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.61<br>1.34        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 3.5<br>0.14              | 39.5<br>1.56                        | 45.5<br>1.79   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.60<br>1.33        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875                   | 2.3<br>0.09              | 39.5<br>1.56                        | 43.0<br>1.69   | 69.0<br>2.72   | 23.4           | 8.76           | 0.0697         | 0.61<br>1.34        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

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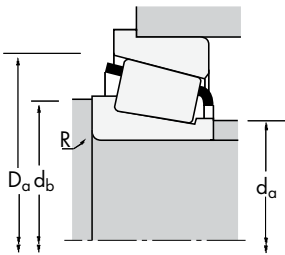
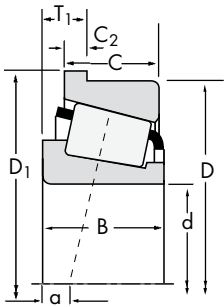


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Dynamic (1)    |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |           |
|-------------------------|------------------|------------------|----------------|------|------|------------------------|------------------|------|-----------------|----------------|-----------|
| d                       | D                | T <sub>1</sub>   | C <sub>1</sub> | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner     |
| 31.750<br>1.2500        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3476           | 3420-B    |
| 31.750<br>1.2500        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600 | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 346            | 332-B     |
| 32.004<br>1.2600        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26126          | 26283-B   |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 7.938<br>0.3125  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14130          | 14276-B   |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 7.938<br>0.3125  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14131          | 14276-B   |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 8.725<br>0.3435  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2581           | 2523-B    |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 8.733<br>0.3438  | 77500<br>17400 | 0.27 | 2.19 | 20100<br>4520          | 9410<br>2120     | 2.14 | 94400<br>21200  | 2585           | 2523-B    |
| 33.338<br>1.3125        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26131          | 26283-B   |
| 33.338<br>1.3125        | 72.000<br>2.8346 | 7.087<br>0.2790  | 54400<br>12200 | 0.36 | 1.67 | 14100<br>3170          | 8700<br>1960     | 1.62 | 60100<br>13500  | 26132          | 26283-B   |
| 33.338<br>1.3125        | 72.238<br>2.8440 | 8.733<br>0.3438  | 52400<br>11800 | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16131          | 16284-B   |
| 33.338<br>1.3125        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3196           | 3120-B    |
| 33.338<br>1.3125        | 72.626<br>2.8593 | 11.112<br>0.4375 | 87700<br>19700 | 0.33 | 1.80 | 22700<br>5110          | 13000<br>2910    | 1.76 | 102000<br>22800 | 3197           | 3120-B    |
| 33.338<br>1.3125        | 76.200<br>3.0000 | 11.112<br>0.4375 | 86200<br>19400 | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89443        | HM89410-B |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3477           | 3420-B    |
| 33.338<br>1.3125        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3483           | 3420-B    |
| 33.338<br>1.3125        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600 | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 335-S          | 332-B     |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 7.938<br>0.3125  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14137A         | 14276-B   |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 7.938<br>0.3125  | 50600<br>11400 | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14138A         | 14276-B   |
| 34.925<br>1.3750        | 72.238<br>2.8440 | 8.733<br>0.3438  | 52400<br>11800 | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16137          | 16284-B   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 10.320<br>0.4063 | 87700<br>19700 | 0.40 | 1.49 | 22700<br>5110          | 15600<br>3520    | 1.45 | 107000<br>24100 | 31593          | 31520-B   |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 11.112<br>0.4375 | 80400<br>18100 | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2786           | 2720-B    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 11.112<br>0.4375 | 80400<br>18100 | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2793           | 2720-B    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 11.112<br>0.4375 | 80400<br>18100 | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2796           | 2720-B    |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 11.112<br>0.4375 | 86200<br>19400 | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89446        | HM89410-B |
| 34.925<br>1.3750        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3478           | 3420-B    |
| 34.925<br>1.3750        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800 | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3482           | 3420-B    |
| 34.925<br>1.3750        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600 | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 335            | 332-B     |
| 34.925<br>1.3750        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600 | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 343            | 332-B     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                 |                                   |                |                          |                | Factors                             |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------|-----------------------------------|----------------|--------------------------|----------------|-------------------------------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius |                 | Shaft<br>backing<br>shoulder dia. |                | backing<br>shoulder dia. |                | Housing<br>backing<br>shoulder dia. |                | G <sub>1</sub> |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>  | R <sup>(4)</sup>                  | d <sub>a</sub> | d <sub>b</sub>           | D <sub>a</sub> | G <sub>1</sub>                      | G <sub>2</sub> |                | C <sub>g</sub>      |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875 | 1.3<br>0.05                       | 41.0<br>1.61   | 43.0<br>1.69             | 76.0<br>2.99   | 29.9                                | 11.2           | 0.0781         | 0.77<br>1.69        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875 | 0.8<br>0.03                       | 39.5<br>1.56   | 40.0<br>1.57             | 77.0<br>3.03   | 26.5                                | 13             | 0.0676         | 0.58<br>1.29        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 1.5<br>0.06                       | 37.5<br>1.48   | 39.5<br>1.56             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.38<br>0.85        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560 | 3.5<br>0.14                       | 39.5<br>1.56   | 46.0<br>1.81             | 65.0<br>2.56   | 18                                  | 9.4            | 0.0668         | 0.35<br>0.77        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560 | 0.8<br>0.03                       | 39.5<br>1.56   | 40.5<br>1.59             | 65.0<br>2.56   | 18                                  | 9.4            | 0.0668         | 0.35<br>0.77        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560 | 0.8<br>0.03                       | 39.0<br>1.54   | 39.5<br>1.56             | 66.0<br>2.60   | 23.6                                | 9.63           | 0.0656         | 0.45<br>0.99        |
| 25.357<br>0.9983 | 19.050<br>0.7500 | -8.6<br>-0.34    | 73.711<br>2.9020           | 3.962<br>0.1560 | 3.5<br>0.14                       | 39.0<br>1.54   | 45.0<br>1.77             | 66.0<br>2.60   | 23.6                                | 9.63           | 0.0656         | 0.44<br>0.98        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 3.5<br>0.14                       | 38.5<br>1.52   | 44.5<br>1.75             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.37<br>0.81        |
| 18.923<br>0.7450 | 15.875<br>0.6250 | -4.1<br>-0.16    | 75.857<br>2.9865           | 3.962<br>0.1560 | 1.5<br>0.06                       | 38.5<br>1.52   | 40.5<br>1.59             | 66.0<br>2.60   | 16.1                                | 10.1           | 0.0630         | 0.37<br>0.82        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 76.098<br>2.9960           | 3.970<br>0.1563 | 3.5<br>0.14                       | 39.5<br>1.56   | 46.0<br>1.81             | 69.0<br>2.72   | 20.3                                | 10.6           | 0.0707         | 0.41<br>0.91        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875 | 3.5<br>0.14                       | 40.5<br>1.59   | 47.0<br>1.85             | 69.0<br>2.72   | 23.4                                | 8.76           | 0.0697         | 0.58<br>1.29        |
| 29.997<br>1.1810 | 23.812<br>0.9375 | -10.2<br>-0.40   | 77.300<br>3.0433           | 4.762<br>0.1875 | 0.8<br>0.03                       | 40.5<br>1.59   | 41.5<br>1.63             | 69.0<br>2.72   | 23.4                                | 8.76           | 0.0697         | 0.59<br>1.30        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 80.863<br>3.1836           | 4.762<br>0.1875 | 0.8<br>0.03                       | 44.5<br>1.75   | 46.5<br>1.83             | 75.0<br>2.95   | 28.9                                | 13.1           | 0.0883         | 0.68<br>1.49        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875 | 3.5<br>0.14                       | 42.5<br>1.67   | 49.0<br>1.93             | 76.0<br>2.99   | 29.9                                | 11.2           | 0.0781         | 0.74<br>1.64        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875 | 0.8<br>0.03                       | 42.5<br>1.67   | 43.0<br>1.69             | 76.0<br>2.99   | 29.9                                | 11.2           | 0.0781         | 0.75<br>1.65        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875 | 0.8<br>0.03                       | 40.5<br>1.59   | 41.0<br>1.61             | 77.0<br>3.03   | 26.5                                | 13             | 0.0676         | 0.57<br>1.26        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560 | 1.5<br>0.06                       | 41.0<br>1.61   | 43.0<br>1.69             | 65.0<br>2.56   | 18                                  | 9.4            | 0.0668         | 0.34<br>0.74        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560 | 3.5<br>0.14                       | 41.0<br>1.61   | 47.0<br>1.85             | 65.0<br>2.56   | 18                                  | 9.4            | 0.0668         | 0.34<br>0.74        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 76.098<br>2.9960           | 3.970<br>0.1563 | 3.5<br>0.14                       | 40.5<br>1.59   | 47.0<br>1.85             | 69.0<br>2.72   | 20.3                                | 10.6           | 0.0707         | 0.40<br>0.88        |
| 28.575<br>1.1250 | 23.812<br>0.9375 | -7.6<br>-0.30    | 80.863<br>3.1836           | 4.762<br>0.1875 | 3.5<br>0.14                       | 43.5<br>1.71   | 50.0<br>1.97             | 74.0<br>2.91   | 26.3                                | 9.08           | 0.0773         | 0.64<br>1.42        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 82.550<br>3.2500           | 6.350<br>0.2500 | 5.0<br>0.20                       | 41.0<br>1.61   | 51.0<br>2.01             | 73.0<br>2.87   | 28.7                                | 12.2           | 0.0725         | 0.57<br>1.26        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 82.550<br>3.2500           | 6.350<br>0.2500 | 0.8<br>0.03                       | 41.0<br>1.61   | 42.0<br>1.65             | 73.0<br>2.87   | 28.7                                | 12.2           | 0.0725         | 0.59<br>1.29        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 82.550<br>3.2500           | 6.350<br>0.2500 | 3.5<br>0.14                       | 41.0<br>1.61   | 47.5<br>1.87             | 73.0<br>2.87   | 28.7                                | 12.2           | 0.0725         | 0.58<br>1.28        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 80.863<br>3.1836           | 4.762<br>0.1875 | 3.5<br>0.14                       | 44.5<br>1.75   | 56.0<br>2.20             | 75.0<br>2.95   | 28.9                                | 13.1           | 0.0883         | 0.66<br>1.45        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875 | 3.5<br>0.14                       | 43.5<br>1.71   | 50.0<br>1.97             | 76.0<br>2.99   | 29.9                                | 11.2           | 0.0781         | 0.72<br>1.60        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875 | 0.8<br>0.03                       | 43.5<br>1.71   | 44.0<br>1.73             | 76.0<br>2.99   | 29.9                                | 11.2           | 0.0781         | 0.73<br>1.61        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875 | 0.8<br>0.03                       | 41.5<br>1.63   | 42.5<br>1.67             | 77.0<br>3.03   | 26.5                                | 13             | 0.0676         | 0.55<br>1.22        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875 | 3.5<br>0.14                       | 41.5<br>1.63   | 48.0<br>1.89             | 77.0<br>3.03   | 26.5                                | 13             | 0.0676         | 0.55<br>1.21        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

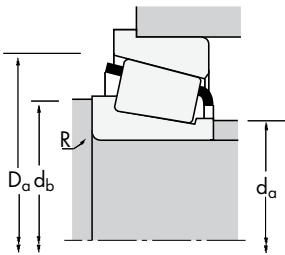
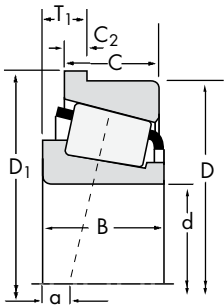


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                  |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |           |
|-------------------------|------------------|------------------|-----------------|------|------|------------------------|------------------|------|-----------------|----------------|-----------|
| d                       | D                | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner     |
| 34.925<br>1.3750        | 80.000<br>3.1496 | 9.100<br>0.3583  | 58800<br>13200  | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28137          | 28315-B   |
| 34.925<br>1.3750        | 80.167<br>3.1562 | 10.320<br>0.4063 | 106000<br>23900 | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379           | 3320-B    |
| 34.925<br>1.3750        | 81.755<br>3.2187 | 10.320<br>0.4063 | 106000<br>23900 | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3379           | 3329-B    |
| 34.925<br>1.3750        | 87.312<br>3.4375 | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3581           | 3525-B    |
| 34.925<br>1.3750        | 92.075<br>3.6250 | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 449            | 432AB     |
| 34.925<br>1.3750        | 95.250<br>3.7500 | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 449            | 432-B     |
| 34.975<br>1.3770        | 69.012<br>2.7170 | 7.932<br>0.3123  | 50600<br>11400  | 0.38 | 1.57 | 13100<br>2950          | 8570<br>1930     | 1.53 | 61700<br>13900  | 14139          | 14276-B   |
| 34.976<br>1.3770        | 72.000<br>2.8346 | 6.287<br>0.2475  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138          | 19283-B   |
| 34.975<br>1.3770        | 80.000<br>3.1496 | 9.100<br>0.3583  | 58800<br>13200  | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28138          | 28315-B   |
| 35.000<br>1.3780        | 68.262<br>2.6875 | 7.539<br>0.2968  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138X         | 19268-B   |
| 35.000<br>1.3780        | 72.000<br>2.8346 | 6.287<br>0.2475  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19138X         | 19283-B   |
| 35.000<br>1.3780        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800  | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3480           | 3420-B    |
| 35.000<br>1.3780        | 80.000<br>3.1496 | 7.938<br>0.3125  | 73600<br>16600  | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 339            | 332-B     |
| 35.000<br>1.3780        | 92.075<br>3.6250 | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 441            | 432AB     |
| 35.000<br>1.3780        | 95.250<br>3.7500 | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 441            | 432-B     |
| 36.512<br>1.4375        | 68.262<br>2.6875 | 7.539<br>0.2968  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19143          | 19268-B   |
| 36.512<br>1.4375        | 72.000<br>2.8346 | 6.287<br>0.2475  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19143          | 19283-B   |
| 36.512<br>1.4375        | 72.238<br>2.8440 | 8.733<br>0.3438  | 52400<br>11800  | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16143          | 16284-B   |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 11.112<br>0.4375 | 86200<br>19400  | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89448        | HM89410-B |
| 36.512<br>1.4375        | 76.200<br>3.0000 | 11.112<br>0.4375 | 86200<br>19400  | 0.55 | 1.10 | 22400<br>5030          | 20900<br>4700    | 1.07 | 119000<br>26700 | HM89449        | HM89410-B |
| 36.512<br>1.4375        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800  | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3479           | 3420-B    |
| 36.512<br>1.4375        | 88.500<br>3.4843 | 13.492<br>0.5312 | 77900<br>17500  | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44143          | 44348-B   |
| 38.100<br>1.5000        | 65.088<br>2.5625 | 5.944<br>0.2340  | 25100<br>5650   | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430   | 13889          | 13836-B   |
| 38.100<br>1.5000        | 68.262<br>2.6875 | 7.539<br>0.2968  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150          | 19268-B   |
| 38.100<br>1.5000        | 72.000<br>2.8346 | 6.287<br>0.2475  | 46900<br>10600  | 0.44 | 1.35 | 12200<br>2740          | 9260<br>2080     | 1.31 | 57800<br>13000  | 19150          | 19283-B   |
| 38.100<br>1.5000        | 72.238<br>2.8440 | 8.733<br>0.3438  | 52400<br>11800  | 0.40 | 1.49 | 13600<br>3060          | 9350<br>2100     | 1.45 | 65800<br>14800  | 16150          | 16284-B   |
| 38.100<br>1.5000        | 76.200<br>3.0000 | 11.112<br>0.4375 | 80400<br>18100  | 0.30 | 1.98 | 20800<br>4690          | 10800<br>2430    | 1.93 | 102000<br>23000 | 2788           | 2720-B    |
| 38.100<br>1.5000        | 79.375<br>3.1250 | 10.320<br>0.4063 | 96900<br>21800  | 0.37 | 1.64 | 25100<br>5650          | 15700<br>3530    | 1.60 | 119000<br>26800 | 3490           | 3420-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 83.858<br>3.3015           | 3.970<br>0.1563                   | 1.5<br>0.06              | 41.0<br>1.61                        | 43.5<br>1.71   | 73.0<br>2.87   | 20.7           | 12.5           | 0.0709         | 0.51<br>1.12        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 84.826<br>3.3396           | 4.762<br>0.1875                   | 3.5<br>0.14              | 41.5<br>1.63                        | 48.0<br>1.89   | 77.0<br>3.03   | 34.6           | 12.1           | 0.0744         | 0.78<br>1.72        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43   | 86.413<br>3.4021           | 4.762<br>0.1875                   | 3.5<br>0.14              | 41.5<br>1.63                        | 48.0<br>1.89   | 77.0<br>3.03   | 34.6           | 12.1           | 0.0744         | 0.79<br>1.75        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 91.986<br>3.6215           | 4.750<br>0.1870                   | 3.5<br>0.14              | 43.0<br>1.69                        | 49.5<br>1.95   | 82.0<br>3.23   | 39.5           | 10.5           | 0.0808         | 0.94<br>2.07        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 97.536<br>3.8400           | 5.558<br>0.2188                   | 0.8<br>0.03              | 43.5<br>1.71                        | 44.0<br>1.73   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805         | 1.04<br>2.28        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 100.686<br>3.9640          | 5.558<br>0.2188                   | 0.8<br>0.03              | 43.5<br>1.71                        | 44.0<br>1.73   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805         | 1.12<br>2.47        |
| 19.583<br>0.7710 | 15.875<br>0.6250 | -4.3<br>-0.17    | 72.873<br>2.8690           | 3.962<br>0.1560                   | 1.3<br>0.05              | 41.0<br>1.61                        | 42.5<br>1.67   | 65.0<br>2.56   | 18             | 9.4            | 0.0668         | 0.34<br>0.74        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 75.857<br>2.9865           | 3.556<br>0.1400                   | 1.5<br>0.06              | 40.5<br>1.59                        | 42.5<br>1.67   | 68.0<br>2.68   | 17.5           | 11.5           | 0.0694         | 0.33<br>0.73        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19    | 83.858<br>3.3015           | 3.970<br>0.1563                   | 1.5<br>0.06              | 41.0<br>1.61                        | 43.5<br>1.71   | 73.0<br>2.87   | 20.7           | 12.5           | 0.0709         | 0.51<br>1.12        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 72.128<br>2.8397           | 3.571<br>0.1406                   | 2.0<br>0.08              | 40.5<br>1.59                        | 43.5<br>1.71   | 67.0<br>2.64   | 17.5           | 11.5           | 0.0694         | 0.27<br>0.60        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 75.857<br>2.9865           | 3.556<br>0.1400                   | 2.0<br>0.08              | 40.5<br>1.59                        | 43.5<br>1.71   | 68.0<br>2.68   | 17.5           | 11.5           | 0.0694         | 0.33<br>0.73        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875                   | 1.5<br>0.06              | 43.5<br>1.71                        | 46.0<br>1.81   | 76.0<br>2.99   | 29.9           | 11.2           | 0.0781         | 0.73<br>1.60        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25    | 84.658<br>3.3330           | 4.762<br>0.1875                   | 0.8<br>0.03              | 41.5<br>1.63                        | 42.5<br>1.67   | 77.0<br>3.03   | 26.5           | 13             | 0.0676         | 0.55<br>1.22        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 97.536<br>3.8400           | 5.558<br>0.2188                   | 3.5<br>0.14              | 43.5<br>1.71                        | 50.0<br>1.97   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805         | 1.03<br>2.27        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 100.686<br>3.9640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 43.5<br>1.71                        | 50.0<br>1.97   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805         | 1.11<br>2.45        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 72.128<br>2.8397           | 3.571<br>0.1406                   | 1.5<br>0.06              | 41.5<br>1.63                        | 44.0<br>1.73   | 67.0<br>2.64   | 17.5           | 11.5           | 0.0694         | 0.26<br>0.58        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 75.857<br>2.9865           | 3.556<br>0.1400                   | 1.5<br>0.06              | 41.5<br>1.63                        | 44.0<br>1.73   | 68.0<br>2.68   | 17.5           | 11.5           | 0.0694         | 0.32<br>0.71        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 76.098<br>2.9960           | 3.970<br>0.1563                   | 3.5<br>0.14              | 42.0<br>1.65                        | 48.5<br>1.91   | 69.0<br>2.72   | 20.3           | 10.6           | 0.0707         | 0.38<br>0.84        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 80.863<br>3.1836           | 4.762<br>0.1875                   | 0.8<br>0.03              | 44.5<br>1.75                        | 48.5<br>1.91   | 75.0<br>2.95   | 28.9           | 13.1           | 0.0883         | 0.64<br>1.41        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | -5.6<br>-0.22    | 80.863<br>3.1836           | 4.762<br>0.1875                   | 3.5<br>0.14              | 44.5<br>1.75                        | 57.0<br>2.24   | 75.0<br>2.95   | 28.9           | 13.1           | 0.0883         | 0.64<br>1.41        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875                   | 0.8<br>0.03              | 44.5<br>1.75                        | 45.5<br>1.79   | 76.0<br>2.99   | 29.9           | 11.2           | 0.0781         | 0.71<br>1.56        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09      | 93.937<br>3.6983           | 5.555<br>0.2187                   | 2.3<br>0.09              | 50.0<br>1.97                        | 54.0<br>2.13   | 86.0<br>3.39   | 22.9           | 8.71           | 0.0899         | 0.76<br>1.68        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03    | 68.161<br>2.6835           | 2.769<br>0.1090                   | 1.5<br>0.06              | 42.5<br>1.67                        | 45.0<br>1.77   | 63.0<br>2.48   | 14.8           | 23.3           | 0.0601         | 0.17<br>0.37        |
| 16.520<br>0.6504 | 11.908<br>0.4688 | -1.5<br>-0.06    | 72.128<br>2.8397           | 3.571<br>0.1406                   | 1.5<br>0.06              | 43.0<br>1.69                        | 45.0<br>1.77   | 67.0<br>2.64   | 17.5           | 11.5           | 0.0694         | 0.25<br>0.55        |
| 16.520<br>0.6504 | 14.288<br>0.5625 | -1.5<br>-0.06    | 75.857<br>2.9865           | 3.556<br>0.1400                   | 1.5<br>0.06              | 43.0<br>1.69                        | 45.0<br>1.77   | 68.0<br>2.68   | 17.5           | 11.5           | 0.0694         | 0.31<br>0.68        |
| 20.638<br>0.8125 | 15.875<br>0.6250 | -4.1<br>-0.16    | 76.098<br>2.9960           | 3.970<br>0.1563                   | 3.5<br>0.14              | 43.0<br>1.69                        | 49.5<br>1.95   | 69.0<br>2.72   | 20.3           | 10.6           | 0.0707         | 0.37<br>0.81        |
| 25.654<br>1.0100 | 19.050<br>0.7500 | -8.1<br>-0.32    | 82.550<br>3.2500           | 6.350<br>0.2500                   | 3.5<br>0.14              | 43.5<br>1.71                        | 50.0<br>1.97   | 73.0<br>2.87   | 28.7           | 12.2           | 0.0725         | 0.54<br>1.20        |
| 29.771<br>1.1721 | 23.812<br>0.9375 | -8.6<br>-0.34    | 84.049<br>3.3090           | 4.762<br>0.1875                   | 3.5<br>0.14              | 45.5<br>1.80                        | 52.0<br>2.05   | 76.0<br>2.99   | 29.9           | 11.2           | 0.0781         | 0.68<br>1.50        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B



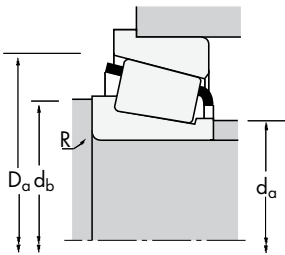
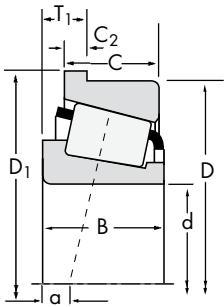


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1) Factors (5) |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |         |
|-------------------------|-------------------|------------------|-------------------------|------|------|------------------------|------------------|------|-----------------|----------------|---------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>          | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner   |
| 38.100<br>1.5000        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600          | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 347            | 332-B   |
| 38.100<br>1.5000        | 80.000<br>3.1496  | 9.100<br>0.3583  | 58800<br>13200          | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28150          | 28315-B |
| 38.100<br>1.5000        | 80.000<br>3.1496  | 9.100<br>0.3583  | 58800<br>13200          | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28151          | 28315-B |
| 38.100<br>1.5000        | 80.167<br>3.1562  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3381           | 3320-B  |
| 38.100<br>1.5000        | 80.167<br>3.1562  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387           | 3320-B  |
| 38.100<br>1.5000        | 81.755<br>3.2187  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3381           | 3329-B  |
| 38.100<br>1.5000        | 81.755<br>3.2187  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3387           | 3329-B  |
| 38.100<br>1.5000        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600         | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3580           | 3525-B  |
| 38.100<br>1.5000        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600         | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3583           | 3525-B  |
| 38.100<br>1.5000        | 88.500<br>3.4843  | 13.492<br>0.5312 | 77900<br>17500          | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44150          | 44348-B |
| 38.100<br>1.5000        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400         | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 440            | 432AB   |
| 38.100<br>1.5000        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400         | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 444            | 432AB   |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400         | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 440            | 432-B   |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400         | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 444            | 432-B   |
| 38.100<br>1.5000        | 111.125<br>4.3750 | 14.288<br>0.5625 | 159000<br>35800         | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 542            | 532-B   |
| 38.481<br>1.5150        | 65.088<br>2.5625  | 5.944<br>0.2340  | 25100<br>5650           | 0.35 | 1.73 | 6520<br>1470           | 3860<br>869      | 1.69 | 33000<br>7430   | 13890          | 13836-B |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3382           | 3320-B  |
| 39.688<br>1.5625        | 80.167<br>3.1562  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3386           | 3320-B  |
| 39.688<br>1.5625        | 81.755<br>3.2187  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3382           | 3329-B  |
| 39.688<br>1.5625        | 81.755<br>3.2187  | 10.320<br>0.4063 | 106000<br>23900         | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3386           | 3329-B  |
| 39.688<br>1.5625        | 88.500<br>3.4843  | 13.492<br>0.5312 | 77900<br>17500          | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44156          | 44348-B |
| 39.688<br>1.5625        | 88.500<br>3.4843  | 13.492<br>0.5312 | 77900<br>17500          | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44158          | 44348-B |
| 39.688<br>1.5625        | 120.650<br>4.7500 | 16.667<br>0.6562 | 192000<br>43200         | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 620            | 612-B   |
| 40.000<br>1.5748        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600          | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 344A           | 332-B   |
| 40.000<br>1.5748        | 80.000<br>3.1496  | 9.100<br>0.3583  | 58800<br>13200          | 0.40 | 1.49 | 15200<br>3430          | 10500<br>2360    | 1.45 | 68900<br>15500  | 28158          | 28315-B |
| 40.000<br>1.5748        | 85.725<br>3.3750  | 11.112<br>0.4375 | 115000<br>25900         | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3879           | 3820-B  |
| 40.000<br>1.5748        | 88.500<br>3.4843  | 13.492<br>0.5312 | 77900<br>17500          | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44157          | 44348-B |
| 40.000<br>1.5748        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400         | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 442-S          | 432AB   |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.



| Bearing          |                  | Dimensions, mm (inches) |                   |                  |                |                |                                                |                                                     | Factors                                    |                                                       |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|-------------------|------------------|----------------|----------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-------------------------------------------------------|----------------|---------------------|
|                  |                  | B                       | C                 | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | Shaft<br>backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | Housing<br>backing<br>shoulder dia.<br>D <sub>a</sub> | G <sub>1</sub> |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25           | 84.658<br>3.3330  | 4.762<br>0.1875  | 3.5<br>0.14    | 44.0<br>1.73   | 50.0<br>1.97                                   | 77.0<br>3.03                                        | 26.5                                       | 13                                                    | 0.0676         | 0.52<br>1.14        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19           | 83.858<br>3.3015  | 3.970<br>0.1563  | 1.5<br>0.06    | 43.5<br>1.71   | 45.5<br>1.79                                   | 73.0<br>2.87                                        | 20.7                                       | 12.5                                                  | 0.0709         | 0.48<br>1.05        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19           | 83.858<br>3.3015  | 3.970<br>0.1563  | 3.5<br>0.14    | 43.5<br>1.71   | 50.0<br>1.97                                   | 73.0<br>2.87                                        | 20.7                                       | 12.5                                                  | 0.0709         | 0.47<br>1.04        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 84.826<br>3.3396  | 4.762<br>0.1875  | 3.5<br>0.14    | 44.5<br>1.75   | 51.0<br>2.01                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.73<br>1.62        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 84.826<br>3.3396  | 4.762<br>0.1875  | 0.8<br>0.03    | 44.5<br>1.75   | 45.0<br>1.77                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.74<br>1.63        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 86.413<br>3.4021  | 4.762<br>0.1875  | 3.5<br>0.14    | 44.5<br>1.75   | 51.0<br>2.01                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.75<br>1.65        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 86.413<br>3.4021  | 4.762<br>0.1875  | 0.8<br>0.03    | 44.5<br>1.75   | 45.0<br>1.77                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.76<br>1.67        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 1.5<br>0.06    | 45.5<br>1.79   | 48.0<br>1.89                                   | 82.0<br>3.23                                        | 39.5                                       | 10.5                                                  | 0.0808         | 0.90<br>1.98        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 3.5<br>0.14    | 45.5<br>1.79   | 52.0<br>2.05                                   | 82.0<br>3.23                                        | 39.5                                       | 10.5                                                  | 0.0808         | 0.89<br>1.97        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09             | 93.937<br>3.6983  | 5.555<br>0.2187  | 2.3<br>0.09    | 51.0<br>2.00   | 55.0<br>2.17                                   | 86.0<br>3.39                                        | 22.9                                       | 8.71                                                  | 0.0899         | 0.74<br>1.64        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 97.536<br>3.8400  | 5.558<br>0.2188  | 0.8<br>0.03    | 45.5<br>1.79   | 46.5<br>1.83                                   | 87.0<br>3.43                                        | 42.5                                       | 11.3                                                  | 0.0805         | 0.99<br>2.19        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 97.536<br>3.8400  | 5.558<br>0.2188  | 3.5<br>0.14    | 45.5<br>1.79   | 52.0<br>2.05                                   | 87.0<br>3.43                                        | 42.5                                       | 11.3                                                  | 0.0805         | 0.99<br>2.18        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 100.686<br>3.9640 | 5.558<br>0.2188  | 0.8<br>0.03    | 45.5<br>1.79   | 46.5<br>1.83                                   | 87.0<br>3.43                                        | 42.5                                       | 11.3                                                  | 0.0805         | 1.08<br>2.37        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 100.686<br>3.9640 | 5.558<br>0.2188  | 3.5<br>0.14    | 45.5<br>1.79   | 52.0<br>2.05                                   | 87.0<br>3.43                                        | 42.5                                       | 11.3                                                  | 0.0805         | 1.07<br>2.36        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48          | 117.373<br>4.6210 | 6.350<br>0.2500  | 3.5<br>0.14    | 49.0<br>1.93   | 55.0<br>2.17                                   | 100.0<br>3.94                                       | 64.3                                       | 16.1                                                  | 0.0938         | 2.01<br>4.43        |
| 11.908<br>0.4688 | 9.525<br>0.3750  | -0.8<br>-0.03           | 68.161<br>2.6835  | 2.769<br>0.1090  | 0.4<br>0.02    | 43.0<br>1.69   | 43.0<br>1.69                                   | 63.0<br>2.48                                        | 14.8                                       | 23.3                                                  | 0.0601         | 0.16<br>0.36        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 84.826<br>3.3396  | 4.762<br>0.1875  | 3.5<br>0.14    | 45.5<br>1.79   | 52.0<br>2.05                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.71<br>1.57        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 84.826<br>3.3396  | 4.762<br>0.1875  | 0.8<br>0.03    | 45.5<br>1.79   | 46.5<br>1.83                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.72<br>1.58        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 86.413<br>3.4021  | 4.762<br>0.1875  | 3.5<br>0.14    | 45.5<br>1.79   | 52.0<br>2.05                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.73<br>1.60        |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 86.413<br>3.4021  | 4.762<br>0.1875  | 0.8<br>0.03    | 45.5<br>1.79   | 46.5<br>1.83                                   | 77.0<br>3.03                                        | 34.6                                       | 12.1                                                  | 0.0744         | 0.73<br>1.61        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09             | 93.937<br>3.6983  | 5.555<br>0.2187  | 2.3<br>0.09    | 51.0<br>2.00   | 56.0<br>2.20                                   | 86.0<br>3.39                                        | 22.9                                       | 8.71                                                  | 0.0899         | 0.73<br>1.60        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09             | 93.937<br>3.6983  | 5.555<br>0.2187  | 3.5<br>0.14    | 51.0<br>2.00   | 58.0<br>2.28                                   | 86.0<br>3.39                                        | 22.9                                       | 8.71                                                  | 0.0899         | 0.72<br>1.59        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55          | 127.691<br>5.0272 | 7.142<br>0.2812  | 0.8<br>0.03    | 52.0<br>2.05   | 53.0<br>2.09                                   | 110.0<br>4.33                                       | 75.9                                       | 16.2                                                  | 0.0694         | 2.60<br>5.74        |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25           | 84.658<br>3.3330  | 4.762<br>0.1875  | 0.8<br>0.03    | 45.5<br>1.79   | 46.0<br>1.81                                   | 77.0<br>3.03                                        | 26.5                                       | 13                                                    | 0.0676         | 0.50<br>1.11        |
| 20.940<br>0.8244 | 15.875<br>0.6250 | -4.8<br>-0.19           | 83.858<br>3.3015  | 3.970<br>0.1563  | 1.5<br>0.06    | 45.0<br>1.77   | 47.5<br>1.87                                   | 73.0<br>2.87                                        | 20.7                                       | 12.5                                                  | 0.0709         | 0.46<br>1.01        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32           | 89.586<br>3.5270  | 4.762<br>0.1875  | 0.8<br>0.03    | 50.0<br>1.97   | 51.0<br>2.01                                   | 83.0<br>3.27                                        | 37.8                                       | 13.5                                                  | 0.0873         | 0.84<br>1.86        |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09             | 93.937<br>3.6983  | 5.555<br>0.2187  | 2.3<br>0.09    | 51.0<br>2.00   | 56.0<br>2.20                                   | 86.0<br>3.39                                        | 22.9                                       | 8.71                                                  | 0.0899         | 0.72<br>1.59        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 97.536<br>3.8400  | 5.558<br>0.2188  | 3.5<br>0.14    | 47.0<br>1.85   | 54.0<br>2.13                                   | 87.0<br>3.43                                        | 42.5                                       | 11.3                                                  | 0.0805         | 0.96<br>2.12        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



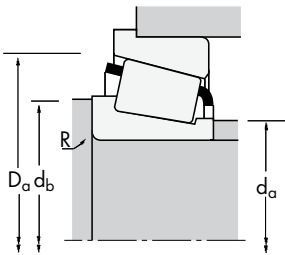
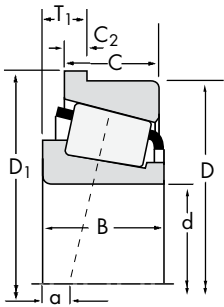


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|-----------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner      |
| 40.000<br>1.5748        | 95.000<br>3.7402  | 10.000<br>0.3937 | 120000<br>27000 | 0.41 | 1.45 | 31200<br>7010          | 22100<br>4960    | 1.41 | 166000<br>37300 | XGA33210       | YSA33210R  |
| 40.000<br>1.5748        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 442-S          | 432-B      |
| 41.275<br>1.6250        | 76.200<br>3.0000  | 7.292<br>0.2871  | 44500<br>10000  | 0.49 | 1.23 | 11500<br>2600          | 9630<br>2170     | 1.20 | 55100<br>12400  | 11162          | 11300-B    |
| 41.275<br>1.6250        | 79.375<br>3.1250  | 8.733<br>0.3438  | 84300<br>19000  | 0.32 | 1.88 | 21900<br>4920          | 11900<br>2680    | 1.83 | 110000<br>24800 | 26882          | 26822-B    |
| 41.275<br>1.6250        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600  | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 336            | 332-B      |
| 41.275<br>1.6250        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600  | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342            | 332-B      |
| 41.275<br>1.6250        | 80.167<br>3.1562  | 10.320<br>0.4063 | 106000<br>23900 | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3383           | 3320-B     |
| 41.275<br>1.6250        | 81.755<br>3.2187  | 10.320<br>0.4063 | 106000<br>23900 | 0.27 | 2.20 | 27600<br>6200          | 12900<br>2900    | 2.14 | 129000<br>29100 | 3383           | 3329-B     |
| 41.275<br>1.6250        | 85.725<br>3.3750  | 11.112<br>0.4375 | 115000<br>25900 | 0.40 | 1.49 | 29800<br>6710          | 20500<br>4610    | 1.45 | 148000<br>33200 | 3877           | 3820-B     |
| 41.275<br>1.6250        | 87.312<br>3.4375  | 11.100<br>0.4370 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3585           | 3525-B     |
| 41.275<br>1.6250        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3576           | 3525-B     |
| 41.275<br>1.6250        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3577           | 3525-B     |
| 41.275<br>1.6250        | 88.500<br>3.4843  | 13.492<br>0.5312 | 77900<br>17500  | 0.78 | 0.77 | 20200<br>4540          | 27000<br>6070    | 0.75 | 88600<br>19900  | 44162          | 44348-B    |
| 41.275<br>1.6250        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 447            | 432AB      |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 447            | 432-B      |
| 41.275<br>1.6250        | 98.425<br>3.8750  | 16.670<br>0.6563 | 92800<br>20900  | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53162          | 53387-B    |
| 42.850<br>1.6870        | 107.950<br>4.2500 | 11.112<br>0.4375 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 461            | 453-B      |
| 42.862<br>1.6875        | 83.058<br>3.2700  | 8.733<br>0.3438  | 83800<br>18800  | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25576          | 25521-B    |
| 42.862<br>1.6875        | 85.000<br>3.3465  | 9.525<br>0.3750  | 86400<br>19400  | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2973           | 2924-B     |
| 42.862<br>1.6875        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3579           | 3525-B     |
| 42.875<br>1.6880        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600  | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342-S          | 332-B      |
| 43.000<br>1.6929        | 80.000<br>3.1496  | 7.938<br>0.3125  | 73600<br>16600  | 0.27 | 2.20 | 19100<br>4290          | 8920<br>2010     | 2.14 | 83400<br>18700  | 342X           | 332-B      |
| 44.450<br>1.7500        | 71.438<br>2.8125  | 5.969<br>0.2350  | 33400<br>7510   | 0.31 | 1.97 | 8660<br>1950           | 4530<br>1020     | 1.91 | 43600<br>9790   | LL103049       | LL103010-B |
| 44.450<br>1.7500        | 73.025<br>2.8750  | 6.350<br>0.2500  | 52800<br>11900  | 0.32 | 1.88 | 13700<br>3080          | 7460<br>1680     | 1.83 | 78300<br>17600  | L102849        | L102810-B  |
| 44.450<br>1.7500        | 76.992<br>3.0312  | 9.126<br>0.3593  | 45900<br>10300  | 0.51 | 1.19 | 11900<br>2670          | 10300<br>2320    | 1.15 | 58100<br>13100  | 12175          | 12303-B    |
| 44.450<br>1.7500        | 79.375<br>3.1250  | 7.539<br>0.2968  | 48200<br>10800  | 0.37 | 1.60 | 12500<br>2810          | 7990<br>1800     | 1.56 | 61300<br>13800  | 18685          | 18620-B    |
| 44.450<br>1.7500        | 83.058<br>3.2700  | 8.733<br>0.3438  | 83800<br>18800  | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25580          | 25521-B    |
| 44.450<br>1.7500        | 85.000<br>3.3465  | 7.938<br>0.3125  | 75800<br>17000  | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355            | 354-B      |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  | Dimensions, mm (inches) |                   |                  |                |                |                                                |                                                     | Factors                                    |                                                       |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|-------------------|------------------|----------------|----------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-------------------------------------------------------|----------------|---------------------|
|                  |                  | B                       | C                 | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | Shaft<br>backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | Housing<br>backing<br>shoulder dia.<br>D <sub>a</sub> | G <sub>1</sub> |                     |
| 32.000<br>1.2598 | 27.000<br>1.0630 | -8.6<br>-0.34           | 102.000<br>4.0157 | 5.000<br>0.1968  | 1.5<br>0.06    | 54.0<br>2.13   | 56.0<br>2.20                                   | 89.0<br>3.50                                        | 48.4<br>15.3                               | 0.0957                                                | 1.23<br>2.70   |                     |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 100.686<br>3.9640 | 5.558<br>0.2188  | 3.5<br>0.14    | 47.0<br>1.85   | 54.0<br>2.13                                   | 87.0<br>3.43                                        | 42.5<br>11.3                               | 0.0805                                                | 1.04<br>2.30   |                     |
| 17.384<br>0.6844 | 14.288<br>0.5625 | -0.8<br>-0.03           | 80.863<br>3.1836  | 3.571<br>0.1406  | 1.5<br>0.06    | 46.5<br>1.83   | 49.0<br>1.93                                   | 73.0<br>2.87                                        | 19.2<br>12.8                               | 0.0735                                                | 0.36<br>0.79   |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -7.4<br>-0.29           | 83.241<br>3.2772  | 3.970<br>0.1563  | 3.5<br>0.14    | 47.0<br>1.85   | 54.0<br>2.13                                   | 76.0<br>2.99                                        | 32.8<br>13.3                               | 0.0770                                                | 0.55<br>1.21   |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25           | 84.658<br>3.3330  | 4.762<br>0.1875  | 0.8<br>0.03    | 46.0<br>1.81   | 47.0<br>1.85                                   | 77.0<br>3.03                                        | 26.5<br>13                                 | 0.0676                                                | 0.49<br>1.08   |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25           | 84.658<br>3.3330  | 4.762<br>0.1875  | 3.5<br>0.14    | 46.0<br>1.81   | 53.0<br>2.09                                   | 77.0<br>3.03                                        | 26.5<br>13                                 | 0.0676                                                | 0.48<br>1.06   |                     |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 84.826<br>3.3396  | 4.762<br>0.1875  | 3.5<br>0.14    | 47.0<br>1.85   | 54.0<br>2.13                                   | 77.0<br>3.03                                        | 34.6<br>12.1                               | 0.0744                                                | 0.69<br>1.51   |                     |
| 30.391<br>1.1965 | 23.812<br>0.9375 | -10.9<br>-0.43          | 86.413<br>3.4021  | 4.762<br>0.1875  | 3.5<br>0.14    | 47.0<br>1.85   | 54.0<br>2.13                                   | 77.0<br>3.03                                        | 34.6<br>12.1                               | 0.0744                                                | 0.70<br>1.55   |                     |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -8.1<br>-0.32           | 89.586<br>3.5270  | 4.762<br>0.1875  | 3.5<br>0.14    | 50.5<br>1.98   | 57.0<br>2.24                                   | 83.0<br>3.27                                        | 37.8<br>13.5                               | 0.0873                                                | 0.82<br>1.80   |                     |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 1.5<br>0.06    | 48.0<br>1.89   | 50.0<br>1.97                                   | 82.0<br>3.23                                        | 39.5<br>10.5                               | 0.0808                                                | 0.85<br>1.88   |                     |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 0.8<br>0.03    | 48.0<br>1.89   | 49.0<br>1.93                                   | 82.0<br>3.23                                        | 39.5<br>10.5                               | 0.0808                                                | 0.85<br>1.88   |                     |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 3.5<br>0.14    | 48.0<br>1.89   | 54.0<br>2.13                                   | 82.0<br>3.23                                        | 39.5<br>10.5                               | 0.0808                                                | 0.85<br>1.87   |                     |
| 23.698<br>0.9330 | 17.462<br>0.6875 | 2.3<br>0.09             | 93.937<br>3.6983  | 5.555<br>0.2187  | 2.3<br>0.09    | 51.0<br>2.00   | 57.0<br>2.24                                   | 86.0<br>3.39                                        | 22.9<br>8.71                               | 0.0899                                                | 0.71<br>1.56   |                     |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 97.536<br>3.8400  | 5.558<br>0.2188  | 3.5<br>0.14    | 48.5<br>1.91   | 55.0<br>2.17                                   | 87.0<br>3.43                                        | 42.5<br>11.3                               | 0.0805                                                | 0.94<br>2.07   |                     |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36           | 100.686<br>3.9640 | 5.558<br>0.2188  | 3.5<br>0.14    | 48.5<br>1.91   | 55.0<br>2.17                                   | 87.0<br>3.43                                        | 42.5<br>11.3                               | 0.0805                                                | 1.02<br>2.26   |                     |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01           | 104.673<br>4.1210 | 6.350<br>0.2500  | 1.5<br>0.06    | 52.5<br>2.07   | 57.0<br>2.24                                   | 92.0<br>3.62                                        | 26.7<br>9.63                               | 0.0930                                                | 1.11<br>2.44   |                     |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28           | 113.386<br>4.4640 | 5.558<br>0.2188  | 0.8<br>0.03    | 53.0<br>2.09   | 54.0<br>2.13                                   | 100.0<br>3.94                                       | 58.6<br>17.1                               | 0.0946                                                | 1.40<br>3.09   |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25           | 86.919<br>3.4220  | 3.970<br>0.1563  | 3.5<br>0.14    | 49.0<br>1.93   | 55.0<br>2.17                                   | 80.0<br>3.15                                        | 35.2<br>14.3                               | 0.0801                                                | 0.60<br>1.32   |                     |
| 25.608<br>1.0082 | 20.638<br>0.8125 | -6.4<br>-0.25           | 89.764<br>3.5340  | 4.762<br>0.1875  | 3.5<br>0.14    | 49.5<br>1.95   | 56.0<br>2.20                                   | 82.0<br>3.23                                        | 38.2<br>15.7                               | 0.0832                                                | 0.69<br>1.53   |                     |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40          | 91.986<br>3.6215  | 4.750<br>0.1870  | 3.5<br>0.14    | 49.5<br>1.95   | 56.0<br>2.20                                   | 82.0<br>3.23                                        | 39.5<br>10.5                               | 0.0808                                                | 0.82<br>1.81   |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.4<br>-0.25           | 84.658<br>3.3330  | 4.762<br>0.1875  | 3.5<br>0.14    | 47.5<br>1.87   | 54.0<br>2.13                                   | 77.0<br>3.03                                        | 26.5<br>13                                 | 0.0676                                                | 0.46<br>1.02   |                     |
| 22.403<br>0.8820 | 17.826<br>0.7018 | -6.1<br>-0.24           | 84.658<br>3.3330  | 4.762<br>0.1875  | 3.5<br>0.14    | 48.0<br>1.89   | 55.0<br>2.17                                   | 77.0<br>3.03                                        | 26.5<br>13                                 | 0.0676                                                | 0.47<br>1.03   |                     |
| 12.700<br>0.5000 | 9.525<br>0.3750  | -1.3<br>-0.05           | 74.231<br>2.9225  | 2.794<br>0.1100  | 1.5<br>0.06    | 48.5<br>1.91   | 51.0<br>2.01                                   | 69.0<br>2.72                                        | 20<br>23.6                                 | 0.0637                                                | 0.19<br>0.42   |                     |
| 18.258<br>0.7188 | 15.083<br>0.5938 | -3.8<br>-0.15           | 76.200<br>3.0000  | 3.175<br>0.1250  | 1.5<br>0.06    | 49.0<br>1.93   | 51.0<br>2.01                                   | 71.0<br>2.80                                        | 30.6<br>23.7                               | 0.0751                                                | 0.31<br>0.68   |                     |
| 17.145<br>0.6750 | 11.908<br>0.4688 | 0.0<br>0.00             | 80.564<br>3.1718  | 3.571<br>0.1406  | 1.5<br>0.06    | 49.5<br>1.95   | 52.0<br>2.05                                   | 75.0<br>2.95                                        | 21<br>15.8                                 | 0.0766                                                | 0.32<br>0.71   |                     |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -2.0<br>-0.08           | 84.038<br>3.3086  | 3.571<br>0.1406  | 2.8<br>0.11    | 49.5<br>1.95   | 54.0<br>2.13                                   | 77.0<br>3.03                                        | 23.9<br>17.7                               | 0.0725                                                | 0.37<br>0.81   |                     |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25           | 86.919<br>3.4220  | 3.970<br>0.1563  | 3.5<br>0.14    | 50.0<br>1.97   | 57.0<br>2.24                                   | 80.0<br>3.15                                        | 35.2<br>14.3                               | 0.0801                                                | 0.58<br>1.27   |                     |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19           | 89.659<br>3.5299  | 4.762<br>0.1875  | 2.3<br>0.09    | 50.0<br>1.97   | 54.0<br>2.13                                   | 82.0<br>3.23                                        | 30<br>12.2                                 | 0.0732                                                | 0.54<br>1.20   |                     |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



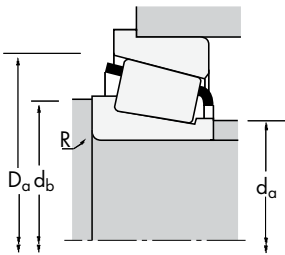
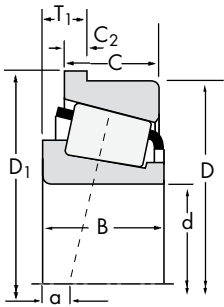


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |          |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|-----------------|----------------|----------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner    |
| 44.450<br>1.7500        | 85.000<br>3.3465  | 7.938<br>0.3125  | 75800<br>17000  | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 355X           | 354-B    |
| 44.450<br>1.7500        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3578           | 3525-B   |
| 44.450<br>1.7500        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 435            | 432AB    |
| 44.450<br>1.7500        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 438            | 432AB    |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 435            | 432-B    |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 438            | 432-B    |
| 44.450<br>1.7500        | 98.425<br>3.8750  | 16.670<br>0.6563 | 92800<br>20900  | 0.74 | 0.81 | 24000<br>5410          | 30500<br>6850    | 0.79 | 104000<br>23400 | 53176          | 53387-B  |
| 44.450<br>1.7500        | 101.600<br>4.0000 | 11.908<br>0.4688 | 123000<br>27600 | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49576          | 49520-B  |
| 44.450<br>1.7500        | 107.950<br>4.2500 | 11.115<br>0.4376 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 460            | 453-B    |
| 44.450<br>1.7500        | 108.966<br>4.2900 | 14.288<br>0.5625 | 158000<br>35500 | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59175          | 59429-B  |
| 44.450<br>1.7500        | 120.650<br>4.7500 | 16.574<br>0.6525 | 192000<br>43200 | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 615            | 612-B    |
| 44.450<br>1.7500        | 127.000<br>5.0000 | 17.462<br>0.6875 | 283000<br>63700 | 0.30 | 2.01 | 73500<br>16500         | 37500<br>8440    | 1.96 | 370000<br>83300 | 6277           | 6220-B   |
| 44.983<br>1.7710        | 83.058<br>3.2700  | 8.733<br>0.3438  | 83800<br>18800  | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25584          | 25521-B  |
| 44.983<br>1.7710        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3776           | 3720-B   |
| 45.000<br>1.7717        | 75.000<br>2.9528  | 8.000<br>0.3150  | 61500<br>13800  | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | X32009X        | Y32009XR |
| 45.000<br>1.7717        | 80.000<br>3.1496  | 10.000<br>0.3937 | 88000<br>19800  | 0.38 | 1.57 | 22800<br>5130          | 15000<br>3370    | 1.52 | 119000<br>26800 | X33109         | Y33109R  |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 7.938<br>0.3125  | 75800<br>17000  | 0.31 | 1.96 | 19600<br>4420          | 10300<br>2320    | 1.91 | 88800<br>20000  | 358            | 354-B    |
| 45.000<br>1.7717        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 367            | 362-B    |
| 45.237<br>1.7810        | 87.312<br>3.4375  | 11.112<br>0.4375 | 105000<br>23600 | 0.31 | 1.96 | 27200<br>6120          | 14300<br>3210    | 1.91 | 134000<br>30100 | 3586           | 3525-B   |
| 45.618<br>1.7960        | 83.058<br>3.2700  | 8.733<br>0.3438  | 83800<br>18800  | 0.33 | 1.79 | 21700<br>4880          | 12500<br>2800    | 1.74 | 111000<br>24900 | 25590          | 25521-B  |
| 46.038<br>1.8125        | 79.375<br>3.1250  | 7.539<br>0.2968  | 48200<br>10800  | 0.37 | 1.60 | 12500<br>2810          | 7990<br>1800     | 1.56 | 61300<br>13800  | 18690          | 18620-B  |
| 46.038<br>1.8125        | 85.000<br>3.3465  | 9.525<br>0.3750  | 86400<br>19400  | 0.35 | 1.73 | 22400<br>5040          | 13300<br>2980    | 1.69 | 117000<br>26200 | 2984           | 2924-B   |
| 46.038<br>1.8125        | 92.075<br>3.6250  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 436            | 432AB    |
| 46.038<br>1.8125        | 95.250<br>3.7500  | 11.115<br>0.4376 | 118000<br>26400 | 0.28 | 2.11 | 30500<br>6850          | 14800<br>3330    | 2.05 | 144000<br>32400 | 436            | 432-B    |
| 47.625<br>1.8750        | 88.900<br>3.5000  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 369-S          | 362AB    |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 369A           | 362-B    |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 369-S          | 362-B    |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3778           | 3720-B   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 89.659<br>3.5299           | 4.762<br>0.1875                   | 3.5<br>0.14              | 50.0<br>1.97                        | 56.0<br>2.20   | 82.0<br>3.23   | 30             | 12.2           | 0.0732              | 0.54<br>1.19        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 91.986<br>3.6215           | 4.750<br>0.1870                   | 3.5<br>0.14              | 51.0<br>2.01                        | 57.0<br>2.24   | 82.0<br>3.23   | 39.5           | 10.5           | 0.0808              | 0.79<br>1.75        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 97.536<br>3.8400           | 5.558<br>0.2188                   | 0.8<br>0.03              | 51.0<br>2.01                        | 52.0<br>2.05   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.90<br>1.98        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 97.536<br>3.8400           | 5.558<br>0.2188                   | 3.5<br>0.14              | 51.0<br>2.01                        | 57.0<br>2.24   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.89<br>1.96        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 100.686<br>3.9640          | 5.558<br>0.2188                   | 0.8<br>0.03              | 51.0<br>2.01                        | 52.0<br>2.05   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.98<br>2.16        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 100.686<br>3.9640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 51.0<br>2.01                        | 57.0<br>2.24   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.97<br>2.15        |
| 28.301<br>1.1142 | 20.638<br>0.8125 | -0.3<br>-0.01    | 104.673<br>4.1210          | 6.350<br>0.2500                   | 1.3<br>0.05              | 52.5<br>2.07                        | 59.0<br>2.32   | 92.0<br>3.62   | 26.7           | 9.63           | 0.0930              | 1.06<br>2.33        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -7.1<br>-0.28    | 107.056<br>4.2148          | 5.558<br>0.2188                   | 0.8<br>0.03              | 54.0<br>2.13                        | 55.0<br>2.17   | 98.0<br>3.86   | 49.1           | 14.2           | 0.0946              | 1.31<br>2.88        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 113.386<br>4.4640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 54.0<br>2.13                        | 60.0<br>2.36   | 100.0<br>3.94  | 58.6           | 17.1           | 0.0946              | 1.37<br>3.02        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -9.7<br>-0.38    | 115.214<br>4.5360          | 6.350<br>0.2500                   | 3.5<br>0.14              | 56.0<br>2.20                        | 63.0<br>2.48   | 101.0<br>3.98  | 57.3           | 14.7           | 0.0999              | 1.72<br>3.79        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 127.691<br>5.0272          | 7.142<br>0.2812                   | 3.5<br>0.14              | 56.0<br>2.20                        | 62.0<br>2.44   | 110.0<br>4.33  | 75.9           | 16.2           | 0.0694              | 2.49<br>5.50        |
| 52.388<br>2.0625 | 41.275<br>1.6250 | -19.6<br>-0.77   | 134.925<br>5.3120          | 7.938<br>0.3125                   | 3.5<br>0.14              | 60.0<br>2.36                        | 67.0<br>2.64   | 117.0<br>4.61  | 103            | 18.7           | 0.0757              | 3.66<br>8.07        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 86.919<br>3.4220           | 3.970<br>0.1563                   | 1.5<br>0.06              | 51.0<br>2.01                        | 53.0<br>2.09   | 80.0<br>3.15   | 35.2           | 14.3           | 0.0801              | 0.57<br>1.27        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 97.937<br>3.8558           | 4.762<br>0.1875                   | 3.5<br>0.14              | 53.0<br>2.09                        | 59.0<br>2.32   | 90.0<br>3.54   | 49.9           | 14.5           | 0.0903              | 0.98<br>2.16        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 79.000<br>3.1102           | 3.500<br>0.1378                   | 1.0<br>0.04              | 51.0<br>2.01                        | 53.0<br>2.09   | 74.0<br>2.91   | 28.7           | 16.2           | 0.0788              | 0.36<br>0.79        |
| 26.000<br>1.0236 | 20.500<br>0.8071 | -6.6<br>-0.26    | 85.000<br>3.3465           | 4.500<br>0.1772                   | 1.5<br>0.06              | 52.0<br>2.05                        | 55.0<br>2.17   | 79.0<br>3.11   | 35.7           | 14.5           | 0.0843              | 0.55<br>1.22        |
| 21.692<br>0.8540 | 17.462<br>0.6875 | -4.8<br>-0.19    | 89.659<br>3.5299           | 4.762<br>0.1875                   | 1.5<br>0.06              | 50.0<br>1.97                        | 53.0<br>2.09   | 82.0<br>3.23   | 30             | 12.2           | 0.0732              | 0.54<br>1.19        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 94.661<br>3.7268           | 4.762<br>0.1875                   | 2.0<br>0.08              | 51.0<br>2.01                        | 55.0<br>2.17   | 86.0<br>3.39   | 33.8           | 14             | 0.0773              | 0.62<br>1.37        |
| 30.886<br>1.2160 | 23.812<br>0.9375 | -10.2<br>-0.40   | 91.986<br>3.6215           | 4.750<br>0.1870                   | 3.5<br>0.14              | 52.0<br>2.05                        | 58.0<br>2.28   | 82.0<br>3.23   | 39.5           | 10.5           | 0.0808              | 0.78<br>1.72        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -6.4<br>-0.25    | 86.919<br>3.4220           | 3.970<br>0.1563                   | 3.5<br>0.14              | 51.0<br>2.01                        | 58.0<br>2.28   | 80.0<br>3.15   | 35.2           | 14.3           | 0.0801              | 0.56<br>1.23        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -2.0<br>-0.08    | 84.038<br>3.3086           | 3.571<br>0.1406                   | 2.8<br>0.11              | 51.0<br>2.01                        | 56.0<br>2.20   | 77.0<br>3.03   | 23.9           | 17.7           | 0.0725              | 0.35<br>0.77        |
| 25.608<br>1.0082 | 20.638<br>0.8125 | -6.4<br>-0.25    | 89.764<br>3.5340           | 4.762<br>0.1875                   | 3.5<br>0.14              | 52.0<br>2.05                        | 58.0<br>2.28   | 82.0<br>3.23   | 38.2           | 15.7           | 0.0832              | 0.65<br>1.43        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 97.536<br>3.8400           | 5.558<br>0.2188                   | 3.5<br>0.14              | 52.0<br>2.05                        | 59.0<br>2.32   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.86<br>1.90        |
| 29.900<br>1.1772 | 22.225<br>0.8750 | -9.1<br>-0.36    | 100.686<br>3.9640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 52.0<br>2.05                        | 59.0<br>2.32   | 87.0<br>3.43   | 42.5           | 11.3           | 0.0805              | 0.95<br>2.09        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17    | 93.662<br>3.6875           | 4.762<br>0.1875                   | 2.3<br>0.09              | 53.0<br>2.09                        | 57.0<br>2.24   | 86.0<br>3.39   | 33.8           | 14             | 0.0773              | 0.58<br>1.28        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 94.661<br>3.7268           | 4.762<br>0.1875                   | 3.5<br>0.14              | 53.0<br>2.09                        | 60.0<br>2.36   | 86.0<br>3.39   | 33.8           | 14             | 0.0773              | 0.59<br>1.29        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17    | 94.661<br>3.7268           | 4.762<br>0.1875                   | 2.3<br>0.09              | 53.0<br>2.09                        | 57.0<br>2.24   | 86.0<br>3.39   | 33.8           | 14             | 0.0773              | 0.59<br>1.30        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 97.937<br>3.8558           | 4.762<br>0.1875                   | 6.4<br>0.25              | 55.0<br>2.17                        | 67.0<br>2.64   | 90.0<br>3.54   | 49.9           | 14.5           | 0.0903              | 0.92<br>2.02        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



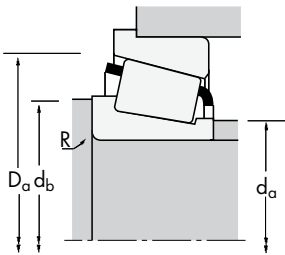
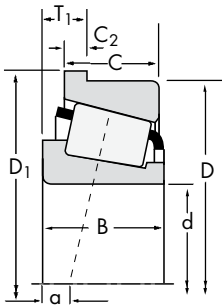


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|-----------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner      |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3779           | 3720-B     |
| 47.625<br>1.8750        | 95.250<br>3.7500  | 11.140<br>0.4386 | 115000<br>25900 | 0.55 | 1.10 | 29900<br>6710          | 27900<br>6280    | 1.07 | 157000<br>35400 | HM804846       | HM804811-B |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 11.112<br>0.4375 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 463            | 453-B      |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 11.112<br>0.4375 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 467            | 453-B      |
| 47.625<br>1.8750        | 108.966<br>4.2900 | 14.288<br>0.5625 | 158000<br>35500 | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59187          | 59429-B    |
| 47.625<br>1.8750        | 120.650<br>4.7500 | 16.574<br>0.6525 | 192000<br>43200 | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 617            | 612-B      |
| 49.212<br>1.9375        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 365-S          | 362-B      |
| 49.212<br>1.9375        | 111.125<br>4.3750 | 14.288<br>0.5625 | 159000<br>35800 | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 545            | 532-B      |
| 49.212<br>1.9375        | 114.300<br>4.5000 | 16.670<br>0.6563 | 207000<br>46500 | 0.43 | 1.39 | 53700<br>12100         | 39500<br>8880    | 1.36 | 256000<br>57500 | 65390          | 65320-B    |
| 49.982<br>1.9678        | 111.125<br>4.3750 | 14.288<br>0.5625 | 159000<br>35800 | 0.30 | 2.02 | 41300<br>9290          | 21000<br>4720    | 1.97 | 206000<br>46200 | 546            | 532-B      |
| 49.987<br>1.9680        | 80.962<br>3.1875  | 7.145<br>0.2813  | 56300<br>12700  | 0.36 | 1.69 | 14600<br>3280          | 8880<br>2000     | 1.64 | 88800<br>20000  | L305648        | L305610-B  |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 365            | 362-B      |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 366            | 362-B      |
| 50.800<br>2.0000        | 77.788<br>3.0625  | 5.969<br>0.2350  | 34600<br>7770   | 0.34 | 1.78 | 8960<br>2010           | 5160<br>1160     | 1.74 | 47200<br>10600  | LL205449       | LL205410-B |
| 50.800<br>2.0000        | 80.962<br>3.1875  | 7.145<br>0.2813  | 56300<br>12700  | 0.36 | 1.69 | 14600<br>3280          | 8880<br>2000     | 1.64 | 88800<br>20000  | L305649        | L305610-B  |
| 50.800<br>2.0000        | 85.000<br>3.3465  | 7.539<br>0.2968  | 50600<br>11400  | 0.41 | 1.48 | 13100<br>2950          | 9110<br>2050     | 1.44 | 67500<br>15200  | 18790          | 18720-B    |
| 50.800<br>2.0000        | 85.725<br>3.3750  | 9.906<br>0.3900  | 47800<br>10700  | 0.57 | 1.06 | 12400<br>2780          | 12000<br>2710    | 1.03 | 63900<br>14400  | 18200          | 18337-B    |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368            | 362AB      |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368A           | 362AB      |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368            | 362-B      |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 8.887<br>0.3499  | 79500<br>17900  | 0.32 | 1.88 | 20600<br>4640          | 11300<br>2540    | 1.83 | 95800<br>21500  | 368A           | 362-B      |
| 50.800<br>2.0000        | 92.075<br>3.6250  | 8.730<br>0.3437  | 91600<br>20600  | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | 28580          | 28521-B    |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3775           | 3720-B     |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3780           | 3720-B     |
| 50.800<br>2.0000        | 101.600<br>4.0000 | 11.908<br>0.4688 | 123000<br>27600 | 0.40 | 1.50 | 31900<br>7160          | 21900<br>4910    | 1.46 | 155000<br>35000 | 49585          | 49520-B    |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 11.908<br>0.4688 | 142000<br>31900 | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285          | 45220-B    |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 11.908<br>0.4688 | 142000<br>31900 | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600 | 45285A         | 45220-B    |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 11.908<br>0.4688 | 158000<br>35500 | 0.40 | 1.49 | 41000<br>9210          | 28200<br>6340    | 1.45 | 202000<br>45400 | 59201          | 59412-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  | Dimensions, mm (inches) |                   |                  |                |                |                                                |                                                     | Factors                                    |                                                       |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|-------------------|------------------|----------------|----------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-------------------------------------------------------|----------------|---------------------|
|                  |                  | B                       | C                 | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | Shaft<br>backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | Housing<br>backing<br>shoulder dia.<br>D <sub>a</sub> | G <sub>1</sub> |                     |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32           | 97.937<br>3.8558  | 4.762<br>0.1875  | 3.5<br>0.14    | 55.0<br>2.17   | 61.0<br>2.40                                   | 90.0<br>3.54                                        | 49.9                                       | 14.5                                                  | 0.0903         | 0.93<br>2.06        |
| 29.370<br>1.1563 | 24.021<br>0.9457 | -3.8<br>-0.15           | 100.686<br>3.9640 | 5.001<br>0.1969  | 3.5<br>0.14    | 57.5<br>2.26   | 66.0<br>2.60                                   | 93.0<br>3.66                                        | 44.8                                       | 14.6                                                  | 0.1017         | 1.01<br>2.24        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28           | 113.386<br>4.4640 | 5.558<br>0.2188  | 4.8<br>0.19    | 56.0<br>2.20   | 65.0<br>2.56                                   | 100.0<br>3.94                                       | 58.6                                       | 17.1                                                  | 0.0946         | 1.31<br>2.89        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28           | 113.386<br>4.4640 | 5.558<br>0.2188  | 0.8<br>0.03    | 56.0<br>2.20   | 57.0<br>2.24                                   | 100.0<br>3.94                                       | 58.6                                       | 17.1                                                  | 0.0946         | 1.32<br>2.92        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -9.7<br>-0.38           | 115.214<br>4.5360 | 6.350<br>0.2500  | 3.5<br>0.14    | 59.0<br>2.32   | 65.0<br>2.56                                   | 101.0<br>3.98                                       | 57.3                                       | 14.7                                                  | 0.0999         | 1.65<br>3.64        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55          | 127.691<br>5.0272 | 7.142<br>0.2812  | 3.5<br>0.14    | 58.0<br>2.28   | 65.0<br>2.56                                   | 110.0<br>4.33                                       | 75.9                                       | 16.2                                                  | 0.0694         | 2.42<br>5.33        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17           | 94.661<br>3.7268  | 4.762<br>0.1875  | 0.8<br>0.03    | 54.0<br>2.13   | 55.0<br>2.17                                   | 86.0<br>3.39                                        | 33.8                                       | 14                                                    | 0.0773         | 0.57<br>1.25        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48          | 117.373<br>4.6210 | 6.350<br>0.2500  | 3.5<br>0.14    | 57.0<br>2.24   | 64.0<br>2.52                                   | 100.0<br>3.94                                       | 64.3                                       | 16.1                                                  | 0.0938         | 1.79<br>3.94        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -12.4<br>-0.49          | 121.341<br>4.7772 | 7.145<br>0.2813  | 3.5<br>0.14    | 60.0<br>2.36   | 70.0<br>2.76                                   | 107.0<br>4.21                                       | 63.1                                       | 13                                                    | 0.1053         | 2.30<br>5.07        |
| 36.957<br>1.4550 | 30.162<br>1.1875 | -12.2<br>-0.48          | 117.373<br>4.6210 | 6.350<br>0.2500  | 3.5<br>0.14    | 58.0<br>2.28   | 65.0<br>2.56                                   | 100.0<br>3.94                                       | 64.3                                       | 16.1                                                  | 0.0938         | 1.77<br>3.90        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -2.5<br>-0.10           | 84.036<br>3.3085  | 3.175<br>0.1250  | 1.5<br>0.06    | 55.0<br>2.17   | 57.0<br>2.24                                   | 78.0<br>3.07                                        | 38.8                                       | 27.8                                                  | 0.0841         | 0.38<br>0.83        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17           | 94.661<br>3.7268  | 4.762<br>0.1875  | 2.0<br>0.08    | 55.0<br>2.17   | 58.0<br>2.28                                   | 86.0<br>3.39                                        | 33.8                                       | 14                                                    | 0.0773         | 0.56<br>1.23        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17           | 94.661<br>3.7268  | 4.762<br>0.1875  | 2.3<br>0.09    | 55.0<br>2.17   | 59.0<br>2.32                                   | 86.0<br>3.39                                        | 33.8                                       | 14                                                    | 0.0773         | 0.56<br>1.23        |
| 12.700<br>0.5000 | 9.525<br>0.3750  | 0.0<br>0.00             | 80.582<br>3.1725  | 2.794<br>0.1100  | 1.5<br>0.06    | 55.0<br>2.17   | 57.0<br>2.24                                   | 75.0<br>2.95                                        | 24.2                                       | 29.1                                                  | 0.0699         | 0.21<br>0.47        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -2.5<br>-0.10           | 84.036<br>3.3085  | 3.175<br>0.1250  | 1.5<br>0.06    | 56.0<br>2.20   | 58.0<br>2.28                                   | 78.0<br>3.07                                        | 38.8                                       | 27.8                                                  | 0.0841         | 0.37<br>0.81        |
| 17.462<br>0.6875 | 13.495<br>0.5313 | -0.8<br>-0.03           | 88.570<br>3.4870  | 3.571<br>0.1406  | 3.5<br>0.14    | 56.0<br>2.20   | 62.0<br>2.44                                   | 82.0<br>3.23                                        | 28.6                                       | 21.5                                                  | 0.0789         | 0.40<br>0.89        |
| 18.263<br>0.7190 | 12.700<br>0.5000 | 2.0<br>0.08             | 89.586<br>3.5270  | 3.556<br>0.1400  | 1.5<br>0.06    | 56.0<br>2.20   | 59.0<br>2.32                                   | 83.0<br>3.27                                        | 26.1                                       | 20.3                                                  | 0.0852         | 0.42<br>0.92        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17           | 93.662<br>3.6875  | 4.762<br>0.1875  | 1.5<br>0.06    | 56.0<br>2.20   | 58.0<br>2.28                                   | 86.0<br>3.39                                        | 33.8                                       | 14                                                    | 0.0773         | 0.53<br>1.18        |
| 22.225<br>0.8750 | 16.513<br>0.6501 | -4.3<br>-0.17           | 93.662<br>3.6875  | 4.762<br>0.1875  | 3.5<br>0.14    | 56.0<br>2.20   | 62.0<br>2.44                                   | 86.0<br>3.39                                        | 33.8                                       | 12.7                                                  | 0.0773         | 0.53<br>1.16        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17           | 94.661<br>3.7268  | 4.762<br>0.1875  | 1.5<br>0.06    | 56.0<br>2.20   | 58.0<br>2.28                                   | 86.0<br>3.39                                        | 33.8                                       | 14                                                    | 0.0773         | 0.54<br>1.20        |
| 22.225<br>0.8750 | 15.875<br>0.6250 | -4.3<br>-0.17           | 94.661<br>3.7268  | 4.762<br>0.1875  | 3.5<br>0.14    | 56.0<br>2.20   | 62.0<br>2.44                                   | 86.0<br>3.39                                        | 33.8                                       | 12.7                                                  | 0.0773         | 0.54<br>1.19        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -4.8<br>-0.19           | 95.941<br>3.7772  | 3.967<br>0.1562  | 3.5<br>0.14    | 57.0<br>2.24   | 63.0<br>2.48                                   | 89.0<br>3.50                                        | 46.4                                       | 22.6                                                  | 0.0912         | 0.73<br>1.61        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32           | 97.937<br>3.8558  | 4.762<br>0.1875  | 0.8<br>0.03    | 58.0<br>2.28   | 58.0<br>2.28                                   | 90.0<br>3.54                                        | 49.9                                       | 14.5                                                  | 0.0903         | 0.88<br>1.95        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32           | 97.937<br>3.8558  | 4.762<br>0.1875  | 3.5<br>0.14    | 58.0<br>2.28   | 64.0<br>2.52                                   | 90.0<br>3.54                                        | 49.9                                       | 14.5                                                  | 0.0903         | 0.87<br>1.93        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | -7.1<br>-0.28           | 107.056<br>4.2148 | 5.558<br>0.2188  | 3.5<br>0.14    | 59.0<br>2.32   | 66.0<br>2.60                                   | 98.0<br>3.86                                        | 49.1                                       | 14.2                                                  | 0.0946         | 1.18<br>2.61        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32           | 110.231<br>4.3398 | 5.558<br>0.2188  | 2.3<br>0.09    | 59.0<br>2.32   | 63.0<br>2.48                                   | 101.0<br>3.98                                       | 63.5                                       | 16.9                                                  | 0.0971         | 1.26<br>2.77        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32           | 110.231<br>4.3398 | 5.558<br>0.2188  | 0.8<br>0.03    | 59.0<br>2.32   | 60.0<br>2.36                                   | 101.0<br>3.98                                       | 63.5                                       | 16.9                                                  | 0.0971         | 1.25<br>2.76        |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -9.7<br>-0.38           | 110.500<br>4.3504 | 3.970<br>0.1563  | 0.8<br>0.03    | 61.0<br>2.40   | 62.0<br>2.44                                   | 101.0<br>3.98                                       | 57.3                                       | 14.7                                                  | 0.0999         | 1.45<br>3.19        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



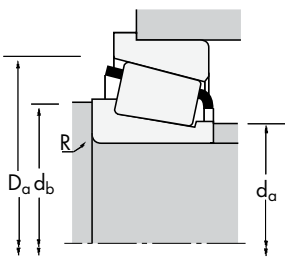
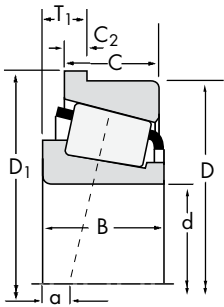


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static          | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|-----------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 | C <sub>0</sub> | Inner      |
| 50.800<br>2.0000        | 104.775<br>4.1250 | 15.875<br>0.6250 | 159000<br>35700 | 0.49 | 1.23 | 41200<br>9260          | 34400<br>7730    | 1.20 | 223000<br>50200 | HM807046       | HM807010-B |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 11.112<br>0.4375 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455            | 453-B      |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 11.115<br>0.4376 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 455-S          | 453-B      |
| 50.800<br>2.0000        | 111.125<br>4.3750 | 15.083<br>0.5938 | 98500<br>22100  | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55200          | 55437-B    |
| 50.800<br>2.0000        | 120.650<br>4.7500 | 16.667<br>0.6562 | 192000<br>43200 | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 619            | 612-B      |
| 50.800<br>2.0000        | 127.000<br>5.0000 | 16.670<br>0.6563 | 225000<br>50700 | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700 | 65200          | 65500-B    |
| 52.000<br>2.0472        | 85.725<br>3.3750  | 9.906<br>0.3900  | 47800<br>10700  | 0.57 | 1.06 | 12400<br>2780          | 12000<br>2710    | 1.03 | 63900<br>14400  | 18204X         | 18337-B    |
| 52.388<br>2.0625        | 92.075<br>3.6250  | 8.730<br>0.3437  | 91600<br>20600  | 0.38 | 1.59 | 23700<br>5340          | 15300<br>3450    | 1.55 | 130000<br>29200 | 28584          | 28521-B    |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 11.112<br>0.4375 | 113000<br>25400 | 0.34 | 1.77 | 29300<br>6590          | 17000<br>3820    | 1.73 | 153000<br>34300 | 3767           | 3720-B     |
| 52.388<br>2.0625        | 111.125<br>4.3750 | 15.083<br>0.5938 | 98500<br>22100  | 0.88 | 0.68 | 25500<br>5740          | 38600<br>8690    | 0.66 | 119000<br>26700 | 55206          | 55437-B    |
| 53.975<br>2.1250        | 93.264<br>3.6718  | 10.320<br>0.4063 | 120000<br>27000 | 0.33 | 1.82 | 31100<br>7000          | 17600<br>3950    | 1.77 | 161000<br>36200 | 33895          | 33820-B    |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 11.115<br>0.4376 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 456            | 453-B      |
| 53.975<br>2.1250        | 120.650<br>4.7500 | 16.667<br>0.6562 | 192000<br>43200 | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800 | 621            | 612-B      |
| 53.975<br>2.1250        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 557-S          | 552-B      |
| 53.975<br>2.1250        | 127.000<br>5.0000 | 7.137<br>0.2810  | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700 | 557-S          | 553-BA     |
| 53.975<br>2.1250        | 127.000<br>5.0000 | 17.462<br>0.6875 | 283000<br>63700 | 0.30 | 2.01 | 73500<br>16500         | 37500<br>8440    | 1.96 | 370000<br>83300 | 6280           | 6220-B     |
| 53.975<br>2.1250        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000 | 636            | 632-B      |
| 54.813<br>2.1580        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6380           | 6320-B     |
| 54.987<br>2.1649        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900 | 6381           | 6320-B     |
| 55.000<br>2.1654        | 96.838<br>3.8125  | 7.938<br>0.3125  | 84200<br>18900  | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 385            | 382-B      |
| 55.000<br>2.1654        | 110.000<br>4.3307 | 16.000<br>0.6299 | 183000<br>41200 | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800 | XGB-33212      | Y33212R    |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900 | 475            | 472-B      |
| 55.562<br>2.1875        | 107.950<br>4.2500 | 11.112<br>0.4375 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200 | 466-S          | 453-B      |
| 55.575<br>2.1880        | 96.838<br>3.8125  | 7.938<br>0.3125  | 84200<br>18900  | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 389            | 382-B      |
| 57.150<br>2.2500        | 84.933<br>3.3438  | 5.969<br>0.2350  | 33500<br>7520   | 0.37 | 1.62 | 8670<br>1950           | 5500<br>1240     | 1.58 | 46800<br>10500  | LL408049       | LL408010-B |
| 57.150<br>2.2500        | 87.312<br>3.4375  | 7.145<br>0.2813  | 58100<br>13100  | 0.39 | 1.54 | 15100<br>3380          | 10000<br>2250    | 1.50 | 95600<br>21500  | L507949        | L507910-B  |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 7.938<br>0.3125  | 84200<br>18900  | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387            | 382-B      |
| 57.150<br>2.2500        | 96.838<br>3.8125  | 7.938<br>0.3125  | 84200<br>18900  | 0.35 | 1.69 | 21800<br>4910          | 13200<br>2980    | 1.65 | 107000<br>24100 | 387A           | 382-B      |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 36.512<br>1.4375 | 28.575<br>1.1250 | -7.4<br>-0.29    | 114.300<br>4.5000          | 7.937<br>0.3125                   | 3.5<br>0.14              | 63.0<br>2.48                        | 70.0<br>2.76   | 103.0<br>4.06  | 63.9           | 17.1           | 0.0760              | 1.60<br>3.53        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 113.386<br>4.4640          | 5.558<br>0.2188                   | 0.8<br>0.03              | 59.0<br>2.32                        | 60.0<br>2.36   | 100.0<br>3.94  | 58.6           | 17.1           | 0.0946              | 1.27<br>2.79        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 113.386<br>4.4640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 59.0<br>2.32                        | 65.0<br>2.56   | 100.0<br>3.94  | 58.6           | 17.1           | 0.0946              | 1.26<br>2.78        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 116.683<br>4.5938          | 5.558<br>0.2188                   | 3.5<br>0.14              | 64.0<br>2.51                        | 71.0<br>2.80   | 107.0<br>4.21  | 36.8           | 13.2           | 0.1085              | 1.28<br>2.83        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 127.691<br>5.0272          | 7.142<br>0.2812                   | 3.5<br>0.14              | 61.0<br>2.40                        | 67.0<br>2.64   | 110.0<br>4.33  | 75.9           | 16.2           | 0.0694              | 2.34<br>5.16        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37    | 134.041<br>5.2772          | 7.145<br>0.2813                   | 3.5<br>0.14              | 69.0<br>2.72                        | 75.0<br>2.95   | 120.0<br>4.72  | 83.2           | 17.2           | 0.0827              | 2.99<br>6.59        |
| 18.263<br>0.7190 | 12.700<br>0.5000 | 2.0<br>0.08      | 89.586<br>3.5270           | 3.556<br>0.1400                   | 2.0<br>0.08              | 57.0<br>2.24                        | 60.0<br>2.36   | 83.0<br>3.27   | 26.1           | 20.3           | 0.0852              | 0.40<br>0.89        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -4.8<br>-0.19    | 95.941<br>3.7772           | 3.967<br>0.1562                   | 3.5<br>0.14              | 58.0<br>2.28                        | 65.0<br>2.56   | 89.0<br>3.50   | 46.4           | 22.6           | 0.0912              | 0.69<br>1.53        |
| 30.302<br>1.1930 | 23.812<br>0.9375 | -8.1<br>-0.32    | 97.937<br>3.8558           | 4.762<br>0.1875                   | 2.3<br>0.09              | 59.0<br>2.32                        | 63.0<br>2.48   | 90.0<br>3.54   | 49.9           | 14.5           | 0.0903              | 0.85<br>1.87        |
| 26.909<br>1.0594 | 20.638<br>0.8125 | 7.1<br>0.28      | 116.683<br>4.5938          | 5.558<br>0.2188                   | 3.5<br>0.14              | 64.0<br>2.51                        | 72.0<br>2.83   | 107.0<br>4.21  | 36.8           | 13.2           | 0.1085              | 1.25<br>2.77        |
| 28.575<br>1.1250 | 22.225<br>0.8750 | -7.6<br>-0.30    | 97.937<br>3.8558           | 4.762<br>0.1875                   | 1.5<br>0.06              | 60.0<br>2.36                        | 63.0<br>2.48   | 91.0<br>3.58   | 52.5           | 18.5           | 0.0910              | 0.78<br>1.72        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 113.386<br>4.4640          | 5.558<br>0.2188                   | 3.5<br>0.14              | 61.0<br>2.40                        | 68.0<br>2.68   | 100.0<br>3.94  | 58.6           | 17.1           | 0.0946              | 1.20<br>2.64        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55   | 127.691<br>5.0272          | 7.142<br>0.2812                   | 3.5<br>0.14              | 63.0<br>2.48                        | 70.0<br>2.76   | 110.0<br>4.33  | 75.9           | 16.2           | 0.0694              | 2.25<br>4.97        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 130.073<br>5.1210          | 6.350<br>0.2500                   | 3.5<br>0.14              | 65.0<br>2.56                        | 71.0<br>2.80   | 116.0<br>4.57  | 91             | 21.1           | 0.1108              | 2.30<br>5.07        |
| 36.678<br>1.4440 | 34.925<br>1.3750 | -9.4<br>-0.37    | 133.248<br>5.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 65.0<br>2.56                        | 71.0<br>2.80   | 116.0<br>4.57  | 91             | 21.1           | 0.1108              | 2.45<br>5.39        |
| 52.388<br>2.0625 | 41.275<br>1.6250 | -19.6<br>-0.77   | 134.925<br>5.3120          | 7.938<br>0.3125                   | 3.5<br>0.14              | 67.0<br>2.64                        | 74.0<br>2.91   | 117.0<br>4.61  | 103            | 18.7           | 0.0757              | 3.36<br>7.40        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810                   | 3.5<br>0.14              | 67.0<br>2.64                        | 73.0<br>2.87   | 125.0<br>4.92  | 106            | 21             | 0.0814              | 3.20<br>7.06        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 143.579<br>5.6527          | 7.938<br>0.3125                   | 0.8<br>0.03              | 70.0<br>2.76                        | 71.0<br>2.80   | 126.0<br>4.96  | 124            | 22.4           | 0.0827              | 4.17<br>9.20        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 143.579<br>5.6527          | 7.938<br>0.3125                   | 3.5<br>0.14              | 70.0<br>2.76                        | 76.0<br>2.99   | 126.0<br>4.96  | 124            | 22.4           | 0.0827              | 4.16<br>9.17        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 101.498<br>3.9960          | 4.762<br>0.1875                   | 2.3<br>0.09              | 61.0<br>2.40                        | 65.0<br>2.56   | 94.0<br>3.70   | 42             | 15.7           | 0.0859              | 0.66<br>1.46        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | -9.9<br>-0.39    | 116.000<br>4.5669          | 7.000<br>0.2756                   | 0.8<br>0.03              | 68.0<br>2.68                        | 71.0<br>2.80   | 107.0<br>4.21  | 76.2           | 18.1           | 0.0758              | 1.72<br>3.80        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180                   | 0.8<br>0.03              | 66.0<br>2.60                        | 67.0<br>2.64   | 115.0<br>4.53  | 77.2           | 23             | 0.1083              | 1.70<br>3.74        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28    | 113.386<br>4.4640          | 5.558<br>0.2188                   | 2.3<br>0.09              | 62.0<br>2.44                        | 66.0<br>2.60   | 100.0<br>3.94  | 58.6           | 17.1           | 0.0946              | 1.17<br>2.59        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 101.498<br>3.9960          | 4.762<br>0.1875                   | 2.3<br>0.09              | 61.0<br>2.40                        | 65.0<br>2.56   | 94.0<br>3.70   | 42             | 15.7           | 0.0859              | 0.65<br>1.44        |
| 12.700<br>0.5000 | 9.525<br>0.3750  | 1.5<br>0.06      | 87.727<br>3.4538           | 2.794<br>0.1100                   | 1.5<br>0.06              | 61.0<br>2.40                        | 64.0<br>2.52   | 82.0<br>3.23   | 27.4           | 36.3           | 0.0749              | 0.24<br>0.52        |
| 18.258<br>0.7188 | 14.288<br>0.5625 | -0.8<br>-0.03    | 90.487<br>3.5625           | 3.175<br>0.1250                   | 1.5<br>0.06              | 62.0<br>2.44                        | 65.0<br>2.56   | 85.0<br>3.35   | 46.1           | 36.9           | 0.0914              | 0.40<br>0.88        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 101.498<br>3.9960          | 4.762<br>0.1875                   | 2.3<br>0.09              | 62.0<br>2.44                        | 66.0<br>2.60   | 94.0<br>3.70   | 42             | 15.7           | 0.0859              | 0.63<br>1.38        |
| 21.946<br>0.8640 | 17.826<br>0.7018 | -3.0<br>-0.12    | 101.498<br>3.9960          | 4.762<br>0.1875                   | 3.5<br>0.14              | 62.0<br>2.44                        | 69.0<br>2.72   | 94.0<br>3.70   | 42             | 15.7           | 0.0859              | 0.62<br>1.37        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B



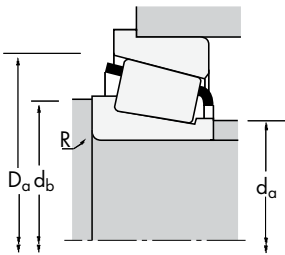
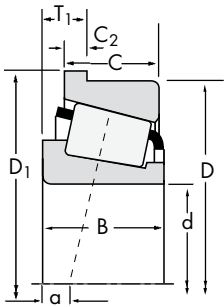


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 57.150<br>2.2500        | 97.630<br>3.8437  | 9.124<br>0.3592  | 96300<br>21600  | 0.40 | 1.49 | 25000<br>5610          | 17200<br>3870    | 1.45 | 142000<br>32000  | 28682          | 28622-B    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 11.908<br>0.4688 | 142000<br>31900 | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600  | 45290          | 45220-B    |
| 57.150<br>2.2500        | 104.775<br>4.1250 | 11.908<br>0.4688 | 142000<br>31900 | 0.33 | 1.80 | 36800<br>8270          | 20900<br>4710    | 1.76 | 189000<br>42600  | 45291          | 45220-B    |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 11.115<br>0.4376 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200  | 462            | 453-B      |
| 57.150<br>2.2500        | 107.950<br>4.2500 | 11.115<br>0.4376 | 126000<br>28200 | 0.34 | 1.79 | 32600<br>7320          | 18700<br>4200    | 1.74 | 166000<br>37200  | 469            | 453-B      |
| 57.150<br>2.2500        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3979           | 3920-B     |
| 57.150<br>2.2500        | 120.650<br>4.7500 | 16.667<br>0.6562 | 192000<br>43200 | 0.31 | 1.91 | 49800<br>11200         | 26800<br>6020    | 1.86 | 244000<br>54800  | 623            | 612-B      |
| 57.150<br>2.2500        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 555-S          | 552-B      |
| 57.150<br>2.2500        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6375           | 6320-B     |
| 57.150<br>2.2500        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 635            | 632-B      |
| 57.150<br>2.2500        | 139.700<br>5.5000 | 17.462<br>0.6875 | 225000<br>50700 | 0.49 | 1.23 | 58500<br>13100         | 48800<br>11000   | 1.20 | 297000<br>66700  | 65225          | 65550-B    |
| 57.150<br>2.2500        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6455           | 6420-B     |
| 58.738<br>2.3125        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3981           | 3920-B     |
| 59.931<br>2.3595        | 150.089<br>5.9090 | 15.875<br>0.6250 | 294000<br>66100 | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 745            | 742-B      |
| 59.977<br>2.3613        | 100.000<br>3.9370 | 9.525<br>0.3750  | 98200<br>22100  | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500  | 28980          | 28921-B    |
| 59.987<br>2.3617        | 104.775<br>4.1250 | 10.320<br>0.4063 | 89600<br>20100  | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000  | 39236          | 39412-B    |
| 59.987<br>2.3617        | 129.944<br>5.1159 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 558-S          | 553-SB     |
| 59.987<br>2.3617        | 130.175<br>5.1250 | 16.637<br>0.6550 | 154000<br>34700 | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911244       | HM911210-B |
| 60.000<br>2.3622        | 100.000<br>3.9370 | 8.500<br>0.3346  | 80900<br>18200  | 0.47 | 1.27 | 21000<br>4710          | 17000<br>3820    | 1.24 | 101000<br>22800  | JP6049         | JP6010-B   |
| 60.000<br>2.3622        | 107.950<br>4.2500 | 10.320<br>0.4063 | 102000<br>22900 | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29580          | 29520-B    |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 10.320<br>0.4063 | 102000<br>22900 | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29580          | 29521-B    |
| 60.000<br>2.3622        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3977           | 3920-B     |
| 60.000<br>2.3622        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 476            | 472-B      |
| 60.325<br>2.3750        | 100.000<br>3.9370 | 9.525<br>0.3750  | 98200<br>22100  | 0.43 | 1.41 | 25500<br>5720          | 18500<br>4170    | 1.37 | 149000<br>33500  | 28985          | 28921-B    |
| 60.325<br>2.3750        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3980           | 3920-B     |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 558            | 552-B      |
| 60.325<br>2.3750        | 130.175<br>5.1250 | 19.050<br>0.7500 | 154000<br>34700 | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911245       | HM911210-B |
| 60.325<br>2.3750        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6376           | 6320-B     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                | Dimensions, mm (inches) |                 |                  |                |                | Factors                    |                                   |                          | Weight<br>kg (lbs.) |                                     |
|------------------|------------------|----------------|-------------------------|-----------------|------------------|----------------|----------------|----------------------------|-----------------------------------|--------------------------|---------------------|-------------------------------------|
|                  |                  |                | B                       | C               | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. |                     | Housing<br>backing<br>shoulder dia. |
| R <sup>(4)</sup> | d <sub>a</sub>   | d <sub>b</sub> |                         |                 |                  |                |                | D <sub>a</sub>             |                                   |                          |                     |                                     |
| 24.608<br>0.9688 | 19.446<br>0.7656 | -3.3<br>-0.13  | 101.498<br>3.9960       | 3.962<br>0.1560 | 3.5<br>0.14      | 63.0<br>2.48   | 70.0<br>2.76   | 94.0<br>3.70               | 54                                | 20.2                     | 0.0979              | 0.75<br>1.66                        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32  | 110.231<br>4.3398       | 5.558<br>0.2188 | 2.3<br>0.09      | 65.0<br>2.56   | 68.0<br>2.68   | 101.0<br>3.98              | 63.5                              | 16.9                     | 0.0971              | 1.12<br>2.48                        |
| 30.958<br>1.2188 | 23.812<br>0.9375 | -8.1<br>-0.32  | 110.231<br>4.3398       | 5.558<br>0.2188 | 6.4<br>0.25      | 65.0<br>2.56   | 76.0<br>2.99   | 101.0<br>3.98              | 63.5                              | 16.9                     | 0.0971              | 1.09<br>2.41                        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28  | 113.386<br>4.4640       | 5.558<br>0.2188 | 2.3<br>0.09      | 63.0<br>2.48   | 67.0<br>2.64   | 100.0<br>3.94              | 58.6                              | 17.1                     | 0.0946              | 1.14<br>2.51                        |
| 29.317<br>1.1542 | 22.225<br>0.8750 | -7.1<br>-0.28  | 113.386<br>4.4640       | 5.558<br>0.2188 | 3.5<br>0.14      | 63.0<br>2.48   | 70.0<br>2.76   | 100.0<br>3.94              | 58.6                              | 17.1                     | 0.0946              | 1.14<br>2.50                        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18  | 117.373<br>4.6210       | 4.762<br>0.1875 | 3.5<br>0.14      | 66.0<br>2.60   | 72.0<br>2.83   | 108.0<br>4.25              | 75.2                              | 21.3                     | 0.1092              | 1.41<br>3.10                        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -14.0<br>-0.55 | 127.691<br>5.0272       | 7.142<br>0.2812 | 3.5<br>0.14      | 66.0<br>2.60   | 72.0<br>2.83   | 110.0<br>4.33              | 75.9                              | 16.2                     | 0.0694              | 2.16<br>4.77                        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37  | 130.073<br>5.1210       | 6.350<br>0.2500 | 3.5<br>0.14      | 67.0<br>2.64   | 73.0<br>2.87   | 116.0<br>4.57              | 91                                | 21.1                     | 0.1108              | 2.22<br>4.89                        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76 | 143.579<br>5.6527       | 7.938<br>0.3125 | 4.3<br>0.17      | 72.0<br>2.83   | 80.0<br>3.15   | 126.0<br>4.96              | 124                               | 22.4                     | 0.0827              | 4.07<br>8.97                        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44 | 143.561<br>5.6520       | 7.137<br>0.2810 | 3.5<br>0.14      | 69.0<br>2.72   | 75.0<br>2.95   | 125.0<br>4.92              | 106                               | 21                       | 0.0814              | 3.11<br>6.86                        |
| 44.450<br>1.7500 | 34.925<br>1.3750 | -9.4<br>-0.37  | 152.400<br>6.0000       | 7.938<br>0.3125 | 3.5<br>0.14      | 71.0<br>2.79   | 80.0<br>3.15   | 120.0<br>4.72              | 83.2                              | 17.2                     | 0.0827              | 3.60<br>7.94                        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59 | 157.061<br>6.1835       | 7.938<br>0.3125 | 3.5<br>0.14      | 75.0<br>2.95   | 81.0<br>3.19   | 140.0<br>5.51              | 158                               | 29.1                     | 0.0931              | 5.20<br>11.46                       |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18  | 117.373<br>4.6210       | 4.762<br>0.1875 | 3.5<br>0.14      | 67.0<br>2.64   | 73.0<br>2.87   | 108.0<br>4.25              | 75.2                              | 21.3                     | 0.1092              | 1.37<br>3.02                        |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47 | 157.912<br>6.2170       | 7.938<br>0.3125 | 3.5<br>0.14      | 75.0<br>2.95   | 81.0<br>3.19   | 143.0<br>5.63              | 160                               | 26.3                     | 0.0898              | 4.39<br>9.68                        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10  | 103.962<br>4.0930       | 3.970<br>0.1563 | 3.5<br>0.14      | 67.0<br>2.64   | 73.0<br>2.87   | 98.0<br>3.86               | 60.1                              | 24.5                     | 0.1032              | 0.79<br>1.75                        |
| 22.000<br>0.8661 | 15.875<br>0.6250 | -1.5<br>-0.06  | 109.433<br>4.3084       | 4.762<br>0.1875 | 2.3<br>0.09      | 67.0<br>2.64   | 71.0<br>2.80   | 102.0<br>4.02              | 51.7                              | 19.5                     | 0.0947              | 0.77<br>1.71                        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37  | 136.025<br>5.3553       | 6.350<br>0.2500 | 3.5<br>0.14      | 69.0<br>2.72   | 75.0<br>2.95   | 116.0<br>4.57              | 91                                | 21.1                     | 0.1108              | 2.45<br>5.41                        |
| 30.924<br>1.2175 | 23.812<br>0.9375 | 7.9<br>0.31    | 136.525<br>5.3750       | 6.350<br>0.2500 | 3.5<br>0.14      | 74.5<br>2.93   | 84.0<br>3.31   | 123.5<br>4.87              | 56.4                              | 16.5                     | 0.0842              | 2.09<br>4.60                        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | 1.3<br>0.05    | 105.000<br>4.1339       | 3.000<br>0.1181 | 2.0<br>0.08      | 66.0<br>2.60   | 69.0<br>2.72   | 98.0<br>3.86               | 39.5                              | 22.5                     | 0.0922              | 0.62<br>1.37                        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03  | 111.816<br>4.4022       | 3.970<br>0.1563 | 3.5<br>0.14      | 68.0<br>2.68   | 75.0<br>2.95   | 105.0<br>4.13              | 70.3                              | 25.8                     | 0.1112              | 1.02<br>2.26                        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03  | 113.800<br>4.4803       | 3.970<br>0.1563 | 3.5<br>0.14      | 68.0<br>2.68   | 75.0<br>2.95   | 105.0<br>4.13              | 70.3                              | 25.8                     | 0.1112              | 1.08<br>2.37                        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18  | 117.373<br>4.6210       | 4.762<br>0.1875 | 3.5<br>0.14      | 68.0<br>2.68   | 74.0<br>2.91   | 108.0<br>4.25              | 75.2                              | 21.3                     | 0.1092              | 1.34<br>2.96                        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16  | 125.435<br>4.9384       | 5.537<br>0.2180 | 2.0<br>0.08      | 69.0<br>2.72   | 73.0<br>2.87   | 115.0<br>4.53              | 77.2                              | 23                       | 0.1083              | 1.59<br>3.51                        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | -2.5<br>-0.10  | 103.962<br>4.0930       | 3.970<br>0.1563 | 3.5<br>0.14      | 67.0<br>2.64   | 73.0<br>2.87   | 98.0<br>3.86               | 60.1                              | 24.5                     | 0.1032              | 0.79<br>1.73                        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18  | 117.373<br>4.6210       | 4.762<br>0.1875 | 3.5<br>0.14      | 68.0<br>2.68   | 75.0<br>2.95   | 108.0<br>4.25              | 75.2                              | 21.3                     | 0.1092              | 1.34<br>2.95                        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37  | 130.073<br>5.1210       | 6.350<br>0.2500 | 2.3<br>0.09      | 69.0<br>2.72   | 73.0<br>2.87   | 116.0<br>4.57              | 91                                | 21.1                     | 0.1108              | 2.14<br>4.72                        |
| 33.338<br>1.3125 | 23.812<br>0.9375 | 5.3<br>0.21    | 136.525<br>5.3750       | 6.350<br>0.2500 | 5.0<br>0.20      | 74.5<br>2.93   | 87.0<br>3.43   | 123.5<br>4.87              | 56.4                              | 16.5                     | 0.0842              | 2.15<br>4.75                        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76 | 143.579<br>5.6527       | 7.938<br>0.3125 | 3.5<br>0.14      | 74.0<br>2.91   | 81.0<br>3.19   | 126.0<br>4.96              | 124                               | 22.4                     | 0.0827              | 3.94<br>8.70                        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

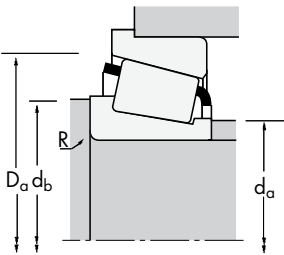
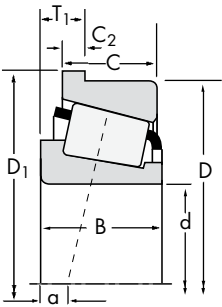


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 637            | 632-B      |
| 60.325<br>2.3750        | 161.925<br>6.3750 | 23.012<br>0.9060 | 275000<br>61900 | 0.71 | 0.85 | 71400<br>16100         | 86700<br>19500   | 0.82 | 330000<br>74200  | 9275           | 9221-B     |
| 61.912<br>2.4375        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 554            | 552-B      |
| 61.912<br>2.4375        | 130.175<br>5.1250 | 19.050<br>0.7500 | 154000<br>34700 | 0.82 | 0.73 | 40000<br>9000          | 56200<br>12600   | 0.71 | 183000<br>41100  | HM911249       | HM911210-B |
| 63.500<br>2.5000        | 104.775<br>4.1250 | 10.320<br>0.4063 | 89600<br>20100  | 0.39 | 1.55 | 23200<br>5220          | 15400<br>3470    | 1.51 | 120000<br>27000  | 39250          | 39412-B    |
| 63.500<br>2.5000        | 107.950<br>4.2500 | 10.320<br>0.4063 | 102000<br>22900 | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29585          | 29520-B    |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 7.917<br>0.3117  | 91600<br>20600  | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100  | 395            | 3920-B     |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3982           | 3920-B     |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 477            | 472-B      |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 483            | 472-B      |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 559            | 552-B      |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 565            | 563-B      |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 16.637<br>0.6550 | 252000<br>56700 | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400  | H414235        | H414210-B  |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 639            | 632-B      |
| 63.500<br>2.5000        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6475           | 6420-B     |
| 64.960<br>2.5575        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6464           | 6420-B     |
| 64.963<br>2.5576        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 569            | 563-B      |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 478            | 472-B      |
| 65.088<br>2.5625        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6379           | 6320-B     |
| 65.883<br>2.5938        | 122.238<br>4.8125 | 13.495<br>0.5313 | 219000<br>49200 | 0.36 | 1.67 | 56800<br>12800         | 34800<br>7830    | 1.63 | 327000<br>73500  | 5595           | 5535-B     |
| 66.675<br>2.6250        | 107.950<br>4.2500 | 10.320<br>0.4063 | 102000<br>22900 | 0.46 | 1.31 | 26400<br>5950          | 20800<br>4670    | 1.27 | 161000<br>36300  | 29590          | 29520-B    |
| 66.675<br>2.6250        | 112.712<br>4.4375 | 11.112<br>0.4375 | 129000<br>28900 | 0.40 | 1.49 | 33300<br>7490          | 22900<br>5160    | 1.45 | 191000<br>43000  | 3984           | 3920-B     |
| 66.675<br>2.6250        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 479            | 472-B      |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 14.288<br>0.5625 | 177000<br>39700 | 0.35 | 1.73 | 45800<br>10300         | 27100<br>6100    | 1.69 | 248000<br>55700  | 560            | 552-B      |
| 66.675<br>2.6250        | 130.200<br>5.1260 | 19.865<br>0.7821 | 179000<br>40300 | 0.50 | 1.20 | 46400<br>10400         | 39900<br>8970    | 1.16 | 256000<br>57600  | HM813844       | HM813815-B |
| 66.675<br>2.6250        | 135.755<br>5.3447 | 17.462<br>0.6875 | 298000<br>66900 | 0.32 | 1.85 | 77200<br>17300         | 42900<br>9640    | 1.80 | 404000<br>90900  | 6386           | 6320-B     |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 641            | 632-B      |
| 66.675<br>2.6250        | 139.700<br>5.5000 | 17.462<br>0.6875 | 249000<br>56000 | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715341        | H715310-B  |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810                   | 3.5<br>0.14              | 72.0<br>2.83                        | 78.0<br>3.07   | 125.0<br>4.92  | 106            | 21             | 0.0814              | 3.02<br>6.65        |
| 46.038<br>1.8125 | 30.162<br>1.1875 | 1.8<br>0.07      | 171.450<br>6.7500          | 7.137<br>0.2810                   | 3.5<br>0.14              | 86.0<br>3.39                        | 92.0<br>3.62   | 153.0<br>6.03  | 102            | 18.4           | 0.0984              | 4.83<br>10.64       |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 130.073<br>5.1210          | 6.350<br>0.2500                   | 3.5<br>0.14              | 71.0<br>2.80                        | 77.0<br>3.03   | 116.0<br>4.57  | 91             | 21.1           | 0.1108              | 2.09<br>4.61        |
| 33.338<br>1.3125 | 23.812<br>0.9375 | 5.3<br>0.21      | 136.525<br>5.3750          | 6.350<br>0.2500                   | 3.5<br>0.14              | 74.0<br>2.91                        | 91.0<br>3.58   | 123.5<br>4.87  | 56.4           | 16.5           | 0.0842              | 2.13<br>4.68        |
| 22.000<br>0.8661 | 15.875<br>0.6250 | -1.5<br>-0.06    | 109.433<br>4.3084          | 4.762<br>0.1875                   | 2.0<br>0.08              | 69.0<br>2.72                        | 73.0<br>2.87   | 102.0<br>4.02  | 51.7           | 19.5           | 0.0947              | 0.72<br>1.59        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 111.816<br>4.4022          | 3.970<br>0.1563                   | 3.5<br>0.14              | 71.0<br>2.80                        | 77.0<br>3.03   | 105.0<br>4.13  | 70.3           | 25.8           | 0.1112              | 0.96<br>2.11        |
| 21.996<br>0.8660 | 23.812<br>0.9375 | -0.8<br>-0.03    | 117.373<br>4.6210          | 4.762<br>0.1875                   | 3.5<br>0.14              | 70.0<br>2.76                        | 77.0<br>3.03   | 108.0<br>4.25  | 56             | 21.4           | 0.0984              | 1.05<br>2.31        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 117.373<br>4.6210          | 4.762<br>0.1875                   | 3.5<br>0.14              | 71.0<br>2.80                        | 77.0<br>3.03   | 108.0<br>4.25  | 75.2           | 21.3           | 0.1092              | 1.26<br>2.78        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180                   | 0.8<br>0.03              | 72.0<br>2.83                        | 73.0<br>2.87   | 115.0<br>4.53  | 77.2           | 23             | 0.1083              | 1.52<br>3.35        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180                   | 3.5<br>0.14              | 72.0<br>2.83                        | 78.0<br>3.07   | 115.0<br>4.53  | 77.2           | 23             | 0.1083              | 1.51<br>3.32        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 130.073<br>5.1210          | 6.350<br>0.2500                   | 3.5<br>0.14              | 72.0<br>2.83                        | 78.0<br>3.07   | 116.0<br>4.57  | 91             | 21.1           | 0.1108              | 2.04<br>4.51        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 73.0<br>2.87                        | 80.0<br>3.15   | 121.0<br>4.76  | 101            | 24             | 0.1167              | 2.16<br>4.76        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -10.9<br>-0.43   | 143.637<br>5.6550          | 7.112<br>0.2800                   | 3.5<br>0.14              | 78.0<br>3.07                        | 82.0<br>3.23   | 130.0<br>5.12  | 113            | 22.8           | 0.0827              | 2.95<br>6.50        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810                   | 3.5<br>0.14              | 74.0<br>2.91                        | 81.0<br>3.19   | 125.0<br>4.92  | 106            | 21             | 0.0814              | 2.92<br>6.43        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 157.061<br>6.1835          | 7.938<br>0.3125                   | 3.5<br>0.14              | 80.0<br>3.15                        | 86.0<br>3.39   | 140.0<br>5.51  | 158            | 29.1           | 0.0931              | 4.94<br>10.90       |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 157.061<br>6.1835          | 7.938<br>0.3125                   | 3.5<br>0.14              | 81.0<br>3.19                        | 87.0<br>3.43   | 140.0<br>5.51  | 158            | 29.1           | 0.0931              | 4.88<br>10.76       |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 74.0<br>2.91                        | 81.0<br>3.19   | 121.0<br>4.76  | 101            | 24             | 0.1167              | 2.12<br>4.67        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180                   | 2.3<br>0.09              | 73.0<br>2.87                        | 77.0<br>3.03   | 115.0<br>4.53  | 77.2           | 23             | 0.1083              | 1.48<br>3.26        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 143.579<br>5.6527          | 7.938<br>0.3125                   | 3.5<br>0.14              | 77.0<br>3.04                        | 84.0<br>3.31   | 126.0<br>4.96  | 124            | 22.4           | 0.0827              | 3.74<br>8.24        |
| 43.764<br>1.7230 | 36.512<br>1.4375 | -12.2<br>-0.48   | 128.588<br>5.0625          | 6.350<br>0.2500                   | 3.5<br>0.14              | 77.0<br>3.03                        | 83.0<br>3.27   | 118.0<br>4.65  | 110            | 24.2           | 0.0825              | 2.29<br>5.05        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | -0.8<br>-0.03    | 111.816<br>4.4022          | 3.970<br>0.1563                   | 3.5<br>0.14              | 73.0<br>2.87                        | 80.0<br>3.15   | 105.0<br>4.13  | 70.3           | 25.8           | 0.1112              | 0.89<br>1.97        |
| 30.048<br>1.1830 | 23.812<br>0.9375 | -4.6<br>-0.18    | 117.373<br>4.6210          | 4.762<br>0.1875                   | 3.5<br>0.14              | 74.0<br>2.91                        | 80.0<br>3.15   | 108.0<br>4.25  | 75.2           | 21.3           | 0.1092              | 1.19<br>2.61        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180                   | 2.3<br>0.09              | 74.0<br>2.91                        | 78.0<br>3.07   | 115.0<br>4.53  | 77.2           | 23             | 0.1083              | 1.44<br>3.17        |
| 36.678<br>1.4440 | 30.162<br>1.1875 | -9.4<br>-0.37    | 130.073<br>5.1210          | 6.350<br>0.2500                   | 3.5<br>0.14              | 75.0<br>2.95                        | 81.0<br>3.19   | 116.0<br>4.57  | 91             | 21.1           | 0.1108              | 1.95<br>4.30        |
| 36.512<br>1.4375 | 26.988<br>1.0625 | -3.8<br>-0.15    | 138.200<br>5.4410          | 10.340<br>0.4071                  | 3.5<br>0.14              | 82.0<br>3.23                        | 88.0<br>3.46   | 124.0<br>4.88  | 91.7           | 24.3           | 0.1252              | 2.26<br>4.98        |
| 56.007<br>2.2050 | 44.450<br>1.7500 | -19.3<br>-0.76   | 143.579<br>5.6527          | 7.938<br>0.3125                   | 4.3<br>0.17              | 77.0<br>3.04                        | 87.0<br>3.43   | 126.0<br>4.96  | 124            | 22.4           | 0.0827              | 3.66<br>8.07        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810                   | 3.5<br>0.14              | 77.0<br>3.03                        | 83.0<br>3.27   | 125.0<br>4.92  | 106            | 21             | 0.0814              | 2.81<br>6.20        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 152.400<br>6.0000          | 7.938<br>0.3125                   | 3.5<br>0.14              | 85.0<br>3.35                        | 91.0<br>3.58   | 135.0<br>5.31  | 147            | 32.8           | 0.0993              | 3.67<br>8.08        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B



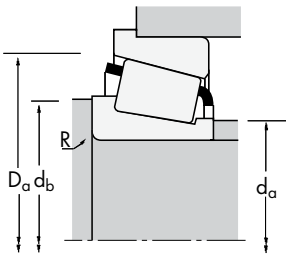
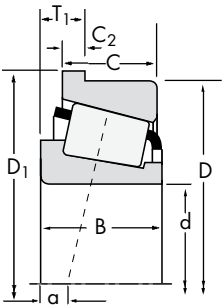


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 7.925<br>0.3120  | 91600<br>20600  | 0.40 | 1.49 | 23700<br>5340          | 16300<br>3670    | 1.45 | 125000<br>28100  | 399A           | 394AB      |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 480            | 472-B      |
| 68.262<br>2.6875        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 570            | 563-B      |
| 68.262<br>2.6875        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 642            | 632-B      |
| 68.262<br>2.6875        | 161.925<br>6.3750 | 24.600<br>0.9685 | 275000<br>61900 | 0.71 | 0.85 | 71400<br>16100         | 86700<br>19500   | 0.82 | 330000<br>74200  | 9278           | 9221-B     |
| 69.850<br>2.7500        | 112.712<br>4.4375 | 10.320<br>0.4063 | 102000<br>23000 | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29675          | 29620-B    |
| 69.850<br>2.7500        | 112.712<br>4.4375 | 11.112<br>0.4375 | 93400<br>21000  | 0.42 | 1.44 | 24200<br>5450          | 17300<br>3880    | 1.40 | 130000<br>29300  | LM613449       | LM613410-B |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 482            | 472-B      |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 566            | 563-B      |
| 69.850<br>2.7500        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 643            | 632-B      |
| 69.850<br>2.7500        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6454           | 6420-B     |
| 69.850<br>2.7500        | 150.089<br>5.9090 | 15.875<br>0.6250 | 294000<br>66100 | 0.33 | 1.84 | 76300<br>17100         | 42500<br>9550    | 1.80 | 417000<br>93800  | 745A           | 742-B      |
| 69.850<br>2.7500        | 152.400<br>6.0000 | 16.667<br>0.6562 | 229000<br>51400 | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 655            | 652-B      |
| 69.850<br>2.7500        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100 | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 835            | 832-B      |
| 69.952<br>2.7540        | 122.238<br>4.8125 | 7.938<br>0.3125  | 94600<br>21300  | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34274          | 34481-B    |
| 70.000<br>2.7559        | 110.000<br>4.3307 | 8.500<br>0.3346  | 84800<br>19100  | 0.46 | 1.30 | 22000<br>4940          | 17400<br>3900    | 1.27 | 112000<br>25200  | JP7049         | JP7010-B   |
| 70.000<br>2.7559        | 120.000<br>4.7244 | 11.095<br>0.4368 | 133000<br>29900 | 0.38 | 1.56 | 34400<br>7740          | 22700<br>5100    | 1.52 | 186000<br>41900  | 484            | 472-B      |
| 70.000<br>2.7559        | 122.238<br>4.8125 | 7.938<br>0.3125  | 94600<br>21300  | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34275          | 34481-B    |
| 71.438<br>2.8125        | 117.475<br>4.6250 | 11.112<br>0.4375 | 128000<br>28800 | 0.44 | 1.38 | 33200<br>7470          | 24800<br>5570    | 1.34 | 197000<br>44300  | 33281          | 33462-B    |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567A           | 563-B      |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 16.637<br>0.6550 | 252000<br>56700 | 0.36 | 1.67 | 65400<br>14700         | 40300<br>9060    | 1.62 | 335000<br>75400  | H414249        | H414210-B  |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 16.662<br>0.6560 | 216000<br>48500 | 0.36 | 1.66 | 55900<br>12600         | 34700<br>7790    | 1.61 | 298000<br>67000  | 645            | 632-B      |
| 71.438<br>2.8125        | 139.700<br>5.5000 | 17.462<br>0.6875 | 249000<br>56000 | 0.47 | 1.27 | 64600<br>14500         | 52300<br>11800   | 1.24 | 405000<br>91000  | H715345        | H715310-B  |
| 73.025<br>2.8750        | 112.712<br>4.4375 | 10.320<br>0.4063 | 102000<br>23000 | 0.49 | 1.23 | 26500<br>5960          | 22100<br>4980    | 1.20 | 166000<br>37200  | 29685          | 29620-B    |
| 73.025<br>2.8750        | 117.475<br>4.6250 | 11.112<br>0.4375 | 109000<br>24500 | 0.51 | 1.18 | 28300<br>6360          | 24700<br>5550    | 1.15 | 183000<br>41200  | LM814845       | LM814810-B |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567            | 563-B      |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 567X           | 563-B      |
| 73.025<br>2.8750        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6460           | 6420-B     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.



| Bearing          |                  |                  | Dimensions, mm (inches)    |                 |                                   |                |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------|-----------------------------------|----------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius |                 | Shaft<br>backing<br>shoulder dia. |                | Housing<br>backing<br>shoulder dia. |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>  | R <sup>(4)</sup>                  | d <sub>a</sub> | d <sub>b</sub>                      | D <sub>a</sub> |                |                |                |                     |
| 21.996<br>0.8660 | 18.825<br>0.7411 | -0.8<br>-0.03    | 114.673<br>4.5147          | 4.750<br>0.1870 | 2.3<br>0.09                       | 74.0<br>2.91   | 78.0<br>3.07                        | 106.0<br>4.17  | 56             | 21.4           | 0.0984         | 0.78<br>1.73        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180 | 3.5<br>0.14                       | 75.0<br>2.95   | 82.0<br>3.23                        | 115.0<br>4.53  | 77.2           | 23             | 0.1083         | 1.40<br>3.08        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500 | 3.5<br>0.14                       | 77.0<br>3.03   | 83.0<br>3.27                        | 121.0<br>4.76  | 101            | 24             | 0.1167         | 2.02<br>4.45        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810 | 3.5<br>0.14                       | 78.0<br>3.07   | 85.0<br>3.35                        | 125.0<br>4.92  | 106            | 21             | 0.0814         | 2.76<br>6.08        |
| 46.038<br>1.8125 | 30.162<br>1.1875 | 0.0<br>0.00      | 171.450<br>6.7500          | 7.137<br>0.2810 | 3.5<br>0.14                       | 90.5<br>3.56   | 97.0<br>3.82                        | 153.0<br>6.03  | 102            | 18.4           | 0.0984         | 4.59<br>10.12       |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04      | 116.586<br>4.5900          | 3.970<br>0.1563 | 1.5<br>0.06                       | 77.0<br>3.03   | 80.0<br>3.15                        | 110.0<br>4.33  | 77.7           | 43.3           | 0.1170         | 1.00<br>2.20        |
| 21.996<br>0.8660 | 15.875<br>0.6250 | 0.0<br>0.00      | 119.062<br>4.6875          | 4.762<br>0.1875 | 1.5<br>0.06                       | 76.0<br>2.99   | 78.0<br>3.07                        | 110.0<br>4.33  | 60.3           | 23.1           | 0.1019         | 0.83<br>1.82        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180 | 3.5<br>0.14                       | 77.0<br>3.03   | 83.0<br>3.27                        | 115.0<br>4.53  | 77.2           | 23             | 0.1083         | 1.36<br>2.99        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500 | 3.5<br>0.14                       | 78.0<br>3.07   | 85.0<br>3.35                        | 121.0<br>4.76  | 101            | 24             | 0.1167         | 1.97<br>4.34        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810 | 3.5<br>0.14                       | 80.0<br>3.15   | 86.0<br>3.39                        | 125.0<br>4.92  | 106            | 21             | 0.0814         | 2.70<br>5.96        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 157.061<br>6.1835          | 7.938<br>0.3125 | 5.0<br>0.20                       | 85.0<br>3.35   | 94.0<br>3.70                        | 140.0<br>5.51  | 158            | 29.1           | 0.0931         | 4.65<br>10.25       |
| 46.672<br>1.8375 | 36.512<br>1.4375 | -11.9<br>-0.47   | 157.912<br>6.2170          | 7.938<br>0.3125 | 3.5<br>0.14                       | 82.0<br>3.23   | 88.0<br>3.46                        | 143.0<br>5.63  | 160            | 26.3           | 0.0898         | 4.02<br>8.87        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 159.441<br>6.2772          | 7.142<br>0.2812 | 3.5<br>0.14                       | 82.0<br>3.23   | 88.0<br>3.46                        | 141.0<br>5.55  | 137            | 27.3           | 0.0919         | 3.70<br>8.16        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750 | 3.5<br>0.14                       | 84.0<br>3.31   | 91.0<br>3.58                        | 155.0<br>6.10  | 198            | 34.8           | 0.0937         | 6.28<br>13.84       |
| 23.012<br>0.9060 | 21.430<br>0.8437 | 1.5<br>0.06      | 126.901<br>4.9961          | 4.762<br>0.1875 | 2.0<br>0.08                       | 78.0<br>3.07   | 81.0<br>3.19                        | 118.0<br>4.65  | 69.3           | 27             | 0.1093         | 1.18<br>2.60        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | 2.5<br>0.10      | 116.000<br>4.5669          | 3.000<br>0.1181 | 2.0<br>0.08                       | 76.0<br>2.99   | 80.0<br>3.15                        | 105.5<br>4.15  | 51.1           | 30.9           | 0.0995         | 0.70<br>1.55        |
| 29.007<br>1.1420 | 24.237<br>0.9542 | -4.1<br>-0.16    | 125.435<br>4.9384          | 5.537<br>0.2180 | 2.0<br>0.08                       | 77.0<br>3.03   | 80.0<br>3.15                        | 115.0<br>4.53  | 77.2           | 23             | 0.1083         | 1.36<br>3.00        |
| 23.012<br>0.9060 | 21.430<br>0.8437 | 1.5<br>0.06      | 126.901<br>4.9961          | 4.762<br>0.1875 | 2.0<br>0.08                       | 78.0<br>3.07   | 82.0<br>3.23                        | 118.0<br>4.65  | 69.3           | 27             | 0.1093         | 1.18<br>2.60        |
| 30.162<br>1.1875 | 23.812<br>0.9375 | -2.8<br>-0.11    | 122.133<br>4.8084          | 4.762<br>0.1875 | 3.5<br>0.14                       | 79.0<br>3.11   | 85.0<br>3.35                        | 114.0<br>4.49  | 84.2           | 24.4           | 0.1162         | 1.29<br>2.85        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500 | 3.5<br>0.14                       | 80.0<br>3.15   | 86.0<br>3.39                        | 121.0<br>4.76  | 101            | 24             | 0.1167         | 1.92<br>4.23        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -10.9<br>-0.43   | 143.637<br>5.6550          | 7.112<br>0.2800 | 3.5<br>0.14                       | 83.0<br>3.27   | 89.0<br>3.50                        | 130.0<br>5.12  | 113            | 22.8           | 0.0827         | 2.68<br>5.90        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -11.2<br>-0.44   | 143.561<br>5.6520          | 7.137<br>0.2810 | 6.4<br>0.25                       | 81.0<br>3.19   | 93.0<br>3.66                        | 125.0<br>4.92  | 106            | 21             | 0.0814         | 2.62<br>5.77        |
| 46.038<br>1.8125 | 36.512<br>1.4375 | -8.6<br>-0.34    | 152.400<br>6.0000          | 7.938<br>0.3125 | 3.5<br>0.14                       | 88.0<br>3.46   | 94.0<br>3.70                        | 135.0<br>5.31  | 147            | 32.8           | 0.0993         | 3.48<br>7.68        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 1.0<br>0.04      | 116.586<br>4.5900          | 3.970<br>0.1563 | 3.5<br>0.14                       | 80.0<br>3.15   | 86.0<br>3.39                        | 110.0<br>4.33  | 77.7           | 43.3           | 0.1170         | 0.92<br>2.03        |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 2.3<br>0.09      | 122.133<br>4.8084          | 4.762<br>0.1875 | 3.5<br>0.14                       | 81.0<br>3.19   | 87.0<br>3.43                        | 116.0<br>4.57  | 88.6           | 36.6           | 0.1239         | 1.07<br>2.35        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500 | 3.5<br>0.14                       | 81.0<br>3.19   | 88.0<br>3.46                        | 121.0<br>4.76  | 101            | 24             | 0.1167         | 1.87<br>4.12        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500 | 4.8<br>0.19                       | 81.0<br>3.19   | 90.0<br>3.54                        | 121.0<br>4.76  | 101            | 24             | 0.1167         | 1.87<br>4.13        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 157.061<br>6.1835          | 7.938<br>0.3125 | 3.5<br>0.14                       | 87.0<br>3.43   | 93.0<br>3.66                        | 140.0<br>5.51  | 158            | 29.1           | 0.0931         | 4.51<br>9.94        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

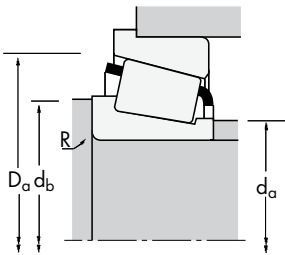
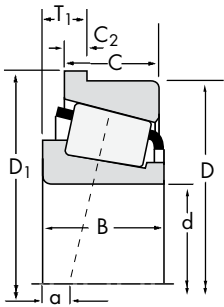


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)     |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|-----------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 73.025<br>2.8750        | 152.400<br>6.0000 | 16.667<br>0.6562 | 229000<br>51400 | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 657            | 652-B      |
| 73.817<br>2.9062        | 127.000<br>5.0000 | 14.288<br>0.5625 | 182000<br>40900 | 0.36 | 1.65 | 47100<br>10600         | 29400<br>6600    | 1.61 | 262000<br>58900  | 568            | 563-B      |
| 74.612<br>2.9375        | 139.992<br>5.5115 | 14.288<br>0.5625 | 191000<br>43000 | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 577            | 572-B      |
| 76.200<br>3.0000        | 122.238<br>4.8125 | 7.938<br>0.3125  | 94600<br>21300  | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34300          | 34481-B    |
| 76.200<br>3.0000        | 122.238<br>4.8125 | 7.940<br>0.3126  | 94600<br>21300  | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34301          | 34481-B    |
| 76.200<br>3.0000        | 125.412<br>4.9375 | 10.317<br>0.4062 | 109000<br>24400 | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27684          | 27620-B    |
| 76.200<br>3.0000        | 130.000<br>5.1181 | 13.495<br>0.5313 | 149000<br>33500 | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800  | 42687          | 42623-B    |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 13.475<br>0.5305 | 143000<br>32100 | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 495A           | 493-B      |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 14.288<br>0.5625 | 191000<br>43000 | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 575            | 572-B      |
| 76.200<br>3.0000        | 149.225<br>5.8750 | 17.462<br>0.6875 | 321000<br>72200 | 0.36 | 1.66 | 83300<br>18700         | 51600<br>11600   | 1.61 | 463000<br>104000 | 6461           | 6420-B     |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 17.450<br>0.6870 | 303000<br>68100 | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 755            | 752-B      |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 19.050<br>0.7500 | 343000<br>77200 | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6575           | 6535-B     |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 24.600<br>0.9685 | 275000<br>61900 | 0.71 | 0.85 | 71400<br>16100         | 86700<br>19500   | 0.82 | 330000<br>74200  | 9285           | 9221-B     |
| 76.200<br>3.0000        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100 | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 837            | 832-B      |
| 77.788<br>3.0625        | 117.475<br>4.6250 | 11.112<br>0.4375 | 109000<br>24500 | 0.51 | 1.18 | 28300<br>6360          | 24700<br>5550    | 1.15 | 183000<br>41200  | LM814849       | LM814810-B |
| 77.788<br>3.0625        | 122.238<br>4.8125 | 7.938<br>0.3125  | 94600<br>21300  | 0.45 | 1.33 | 24500<br>5510          | 18900<br>4260    | 1.30 | 136000<br>30600  | 34306          | 34481-B    |
| 77.788<br>3.0625        | 127.000<br>5.0000 | 13.495<br>0.5313 | 149000<br>33500 | 0.42 | 1.43 | 38700<br>8690          | 27700<br>6230    | 1.39 | 222000<br>49800  | 42690          | 42620-B    |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000 | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 595A           | 592-B      |
| 79.985<br>3.1490        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000 | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 590            | 592-B      |
| 80.000<br>3.1496        | 125.000<br>4.9213 | 10.500<br>0.4134 | 105000<br>23600 | 0.45 | 1.33 | 27200<br>6110          | 21000<br>4730    | 1.29 | 141000<br>31800  | JP8049         | JP8010-B   |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 12.700<br>0.5000 | 167000<br>37600 | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47681          | 47620-B    |
| 80.962<br>3.1875        | 136.525<br>5.3750 | 13.475<br>0.5305 | 143000<br>32100 | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 496            | 493-B      |
| 80.962<br>3.1875        | 139.992<br>5.5115 | 14.288<br>0.5625 | 191000<br>43000 | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 581            | 572-B      |
| 80.962<br>3.1875        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100 | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 838            | 832-B      |
| 82.550<br>3.2500        | 115.888<br>4.5625 | 7.938<br>0.3125  | 83500<br>18800  | 0.31 | 1.95 | 21700<br>4870          | 11400<br>2570    | 1.90 | 147000<br>33100  | L116149        | L116110-B  |
| 82.550<br>3.2500        | 125.412<br>4.9375 | 10.317<br>0.4062 | 109000<br>24400 | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27687          | 27620-B    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 12.700<br>0.5000 | 167000<br>37600 | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47685          | 47620-B    |
| 82.550<br>3.2500        | 133.350<br>5.2500 | 12.700<br>0.5000 | 167000<br>37600 | 0.40 | 1.48 | 43400<br>9750          | 30000<br>6750    | 1.44 | 262000<br>58900  | 47686          | 47620-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 159.441<br>6.2772          | 7.142<br>0.2812                   | 3.5<br>0.14              | 85.0<br>3.35                        | 91.0<br>3.58   | 141.0<br>5.55  | 137            | 27.3           | 0.0919              | 3.58<br>7.90        |
| 36.170<br>1.4240 | 28.575<br>1.1250 | -8.1<br>-0.32    | 133.248<br>5.2460          | 6.350<br>0.2500                   | 0.8<br>0.03              | 82.0<br>3.23                        | 83.0<br>3.27   | 121.0<br>4.76  | 101            | 24             | 0.1167              | 1.86<br>4.09        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 146.240<br>5.7575          | 6.350<br>0.2500                   | 3.5<br>0.14              | 85.0<br>3.35                        | 91.0<br>3.58   | 134.0<br>5.28  | 126            | 32             | 0.1295              | 2.48<br>5.47        |
| 23.012<br>0.9060 | 21.430<br>0.8437 | 1.5<br>0.06      | 126.901<br>4.9961          | 4.762<br>0.1875                   | 2.0<br>0.08              | 83.0<br>3.27                        | 86.0<br>3.39   | 118.0<br>4.65  | 69.3           | 27             | 0.1093              | 1.05<br>2.32        |
| 23.012<br>0.9060 | 21.430<br>0.8437 | 1.5<br>0.06      | 126.901<br>4.9961          | 4.762<br>0.1875                   | 3.5<br>0.14              | 83.0<br>3.27                        | 89.0<br>3.50   | 118.0<br>4.65  | 69.3           | 27             | 0.1093              | 1.04<br>2.30        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | 0.5<br>0.02      | 130.076<br>5.1211          | 4.762<br>0.1875                   | 3.5<br>0.14              | 84.0<br>3.31                        | 91.0<br>3.58   | 123.0<br>4.84  | 98.2           | 41.8           | 0.1198              | 1.25<br>2.76        |
| 31.000<br>1.2205 | 22.225<br>0.8750 | -2.8<br>-0.11    | 135.456<br>5.3329          | 5.558<br>0.2188                   | 3.5<br>0.14              | 84.0<br>3.31                        | 90.0<br>3.54   | 124.0<br>4.88  | 96.2           | 28.6           | 0.1197              | 1.62<br>3.58        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 141.961<br>5.5890          | 5.537<br>0.2180                   | 3.5<br>0.14              | 86.0<br>3.39                        | 92.0<br>3.62   | 131.0<br>5.16  | 105            | 29.3           | 0.1252              | 1.85<br>4.09        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 146.240<br>5.7575          | 6.350<br>0.2500                   | 3.5<br>0.14              | 86.0<br>3.39                        | 92.0<br>3.62   | 134.0<br>5.28  | 126            | 32             | 0.1295              | 2.43<br>5.35        |
| 54.229<br>2.1350 | 44.450<br>1.7500 | -15.0<br>-0.59   | 157.061<br>6.1835          | 7.938<br>0.3125                   | 3.5<br>0.14              | 89.5<br>3.52                        | 96.0<br>3.78   | 140.0<br>5.51  | 158            | 29.1           | 0.0931              | 4.35<br>9.59        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 169.748<br>6.6830          | 7.925<br>0.3120                   | 3.5<br>0.14              | 88.0<br>3.46                        | 95.0<br>3.74   | 150.0<br>5.91  | 177            | 29.4           | 0.0945              | 4.82<br>10.63       |
| 55.100<br>2.1693 | 42.862<br>1.6875 | -13.2<br>-0.52   | 171.450<br>6.7500          | 7.938<br>0.3125                   | 6.4<br>0.25              | 92.0<br>3.62                        | 104.0<br>4.09  | 155.0<br>6.10  | 199            | 33.5           | 0.1037              | 5.43<br>11.98       |
| 46.038<br>1.8125 | 30.162<br>1.1875 | 0.0<br>0.00      | 171.450<br>6.7500          | 7.137<br>0.2810                   | 3.5<br>0.14              | 90.5<br>3.56                        | 103.0<br>4.06  | 153.0<br>6.03  | 102            | 18.4           | 0.0984              | 4.27<br>9.40        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750                   | 0.8<br>0.03              | 89.0<br>3.50                        | 90.0<br>3.54   | 155.0<br>6.10  | 198            | 34.8           | 0.0937              | 5.97<br>13.15       |
| 25.400<br>1.0000 | 19.050<br>0.7500 | 2.3<br>0.09      | 122.133<br>4.8084          | 4.762<br>0.1875                   | 3.5<br>0.14              | 85.0<br>3.35                        | 91.0<br>3.58   | 116.0<br>4.57  | 88.6           | 36.6           | 0.1239              | 0.95<br>2.11        |
| 23.012<br>0.9060 | 21.430<br>0.8437 | 1.5<br>0.06      | 126.901<br>4.9961          | 4.762<br>0.1875                   | 3.5<br>0.14              | 84.0<br>3.31                        | 90.0<br>3.54   | 118.0<br>4.65  | 69.3           | 27             | 0.1093              | 1.01<br>2.22        |
| 31.000<br>1.2205 | 22.225<br>0.8750 | -2.8<br>-0.11    | 133.248<br>5.2460          | 5.558<br>0.2188                   | 3.5<br>0.14              | 85.0<br>3.35                        | 91.0<br>3.58   | 124.0<br>4.88  | 96.2           | 28.6           | 0.1197              | 1.44<br>3.18        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 91.0<br>3.58                        | 98.0<br>3.86   | 144.0<br>5.67  | 151            | 38.3           | 0.1416              | 3.19<br>7.03        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 91.0<br>3.58                        | 98.0<br>3.86   | 144.0<br>5.67  | 151            | 38.3           | 0.1416              | 3.17<br>6.98        |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 2.3<br>0.09      | 132.000<br>5.1969          | 4.000<br>0.1575                   | 2.0<br>0.08              | 86.0<br>3.39                        | 89.0<br>3.50   | 129.0<br>5.08  | 69.7           | 37.4           | 0.1095              | 1.01<br>2.22        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 138.811<br>5.4650          | 5.558<br>0.2188                   | 3.5<br>0.14              | 89.0<br>3.50                        | 95.0<br>3.74   | 130.0<br>5.12  | 119            | 29.2           | 0.1273              | 1.90<br>4.18        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 141.961<br>5.5890          | 5.537<br>0.2180                   | 3.5<br>0.14              | 89.0<br>3.50                        | 95.0<br>3.74   | 131.0<br>5.16  | 105            | 29.3           | 0.1252              | 1.72<br>3.79        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 146.240<br>5.7575          | 6.350<br>0.2500                   | 3.5<br>0.14              | 90.0<br>3.54                        | 96.0<br>3.78   | 134.0<br>5.28  | 126            | 32             | 0.1295              | 2.26<br>4.98        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750                   | 0.8<br>0.03              | 93.0<br>3.66                        | 94.0<br>3.70   | 155.0<br>6.10  | 198            | 34.8           | 0.0937              | 5.71<br>12.58       |
| 21.433<br>0.8438 | 16.670<br>0.6563 | -1.3<br>-0.05    | 119.855<br>4.7187          | 3.970<br>0.1563                   | 1.5<br>0.06              | 88.0<br>3.46                        | 90.0<br>3.54   | 113.0<br>4.45  | 97.2           | 64.3           | 0.1079              | 0.69<br>1.52        |
| 25.400<br>1.0000 | 19.845<br>0.7813 | 0.5<br>0.02      | 130.076<br>5.1211          | 4.762<br>0.1875                   | 3.5<br>0.14              | 89.0<br>3.50                        | 96.0<br>3.78   | 123.0<br>4.84  | 98.2           | 41.8           | 0.1198              | 1.10<br>2.41        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 138.811<br>5.4650          | 5.558<br>0.2188                   | 0.8<br>0.03              | 90.0<br>3.54                        | 91.0<br>3.58   | 130.0<br>5.12  | 119            | 29.2           | 0.1273              | 1.86<br>4.09        |
| 33.338<br>1.3125 | 26.195<br>1.0313 | -4.3<br>-0.17    | 138.811<br>5.4650          | 5.558<br>0.2188                   | 3.5<br>0.14              | 90.0<br>3.54                        | 97.0<br>3.82   | 130.0<br>5.12  | 119            | 29.2           | 0.1273              | 1.84<br>4.06        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

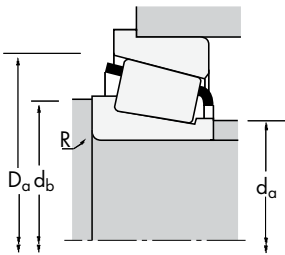
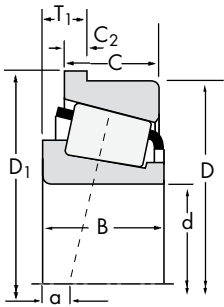


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)      |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|------------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>   | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 82.550<br>3.2500        | 136.525<br>5.3750 | 13.475<br>0.5305 | 143000<br>32100  | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 495            | 493-B      |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 14.288<br>0.5625 | 191000<br>43000  | 0.40 | 1.49 | 49600<br>11200         | 34300<br>7720    | 1.45 | 291000<br>65400  | 580            | 572-B      |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 595            | 592-B      |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 16.667<br>0.6562 | 229000<br>51400  | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 663            | 652-B      |
| 82.550<br>3.2500        | 161.925<br>6.3750 | 17.450<br>0.6870 | 303000<br>68100  | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 757            | 752-B      |
| 82.550<br>3.2500        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100  | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 839            | 832-B      |
| 82.550<br>3.2500        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100  | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 842            | 832-B      |
| 83.345<br>3.2813        | 125.412<br>4.9375 | 10.317<br>0.4062 | 109000<br>24400  | 0.42 | 1.44 | 28100<br>6320          | 20000<br>4500    | 1.40 | 178000<br>39900  | 27690          | 27620-B    |
| 84.138<br>3.3125        | 136.525<br>5.3750 | 13.475<br>0.5305 | 143000<br>32100  | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 498            | 493-B      |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 11.560<br>0.4550 | 149000<br>33600  | 0.44 | 1.35 | 38700<br>8700          | 29400<br>6620    | 1.31 | 245000<br>55100  | JM716649       | JM716610-B |
| 85.725<br>3.3750        | 136.525<br>5.3750 | 13.475<br>0.5305 | 143000<br>32100  | 0.44 | 1.35 | 37100<br>8330          | 28200<br>6340    | 1.31 | 216000<br>48600  | 497            | 493-B      |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596            | 592-B      |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 16.667<br>0.6562 | 229000<br>51400  | 0.41 | 1.47 | 59300<br>13300         | 41500<br>9330    | 1.43 | 335000<br>75300  | 665            | 652-B      |
| 85.725<br>3.3750        | 161.925<br>6.3750 | 17.450<br>0.6870 | 303000<br>68100  | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 758            | 752-B      |
| 85.725<br>3.3750        | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 677            | 672-B      |
| 85.725<br>3.3750        | 168.275<br>6.6250 | 22.225<br>0.8750 | 379000<br>85100  | 0.30 | 2.00 | 98200<br>22100         | 50300<br>11300   | 1.95 | 522000<br>117000 | 841            | 832-B      |
| 87.312<br>3.4375        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 596-S          | 592-B      |
| 88.900<br>3.5000        | 149.225<br>5.8750 | 12.700<br>0.5000 | 151000<br>33900  | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42350          | 42587-B    |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 593            | 592-B      |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 17.450<br>0.6870 | 303000<br>68100  | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 766            | 752-B      |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 17.462<br>0.6875 | 303000<br>68100  | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 759            | 752-B      |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 19.050<br>0.7500 | 343000<br>77200  | 0.40 | 1.50 | 89000<br>20000         | 61000<br>13700   | 1.46 | 523000<br>118000 | 6580           | 6535-B     |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 679            | 672-B      |
| 88.900<br>3.5000        | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 775            | 772-B      |
| 88.900<br>3.5000        | 190.500<br>7.5000 | 22.225<br>0.8750 | 424000<br>95300  | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000 | 855            | 854-B      |
| 88.900<br>3.5000        | 190.500<br>7.5000 | 22.225<br>0.8750 | 494000<br>111000 | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221434       | HH221410-B |
| 88.900<br>3.5000        | 200.000<br>7.8740 | 27.361<br>1.0772 | 376000<br>84600  | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98350          | 98788-B    |
| 90.000<br>3.5433        | 135.000<br>5.3150 | 10.500<br>0.4134 | 110000<br>24600  | 0.49 | 1.21 | 28400<br>6390          | 24000<br>5410    | 1.18 | 155000<br>34900  | JP9049         | JP9010-B   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 141.961<br>5.5890          | 5.537<br>0.2180                   | 3.5<br>0.14              | 90.0<br>3.54                        | 97.0<br>3.82   | 131.0<br>5.16  | 105            | 29.3           | 0.1252              | 1.67<br>3.68        |
| 36.098<br>1.4212 | 28.575<br>1.1250 | -5.3<br>-0.21    | 146.240<br>5.7575          | 6.350<br>0.2500                   | 3.5<br>0.14              | 91.0<br>3.58                        | 98.0<br>3.86   | 134.0<br>5.28  | 126            | 32             | 0.1295              | 2.21<br>4.86        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 93.0<br>3.66                        | 100.0<br>3.94  | 144.0<br>5.67  | 151            | 36.8           | 0.1416              | 3.07<br>6.78        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 159.441<br>6.2772          | 7.142<br>0.2812                   | 3.5<br>0.14              | 92.0<br>3.62                        | 99.0<br>3.90   | 141.0<br>5.55  | 137            | 27.3           | 0.0919              | 3.21<br>7.07        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 169.748<br>6.6830          | 7.925<br>0.3120                   | 3.5<br>0.14              | 94.0<br>3.70                        | 100.0<br>3.94  | 150.0<br>5.91  | 177            | 29.4           | 0.0945              | 4.52<br>9.97        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750                   | 0.8<br>0.03              | 94.0<br>3.70                        | 95.0<br>3.74   | 155.0<br>6.10  | 198            | 34.8           | 0.0937              | 5.62<br>12.38       |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750                   | 3.5<br>0.14              | 94.0<br>3.70                        | 101.0<br>3.98  | 155.0<br>6.10  | 198            | 34.8           | 0.0937              | 5.60<br>12.35       |
| 25.400<br>1.0000 | 19.845<br>0.7813 | 0.5<br>0.02      | 130.076<br>5.1211          | 4.762<br>0.1875                   | 3.5<br>0.14              | 90.0<br>3.54                        | 96.0<br>3.78   | 123.0<br>4.84  | 98.2           | 41.8           | 0.1198              | 1.07<br>2.37        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 141.961<br>5.5890          | 5.537<br>0.2180                   | 3.5<br>0.14              | 91.0<br>3.58                        | 98.0<br>3.86   | 131.0<br>5.16  | 105            | 29.3           | 0.1252              | 1.62<br>3.57        |
| 29.000<br>1.1417 | 24.000<br>0.9449 | -0.3<br>-0.01    | 135.448<br>5.3346          | 5.558<br>0.2188                   | 3.0<br>0.12              | 92.0<br>3.62                        | 98.0<br>3.86   | 127.0<br>5.00  | 117            | 36.6           | 0.1303              | 1.40<br>3.09        |
| 29.769<br>1.1720 | 22.225<br>0.8750 | -0.8<br>-0.03    | 141.961<br>5.5890          | 5.537<br>0.2180                   | 3.5<br>0.14              | 93.0<br>3.66                        | 99.0<br>3.90   | 131.0<br>5.16  | 105            | 29.3           | 0.1252              | 1.57<br>3.46        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 96.0<br>3.78                        | 102.0<br>4.02  | 144.0<br>5.67  | 151            | 36.8           | 0.1416              | 2.95<br>6.51        |
| 41.275<br>1.6250 | 31.750<br>1.2500 | -7.9<br>-0.31    | 159.441<br>6.2772          | 7.142<br>0.2812                   | 3.5<br>0.14              | 95.0<br>3.74                        | 102.0<br>4.02  | 141.0<br>5.55  | 137            | 27.3           | 0.0919              | 3.07<br>6.77        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 169.748<br>6.6830          | 7.925<br>0.3120                   | 3.5<br>0.14              | 97.0<br>3.82                        | 103.0<br>4.06  | 150.0<br>5.91  | 177            | 29.4           | 0.0945              | 4.37<br>9.62        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 175.336<br>6.9030          | 7.142<br>0.2812                   | 3.5<br>0.14              | 99.0<br>3.90                        | 105.0<br>4.13  | 160.0<br>6.30  | 182            | 37.2           | 0.1056              | 4.23<br>9.33        |
| 56.363<br>2.2190 | 41.275<br>1.6250 | -18.5<br>-0.73   | 177.698<br>6.9960          | 9.525<br>0.3750                   | 3.5<br>0.14              | 97.0<br>3.82                        | 104.0<br>4.09  | 155.0<br>6.10  | 198            | 34.8           | 0.0937              | 5.42<br>11.95       |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 97.0<br>3.82                        | 103.0<br>4.06  | 144.0<br>5.67  | 151            | 38.3           | 0.1416              | 2.89<br>6.38        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12      | 154.681<br>6.0898          | 5.558<br>0.2188                   | 3.0<br>0.12              | 98.0<br>3.86                        | 104.0<br>4.09  | 152.0<br>5.98  | 130            | 37.2           | 0.1386              | 2.13<br>4.70        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10    | 158.648<br>6.2460          | 6.350<br>0.2500                   | 3.5<br>0.14              | 98.0<br>3.86                        | 104.0<br>4.09  | 144.0<br>5.67  | 151            | 36.8           | 0.1416              | 2.83<br>6.24        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 169.748<br>6.6830          | 7.925<br>0.3120                   | 7.0<br>0.28              | 99.0<br>3.90                        | 113.0<br>4.45  | 150.0<br>5.91  | 177            | 29.4           | 0.0945              | 4.16<br>9.16        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47   | 169.748<br>6.6830          | 7.925<br>0.3120                   | 3.5<br>0.14              | 99.0<br>3.90                        | 106.0<br>4.17  | 150.0<br>5.91  | 177            | 29.4           | 0.0945              | 4.20<br>9.26        |
| 55.100<br>2.1693 | 42.862<br>1.6875 | -13.2<br>-0.52   | 171.450<br>6.7500          | 7.938<br>0.3125                   | 3.5<br>0.14              | 102.0<br>4.01                       | 109.0<br>4.29  | 155.0<br>6.10  | 199            | 33.5           | 0.1037              | 4.75<br>10.47       |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 175.336<br>6.9030          | 7.142<br>0.2812                   | 3.5<br>0.14              | 101.0<br>3.98                       | 107.0<br>4.21  | 160.0<br>6.30  | 182            | 37.2           | 0.1056              | 4.09<br>9.02        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 188.798<br>7.4330          | 7.938<br>0.3125                   | 4.8<br>0.19              | 103.0<br>4.06                       | 112.0<br>4.41  | 168.0<br>6.61  | 227            | 41.3           | 0.1067              | 5.89<br>12.98       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 199.923<br>7.8710          | 9.525<br>0.3750                   | 8.0<br>0.31              | 103.0<br>4.06                       | 118.0<br>4.65  | 174.0<br>6.85  | 264            | 44.9           | 0.1072              | 7.89<br>17.39       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 199.923<br>7.8710          | 11.112<br>0.4375                  | 8.0<br>0.31              | 105.0<br>4.13                       | 120.0<br>4.72  | 179.0<br>7.05  | 266            | 28.4           | 0.1072              | 8.33<br>18.36       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 209.550<br>8.2500          | 9.525<br>0.3750                   | 3.5<br>0.14              | 112.0<br>4.41                       | 118.0<br>4.65  | 188.0<br>7.40  | 203            | 37.4           | 0.1197              | 7.72<br>17.02       |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 5.6<br>0.22      | 142.000<br>5.5906          | 4.000<br>0.1575                   | 2.0<br>0.08              | 97.0<br>3.82                        | 100.0<br>3.94  | 133.0<br>5.24  | 83.8           | 46             | 0.1196              | 1.14<br>2.51        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B



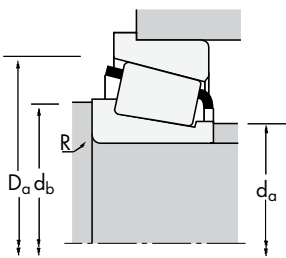
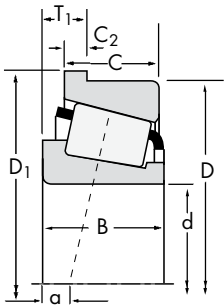


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)      |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |            |
|-------------------------|-------------------|------------------|------------------|------|------|------------------------|------------------|------|------------------|----------------|------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>   | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner      |
| 90.488<br>3.5625        | 161.925<br>6.3750 | 17.450<br>0.6870 | 303000<br>68100  | 0.34 | 1.76 | 78500<br>17700         | 45900<br>10300   | 1.71 | 441000<br>99200  | 760            | 752-B      |
| 92.075<br>3.6250        | 142.875<br>5.6250 | 15.080<br>0.5937 | 182000<br>41000  | 0.45 | 1.34 | 47300<br>10600         | 36300<br>8160    | 1.30 | 307000<br>69000  | 47890          | 47825-B    |
| 92.075<br>3.6250        | 149.225<br>5.8750 | 12.700<br>0.5000 | 151000<br>33900  | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42362          | 42587-B    |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 598            | 592-B      |
| 92.075<br>3.6250        | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 681            | 672-B      |
| 93.662<br>3.6875        | 149.225<br>5.8750 | 12.700<br>0.5000 | 151000<br>33900  | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42368          | 42587-B    |
| 93.662<br>3.6875        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 597            | 592-B      |
| 95.250<br>3.7500        | 142.875<br>5.6250 | 15.080<br>0.5937 | 182000<br>41000  | 0.45 | 1.34 | 47300<br>10600         | 36300<br>8160    | 1.30 | 307000<br>69000  | 47896          | 47825-B    |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 12.700<br>0.5000 | 151000<br>33900  | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42375          | 42587-B    |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 15.875<br>0.6250 | 200000<br>45000  | 0.44 | 1.36 | 51900<br>11700         | 39200<br>8820    | 1.32 | 319000<br>71600  | 594            | 592-B      |
| 95.250<br>3.7500        | 160.000<br>6.2992 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52375          | 52630XB    |
| 95.250<br>3.7500        | 161.925<br>6.3750 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52375          | 52637-B    |
| 95.250<br>3.7500        | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 683            | 672-B      |
| 95.250<br>3.7500        | 171.450<br>6.7500 | 17.462<br>0.6875 | 315000<br>70700  | 0.37 | 1.63 | 81500<br>18300         | 51200<br>11500   | 1.59 | 474000<br>107000 | 77375          | 77675-B    |
| 95.250<br>3.7500        | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 776            | 772-B      |
| 95.250<br>3.7500        | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 777            | 772-B      |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 22.225<br>0.8750 | 424000<br>95300  | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000 | 864            | 854-B      |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 22.225<br>0.8750 | 494000<br>111000 | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221440       | HH221410-B |
| 96.838<br>3.8125        | 149.225<br>5.8750 | 12.700<br>0.5000 | 151000<br>33900  | 0.49 | 1.22 | 39100<br>8790          | 33000<br>7410    | 1.19 | 241000<br>54300  | 42381          | 42587-B    |
| 98.425<br>3.8750        | 161.925<br>6.3750 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52387          | 52637-B    |
| 98.425<br>3.8750        | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 685            | 672-B      |
| 98.425<br>3.8750        | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 779            | 772-B      |
| 98.425<br>3.8750        | 190.500<br>7.5000 | 22.225<br>0.8750 | 494000<br>111000 | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221442       | HH221410-B |
| 98.425<br>3.8750        | 212.725<br>8.3750 | 23.812<br>0.9375 | 630000<br>142000 | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | HH224332       | HH224310-B |
| 99.982<br>3.9363        | 190.500<br>7.5000 | 22.225<br>0.8750 | 494000<br>111000 | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221447       | HH221410-B |
| 100.000<br>3.9370       | 145.000<br>5.7087 | 10.500<br>0.4134 | 116000<br>26100  | 0.47 | 1.27 | 30100<br>6770          | 24400<br>5480    | 1.24 | 172000<br>38700  | JP10049        | JP10010-B  |
| 100.000<br>3.9370       | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 783            | 772-B      |
| 101.600<br>4.0000       | 157.162<br>6.1875 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400          | 52618-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  | Dimensions, mm (inches) |                   |                  |                |                |                                                |                                                     | Factors                                    |                                                       |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|-------------------|------------------|----------------|----------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-------------------------------------------------------|----------------|---------------------|
|                  |                  | B                       | C                 | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | Shaft<br>backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | Housing<br>backing<br>shoulder dia.<br>D <sub>a</sub> | G <sub>1</sub> |                     |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -11.9<br>-0.47          | 169.748<br>6.6830 | 7.925<br>0.3120  | 3.5<br>0.14    | 101.0<br>3.98  | 107.0<br>4.21                                  | 150.0<br>5.91                                       | 177                                        | 29.4                                                  | 0.0945         | 4.12<br>9.07        |
| 34.925<br>1.3750 | 26.195<br>1.0313 | -1.0<br>-0.04           | 149.123<br>5.8710 | 7.938<br>0.3125  | 3.5<br>0.14    | 101.0<br>3.98  | 107.0<br>4.21                                  | 142.0<br>5.59                                       | 153                                        | 38.1                                                  | 0.1428         | 2.00<br>4.41        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12             | 154.681<br>6.0898 | 5.558<br>0.2188  | 3.5<br>0.14    | 101.0<br>3.98  | 107.0<br>4.21                                  | 152.0<br>5.98                                       | 130                                        | 37.2                                                  | 0.1386         | 2.03<br>4.46        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10           | 158.648<br>6.2460 | 6.350<br>0.2500  | 3.5<br>0.14    | 101.0<br>3.98  | 107.0<br>4.21                                  | 144.0<br>5.67                                       | 151                                        | 36.8                                                  | 0.1416         | 2.70<br>5.96        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11           | 175.336<br>6.9030 | 7.142<br>0.2812  | 3.5<br>0.14    | 104.0<br>4.09  | 110.0<br>4.33                                  | 160.0<br>6.30                                       | 182                                        | 37.2                                                  | 0.1056         | 3.94<br>8.70        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12             | 154.681<br>6.0898 | 5.558<br>0.2188  | 3.0<br>0.12    | 102.0<br>4.02  | 107.0<br>4.21                                  | 152.0<br>5.98                                       | 130                                        | 37.2                                                  | 0.1386         | 1.98<br>4.36        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10           | 158.648<br>6.2460 | 6.350<br>0.2500  | 3.5<br>0.14    | 102.0<br>4.02  | 109.0<br>4.29                                  | 144.0<br>5.67                                       | 151                                        | 38.3                                                  | 0.1416         | 2.64<br>5.81        |
| 34.925<br>1.3750 | 26.195<br>1.0313 | -1.0<br>-0.04           | 149.123<br>5.8710 | 7.938<br>0.3125  | 3.5<br>0.14    | 103.0<br>4.06  | 110.0<br>4.33                                  | 142.0<br>5.59                                       | 153                                        | 38.1                                                  | 0.1428         | 1.87<br>4.13        |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12             | 154.681<br>6.0898 | 5.558<br>0.2188  | 3.0<br>0.12    | 103.0<br>4.06  | 108.0<br>4.25                                  | 152.0<br>5.98                                       | 130                                        | 37.2                                                  | 0.1386         | 1.93<br>4.26        |
| 36.322<br>1.4300 | 30.162<br>1.1875 | -2.5<br>-0.10           | 158.648<br>6.2460 | 6.350<br>0.2500  | 3.5<br>0.14    | 104.0<br>4.09  | 110.0<br>4.33                                  | 144.0<br>5.67                                       | 151                                        | 36.8                                                  | 0.1416         | 2.57<br>5.66        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02           | 166.345<br>6.5490 | 6.350<br>0.2500  | 3.5<br>0.14    | 105.0<br>4.13  | 112.0<br>4.41                                  | 155.0<br>6.10                                       | 175                                        | 41.7                                                  | 0.1519         | 2.91<br>6.41        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02           | 168.173<br>6.6210 | 6.350<br>0.2500  | 3.5<br>0.14    | 105.0<br>4.13  | 112.0<br>4.41                                  | 155.0<br>6.10                                       | 175                                        | 41.7                                                  | 0.1519         | 2.99<br>6.59        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11           | 175.336<br>6.9030 | 7.142<br>0.2812  | 3.5<br>0.14    | 106.0<br>4.17  | 113.0<br>4.45                                  | 160.0<br>6.30                                       | 182                                        | 37.2                                                  | 0.1056         | 3.79<br>8.36        |
| 48.260<br>1.9000 | 38.100<br>1.5000 | -9.7<br>-0.38           | 179.283<br>7.0584 | 7.938<br>0.3125  | 3.5<br>0.14    | 106.0<br>4.17  | 113.0<br>4.45                                  | 161.0<br>6.34                                       | 206                                        | 37.7                                                  | 0.1017         | 4.72<br>10.40       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32           | 188.798<br>7.4330 | 7.938<br>0.3125  | 3.5<br>0.14    | 107.0<br>4.21  | 114.0<br>4.49                                  | 168.0<br>6.61                                       | 227                                        | 41.3                                                  | 0.1067         | 5.55<br>12.24       |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32           | 188.798<br>7.4330 | 7.938<br>0.3125  | 9.7<br>0.38    | 107.0<br>4.21  | 126.0<br>4.96                                  | 168.0<br>6.61                                       | 227                                        | 41.3                                                  | 0.1067         | 5.45<br>12.03       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60          | 199.923<br>7.8710 | 9.525<br>0.3750  | 8.0<br>0.31    | 108.0<br>4.25  | 123.0<br>4.84                                  | 174.0<br>6.85                                       | 264                                        | 44.9                                                  | 0.1072         | 7.47<br>16.46       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59          | 199.923<br>7.8710 | 11.112<br>0.4375 | 8.0<br>0.31    | 110.0<br>4.33  | 125.0<br>4.92                                  | 179.0<br>7.05                                       | 266                                        | 28.4                                                  | 0.1072         | 7.91<br>17.44       |
| 28.971<br>1.1406 | 24.608<br>0.9688 | 3.0<br>0.12             | 154.681<br>6.0898 | 5.558<br>0.2188  | 3.5<br>0.14    | 104.0<br>4.09  | 110.0<br>4.33                                  | 152.0<br>5.98                                       | 130                                        | 37.2                                                  | 0.1386         | 1.86<br>4.11        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -0.5<br>-0.02           | 168.173<br>6.6210 | 6.350<br>0.2500  | 3.5<br>0.14    | 108.0<br>4.25  | 114.0<br>4.49                                  | 155.0<br>6.10                                       | 175                                        | 41.7                                                  | 0.1519         | 2.85<br>6.28        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11           | 175.336<br>6.9030 | 7.142<br>0.2812  | 3.5<br>0.14    | 109.0<br>4.29  | 116.0<br>4.57                                  | 160.0<br>6.30                                       | 182                                        | 37.2                                                  | 0.1056         | 3.64<br>8.02        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32           | 188.798<br>7.4330 | 7.938<br>0.3125  | 3.5<br>0.14    | 110.0<br>4.33  | 116.0<br>4.57                                  | 168.0<br>6.61                                       | 227                                        | 41.3                                                  | 0.1067         | 5.37<br>11.84       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59          | 199.923<br>7.8710 | 11.112<br>0.4375 | 3.5<br>0.14    | 113.0<br>4.45  | 119.0<br>4.69                                  | 179.0<br>7.05                                       | 266                                        | 28.4                                                  | 0.1072         | 7.75<br>17.09       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74          | 223.733<br>8.8084 | 11.112<br>0.4375 | 3.5<br>0.14    | 119.0<br>4.69  | 123.0<br>4.84                                  | 204.0<br>8.03                                       | 367                                        | 47.8                                                  | 0.1182         | 12.40<br>27.34      |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59          | 199.923<br>7.8710 | 11.112<br>0.4375 | 6.4<br>0.25    | 114.0<br>4.49  | 126.0<br>4.96                                  | 179.0<br>7.05                                       | 266                                        | 28.4                                                  | 0.1072         | 7.61<br>16.77       |
| 22.500<br>0.8858 | 17.500<br>0.6890 | 6.1<br>0.24             | 152.000<br>5.9843 | 4.000<br>0.1575  | 3.0<br>0.12    | 106.0<br>4.17  | 112.0<br>4.41                                  | 142.0<br>5.59                                       | 104                                        | 40.9                                                  | 0.1264         | 1.18<br>2.61        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32           | 188.798<br>7.4330 | 7.938<br>0.3125  | 3.5<br>0.14    | 111.0<br>4.37  | 118.0<br>4.65                                  | 168.0<br>6.61                                       | 227                                        | 41.3                                                  | 0.1067         | 5.28<br>11.64       |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20           | 163.512<br>6.4375 | 6.350<br>0.2500  | 3.5<br>0.14    | 111.0<br>4.37  | 117.0<br>4.61                                  | 155.0<br>6.10                                       | 175                                        | 41.7                                                  | 0.1519         | 2.47<br>5.45        |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B





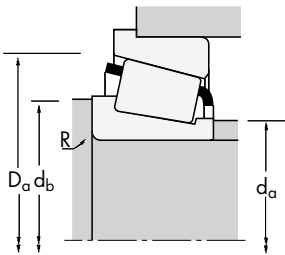
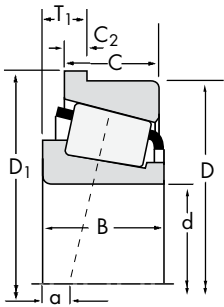


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                   |                  | Dynamic (1)      |      |      | Load Ratings, N (lbf.) |                  |      | Static           | Part Number    |             |
|-------------------------|-------------------|------------------|------------------|------|------|------------------------|------------------|------|------------------|----------------|-------------|
| d                       | D                 | T <sub>1</sub>   | C <sub>1</sub>   | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  | C <sub>0</sub> | Inner       |
| 101.600<br>4.0000       | 160.000<br>6.2992 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400          | 52630XB     |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 16.667<br>0.6562 | 207000<br>46500  | 0.47 | 1.26 | 53600<br>12100         | 43600<br>9800    | 1.23 | 343000<br>77000  | 52400          | 52637-B     |
| 101.600<br>4.0000       | 168.275<br>6.6250 | 18.255<br>0.7187 | 245000<br>55100  | 0.47 | 1.28 | 63500<br>14300         | 51200<br>11500   | 1.24 | 386000<br>86700  | 687            | 672-B       |
| 101.600<br>4.0000       | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 780            | 772-B       |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 22.225<br>0.8750 | 424000<br>95300  | 0.33 | 1.79 | 110000<br>24700        | 63000<br>14200   | 1.74 | 630000<br>142000 | 861            | 854-B       |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 22.225<br>0.8750 | 494000<br>111000 | 0.33 | 1.79 | 128000<br>28800        | 73400<br>16500   | 1.74 | 692000<br>156000 | HH221449       | HH221410-B  |
| 101.600<br>4.0000       | 200.000<br>7.8740 | 27.361<br>1.0772 | 376000<br>84600  | 0.63 | 0.95 | 97500<br>21900         | 106000<br>23700  | 0.92 | 519000<br>117000 | 98400          | 98788-B     |
| 101.600<br>4.0000       | 212.725<br>8.3750 | 23.812<br>0.9375 | 530000<br>119000 | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000 | 941            | 932-B       |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 17.462<br>0.6875 | 320000<br>72000  | 0.39 | 1.56 | 83100<br>18700         | 54800<br>12300   | 1.51 | 495000<br>111000 | 782            | 772-B       |
| 104.775<br>4.1250       | 190.500<br>7.5000 | 20.638<br>0.8125 | 337000<br>75700  | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000 | 71412          | 71750-B     |
| 107.950<br>4.2500       | 165.100<br>6.5000 | 15.875<br>0.6250 | 210000<br>47100  | 0.50 | 1.21 | 54400<br>12200         | 46300<br>10400   | 1.18 | 355000<br>79700  | 56425          | 56650-B     |
| 107.950<br>4.2500       | 190.500<br>7.5000 | 20.638<br>0.8125 | 337000<br>75700  | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000 | 71425          | 71750-B     |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 23.812<br>0.9375 | 530000<br>119000 | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000 | 936            | 932-B       |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 23.812<br>0.9375 | 630000<br>142000 | 0.33 | 1.84 | 163000<br>36700        | 91000<br>20500   | 1.79 | 906000<br>204000 | HH224340       | HH224310-B  |
| 109.538<br>4.3125       | 158.750<br>6.2500 | 11.908<br>0.4688 | 107000<br>24000  | 0.61 | 0.99 | 27600<br>6220          | 28700<br>6450    | 0.96 | 179000<br>40100  | 37431          | 37625-B     |
| 109.992<br>4.3304       | 177.800<br>7.0000 | 18.258<br>0.7188 | 254000<br>57200  | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200  | 64433          | 64700-B     |
| 111.125<br>4.3750       | 190.500<br>7.5000 | 20.638<br>0.8125 | 337000<br>75700  | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000 | 71437          | 71750-B     |
| 114.300<br>4.5000       | 177.800<br>7.0000 | 18.258<br>0.7188 | 254000<br>57200  | 0.52 | 1.16 | 65900<br>14800         | 58300<br>13100   | 1.13 | 419000<br>94200  | 64450          | 64700-B     |
| 114.300<br>4.5000       | 190.500<br>7.5000 | 20.638<br>0.8125 | 337000<br>75700  | 0.42 | 1.44 | 87300<br>19600         | 62200<br>14000   | 1.40 | 543000<br>122000 | 71450          | 71750-B     |
| 114.300<br>4.5000       | 212.725<br>8.3750 | 23.812<br>0.9375 | 530000<br>119000 | 0.33 | 1.84 | 137000<br>30900        | 76600<br>17200   | 1.79 | 786000<br>177000 | 938            | 932-B       |
| 115.000<br>4.5276       | 165.000<br>6.4961 | 12.500<br>0.4921 | 148000<br>33200  | 0.46 | 1.31 | 38300<br>8620          | 30100<br>6770    | 1.27 | 245000<br>55100  | JLM722948      | JLM722912-B |
| 117.475<br>4.6250       | 180.975<br>7.1250 | 16.667<br>0.6562 | 181000<br>40700  | 0.50 | 1.21 | 46900<br>10600         | 39900<br>8980    | 1.18 | 271000<br>61000  | 68462          | 68712-B     |
| 120.000<br>4.7244       | 180.000<br>7.0866 | 16.350<br>0.6437 | 229000<br>51400  | 0.41 | 1.45 | 59300<br>13300         | 41900<br>9430    | 1.41 | 377000<br>84700  | JM624649       | JM624610-B  |
| 120.650<br>4.7500       | 160.338<br>6.3125 | 8.733<br>0.3438  | 97500<br>21900   | 0.43 | 1.38 | 25300<br>5680          | 18800<br>4230    | 1.34 | 206000<br>46400  | L624549        | L624510-B   |
| 120.650<br>4.7500       | 234.950<br>9.2500 | 25.400<br>1.0000 | 582000<br>131000 | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000 | 95475          | 95925-B     |
| 123.825<br>4.8750       | 182.562<br>7.1875 | 12.700<br>0.5000 | 248000<br>55800  | 0.31 | 1.97 | 64300<br>14500         | 33600<br>7550    | 1.91 | 493000<br>111000 | 48286          | 48220-B     |
| 127.000<br>5.0000       | 182.562<br>7.1875 | 12.700<br>0.5000 | 248000<br>55800  | 0.31 | 1.97 | 64300<br>14500         | 33600<br>7550    | 1.91 | 493000<br>111000 | 48290          | 48220-B     |
| 127.000<br>5.0000       | 215.900<br>8.5000 | 20.638<br>0.8125 | 354000<br>79500  | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000 | 74500          | 74850-B     |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                  |                                   |                |                          |                | Factors                             |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|------------------|-----------------------------------|----------------|--------------------------|----------------|-------------------------------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius |                  | Shaft<br>backing<br>shoulder dia. |                | backing<br>shoulder dia. |                | Housing<br>backing<br>shoulder dia. |                | G <sub>1</sub> |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>   | R <sup>(4)</sup>                  | d <sub>a</sub> | d <sub>b</sub>           | D <sub>a</sub> | G <sub>1</sub>                      | G <sub>2</sub> |                | C <sub>g</sub>      |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20    | 166.345<br>6.5490          | 6.350<br>0.2500  | 3.5<br>0.14                       | 111.0<br>4.37  | 117.0<br>4.61            | 155.0<br>6.10  | 175                                 | 41.7           | 0.1519         | 2.64<br>5.83        |
| 36.116<br>1.4219 | 26.195<br>1.0313 | -5.1<br>-0.20    | 168.173<br>6.6210          | 6.350<br>0.2500  | 3.5<br>0.14                       | 111.0<br>4.37  | 117.0<br>4.61            | 155.0<br>6.10  | 175                                 | 41.7           | 0.1519         | 2.72<br>6.01        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | -2.8<br>-0.11    | 175.336<br>6.9030          | 7.142<br>0.2812  | 3.5<br>0.14                       | 112.0<br>4.41  | 118.0<br>4.65            | 160.0<br>6.30  | 182                                 | 37.2           | 0.1056         | 3.48<br>7.66        |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 188.798<br>7.4330          | 7.938<br>0.3125  | 3.5<br>0.14                       | 113.0<br>4.45  | 119.0<br>4.69            | 168.0<br>6.61  | 227                                 | 38.2           | 0.1067         | 5.18<br>11.43       |
| 57.531<br>2.2650 | 44.450<br>1.7500 | -15.2<br>-0.60   | 199.923<br>7.8710          | 9.525<br>0.3750  | 8.0<br>0.31                       | 114.0<br>4.49  | 129.0<br>5.08            | 174.0<br>6.85  | 264                                 | 44.9           | 0.1072         | 7.02<br>15.48       |
| 57.531<br>2.2650 | 46.038<br>1.8125 | -15.0<br>-0.59   | 199.923<br>7.8710          | 11.112<br>0.4375 | 8.0<br>0.31                       | 116.0<br>4.56  | 131.0<br>5.16            | 179.0<br>7.05  | 266                                 | 28.4           | 0.1072         | 7.46<br>16.45       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | 1.3<br>0.05      | 209.550<br>8.2500          | 9.525<br>0.3750  | 3.5<br>0.14                       | 120.5<br>4.75  | 128.0<br>5.04            | 188.0<br>7.40  | 203                                 | 37.4           | 0.1197         | 6.99<br>15.40       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 223.736<br>8.8085          | 11.112<br>0.4375 | 7.0<br>0.28                       | 117.0<br>4.61  | 130.0<br>5.12            | 199.0<br>7.83  | 339                                 | 39.7           | 0.1153         | 11.31<br>24.93      |
| 48.006<br>1.8900 | 38.100<br>1.5000 | -8.1<br>-0.32    | 188.798<br>7.4330          | 7.938<br>0.3125  | 3.5<br>0.14                       | 116.0<br>4.57  | 122.0<br>4.80            | 168.0<br>6.61  | 227                                 | 38.2           | 0.1067         | 4.99<br>11.00       |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 198.323<br>7.8080          | 7.937<br>0.3125  | 3.5<br>0.14                       | 118.0<br>4.65  | 124.0<br>4.88            | 181.0<br>7.13  | 269                                 | 45.7           | 0.1156         | 5.94<br>13.09       |
| 36.512<br>1.4375 | 26.988<br>1.0625 | 2.0<br>0.08      | 171.348<br>6.7460          | 6.350<br>0.2500  | 3.5<br>0.14                       | 117.0<br>4.61  | 123.0<br>4.84            | 162.0<br>6.38  | 191                                 | 47.7           | 0.1584         | 2.73<br>6.01        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 198.323<br>7.8080          | 7.937<br>0.3125  | 3.5<br>0.14                       | 120.0<br>4.72  | 126.0<br>4.96            | 181.0<br>7.13  | 269                                 | 45.7           | 0.1156         | 5.73<br>12.64       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 223.736<br>8.8085          | 11.112<br>0.4375 | 8.0<br>0.31                       | 122.0<br>4.80  | 137.0<br>5.39            | 199.0<br>7.83  | 339                                 | 39.7           | 0.1153         | 10.74<br>23.69      |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -18.8<br>-0.74   | 223.733<br>8.8084          | 11.112<br>0.4375 | 8.0<br>0.31                       | 126.0<br>4.96  | 139.0<br>5.47            | 204.0<br>8.03  | 367                                 | 47.8           | 0.1182         | 11.53<br>25.41      |
| 21.438<br>0.8440 | 15.875<br>0.6250 | 13.7<br>0.54     | 163.413<br>6.4336          | 4.762<br>0.1875  | 3.5<br>0.14                       | 116.0<br>4.57  | 123.0<br>4.84            | 153.0<br>6.02  | 124                                 | 48.7           | 0.1443         | 1.38<br>3.05        |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 184.841<br>7.2772          | 7.145<br>0.2813  | 3.5<br>0.14                       | 121.0<br>4.76  | 128.0<br>5.04            | 174.0<br>6.85  | 219                                 | 45.3           | 0.1153         | 3.92<br>8.65        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 198.323<br>7.8080          | 7.937<br>0.3125  | 3.5<br>0.14                       | 123.0<br>4.84  | 129.0<br>5.08            | 181.0<br>7.13  | 269                                 | 45.7           | 0.1156         | 5.52<br>12.17       |
| 41.275<br>1.6250 | 30.162<br>1.1875 | 1.3<br>0.05      | 184.841<br>7.2772          | 7.145<br>0.2813  | 3.5<br>0.14                       | 125.0<br>4.92  | 131.0<br>5.16            | 174.0<br>6.85  | 219                                 | 45.3           | 0.1153         | 3.68<br>8.11        |
| 49.212<br>1.9375 | 34.925<br>1.3750 | -6.6<br>-0.26    | 198.323<br>7.8080          | 7.937<br>0.3125  | 3.5<br>0.14                       | 125.0<br>4.92  | 132.0<br>5.20            | 181.0<br>7.13  | 269                                 | 45.7           | 0.1156         | 5.31<br>11.70       |
| 66.675<br>2.6250 | 53.975<br>2.1250 | -19.8<br>-0.78   | 223.736<br>8.8085          | 11.112<br>0.4375 | 7.0<br>0.28                       | 128.0<br>5.04  | 141.0<br>5.55            | 199.0<br>7.83  | 339                                 | 39.7           | 0.1153         | 10.18<br>22.44      |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 5.6<br>0.22      | 172.000<br>6.7717          | 5.500<br>0.2165  | 3.3<br>0.13                       | 121.0<br>4.76  | 127.0<br>5.00            | 160.0<br>6.30  | 161                                 | 57.2           | 0.1449         | 1.83<br>4.05        |
| 31.750<br>1.2500 | 25.400<br>1.0000 | 5.3<br>0.21      | 188.016<br>7.4022          | 7.145<br>0.2813  | 3.5<br>0.14                       | 125.0<br>4.92  | 132.0<br>5.20            | 172.0<br>6.77  | 163                                 | 51.7           | 0.1026         | 2.86<br>6.31        |
| 36.000<br>1.4173 | 26.000<br>1.0236 | 0.0<br>0.00      | 188.000<br>7.4016          | 6.580<br>0.2590  | 3.5<br>0.14                       | 128.0<br>5.04  | 135.0<br>5.31            | 175.0<br>6.89  | 227                                 | 61.6           | 0.1084         | 3.04<br>6.70        |
| 21.433<br>0.8438 | 16.670<br>0.6563 | 8.4<br>0.33      | 164.203<br>6.4647          | 3.970<br>0.1563  | 1.5<br>0.06                       | 127.0<br>5.00  | 129.0<br>5.08            | 157.0<br>6.18  | 195                                 | 139            | 0.1509         | 1.19<br>2.63        |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55   | 245.958<br>9.6834          | 11.112<br>0.4375 | 6.4<br>0.25                       | 137.0<br>5.39  | 149.0<br>5.87            | 217.0<br>8.54  | 454                                 | 59.3           | 0.1323         | 12.90<br>28.43      |
| 38.100<br>1.5000 | 33.338<br>1.3125 | -5.6<br>-0.22    | 188.811<br>7.4335          | 6.350<br>0.2500  | 3.5<br>0.14                       | 133.0<br>5.24  | 139.0<br>5.47            | 177.0<br>6.97  | 353                                 | 91.3           | 0.1138         | 3.63<br>8.00        |
| 38.100<br>1.5000 | 33.338<br>1.3125 | -5.6<br>-0.22    | 188.811<br>7.4335          | 6.350<br>0.2500  | 3.5<br>0.14                       | 135.0<br>5.31  | 141.0<br>5.55            | 177.0<br>6.97  | 353                                 | 91.3           | 0.1138         | 3.44<br>7.59        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09      | 223.733<br>8.8084          | 7.938<br>0.3125  | 3.5<br>0.14                       | 141.0<br>5.55  | 148.0<br>5.83            | 209.0<br>8.23  | 363                                 | 68.5           | 0.1338         | 7.19<br>15.84       |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

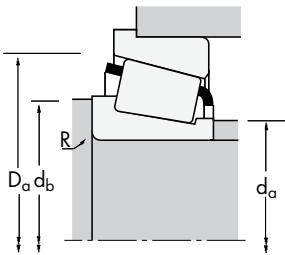
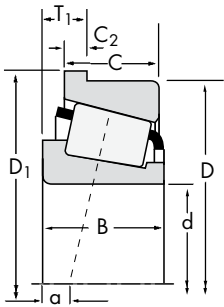
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# ROLLER BEARINGS

## TSF SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Dynamic (1)      |      |      | Load Ratings, N (lbf.) |                  |      | Static            | Part Number    |            |
|-------------------------|--------------------|------------------|------------------|------|------|------------------------|------------------|------|-------------------|----------------|------------|
| d                       | D                  | T <sub>1</sub>   | C <sub>1</sub>   | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   | C <sub>0</sub> | Inner      |
| 127.000<br>5.0000       | 234.950<br>9.2500  | 25.400<br>1.0000 | 582000<br>131000 | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000  | 95500          | 95925-B    |
| 130.000<br>5.1181       | 185.000<br>7.2835  | 13.000<br>0.5118 | 181000<br>40800  | 0.47 | 1.27 | 47000<br>10600         | 38100<br>8560    | 1.24 | 283000<br>63600   | JP13049        | JP13010-B  |
| 130.175<br>5.1250       | 196.850<br>7.7500  | 15.083<br>0.5938 | 340000<br>76500  | 0.34 | 1.74 | 88200<br>19800         | 52000<br>11700   | 1.70 | 625000<br>141000  | 67389          | 67322-B    |
| 133.350<br>5.2500       | 190.500<br>7.5000  | 11.908<br>0.4688 | 262000<br>58900  | 0.32 | 1.87 | 67900<br>15300         | 37300<br>8390    | 1.82 | 542000<br>122000  | 48385          | 48320-B    |
| 133.350<br>5.2500       | 215.900<br>8.5000  | 20.638<br>0.8125 | 354000<br>79500  | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74525          | 74850-B    |
| 133.350<br>5.2500       | 234.950<br>9.2500  | 25.400<br>1.0000 | 582000<br>131000 | 0.37 | 1.62 | 151000<br>33900        | 95500<br>21500   | 1.58 | 931000<br>209000  | 95525          | 95925-B    |
| 136.525<br>5.3750       | 215.900<br>8.5000  | 20.638<br>0.8125 | 354000<br>79500  | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74537          | 74850-B    |
| 136.525<br>5.3750       | 254.000<br>10.0000 | 30.162<br>1.1875 | 611000<br>137000 | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99537          | 99100-B    |
| 139.700<br>5.5000       | 215.900<br>8.5000  | 20.638<br>0.8125 | 354000<br>79500  | 0.49 | 1.23 | 91700<br>20600         | 76500<br>17200   | 1.20 | 614000<br>138000  | 74550          | 74850-B    |
| 139.700<br>5.5000       | 241.300<br>9.5000  | 22.225<br>0.8750 | 553000<br>124000 | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231132       | HM231115-B |
| 139.700<br>5.5000       | 254.000<br>10.0000 | 30.162<br>1.1875 | 611000<br>137000 | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99550          | 99100-B    |
| 140.000<br>5.5118       | 195.000<br>7.6772  | 13.000<br>0.5118 | 188000<br>42300  | 0.50 | 1.19 | 48800<br>11000         | 42000<br>9440    | 1.16 | 304000<br>68400   | JP14049        | JP14010-B  |
| 142.875<br>5.6250       | 193.675<br>7.6250  | 9.525<br>0.3750  | 182000<br>40900  | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600   | 36686          | 36620-B    |
| 142.875<br>5.6250       | 200.025<br>7.8750  | 12.700<br>0.5000 | 265000<br>59600  | 0.34 | 1.78 | 68800<br>15500         | 39600<br>8900    | 1.74 | 560000<br>126000  | 48685          | 48620-B    |
| 142.875<br>5.6250       | 241.300<br>9.5000  | 22.225<br>0.8750 | 553000<br>124000 | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231136       | HM231115-B |
| 146.050<br>5.7500       | 193.675<br>7.6250  | 9.525<br>0.3750  | 182000<br>40900  | 0.37 | 1.63 | 47100<br>10600         | 29700<br>6690    | 1.59 | 394000<br>88600   | 36690          | 36620-B    |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 22.225<br>0.8750 | 477000<br>107000 | 0.44 | 1.36 | 124000<br>27800        | 93600<br>21000   | 1.32 | 810000<br>182000  | 82576          | 82950-B    |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 22.225<br>0.8750 | 553000<br>124000 | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231140       | HM231115-B |
| 146.050<br>5.7500       | 254.000<br>10.0000 | 30.162<br>1.1875 | 611000<br>137000 | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99575          | 99100-B    |
| 149.225<br>5.8750       | 241.300<br>9.5000  | 22.225<br>0.8750 | 553000<br>124000 | 0.32 | 1.88 | 143000<br>32200        | 78200<br>17600   | 1.83 | 932000<br>210000  | HM231149       | HM231115-B |
| 149.225<br>5.8750       | 254.000<br>10.0000 | 30.162<br>1.1875 | 611000<br>137000 | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99587          | 99100-B    |
| 150.000<br>5.9055       | 205.000<br>8.0709  | 12.000<br>0.4724 | 179000<br>40300  | 0.46 | 1.31 | 46500<br>10500         | 36500<br>8210    | 1.27 | 339000<br>76100   | JL730646       | JL730612-B |
| 152.400<br>6.0000       | 192.088<br>7.5625  | 9.970<br>0.3925  | 132000<br>29700  | 0.42 | 1.44 | 34200<br>7690          | 24400<br>5480    | 1.40 | 277000<br>62200   | L630349        | L630310-B  |
| 152.400<br>6.0000       | 254.000<br>10.0000 | 30.162<br>1.1875 | 611000<br>137000 | 0.41 | 1.47 | 158000<br>35600        | 110000<br>24800  | 1.43 | 1030000<br>231000 | 99600          | 99100-B    |
| 158.750<br>6.2500       | 225.425<br>8.8750  | 13.495<br>0.5313 | 281000<br>63100  | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000  | 46780          | 46720-B    |
| 160.325<br>6.3120       | 288.925<br>11.3750 | 26.988<br>1.0625 | 763000<br>171000 | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000 | HM237532       | HM237510-B |
| 165.100<br>6.5000       | 225.425<br>8.8750  | 13.495<br>0.5313 | 281000<br>63100  | 0.38 | 1.57 | 72800<br>16400         | 47800<br>10700   | 1.52 | 635000<br>143000  | 46790          | 46720-B    |
| 165.100<br>6.5000       | 247.650<br>9.7500  | 16.670<br>0.6563 | 375000<br>84300  | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000  | 67780          | 67720-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  | Dimensions, mm (inches) |                    |                  |                |                |                                                |                                                     | Factors                                    |                                                       |                | Weight<br>kg (lbs.) |
|------------------|------------------|-------------------------|--------------------|------------------|----------------|----------------|------------------------------------------------|-----------------------------------------------------|--------------------------------------------|-------------------------------------------------------|----------------|---------------------|
|                  |                  | B                       | C                  | a <sup>(3)</sup> | D <sub>1</sub> | C <sub>2</sub> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | Shaft<br>backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | Housing<br>backing<br>shoulder dia.<br>D <sub>a</sub> | G <sub>1</sub> |                     |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55          | 245.958<br>9.6834  | 11.112<br>0.4375 | 6.4<br>0.25    | 142.0<br>5.59  | 154.0<br>6.06                                  | 217.0<br>8.54                                       | 454                                        | 53.8                                                  | 0.1323         | 12.28<br>27.07      |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 8.9<br>0.35             | 192.000<br>7.5591  | 5.000<br>0.1969  | 3.0<br>0.12    | 137.0<br>5.39  | 143.0<br>5.63                                  | 188.0<br>7.40                                       | 192                                        | 60.3                                                  | 0.1064         | 2.24<br>4.95        |
| 46.038<br>1.8125 | 38.100<br>1.5000 | -6.4<br>-0.25           | 203.891<br>8.0272  | 7.145<br>0.2813  | 3.5<br>0.14    | 141.0<br>5.55  | 146.0<br>5.75                                  | 191.0<br>7.52                                       | 384                                        | 70.1                                                  | 0.1220         | 5.04<br>11.11       |
| 39.688<br>1.5625 | 33.338<br>1.3125 | -4.1<br>-0.16           | 195.956<br>7.7148  | 5.558<br>0.2188  | 3.5<br>0.14    | 142.0<br>5.59  | 148.0<br>5.83                                  | 186.0<br>7.32                                       | 404                                        | 95.6                                                  | 0.1209         | 3.60<br>7.94        |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09             | 223.733<br>8.8084  | 7.938<br>0.3125  | 3.5<br>0.14    | 146.0<br>5.75  | 152.0<br>5.98                                  | 209.0<br>8.23                                       | 363                                        | 63.3                                                  | 0.1338         | 6.70<br>14.77       |
| 63.500<br>2.5000 | 49.212<br>1.9375 | -14.0<br>-0.55          | 245.958<br>9.6834  | 11.112<br>0.4375 | 9.7<br>0.38    | 148.0<br>5.83  | 166.0<br>6.54                                  | 217.0<br>8.54                                       | 454                                        | 53.8                                                  | 0.1323         | 11.54<br>25.44      |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09             | 223.733<br>8.8084  | 7.938<br>0.3125  | 3.5<br>0.14    | 148.0<br>5.83  | 155.0<br>6.10                                  | 209.0<br>8.23                                       | 363                                        | 68.5                                                  | 0.1338         | 6.45<br>14.22       |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48          | 264.973<br>10.4320 | 11.112<br>0.4375 | 7.0<br>0.28    | 156.0<br>6.14  | 167.0<br>6.57                                  | 238.0<br>9.37                                       | 556                                        | 73.5                                                  | 0.1459         | 14.75<br>32.53      |
| 47.625<br>1.8750 | 34.925<br>1.3750 | 2.3<br>0.09             | 223.733<br>8.8084  | 7.938<br>0.3125  | 3.5<br>0.14    | 151.0<br>5.94  | 158.0<br>6.22                                  | 209.0<br>8.23                                       | 363                                        | 63.3                                                  | 0.1338         | 6.19<br>13.65       |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45          | 250.723<br>9.8710  | 9.525<br>0.3750  | 3.5<br>0.14    | 156.0<br>6.14  | 160.0<br>6.30                                  | 224.0<br>8.82                                       | 533                                        | 85.9                                                  | 0.1327         | 10.73<br>23.65      |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48          | 264.973<br>10.4320 | 11.112<br>0.4375 | 7.0<br>0.28    | 156.0<br>6.14  | 170.0<br>6.69                                  | 238.0<br>9.37                                       | 556                                        | 73.5                                                  | 0.1459         | 14.37<br>31.68      |
| 27.000<br>1.0630 | 21.000<br>0.8268 | 11.9<br>0.47            | 202.000<br>7.9528  | 5.000<br>0.1969  | 3.0<br>0.12    | 148.0<br>5.83  | 153.0<br>6.02                                  | 198.0<br>7.80                                       | 220                                        | 68.1                                                  | 0.1133         | 2.40<br>5.30        |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19             | 197.541<br>7.7772  | 3.970<br>0.1563  | 1.5<br>0.06    | 151.0<br>5.94  | 153.0<br>6.02                                  | 190.0<br>7.48                                       | 366                                        | 152                                                   | 0.1768         | 2.48<br>5.46        |
| 39.688<br>1.5625 | 34.130<br>1.3437 | -3.0<br>-0.12           | 205.481<br>8.0898  | 5.555<br>0.2187  | 3.5<br>0.14    | 151.0<br>5.94  | 158.0<br>6.22                                  | 194.0<br>7.64                                       | 440                                        | 115                                                   | 0.1261         | 3.85<br>8.50        |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45          | 250.723<br>9.8710  | 9.525<br>0.3750  | 3.5<br>0.14    | 158.0<br>6.22  | 162.0<br>6.38                                  | 224.0<br>8.82                                       | 533                                        | 85.9                                                  | 0.1327         | 10.42<br>22.96      |
| 28.575<br>1.1250 | 23.020<br>0.9063 | 4.8<br>0.19             | 197.541<br>7.7772  | 3.970<br>0.1563  | 1.5<br>0.06    | 153.0<br>6.02  | 155.0<br>6.10                                  | 190.0<br>7.48                                       | 366                                        | 121                                                   | 0.1768         | 2.31<br>5.10        |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -3.6<br>-0.14           | 250.723<br>9.8710  | 9.525<br>0.3750  | 3.5<br>0.14    | 160.0<br>6.30  | 166.0<br>6.54                                  | 226.0<br>8.90                                       | 460                                        | 81.1                                                  | 0.1405         | 10.34<br>22.79      |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45          | 250.723<br>9.8710  | 9.525<br>0.3750  | 3.5<br>0.14    | 160.0<br>6.30  | 164.0<br>6.46                                  | 224.0<br>8.82                                       | 533                                        | 85.9                                                  | 0.1327         | 10.10<br>22.26      |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48          | 264.973<br>10.4320 | 11.112<br>0.4375 | 7.0<br>0.28    | 162.0<br>6.38  | 175.0<br>6.89                                  | 238.0<br>9.37                                       | 556                                        | 73.5                                                  | 0.1459         | 13.62<br>30.03      |
| 56.642<br>2.2300 | 44.450<br>1.7500 | -11.4<br>-0.45          | 250.723<br>9.8710  | 9.525<br>0.3750  | 3.5<br>0.14    | 163.0<br>6.42  | 167.0<br>6.57                                  | 224.0<br>8.82                                       | 533                                        | 85.9                                                  | 0.1327         | 9.77<br>21.54       |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48          | 264.973<br>10.4320 | 11.112<br>0.4375 | 7.0<br>0.28    | 165.0<br>6.50  | 178.0<br>7.01                                  | 238.0<br>9.37                                       | 556                                        | 73.5                                                  | 0.1459         | 13.24<br>29.18      |
| 28.575<br>1.1250 | 21.438<br>0.8440 | 11.4<br>0.45            | 210.000<br>8.2677  | 4.862<br>0.1914  | 3.3<br>0.13    | 158.0<br>6.22  | 164.0<br>6.46                                  | 200.0<br>7.87                                       | 295                                        | 103                                                   | 0.1763         | 2.68<br>5.90        |
| 24.000<br>0.9449 | 19.000<br>0.7480 | 10.2<br>0.40            | 197.371<br>7.7705  | 3.967<br>0.1562  | 2.0<br>0.08    | 158.0<br>6.22  | 162.0<br>6.38                                  | 190.0<br>7.48                                       | 293                                        | 164                                                   | 0.1698         | 1.63<br>3.59        |
| 66.675<br>2.6250 | 47.625<br>1.8750 | -12.2<br>-0.48          | 264.973<br>10.4320 | 11.112<br>0.4375 | 7.0<br>0.28    | 169.5<br>6.68  | 181.0<br>7.13                                  | 238.0<br>9.37                                       | 556                                        | 66.7                                                  | 0.1459         | 12.84<br>28.31      |
| 39.688<br>1.5625 | 33.337<br>1.3125 | 2.5<br>0.10             | 230.881<br>9.0898  | 5.557<br>0.2188  | 3.5<br>0.14    | 169.0<br>6.65  | 176.0<br>6.93                                  | 219.0<br>8.62                                       | 572                                        | 133                                                   | 0.1432         | 5.18<br>11.42       |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -11.7<br>-0.46          | 299.933<br>11.8084 | 11.112<br>0.4375 | 7.0<br>0.28    | 181.0<br>7.13  | 192.0<br>7.56                                  | 279.0<br>10.98                                      | 751                                        | 101                                                   | 0.1168         | 17.84<br>39.33      |
| 39.688<br>1.5625 | 33.337<br>1.3125 | 2.5<br>0.10             | 230.881<br>9.0898  | 5.557<br>0.2188  | 3.5<br>0.14    | 174.0<br>6.85  | 181.0<br>7.13                                  | 219.0<br>8.62                                       | 572                                        | 175                                                   | 0.1432         | 4.68<br>10.32       |
| 47.625<br>1.8750 | 38.100<br>1.5000 | 4.8<br>0.19             | 254.691<br>10.0272 | 7.145<br>0.2813  | 3.5<br>0.14    | 179.0<br>7.05  | 185.0<br>7.28                                  | 241.0<br>9.49                                       | 622                                        | 122                                                   | 0.1214         | 8.48<br>18.70       |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

B



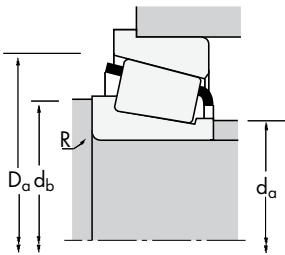
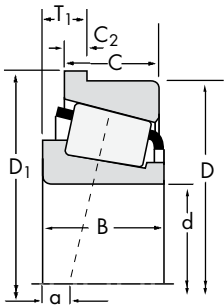


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Dynamic (1)      |      |      | Load Ratings, N (lbf.) |                  |      | Static            | Part Number    |            |
|-------------------------|--------------------|------------------|------------------|------|------|------------------------|------------------|------|-------------------|----------------|------------|
| d                       | D                  | T <sub>1</sub>   | C <sub>1</sub>   | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   | C <sub>0</sub> | Inner      |
| 165.100<br>6.5000       | 254.000<br>10.0000 | 22.225<br>0.8750 | 389000<br>87400  | 0.37 | 1.62 | 101000<br>22700        | 63800<br>14300   | 1.58 | 644000<br>145000  | 86650          | 86100-B    |
| 171.450<br>6.7500       | 260.350<br>10.2500 | 25.400<br>1.0000 | 605000<br>136000 | 0.40 | 1.49 | 157000<br>35300        | 108000<br>24300  | 1.45 | 1180000<br>265000 | HM535349       | HM535310-B |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 26.988<br>1.0625 | 611000<br>137000 | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000 | 94687          | 94113-B    |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 26.988<br>1.0625 | 763000<br>171000 | 0.32 | 1.88 | 198000<br>44500        | 108000<br>24300  | 1.83 | 1240000<br>278000 | HM237542       | HM237510-B |
| 177.800<br>7.0000       | 247.650<br>9.7500  | 16.670<br>0.6563 | 375000<br>84300  | 0.44 | 1.36 | 97200<br>21900         | 73200<br>16500   | 1.33 | 779000<br>175000  | 67790          | 67720-B    |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 26.988<br>1.0625 | 611000<br>137000 | 0.47 | 1.28 | 159000<br>35600        | 127000<br>28600  | 1.25 | 1070000<br>242000 | 94700          | 94113-B    |
| 179.975<br>7.0856       | 317.500<br>12.5000 | 28.575<br>1.1250 | 677000<br>152000 | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93708          | 93125-B    |
| 190.500<br>7.5000       | 266.700<br>10.5000 | 16.670<br>0.6563 | 386000<br>86700  | 0.48 | 1.26 | 99900<br>22500         | 81700<br>18400   | 1.22 | 835000<br>188000  | 67885          | 67820-B    |
| 190.500<br>7.5000       | 317.500<br>12.5000 | 28.575<br>1.1250 | 677000<br>152000 | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93750          | 93125-B    |
| 193.675<br>7.6250       | 282.575<br>11.1250 | 23.812<br>0.9375 | 398000<br>89400  | 0.42 | 1.44 | 103000<br>23200        | 73300<br>16500   | 1.41 | 692000<br>156000  | 87762          | 87111-B    |
| 200.025<br>7.8750       | 317.500<br>12.5000 | 28.575<br>1.1250 | 677000<br>152000 | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93787          | 93125-B    |
| 203.200<br>8.0000       | 282.575<br>11.1250 | 16.670<br>0.6563 | 393000<br>88300  | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67983          | 67920-B    |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 28.575<br>1.1250 | 677000<br>152000 | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93800          | 93125-B    |
| 206.375<br>8.1250       | 282.575<br>11.1250 | 16.670<br>0.6563 | 393000<br>88300  | 0.51 | 1.18 | 102000<br>22900        | 88700<br>19900   | 1.15 | 876000<br>197000  | 67985          | 67920-B    |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 28.575<br>1.1250 | 677000<br>152000 | 0.52 | 1.15 | 175000<br>39500        | 157000<br>35300  | 1.12 | 1290000<br>290000 | 93825          | 93125-B    |
| 215.900<br>8.5000       | 285.750<br>11.2500 | 19.050<br>0.7500 | 398000<br>89500  | 0.48 | 1.25 | 103000<br>23200        | 85000<br>19100   | 1.21 | 892000<br>200000  | LM742749       | LM742710-B |
| 228.600<br>9.0000       | 327.025<br>12.8750 | 25.400<br>1.0000 | 517000<br>116000 | 0.41 | 1.48 | 134000<br>30100        | 93300<br>21000   | 1.44 | 1070000<br>240000 | 8573           | 8520-B     |
| 241.300<br>9.5000       | 327.025<br>12.8750 | 25.400<br>1.0000 | 517000<br>116000 | 0.41 | 1.48 | 134000<br>30100        | 93300<br>21000   | 1.44 | 1070000<br>240000 | 8578           | 8520-B     |
| 244.475<br>9.6250       | 381.000<br>15.0000 | 34.925<br>1.3750 | 889000<br>200000 | 0.52 | 1.16 | 231000<br>51800        | 204000<br>45800  | 1.13 | 1690000<br>381000 | EE126097       | 126150-B   |
| 254.000<br>10.0000      | 358.775<br>14.1250 | 30.162<br>1.1875 | 896000<br>202000 | 0.33 | 1.80 | 232000<br>52200        | 132000<br>29700  | 1.76 | 1850000<br>416000 | M249749        | M249710-B  |
| 254.000<br>10.0000      | 403.225<br>15.8750 | 38.100<br>1.5000 | 865000<br>195000 | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275100       | 275158-B   |
| 266.700<br>10.5000      | 355.600<br>14.0000 | 22.225<br>0.8750 | 688000<br>155000 | 0.36 | 1.67 | 178000<br>40100        | 110000<br>24700  | 1.62 | 1510000<br>339000 | LM451349       | LM451310-B |
| 266.700<br>10.5000      | 403.225<br>15.8750 | 38.100<br>1.5000 | 865000<br>195000 | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275105       | 275158-B   |
| 273.050<br>10.7500      | 403.225<br>15.8750 | 38.100<br>1.5000 | 865000<br>195000 | 0.40 | 1.49 | 224000<br>50400        | 154000<br>34700  | 1.45 | 1600000<br>359000 | EE275108       | 275158-B   |
| 276.225<br>10.8750      | 349.948<br>13.7775 | 18.700<br>0.7362 | 326000<br>73400  | 0.54 | 1.11 | 84600<br>19000         | 78000<br>17500   | 1.08 | 750000<br>169000  | L853049        | L853011-B  |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 28.575<br>1.1250 | 906000<br>204000 | 0.39 | 1.55 | 235000<br>52800        | 155000<br>34900  | 1.51 | 1820000<br>409000 | EE128110       | 128160-B   |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 28.575<br>1.1250 | 851000<br>191000 | 0.39 | 1.55 | 221000<br>49600        | 146000<br>32800  | 1.51 | 1660000<br>374000 | EE128111       | 128160-B   |
| 298.450<br>11.7500      | 444.500<br>17.5000 | 36.512<br>1.4375 | 758000<br>170000 | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600  | 1.55 | 1390000<br>312000 | EE291175       | 291750-B   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                | Factors        |                |                | Weight<br>kg (lbs.) |                     |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |                     |
| B                | C                | a <sup>(3)</sup> | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub> | D <sub>a</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      | Weight<br>kg (lbs.) |
| 46.038<br>1.8125 | 33.338<br>1.3125 | -1.5<br>-0.06    | 263.525<br>10.3750         | 9.525<br>0.3750                   | 4.8<br>0.19              | 176.0<br>6.93                       | 185.0<br>7.28  | 239.0<br>9.41  | 466            | 112            | 0.1041              | 7.96<br>17.55       |
| 66.675<br>2.6250 | 52.388<br>2.0625 | -8.6<br>-0.34    | 271.374<br>10.6840         | 11.112<br>0.4375                  | 3.5<br>0.14              | 188.0<br>7.40                       | 192.0<br>7.56  | 250.0<br>9.84  | 750            | 116            | 0.1263              | 12.71<br>28.02      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -0.8<br>-0.03    | 299.933<br>11.8084         | 11.112<br>0.4375                  | 7.0<br>0.28              | 193.0<br>7.60                       | 204.0<br>8.03  | 272.0<br>10.71 | 692            | 93.8           | 0.1287              | 16.36<br>36.07      |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -11.7<br>-0.46   | 299.933<br>11.8084         | 11.112<br>0.4375                  | 7.0<br>0.28              | 191.0<br>7.52                       | 202.0<br>7.95  | 279.0<br>10.98 | 751            | 101            | 0.1168              | 15.96<br>35.20      |
| 47.625<br>1.8750 | 38.100<br>1.5000 | 4.8<br>0.19      | 254.691<br>10.0272         | 7.145<br>0.2813                   | 3.5<br>0.14              | 188.0<br>7.40                       | 194.0<br>7.64  | 241.0<br>9.49  | 622            | 122            | 0.1214              | 7.21<br>15.89       |
| 63.500<br>2.5000 | 47.625<br>1.8750 | -0.8<br>-0.03    | 299.933<br>11.8084         | 11.112<br>0.4375                  | 7.0<br>0.28              | 195.0<br>7.68                       | 207.0<br>8.15  | 272.0<br>10.71 | 692            | 93.8           | 0.1287              | 15.92<br>35.10      |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 328.523<br>12.9340         | 11.112<br>0.4375                  | 3.5<br>0.14              | 204.0<br>8.03                       | 209.0<br>8.23  | 300.0<br>11.81 | 912            | 126            | 0.1460              | 21.69<br>47.82      |
| 46.833<br>1.8438 | 38.100<br>1.5000 | 10.2<br>0.40     | 273.741<br>10.7772         | 7.145<br>0.2813                   | 3.5<br>0.14              | 203.0<br>7.99                       | 209.0<br>8.23  | 259.0<br>10.20 | 728            | 147            | 0.1310              | 8.07<br>17.78       |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 328.523<br>12.9340         | 11.112<br>0.4375                  | 4.3<br>0.17              | 212.0<br>8.35                       | 218.0<br>8.58  | 300.0<br>11.81 | 912            | 126            | 0.1460              | 20.15<br>44.43      |
| 47.625<br>1.8750 | 36.512<br>1.4375 | 3.8<br>0.15      | 292.000<br>11.4960         | 9.525<br>0.3750                   | 3.5<br>0.14              | 206.0<br>8.11                       | 211.0<br>8.31  | 272.0<br>10.71 | 575            | 131            | 0.1155              | 9.47<br>20.88       |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 328.523<br>12.9340         | 11.112<br>0.4375                  | 4.3<br>0.17              | 219.0<br>8.62                       | 225.0<br>8.86  | 300.0<br>11.81 | 912            | 126            | 0.1460              | 18.70<br>41.22      |
| 46.038<br>1.8125 | 36.512<br>1.4375 | 16.0<br>0.63     | 289.616<br>11.4022         | 7.145<br>0.2813                   | 3.5<br>0.14              | 216.0<br>8.50                       | 222.0<br>8.74  | 275.0<br>10.83 | 820            | 172            | 0.1388              | 8.80<br>19.40       |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 328.523<br>12.9340         | 11.112<br>0.4375                  | 4.3<br>0.17              | 222.0<br>8.74                       | 227.0<br>8.94  | 300.0<br>11.81 | 912            | 126            | 0.1460              | 18.20<br>40.12      |
| 46.038<br>1.8125 | 36.512<br>1.4375 | 16.0<br>0.63     | 289.616<br>11.4022         | 7.145<br>0.2813                   | 3.5<br>0.14              | 219.0<br>8.62                       | 224.0<br>8.82  | 275.0<br>10.83 | 820            | 172            | 0.1388              | 8.43<br>18.59       |
| 63.500<br>2.5000 | 46.038<br>1.8125 | 7.9<br>0.31      | 328.523<br>12.9340         | 11.112<br>0.4375                  | 4.3<br>0.17              | 227.0<br>8.93                       | 233.0<br>9.17  | 300.0<br>11.81 | 912            | 126            | 0.1460              | 17.18<br>37.87      |
| 46.038<br>1.8125 | 34.925<br>1.3750 | 14.2<br>0.56     | 293.685<br>11.5624         | 7.938<br>0.3125                   | 3.5<br>0.14              | 227.0<br>8.94                       | 233.0<br>9.17  | 280.0<br>11.02 | 867            | 225            | 0.1388              | 7.81<br>17.21       |
| 52.388<br>2.0625 | 36.512<br>1.4375 | 7.6<br>0.30      | 336.448<br>13.2460         | 9.525<br>0.3750                   | 6.4<br>0.25              | 244.0<br>9.61                       | 255.0<br>10.04 | 313.0<br>12.32 | 1050           | 172            | 0.1401              | 13.66<br>30.11      |
| 52.388<br>2.0625 | 36.512<br>1.4375 | 7.6<br>0.30      | 336.448<br>13.2460         | 9.525<br>0.3750                   | 6.4<br>0.25              | 253.0<br>9.96                       | 264.0<br>10.39 | 313.0<br>12.32 | 1050           | 172            | 0.1401              | 11.73<br>25.86      |
| 76.200<br>3.0000 | 57.150<br>2.2500 | 9.7<br>0.38      | 393.598<br>15.4960         | 12.700<br>0.5000                  | 6.4<br>0.25              | 266.0<br>10.47                      | 275.0<br>10.83 | 358.0<br>14.09 | 1320           | 169            | 0.1640              | 31.86<br>70.24      |
| 71.438<br>2.8125 | 53.975<br>2.1250 | -6.9<br>-0.27    | 371.475<br>14.6250         | 12.700<br>0.5000                  | 3.5<br>0.14              | 270.0<br>10.63                      | 274.0<br>10.79 | 343.0<br>13.50 | 1630           | 168            | 0.1526              | 22.21<br>48.96      |
| 69.850<br>2.7500 | 46.038<br>1.8125 | 2.5<br>0.10      | 417.408<br>16.4334         | 14.288<br>0.5625                  | 6.4<br>0.25              | 277.0<br>10.91                      | 287.0<br>11.30 | 389.0<br>15.31 | 1450           | 201            | 0.1555              | 31.80<br>70.11      |
| 57.150<br>2.2500 | 44.450<br>1.7500 | 5.1<br>0.20      | 365.125<br>14.3750         | 9.525<br>0.3750                   | 3.5<br>0.14              | 281.0<br>11.06                      | 285.0<br>11.22 | 344.0<br>13.54 | 1550           | 212            | 0.1536              | 15.65<br>34.51      |
| 69.850<br>2.7500 | 46.038<br>1.8125 | 2.5<br>0.10      | 417.408<br>16.4334         | 14.288<br>0.5625                  | 6.4<br>0.25              | 287.0<br>11.30                      | 296.0<br>11.65 | 389.0<br>15.31 | 1450           | 201            | 0.1555              | 28.96<br>63.84      |
| 69.850<br>2.7500 | 46.038<br>1.8125 | 2.5<br>0.10      | 417.408<br>16.4334         | 14.288<br>0.5625                  | 6.4<br>0.25              | 291.0<br>11.46                      | 301.0<br>11.85 | 389.0<br>15.31 | 1450           | 201            | 0.1555              | 27.48<br>60.59      |
| 34.925<br>1.3750 | 23.812<br>0.9375 | 35.1<br>1.38     | 357.950<br>14.0925         | 6.000<br>0.2362                   | 3.5<br>0.14              | 288.0<br>11.34                      | 293.0<br>11.54 | 342.0<br>13.46 | 1060           | 350            | 0.1517              | 7.58<br>16.72       |
| 67.673<br>2.6643 | 53.975<br>2.1250 | 6.6<br>0.26      | 418.998<br>16.4960         | 12.700<br>0.5000                  | 6.8<br>0.27              | 307.0<br>12.09                      | 309.0<br>12.17 | 384.0<br>15.12 | 1730           | 255            | 0.1628              | 27.79<br>61.27      |
| 67.673<br>2.6643 | 53.975<br>2.1250 | 6.6<br>0.26      | 418.998<br>16.4960         | 12.700<br>0.5000                  | 6.8<br>0.27              | 307.0<br>12.09                      | 309.0<br>12.17 | 384.0<br>15.12 | 1620           | 240            | 0.1592              | 27.94<br>61.60      |
| 61.912<br>2.4375 | 39.688<br>1.5625 | 7.6<br>0.30      | 457.098<br>17.9960         | 12.700<br>0.5000                  | 8.0<br>0.31              | 320.0<br>12.60                      | 332.0<br>13.07 | 428.0<br>16.85 | 1580           | 245            | 0.1557              | 30.43<br>67.09      |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.



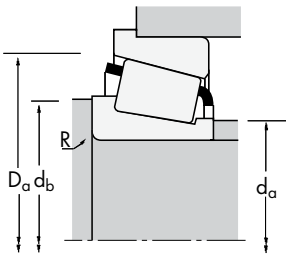
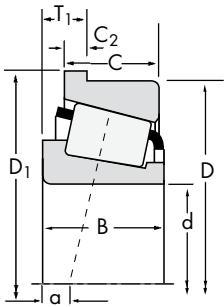


# ROLLER BEARINGS

## TSF

### SINGLE-ROW

B



| Dimensions, mm (inches) |                    |                  | Dynamic (1)       |      |      | Load Ratings, N (lbf.) |                  |      | Static             | Part Number    |            |
|-------------------------|--------------------|------------------|-------------------|------|------|------------------------|------------------|------|--------------------|----------------|------------|
| d                       | D                  | T <sub>1</sub>   | C <sup>(1)</sup>  | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                    | C <sub>0</sub> | Inner      |
| 304.800<br>12.0000      | 404.950<br>15.9429 | 22.225<br>0.8750 | 575000<br>129000  | 0.36 | 1.67 | 149000<br>33500        | 91600<br>20600   | 1.63 | 1310000<br>295000  | L357049        | L357019-B  |
| 304.800<br>12.0000      | 406.400<br>16.0000 | 25.400<br>1.0000 | 754000<br>170000  | 0.44 | 1.36 | 196000<br>44000        | 148000<br>33200  | 1.32 | 1740000<br>392000  | LM757049       | LM757010-B |
| 304.800<br>12.0000      | 444.500<br>17.5000 | 36.512<br>1.4375 | 758000<br>170000  | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600  | 1.55 | 1390000<br>312000  | EE291201       | 291750-B   |
| 317.500<br>12.5000      | 444.500<br>17.5000 | 36.512<br>1.4375 | 758000<br>170000  | 0.38 | 1.59 | 196000<br>44200        | 127000<br>28600  | 1.55 | 1390000<br>312000  | EE291250       | 291750-B   |
| 330.200<br>13.0000      | 482.600<br>19.0000 | 41.275<br>1.6250 | 1230000<br>276000 | 0.39 | 1.54 | 318000<br>71400        | 213000<br>47800  | 1.49 | 2320000<br>523000  | EE526130       | 526190-B   |
| 349.250<br>13.7500      | 501.650<br>19.7500 | 34.925<br>1.3750 | 1320000<br>298000 | 0.37 | 1.63 | 343000<br>77200        | 216000<br>48500  | 1.59 | 2780000<br>626000  | EE333137       | 333197-B   |
| 371.475<br>14.6250      | 508.000<br>20.0000 | 38.100<br>1.5000 | 899000<br>202000  | 0.44 | 1.36 | 233000<br>52400        | 176000<br>39500  | 1.33 | 1870000<br>420000  | EE231462       | 232000-B   |
| 381.000<br>15.0000      | 479.425<br>18.8750 | 23.812<br>0.9375 | 582000<br>131000  | 0.50 | 1.21 | 151000<br>33900        | 128000<br>28800  | 1.18 | 1380000<br>311000  | L865547        | L865512-B  |
| 381.000<br>15.0000      | 522.288<br>20.5625 | 38.100<br>1.5000 | 1360000<br>306000 | 0.39 | 1.56 | 353000<br>79400        | 233000<br>52400  | 1.51 | 2950000<br>663000  | LM565949       | LM565910-B |
| 396.875<br>15.6250      | 549.275<br>21.6250 | 38.100<br>1.5000 | 1400000<br>316000 | 0.41 | 1.47 | 364000<br>81800        | 254000<br>57100  | 1.43 | 3130000<br>704000  | LM567943       | LM567910-B |
| 406.400<br>16.0000      | 508.000<br>20.0000 | 25.400<br>1.0000 | 842000<br>189000  | 0.37 | 1.64 | 218000<br>49100        | 137000<br>30700  | 1.60 | 2230000<br>502000  | L467549        | L467510-B  |
| 406.400<br>16.0000      | 549.275<br>21.6250 | 38.100<br>1.5000 | 1400000<br>316000 | 0.41 | 1.47 | 364000<br>81800        | 254000<br>57100  | 1.43 | 3130000<br>704000  | LM567949       | LM567910-B |
| 488.950<br>19.2500      | 660.400<br>26.0000 | 38.100<br>1.5000 | 2030000<br>455000 | 0.31 | 1.95 | 525000<br>118000       | 276000<br>62000  | 1.90 | 4590000<br>1030000 | EE640192       | 640260-B   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.



| Bearing                 |                         |                     | Dimensions, mm (inches)    |                                   |                          |                                     |                       |                       | Factors        |                |                | Weight<br>kg (lbs.)    |
|-------------------------|-------------------------|---------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|-----------------------|-----------------------|----------------|----------------|----------------|------------------------|
|                         |                         |                     | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. | G <sub>1</sub>        | G <sub>2</sub>        | C <sub>g</sub> |                |                |                        |
| B                       | C                       | a <sup>(3)</sup>    | D <sub>1</sub>             | C <sub>2</sub>                    | R <sup>(4)</sup>         | d <sub>a</sub>                      | d <sub>b</sub>        | D <sub>a</sub>        | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.)    |
| <b>50.800</b><br>2.0000 | <b>38.100</b><br>1.5000 | <b>12.7</b><br>0.50 | <b>419.923</b><br>16.5324  | <b>9.525</b><br>0.3750            | <b>6.4</b><br>0.25       | <b>319.0</b><br>12.56               | <b>329.0</b><br>12.95 | <b>380.0</b><br>14.96 | <b>1750</b>    | <b>301</b>     | <b>0.1585</b>  | <b>17.28</b><br>38.10  |
| <b>63.500</b><br>2.5000 | <b>47.625</b><br>1.8750 | <b>16.3</b><br>0.64 | <b>419.100</b><br>16.5000  | <b>9.525</b><br>0.3750            | <b>6.4</b><br>0.25       | <b>322.0</b><br>12.68               | <b>331.0</b><br>13.03 | <b>393.0</b><br>15.47 | <b>1990</b>    | <b>260</b>     | <b>0.1775</b>  | <b>21.93</b><br>48.35  |
| <b>61.912</b><br>2.4375 | <b>39.688</b><br>1.5625 | <b>7.6</b><br>0.30  | <b>457.098</b><br>17.9960  | <b>12.700</b><br>0.5000           | <b>8.0</b><br>0.31       | <b>324.0</b><br>12.76               | <b>337.0</b><br>13.27 | <b>428.0</b><br>16.85 | <b>1580</b>    | <b>245</b>     | <b>0.1557</b>  | <b>28.97</b><br>63.87  |
| <b>61.912</b><br>2.4375 | <b>39.688</b><br>1.5625 | <b>7.6</b><br>0.30  | <b>457.098</b><br>17.9960  | <b>12.700</b><br>0.5000           | <b>8.0</b><br>0.31       | <b>334.0</b><br>13.15               | <b>346.0</b><br>13.62 | <b>428.0</b><br>16.85 | <b>1580</b>    | <b>245</b>     | <b>0.1557</b>  | <b>25.95</b><br>57.22  |
| <b>80.167</b><br>3.1562 | <b>60.325</b><br>2.3750 | <b>4.8</b><br>0.19  | <b>498.373</b><br>19.6210  | <b>15.875</b><br>0.6250           | <b>6.4</b><br>0.25       | <b>351.0</b><br>13.82               | <b>360.0</b><br>14.17 | <b>464.0</b><br>18.27 | <b>2280</b>    | <b>287</b>     | <b>0.1790</b>  | <b>46.44</b><br>102.38 |
| <b>84.138</b><br>3.3125 | <b>69.850</b><br>2.7500 | <b>3.6</b><br>0.14  | <b>515.838</b><br>20.3086  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>372.0</b><br>14.65               | <b>382.0</b><br>15.04 | <b>486.0</b><br>19.13 | <b>3040</b>    | <b>337</b>     | <b>0.1928</b>  | <b>54.31</b><br>119.74 |
| <b>66.675</b><br>2.6250 | <b>50.800</b><br>2.0000 | <b>19.6</b><br>0.77 | <b>522.188</b><br>20.5586  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>390.0</b><br>15.35               | <b>400.0</b><br>15.75 | <b>489.0</b><br>19.25 | <b>2390</b>    | <b>366</b>     | <b>0.1874</b>  | <b>37.31</b><br>82.25  |
| <b>47.625</b><br>1.8750 | <b>34.925</b><br>1.3750 | <b>42.9</b><br>1.69 | <b>489.737</b><br>19.2810  | <b>9.525</b><br>0.3750            | <b>6.4</b><br>0.25       | <b>395.0</b><br>15.55               | <b>407.0</b><br>16.02 | <b>465.0</b><br>18.31 | <b>2260</b>    | <b>529</b>     | <b>0.1897</b>  | <b>18.86</b><br>41.58  |
| <b>84.138</b><br>3.3125 | <b>61.912</b><br>2.4375 | <b>8.9</b><br>0.35  | <b>536.476</b><br>21.1211  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>402.0</b><br>15.83               | <b>411.0</b><br>16.18 | <b>507.0</b><br>19.96 | <b>3380</b>    | <b>378</b>     | <b>0.2028</b>  | <b>50.16</b><br>110.59 |
| <b>84.138</b><br>3.3125 | <b>61.912</b><br>2.4375 | <b>15.5</b><br>0.61 | <b>563.463</b><br>22.1836  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>420.0</b><br>16.54               | <b>430.0</b><br>16.93 | <b>531.0</b><br>20.91 | <b>3800</b>    | <b>427</b>     | <b>0.2143</b>  | <b>58.76</b><br>129.54 |
| <b>61.912</b><br>2.4375 | <b>47.625</b><br>1.8750 | <b>20.3</b><br>0.80 | <b>519.013</b><br>20.4336  | <b>11.112</b><br>0.4375           | <b>3.3</b><br>0.13       | <b>423.0</b><br>16.65               | <b>426.0</b><br>16.77 | <b>492.0</b><br>19.37 | <b>3720</b>    | <b>673</b>     | <b>0.2038</b>  | <b>27.21</b><br>59.98  |
| <b>84.138</b><br>3.3125 | <b>61.912</b><br>2.4375 | <b>15.5</b><br>0.61 | <b>563.463</b><br>22.1836  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>427.0</b><br>16.81               | <b>437.0</b><br>17.20 | <b>531.0</b><br>20.91 | <b>3800</b>    | <b>427</b>     | <b>0.2143</b>  | <b>55.12</b><br>121.52 |
| <b>94.458</b><br>3.7188 | <b>69.850</b><br>2.7500 | <b>4.8</b><br>0.19  | <b>676.275</b><br>26.6250  | <b>14.288</b><br>0.5625           | <b>6.4</b><br>0.25       | <b>513.0</b><br>20.20               | <b>522.0</b><br>20.55 | <b>642.0</b><br>25.28 | <b>6320</b>    | <b>601</b>     | <b>0.2310</b>  | <b>86.40</b><br>190.48 |

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.  
<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.  
<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.





## **ROLLER BEARINGS**



### **NOTES**

**B**





## TDO DOUBLE OUTER RACE

### TAPERED ROLLER BEARINGS

- TDO consists of a single piece (double) outer race and two single inner races.
- Configuration offers a wide effective bearing spread to support loads created by overturning moments.
- Bearings can be used at fixed positions or allowed to float in the housing bore to compensate for shaft expansion.

|           |                                                                                                                                                                                                                                                                                                                                                        |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D</b>  | CD suffix now replaces the D suffix listed for part numbers in previous publications.<br>A groove with oil holes is provided for lubrication in suffix outer race.                                                                                                                                                                                     |
| <b>CD</b> | Outer races can be pinned to prevent circumferential precession in the housing at floating positions (see the following tables for details).<br>This suffix in current part numbers now replaces the D and DC suffixes listed for part numbers in previous publications.<br>A groove with oil holes is provided for lubrication in suffix outer races. |
| <b>DC</b> | Can be pinned to prevent circumferential precession in the housing at floating positions (see the following tables for details).<br>Outer races have one lubricant hole. Normally, these are used at floating positions with a fixing pin.                                                                                                             |

- TDO bearings are usually supplied complete with an inner race spacer as a pre-set assembly.
- To suit the application duty, the built-in setting value needs to be established by your Timken representative before an order is placed.
- The tables list part numbers of plain-ring spacers.
- If a spacer with provision for lubricant passage is required, consult your Timken representative.
- To place an order or obtain a price quotation, specify the bearing and spacer part number.

Example:  $\frac{\text{inner race}}{\text{A2047}} - \frac{\text{outer race}}{\text{A2120D}}$   
R80003 spacer

- Double outer race can be used with any single race from the same 'series.'
- The tables list regularly specified inner race part numbers.
- Please consult a Timken representative for more information.

#### BEARING DATA TABLES

In the following bearing data tables, part numbers are listed in ascending order of bore, outside diameter and width.

Bearing ratings shown in tables are based on environmental reference conditions. Effects of known operating conditions on bearing performance in an application should be investigated before final bearing selection is made.

Approximate mass is listed for every part number. For weight-critical applications or exact freight cost evaluation purposes, a more accurate value should be obtained from your Timken representative.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

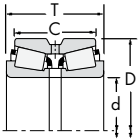
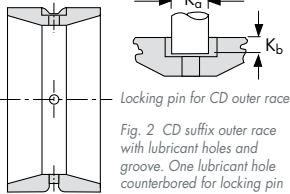
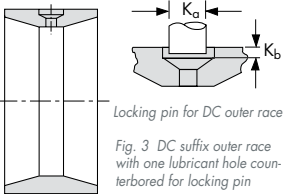


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



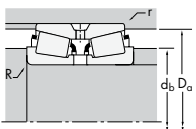
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                  |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                  |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 11.987<br>0.4719        | 30.480<br>1.2000 | 25.400<br>1.0000 | 21.260<br>0.8370 | 18500<br>4150          | 0.41 | 1.67           | 2.48           | 2750<br>618            | 1910<br>429      | 4780<br>1080       | 1.44 |
| 14.987<br>0.5901        | 34.987<br>1.3775 | 25.174<br>0.9911 | 20.638<br>0.8125 | 21200<br>4770          | 0.45 | 1.49           | 2.22           | 3160<br>710            | 2450<br>550      | 5500<br>1240       | 1.29 |
| 16.993<br>0.6690        | 47.000<br>1.8504 | 31.750<br>1.2500 | 25.212<br>0.9926 | 43100<br>9690          | 0.36 | 1.89           | 2.82           | 6420<br>1440           | 3920<br>881      | 11200<br>2510      | 1.64 |
| 19.050<br>0.7500        | 47.000<br>1.8504 | 31.750<br>1.2500 | 25.212<br>0.9926 | 43100<br>9690          | 0.36 | 1.89           | 2.82           | 6420<br>1440           | 3920<br>881      | 11200<br>2510      | 1.64 |
| 19.050<br>0.7500        | 57.150<br>2.2500 | 49.212<br>1.9375 | 36.512<br>1.4375 | 74900<br>16800         | 0.59 | 1.14           | 1.70           | 11200<br>2510          | 11300<br>2540    | 19400<br>4370      | 0.99 |
| 19.987<br>0.7869        | 45.984<br>1.8104 | 31.750<br>1.2500 | 25.212<br>0.9926 | 43100<br>9690          | 0.36 | 1.89           | 2.82           | 6420<br>1440           | 3920<br>881      | 11200<br>2510      | 1.64 |
| 19.987<br>0.7869        | 47.000<br>1.8504 | 31.750<br>1.2500 | 25.212<br>0.9926 | 43100<br>9690          | 0.36 | 1.89           | 2.82           | 6420<br>1440           | 3920<br>881      | 11200<br>2510      | 1.64 |
| 20.000<br>0.7874        | 50.005<br>1.9687 | 33.340<br>1.3126 | 25.400<br>1.0000 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 23.812<br>0.9375        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 23.812<br>0.9375        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 24.384<br>0.9600        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 24.981<br>0.9835        | 50.005<br>1.9687 | 33.340<br>1.3126 | 25.400<br>1.0000 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 24.981<br>0.9835        | 62.000<br>2.4409 | 39.688<br>1.5625 | 36.258<br>1.4275 | 69700<br>15700         | 0.38 | 1.77           | 2.63           | 10400<br>2330          | 6800<br>1530     | 18100<br>4060      | 1.53 |
| 25.000<br>0.9843        | 50.005<br>1.9687 | 33.340<br>1.3126 | 25.400<br>1.0000 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 25.000<br>0.9843        | 62.000<br>2.4409 | 39.688<br>1.5625 | 36.258<br>1.4275 | 69700<br>15700         | 0.38 | 1.77           | 2.63           | 10400<br>2330          | 6800<br>1530     | 18100<br>4060      | 1.53 |
| 25.400<br>1.0000        | 50.005<br>1.9687 | 33.340<br>1.3126 | 25.400<br>1.0000 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 25.400<br>1.0000        | 50.005<br>1.9687 | 33.340<br>1.3126 | 25.400<br>1.0000 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 25.400<br>1.0000        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 25.400<br>1.0000        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 25.400<br>1.0000        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 28.575<br>1.1250        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 28.575<br>1.1250        | 66.421<br>2.6150 | 44.453<br>1.7501 | 38.100<br>1.5000 | 90100<br>20200         | 0.34 | 1.99           | 2.96           | 13400<br>3010          | 7790<br>1750     | 23300<br>5250      | 1.72 |
| 28.575<br>1.1250        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 28.575<br>1.1250        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 28.575<br>1.1250        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 28.575<br>1.1250        | 76.200<br>3.0000 | 47.625<br>1.8750 | 38.100<br>1.5000 | 106000<br>23800        | 0.45 | 1.49           | 2.21           | 15800<br>3550          | 12300<br>2750    | 27500<br>6170      | 1.29 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |        |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|--------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |        |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer  | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| A2047       | A2120D | R800003               | 0.8<br>0.03                                    | 16.5<br>0.65                               | 0.0<br>0.00                                      | 28.0<br>1.10                               |                |                | 1.7            | 3.17           | 0.0308         | 0.08<br>0.19        |
| A4059       | A4138D | X6SA4059              | 0.8<br>0.03                                    | 19.5<br>0.77                               | 0.6<br>0.02                                      | 31.5<br>1.24                               |                |                | 2.3            | 4.12           | 0.0355         | 0.12<br>0.26        |
| 05066       | 05185D | X1S-05066             | 1.5<br>0.06                                    | 24.5<br>0.96                               | 0.8<br>0.03                                      | 42.5<br>1.67                               |                |                | 5.8            | 5.55           | 0.0448         | 0.28<br>0.62        |
| 05075       | 05185D | X3S-05075             | 1.3<br>0.05                                    | 25.0<br>0.98                               | 0.8<br>0.03                                      | 42.5<br>1.67                               |                |                | 5.8            | 5.55           | 0.0448         | 0.26<br>0.58        |
| 21075       | 21226D | X1S-21075             | 1.5<br>0.06                                    | 31.5<br>1.24                               | 0.8<br>0.03                                      | 51.0<br>2.01                               |                |                | 7              | 3.55           | 0.0558         | 0.65<br>1.44        |
| 05079       | 05180D |                       | 1.5<br>0.06                                    | 26.5<br>1.04                               | 0.8<br>0.03                                      | 42.0<br>1.65                               |                |                | 5.8            | 5.55           | 0.0448         | 0.26<br>0.56        |
| 05079       | 05185D | X1S-05079             | 1.5<br>0.06                                    | 26.5<br>1.04                               | 0.8<br>0.03                                      | 42.5<br>1.67                               |                |                | 5.8            | 5.55           | 0.0448         | 0.26<br>0.57        |
| 07079       | 07196D | X1S-07079             | 1.5<br>0.06                                    | 27.5<br>1.08                               | 0.6<br>0.02                                      | 46.5<br>1.83                               |                |                | 7.6            | 7.07           | 0.0509         | 0.32<br>0.70        |
| 26093       | 26282D |                       | 2.3<br>0.09                                    | 35.0<br>1.38                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.88<br>1.94        |
| 26093       | 26284D |                       | 2.3<br>0.09                                    | 35.0<br>1.38                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.90<br>1.98        |
| 43096       | 43319D | X1S-43096             | 0.8<br>0.03                                    | 40.5<br>1.59                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.43<br>3.14        |
| 07098       | 07196D | X1S-07097             | 1.5<br>0.06                                    | 31.0<br>1.22                               | 0.6<br>0.02                                      | 46.5<br>1.83                               |                |                | 7.6            | 7.07           | 0.0509         | 0.28<br>0.61        |
| 17098       | 17245D | X1S-17098             | 1.5<br>0.06                                    | 33.0<br>1.30                               | 0.8<br>0.03                                      | 57.0<br>2.24                               |                |                | 11.8           | 7.49           | 0.0579         | 0.60<br>1.33        |
| 07097       | 07196D | X1S-07097             | 1.5<br>0.06                                    | 31.0<br>1.22                               | 0.6<br>0.02                                      | 46.5<br>1.83                               |                |                | 7.6            | 7.07           | 0.0509         | 0.28<br>0.61        |
| 17098X      | 17245D | X1S-17098             | 1.5<br>0.06                                    | 33.0<br>1.30                               | 0.8<br>0.03                                      | 57.0<br>2.24                               |                |                | 11.8           | 7.49           | 0.0579         | 0.60<br>1.33        |
| 07100-S     | 07196D | X1S-07100             | 1.5<br>0.06                                    | 31.5<br>1.24                               | 0.6<br>0.02                                      | 46.5<br>1.83                               |                |                | 7.6            | 7.07           | 0.0509         | 0.27<br>0.60        |
| 07100-SA    | 07196D | X1S-07100             | 3.3<br>0.13                                    | 35.0<br>1.38                               | 0.6<br>0.02                                      | 46.5<br>1.83                               |                |                | 7.6            | 7.07           | 0.0509         | 0.27<br>0.59        |
| 15100       | 15251D |                       | 3.5<br>0.14                                    | 38.0<br>1.50                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.69<br>1.53        |
| 15100-S     | 15251D | X1S-15101             | 1.3<br>0.05                                    | 33.5<br>1.32                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.72<br>1.59        |
| 15101       | 15251D | X1S-15101             | 0.8<br>0.03                                    | 32.5<br>1.28                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.72<br>1.59        |
| 26100       | 26282D | X1S-26100             | 1.5<br>0.06                                    | 34.5<br>1.36                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.87<br>1.91        |
| 26100       | 26284D |                       | 1.5<br>0.06                                    | 34.5<br>1.36                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.88<br>1.95        |
| 15112       | 15251D | X1S-15112             | 3.5<br>0.14                                    | 40.0<br>1.57                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.66<br>1.45        |
| 24112       | 24262D |                       | 1.5<br>0.06                                    | 36.0<br>1.42                               | 0.8<br>0.03                                      | 61.0<br>2.40                               |                |                | 14             | 8.28           | 0.0589         | 0.70<br>1.54        |
| 2578        | 2524YD |                       | 2.3<br>0.09                                    | 39.0<br>1.54                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.19<br>2.63        |
| 26112       | 26282D |                       | 1.5<br>0.06                                    | 37.0<br>1.46                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.83<br>1.82        |
| 26112       | 26284D |                       | 1.5<br>0.06                                    | 37.0<br>1.46                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.84<br>1.86        |
| 02872       | 02823D | X1S-02872             | 0.8<br>0.03                                    | 37.5<br>1.48                               | 0.8<br>0.03                                      | 70.0<br>2.76                               |                |                | 20.6           | 10.1           | 0.0740         | 1.13<br>2.49        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

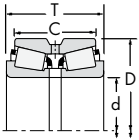
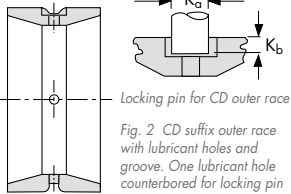
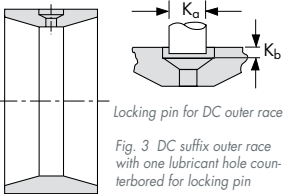


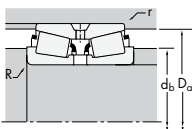
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                  |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                  |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 28.575<br>1.1250        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 29.987<br>1.1806        | 62.000<br>2.4409 | 39.688<br>1.5625 | 36.258<br>1.4275 | 69700<br>15700         | 0.38 | 1.77           | 2.63           | 10400<br>2330          | 6800<br>1530     | 18100<br>4060      | 1.53 |
| 29.987<br>1.1806        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 29.987<br>1.1806        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 29.987<br>1.1806        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 29.987<br>1.1806        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 30.000<br>1.1811        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 30.162<br>1.1875        | 58.738<br>2.3125 | 32.542<br>1.2812 | 24.608<br>0.9688 | 51100<br>11500         | 0.47 | 1.42           | 2.12           | 7610<br>1710           | 6170<br>1390     | 13200<br>2980      | 1.23 |
| 30.162<br>1.1875        | 62.000<br>2.4409 | 39.688<br>1.5625 | 36.258<br>1.4275 | 69700<br>15700         | 0.38 | 1.77           | 2.63           | 10400<br>2330          | 6800<br>1530     | 18100<br>4060      | 1.53 |
| 30.162<br>1.1875        | 66.421<br>2.6150 | 44.453<br>1.7501 | 38.100<br>1.5000 | 90100<br>20200         | 0.34 | 1.99           | 2.96           | 13400<br>3010          | 7790<br>1750     | 23300<br>5250      | 1.72 |
| 30.162<br>1.1875        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 30.162<br>1.1875        | 80.035<br>3.1510 | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 30.162<br>1.1875        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 30.213<br>1.1895        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 31.750<br>1.2500        | 58.738<br>2.3125 | 32.542<br>1.2812 | 24.608<br>0.9688 | 51100<br>11500         | 0.47 | 1.42           | 2.12           | 7610<br>1710           | 6170<br>1390     | 13200<br>2980      | 1.23 |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 44.259<br>1.7425 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 31.750<br>1.2500        | 63.500<br>2.5000 | 46.038<br>1.8125 | 36.512<br>1.4375 | 81400<br>18300         | 0.35 | 1.93           | 2.87           | 12100<br>2730          | 7280<br>1640     | 21100<br>4750      | 1.67 |
| 31.750<br>1.2500        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 31.750<br>1.2500        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 47.625<br>1.8750 | 38.100<br>1.5000 | 106000<br>23800        | 0.45 | 1.49           | 2.21           | 15800<br>3550          | 12300<br>2750    | 27500<br>6170      | 1.29 |
| 31.750<br>1.2500        | 76.200<br>3.0000 | 47.625<br>1.8750 | 38.100<br>1.5000 | 106000<br>23800        | 0.45 | 1.49           | 2.21           | 15800<br>3550          | 12300<br>2750    | 27500<br>6170      | 1.29 |
| 31.750<br>1.2500        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 31.750<br>1.2500        | 82.550<br>3.2500 | 66.678<br>2.6251 | 55.562<br>2.1875 | 169000<br>37900        | 0.37 | 1.85           | 2.75           | 25100<br>5650          | 15700<br>3530    | 43700<br>9830      | 1.60 |
| 32.004<br>1.2600        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |        |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|--------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |        |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer  | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 43112       | 43319D | X1S-43112             | 0.8<br>0.03                                    | 42.5<br>1.67                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.37<br>3.01        |
| 17118       | 17245D | X1S-17119             | 1.5<br>0.06                                    | 37.0<br>1.46                               | 0.8<br>0.03                                      | 57.0<br>2.24                               |                |                | 11.8           | 7.49           | 0.0579         | 0.54<br>1.18        |
| 15117       | 15251D | X1S-15117             | 1.3<br>0.05                                    | 36.5<br>1.44                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.65<br>1.43        |
| 26118       | 26282D | X2S-26118             | 1.5<br>0.06                                    | 38.0<br>1.50                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.81<br>1.78        |
| 26118       | 26284D | X1S-26118             | 1.5<br>0.06                                    | 38.0<br>1.50                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.84<br>1.85        |
| 43117       | 43319D |                       | 1.5<br>0.06                                    | 44.5<br>1.75                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.31<br>2.88        |
| 14117A      | 14276D | X1S-14117A            | 3.5<br>0.14                                    | 43.0<br>1.69                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.79<br>1.75        |
| 14118       | 14276D | X1S-14117A            | 0.8<br>0.03                                    | 37.0<br>1.46                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.79<br>1.75        |
| 08118       | 08231D | X1S-08118             | 3.5<br>0.14                                    | 41.5<br>1.63                               | 0.4<br>0.02                                      | 55.0<br>2.17                               |                |                | 10.7           | 10.6           | 0.0601         | 0.37<br>0.81        |
| 17119       | 17245D | X4S-17119             | 1.5<br>0.06                                    | 37.0<br>1.46                               | 0.8<br>0.03                                      | 57.0<br>2.24                               |                |                | 11.8           | 7.49           | 0.0579         | 0.53<br>1.18        |
| 24118       | 24262D | X1S-24118             | 1.5<br>0.06                                    | 37.5<br>1.48                               | 0.8<br>0.03                                      | 61.0<br>2.40                               |                |                | 14             | 8.28           | 0.0589         | 0.69<br>1.53        |
| 2558        | 2524YD |                       | 2.3<br>0.09                                    | 40.0<br>1.57                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.16<br>2.56        |
| 28118       | 28318D |                       | 1.5<br>0.06                                    | 40.0<br>1.57                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 1.10<br>2.43        |
| 43118       | 43319D | X1S-43118             | 1.5<br>0.06                                    | 45.0<br>1.77                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.33<br>2.93        |
| 15118       | 15251D |                       | 3.5<br>0.14                                    | 41.5<br>1.63                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.62<br>1.37        |
| 15119       | 15251D | X1S-15118             | 1.5<br>0.06                                    | 37.5<br>1.48                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.65<br>1.43        |
| 08125       | 08231D | X6S-08125             | 1.0<br>0.04                                    | 37.5<br>1.48                               | 0.4<br>0.02                                      | 55.0<br>2.17                               |                |                | 10.7           | 10.6           | 0.0601         | 0.36<br>0.79        |
| 15123       | 15251D | X1S-15123             | 0.0<br>0.00                                    | 42.5<br>1.67                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.59<br>1.30        |
| 15125       | 15251D | X1S-15125             | 3.5<br>0.14                                    | 42.5<br>1.67                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.61<br>1.35        |
| 15126       | 15251D | X1S-15126             | 0.8<br>0.03                                    | 37.0<br>1.46                               | 0.8<br>0.03                                      | 59.0<br>2.32                               |                |                | 14.6           | 7.58           | 0.0606         | 0.62<br>1.37        |
| 14125A      | 14276D | X1S-14125A            | 3.5<br>0.14                                    | 44.5<br>1.75                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.76<br>1.68        |
| 2580        | 2524YD | X2S-2580              | 0.8<br>0.03                                    | 38.5<br>1.52                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.18<br>2.61        |
| 2582        | 2524YD |                       | 3.5<br>0.14                                    | 44.0<br>1.73                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.13<br>2.48        |
| 02875       | 02823D | X3S-02875             | 3.5<br>0.14                                    | 45.5<br>1.79                               | 0.8<br>0.03                                      | 70.0<br>2.76                               |                |                | 20.6           | 10.1           | 0.0740         | 1.05<br>2.32        |
| 02876       | 02823D |                       | 0.8<br>0.03                                    | 40.0<br>1.57                               | 0.8<br>0.03                                      | 70.0<br>2.76                               |                |                | 20.6           | 10.1           | 0.0740         | 1.06<br>2.34        |
| 43125       | 43319D | X1S-43125             | 1.5<br>0.06                                    | 44.0<br>1.73                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.31<br>2.88        |
| 3476        | 3423D  | X1S-3476              | 1.3<br>0.05                                    | 43.0<br>1.69                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 29.9           | 11.2           | 0.0781         | 1.84<br>4.05        |
| 26126       | 26282D |                       | 1.5<br>0.06                                    | 39.5<br>1.56                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.78<br>1.71        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B







# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

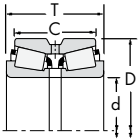
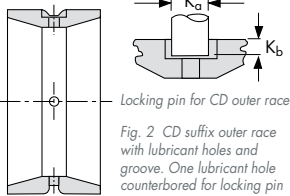
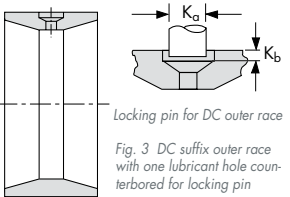


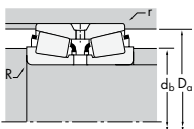
Fig. 1 D suffix outer race with lubricant holes and groove



locking pin for CD outer race  
Fig. 2 CD suffix outer race with lubricant holes and groove. One lubricant hole counterbored for locking pin



locking pin for DC outer race  
Fig. 3 DC suffix outer race with one lubricant hole counterbored for locking pin



| Dimensions, mm (inches) |                  |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                  |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 32.004<br>1.2600        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 33.338<br>1.3125        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 33.338<br>1.3125        | 69.850<br>2.7500 | 66.675<br>2.6250 | 57.150<br>2.2500 | 135000<br>30300        | 0.27 | 2.47           | 3.67           | 20100<br>4520          | 9410<br>2120     | 35000<br>7870      | 2.14 |
| 33.338<br>1.3125        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 33.338<br>1.3125        | 71.438<br>2.8125 | 42.862<br>1.6875 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 33.338<br>1.3125        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 33.338<br>1.3125        | 71.975<br>2.8336 | 42.761<br>1.6835 | 36.512<br>1.4375 | 94700<br>21300         | 0.36 | 1.87           | 2.79           | 14100<br>3170          | 8700<br>1960     | 24600<br>5520      | 1.62 |
| 33.338<br>1.3125        | 73.025<br>2.8750 | 42.862<br>1.6875 | 35.522<br>1.3985 | 85700<br>19300         | 0.51 | 1.33           | 1.98           | 12800<br>2870          | 11100<br>2500    | 22200<br>5000      | 1.15 |
| 33.338<br>1.3125        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 33.338<br>1.3125        | 80.962<br>3.1875 | 55.562<br>2.1875 | 39.688<br>1.5625 | 125000<br>28100        | 0.67 | 1.01           | 1.50           | 18600<br>4190          | 21300<br>4790    | 32400<br>7290      | 0.87 |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 34.925<br>1.3750        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 47.625<br>1.8750 | 38.100<br>1.5000 | 106000<br>23800        | 0.45 | 1.49           | 2.21           | 15800<br>3550          | 12300<br>2750    | 27500<br>6170      | 1.29 |
| 34.925<br>1.3750        | 76.200<br>3.0000 | 47.625<br>1.8750 | 38.100<br>1.5000 | 106000<br>23800        | 0.45 | 1.49           | 2.21           | 15800<br>3550          | 12300<br>2750    | 27500<br>6170      | 1.29 |
| 34.925<br>1.3750        | 80.035<br>3.1510 | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 34.925<br>1.3750        | 80.035<br>3.1510 | 57.150<br>2.2500 | 44.958<br>1.7700 | 126000<br>28300        | 0.56 | 1.20           | 1.79           | 18700<br>4210          | 18000<br>4040    | 32600<br>7330      | 1.04 |
| 34.925<br>1.3750        | 95.250<br>3.7500 | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 34.975<br>1.3770        | 69.012<br>2.7170 | 46.040<br>1.8126 | 38.100<br>1.5000 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 34.975<br>1.3770        | 80.035<br>3.1510 | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 35.000<br>1.3780        | 95.250<br>3.7500 | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 36.512<br>1.4375        | 69.012<br>2.7170 | 46.035<br>1.8124 | 38.100<br>1.5000 | 91400<br>20600         | 0.40 | 1.68           | 2.50           | 13600<br>3060          | 9370<br>2110     | 23700<br>5330      | 1.45 |
| 36.512<br>1.4375        | 69.012<br>2.7170 | 46.035<br>1.8124 | 38.100<br>1.5000 | 91400<br>20600         | 0.40 | 1.68           | 2.50           | 13600<br>3060          | 9370<br>2110     | 23700<br>5330      | 1.45 |
| 36.512<br>1.4375        | 82.550<br>3.2500 | 66.678<br>2.6251 | 55.562<br>2.1875 | 169000<br>37900        | 0.37 | 1.85           | 2.75           | 25100<br>5650          | 15700<br>3530    | 43700<br>9830      | 1.60 |
| 36.512<br>1.4375        | 82.931<br>3.2650 | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800    | 37800<br>8500      | 1.74 |
| 36.512<br>1.4375        | 92.075<br>3.6250 | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |         |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|---------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |         |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer   | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 26126       | 26284D  |                       | 1.5<br>0.06                                    | 39.5<br>1.56                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.79<br>1.75        |
| 14131       | 14276D  | X1S-14131             | 0.8<br>0.03                                    | 40.5<br>1.59                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.74<br>1.63        |
| 2581        | 2523D   |                       | 0.8<br>0.03                                    | 39.5<br>1.56                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.10<br>2.43        |
| 2581        | 2524YD  |                       | 0.8<br>0.03                                    | 39.5<br>1.56                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.10<br>2.43        |
| 2585        | 2523D   | X1S-2585              | 3.5<br>0.14                                    | 45.0<br>1.77                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.13<br>2.49        |
| 2585        | 2524YD  |                       | 3.5<br>0.14                                    | 45.0<br>1.77                               | 0.8<br>0.03                                      | 64.0<br>2.52                               |                |                | 23.6           | 9.63           | 0.0656         | 1.09<br>2.41        |
| 26131       | 26282D  | X1S-26131             | 3.5<br>0.14                                    | 44.5<br>1.75                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.76<br>1.67        |
| 26132       | 26282D  |                       | 1.5<br>0.06                                    | 40.5<br>1.59                               | 0.4<br>0.02                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.76<br>1.67        |
| 26131       | 26284D  | X1S-26131             | 3.5<br>0.14                                    | 44.5<br>1.75                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.78<br>1.71        |
| 26132       | 26284D  |                       | 1.5<br>0.06                                    | 40.5<br>1.59                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 16.1           | 10.1           | 0.0630         | 0.77<br>1.71        |
| 25132       | 25289D  | X1S-25132             | 2.3<br>0.09                                    | 43.5<br>1.71                               | 0.8<br>0.03                                      | 66.5<br>2.62                               |                |                | 14.6           | 13.4           | 0.0681         | 0.87<br>1.93        |
| 43131       | 43319D  | X1S-43131             | 3.5<br>0.14                                    | 51.0<br>2.01                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.26<br>2.78        |
| 43132       | 43319D  | X1S-43131             | 2.0<br>0.08                                    | 48.0<br>1.89                               | 1.5<br>0.06                                      | 74.0<br>2.91                               |                |                | 16.8           | 7.57           | 0.0774         | 1.27<br>2.80        |
| 14137A      | 14276D  | X2S-14137             | 1.5<br>0.06                                    | 43.0<br>1.69                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.71<br>1.57        |
| 14138A      | 14276D  | X2S-14137             | 3.5<br>0.14                                    | 47.0<br>1.85                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.71<br>1.57        |
| 02877       | 02823D  | X1S-02877             | 3.5<br>0.14                                    | 48.5<br>1.91                               | 0.8<br>0.03                                      | 70.0<br>2.76                               |                |                | 20.6           | 10.1           | 0.0740         | 1.00<br>2.21        |
| 02878       | 02823D  | X1S-02877             | 0.8<br>0.03                                    | 42.5<br>1.67                               | 0.8<br>0.03                                      | 70.0<br>2.76                               |                |                | 20.6           | 10.1           | 0.0740         | 1.02<br>2.24        |
| 28137       | 28318D  | X1S-28138             | 1.5<br>0.06                                    | 43.5<br>1.71                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 1.05<br>2.31        |
| 27875       | 27820D  | X2S-27875             | 0.8<br>0.03                                    | 45.5<br>1.79                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 24.6           | 12.6           | 0.0839         | 1.30<br>2.87        |
| 449         | 432D    |                       | 0.8<br>0.03                                    | 44.0<br>1.73                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.28<br>5.02        |
| 14139       | 14276D  | X2S-14137             | 1.3<br>0.05                                    | 42.5<br>1.67                               | 0.8<br>0.03                                      | 63.0<br>2.48                               |                |                | 18             | 9.4            | 0.0668         | 0.71<br>1.57        |
| 28138       | 28318D  |                       | 1.5<br>0.06                                    | 43.5<br>1.71                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 1.02<br>2.25        |
| 441         | 432D    |                       | 3.5<br>0.14                                    | 50.0<br>1.97                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.26<br>4.99        |
| 13682       | 13621D  |                       | 3.5<br>0.14                                    | 48.0<br>1.89                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 20.7           | 12.2           | 0.0713         | 0.66<br>1.45        |
| 13682       | 13621DC | X1S-13682             | 3.5<br>0.14                                    | 48.0<br>1.89                               | 0.8<br>0.03                                      | 65.0<br>2.56                               | 6.1<br>0.24    | 2.3<br>0.09    | 20.7           | 12.2           | 0.0713         | 0.71<br>1.56        |
| 3479        | 3423D   | X2S-3479              | 0.8<br>0.03                                    | 45.5<br>1.79                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 29.9           | 11.2           | 0.0781         | 1.71<br>3.77        |
| 25570       | 25520D  | X1S-25570             | 3.5<br>0.14                                    | 51.0<br>2.01                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.53<br>3.36        |
| 44143       | 44363D  | X1S-44143             | 2.3<br>0.09                                    | 54.0<br>2.13                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.72<br>3.78        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

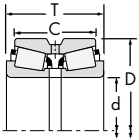
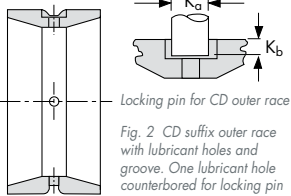
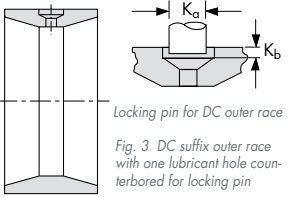


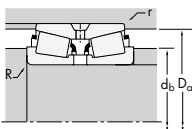
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 38.100<br>1.5000        | 63.500<br>2.5000  | 38.100<br>1.5000 | 31.750<br>1.2500 | 43800<br>9840          | 0.35 | 1.95           | 2.90           | 6520<br>1470           | 3860<br>869      | 11300<br>2550      | 1.69 |
| 38.100<br>1.5000        | 69.012<br>2.7170  | 46.035<br>1.8124 | 38.100<br>1.5000 | 91400<br>20600         | 0.40 | 1.68           | 2.50           | 13600<br>3060          | 9370<br>2110     | 23700<br>5330      | 1.45 |
| 38.100<br>1.5000        | 69.012<br>2.7170  | 46.035<br>1.8124 | 38.100<br>1.5000 | 91400<br>20600         | 0.40 | 1.68           | 2.50           | 13600<br>3060          | 9370<br>2110     | 23700<br>5330      | 1.45 |
| 38.100<br>1.5000        | 69.012<br>2.7170  | 46.035<br>1.8124 | 38.100<br>1.5000 | 91400<br>20600         | 0.40 | 1.68           | 2.50           | 13600<br>3060          | 9370<br>2110     | 23700<br>5330      | 1.45 |
| 38.100<br>1.5000        | 80.035<br>3.1510  | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 38.100<br>1.5000        | 80.035<br>3.1510  | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 38.100<br>1.5000        | 80.035<br>3.1510  | 57.150<br>2.2500 | 44.958<br>1.7700 | 126000<br>28300        | 0.56 | 1.20           | 1.79           | 18700<br>4210          | 18000<br>4040    | 32600<br>7330      | 1.04 |
| 38.100<br>1.5000        | 80.035<br>3.1510  | 57.150<br>2.2500 | 44.958<br>1.7700 | 126000<br>28300        | 0.56 | 1.20           | 1.79           | 18700<br>4210          | 18000<br>4040    | 32600<br>7330      | 1.04 |
| 38.100<br>1.5000        | 82.550<br>3.2500  | 66.678<br>2.6251 | 55.562<br>2.1875 | 169000<br>37900        | 0.37 | 1.85           | 2.75           | 25100<br>5650          | 15700<br>3530    | 43700<br>9830      | 1.60 |
| 38.100<br>1.5000        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800    | 37800<br>8500      | 1.74 |
| 38.100<br>1.5000        | 92.075<br>3.6250  | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 38.100<br>1.5000        | 95.250<br>3.7500  | 65.088<br>2.5625 | 44.450<br>1.7500 | 161000<br>36300        | 0.74 | 0.91           | 1.36           | 24000<br>5410          | 30500<br>6850    | 41900<br>9410      | 0.79 |
| 38.100<br>1.5000        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |
| 38.481<br>1.5150        | 63.500<br>2.5000  | 38.100<br>1.5000 | 31.750<br>1.2500 | 43800<br>9840          | 0.35 | 1.95           | 2.90           | 6520<br>1470           | 3860<br>869      | 11300<br>2550      | 1.69 |
| 39.688<br>1.5625        | 92.075<br>3.6250  | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |
| 39.688<br>1.5625        | 92.075<br>3.6250  | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |
| 39.980<br>1.5740        | 80.035<br>3.1510  | 43.459<br>1.7110 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 39.980<br>1.5740        | 80.035<br>3.1510  | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 40.000<br>1.5748        | 80.035<br>3.1510  | 46.040<br>1.8126 | 34.925<br>1.3750 | 102000<br>23000        | 0.40 | 1.68           | 2.50           | 15200<br>3430          | 10500<br>2360    | 26500<br>5970      | 1.45 |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 40.000<br>1.5748        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 40.000<br>1.5748        | 92.075<br>3.6250  | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |
| 40.000<br>1.5748        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |         |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|---------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |         |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer   | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 13889       | 13835D  | X1S-13889             | 1.5<br>0.06                                    | 45.0<br>1.77                               | 0.4<br>0.02                                      | 60.0<br>2.36                               |                |                | 14.8           | 23.3           | 0.0601         | 0.42<br>0.93        |
| 13685       | 13621DC | X1S-13687             | 3.5<br>0.14                                    | 49.5<br>1.95                               | 0.8<br>0.03                                      | 65.0<br>2.56                               | 6.1<br>0.24    | 2.3<br>0.09    | 20.7           | 10.9           | 0.0713         | 0.68<br>1.49        |
| 13685       | 13621D  | X2S-13687             | 3.5<br>0.14                                    | 49.5<br>1.95                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 20.7           | 10.9           | 0.0713         | 0.65<br>1.44        |
| 13687       | 13621D  | X1S-13687             | 2.0<br>0.08                                    | 46.5<br>1.83                               | 0.8<br>0.03                                      | 65.0<br>2.56                               |                |                | 20.7           | 10.9           | 0.0713         | 0.66<br>1.46        |
| 28150       | 28318D  | X4S-28150             | 1.5<br>0.06                                    | 45.5<br>1.79                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 0.98<br>2.17        |
| 28151       | 28318D  |                       | 3.5<br>0.14                                    | 50.0<br>1.97                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 0.95<br>2.10        |
| 27880       | 27820D  | X1S-27880             | 0.8<br>0.03                                    | 48.0<br>1.89                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 24.6           | 12.6           | 0.0839         | 1.22<br>2.69        |
| 27881       | 27820D  | X1S-27881             | 3.5<br>0.14                                    | 53.0<br>2.09                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 24.6           | 12.6           | 0.0839         | 1.21<br>2.66        |
| 3490        | 3423D   | X1S-3490              | 3.5<br>0.14                                    | 52.0<br>2.05                               | 0.8<br>0.03                                      | 75.0<br>2.95                               |                |                | 29.9           | 11.2           | 0.0781         | 1.65<br>3.64        |
| 25572       | 25520D  | X1S-25572             | 0.8<br>0.03                                    | 46.0<br>1.81                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.48<br>3.26        |
| 44150       | 44363D  | X1S-44150             | 2.3<br>0.09                                    | 55.0<br>2.17                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.67<br>3.69        |
| 440         | 432D    |                       | 0.8<br>0.03                                    | 46.5<br>1.83                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.19<br>4.83        |
| 444         | 432D    |                       | 3.5<br>0.14                                    | 52.0<br>2.05                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.18<br>4.80        |
| 33880       | 33821D  | X1S-33880             | 3.5<br>0.14                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 2.25<br>4.97        |
| 53150       | 53376D  | X2S-53150             | 1.5<br>0.06                                    | 55.0<br>2.17                               | 0.8<br>0.03                                      | 89.0<br>3.50                               |                |                | 26.7           | 9.63           | 0.0930         | 2.11<br>4.64        |
| 542         | 533D    | X1S-542               | 3.5<br>0.14                                    | 55.0<br>2.17                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.98<br>8.77        |
| 13890       | 13835D  | X1S-13890             | 0.4<br>0.02                                    | 43.0<br>1.69                               | 0.4<br>0.02                                      | 60.0<br>2.36                               |                |                | 14.8           | 23.3           | 0.0601         | 0.41<br>0.91        |
| 44156       | 44363D  | X1S-44156             | 2.3<br>0.09                                    | 56.0<br>2.20                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.60<br>3.53        |
| 44158       | 44363D  |                       | 3.5<br>0.14                                    | 58.0<br>2.28                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.59<br>3.51        |
| 28156       | 28318D  |                       | 2.3<br>0.09                                    | 49.0<br>1.93                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 0.90<br>1.98        |
| 28159       | 28318D  | X1S-28158             | 3.5<br>0.14                                    | 52.0<br>2.05                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 0.94<br>2.07        |
| 28158       | 28318D  | X2S-28158             | 1.5<br>0.06                                    | 47.5<br>1.87                               | 0.8<br>0.03                                      | 73.0<br>2.87                               |                |                | 20.7           | 12.5           | 0.0709         | 0.95<br>2.09        |
| 350         | 353D    |                       | 4.0<br>0.16                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.46<br>3.23        |
| 350         | 353DC   | X1S-357               | 4.0<br>0.16                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 82.0<br>3.23                               | 7.9<br>0.31    | 3.8<br>0.15    | 30             | 12.2           | 0.0732         | 1.52<br>3.35        |
| 350A        | 353D    | X1S-357               | 0.8<br>0.03                                    | 47.5<br>1.87                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.54<br>3.39        |
| 357         | 353D    | X1S-357               | 2.3<br>0.09                                    | 51.0<br>2.01                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.53<br>3.38        |
| 44157       | 44363D  |                       | 2.3<br>0.09                                    | 56.0<br>2.20                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.59<br>3.51        |
| 442-S       | 432D    |                       | 3.5<br>0.14                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.12<br>4.68        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

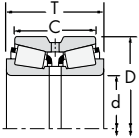
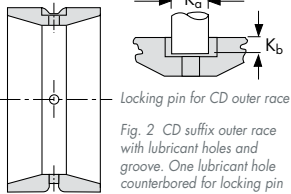
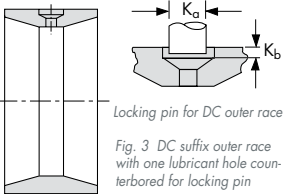


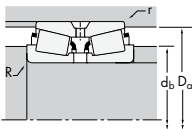
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 41.275<br>1.6250        | 76.200<br>3.0000  | 49.212<br>1.9375 | 39.688<br>1.5625 | 122000<br>27400        | 0.39 | 1.72           | 2.56           | 18100<br>4080          | 12200<br>2740    | 31600<br>7100      | 1.49 |
| 41.275<br>1.6250        | 76.200<br>3.0000  | 49.212<br>1.9375 | 39.688<br>1.5625 | 122000<br>27400        | 0.39 | 1.72           | 2.56           | 18100<br>4080          | 12200<br>2740    | 31600<br>7100      | 1.49 |
| 41.275<br>1.6250        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 41.275<br>1.6250        | 92.075<br>3.6250  | 55.562<br>2.1875 | 39.688<br>1.5625 | 136000<br>30500        | 0.78 | 0.86           | 1.29           | 20200<br>4540          | 27000<br>6070    | 35200<br>7910      | 0.75 |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 41.275<br>1.6250        | 95.250<br>3.7500  | 65.088<br>2.5625 | 44.450<br>1.7500 | 161000<br>36300        | 0.74 | 0.91           | 1.36           | 24000<br>5410          | 30500<br>6850    | 41900<br>9410      | 0.79 |
| 41.275<br>1.6250        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 41.275<br>1.6250        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |
| 42.850<br>1.6870        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 42.862<br>1.6875        | 82.550<br>3.2500  | 44.450<br>1.7500 | 34.925<br>1.3750 | 105000<br>23700        | 0.43 | 1.57           | 2.34           | 15700<br>3530          | 11500<br>2600    | 27300<br>6140      | 1.36 |
| 42.862<br>1.6875        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800    | 37800<br>8500      | 1.74 |
| 44.450<br>1.7500        | 79.375<br>3.1250  | 41.272<br>1.6249 | 33.338<br>1.3125 | 83800<br>18800         | 0.37 | 1.80           | 2.69           | 12500<br>2810          | 7990<br>1800     | 21700<br>4890      | 1.56 |
| 44.450<br>1.7500        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800    | 37800<br>8500      | 1.74 |
| 44.450<br>1.7500        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800    | 37800<br>8500      | 1.74 |
| 44.450<br>1.7500        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 44.450<br>1.7500        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 44.450<br>1.7500        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 44.450<br>1.7500        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330    | 53000<br>11900     | 2.05 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 65.088<br>2.5625 | 44.450<br>1.7500 | 161000<br>36300        | 0.74 | 0.91           | 1.36           | 24000<br>5410          | 30500<br>6850    | 41900<br>9410      | 0.79 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 65.088<br>2.5625 | 44.450<br>1.7500 | 161000<br>36300        | 0.74 | 0.91           | 1.36           | 24000<br>5410          | 30500<br>6850    | 41900<br>9410      | 0.79 |
| 44.450<br>1.7500        | 95.250<br>3.7500  | 65.088<br>2.5625 | 44.450<br>1.7500 | 161000<br>36300        | 0.74 | 0.91           | 1.36           | 24000<br>5410          | 30500<br>6850    | 41900<br>9410      | 0.79 |
| 44.450<br>1.7500        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 44.450<br>1.7500        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |         |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|---------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |         |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer   | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 24780       | 24720D  |                       | 3.5<br>0.14                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 72.0<br>2.83                               |                |                | 26.4           | 12.5           | 0.0767         | 0.93<br>2.04        |
| 24780       | 24720XD |                       | 3.5<br>0.14                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 72.0<br>2.83                               |                |                | 26.4           | 12.5           | 0.0767         | 0.91<br>2.00        |
| 365A        | 363D    | X1S-365A              | 3.5<br>0.14                                    | 55.0<br>2.17                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.41<br>3.11        |
| 44162       | 44363D  | X2S-44162             | 2.3<br>0.09                                    | 57.0<br>2.24                               | 1.5<br>0.06                                      | 85.0<br>3.35                               |                |                | 22.9           | 8.71           | 0.0899         | 1.59<br>3.51        |
| 447         | 432D    | X1S-447               | 3.5<br>0.14                                    | 55.0<br>2.17                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.11<br>4.65        |
| 53162       | 53376D  |                       | 1.5<br>0.06                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 89.0<br>3.50                               |                |                | 26.7           | 9.63           | 0.0930         | 1.96<br>4.32        |
| 464         | 452D    | X1S-464               | 2.3<br>0.09                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 3.08<br>6.79        |
| 541         | 533D    |                       | 3.5<br>0.14                                    | 58.0<br>2.28                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.86<br>8.51        |
| 461         | 452D    |                       | 0.8<br>0.03                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.97<br>6.56        |
| 22168       | 22325D  | X2S-22168             | 2.3<br>0.09                                    | 52.0<br>2.05                               | 0.8<br>0.03                                      | 76.0<br>2.99                               |                |                | 23.7           | 14.4           | 0.0758         | 1.01<br>2.24        |
| 25578       | 25520D  | X1S-25578             | 2.3<br>0.09                                    | 53.0<br>2.09                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.33<br>2.93        |
| 18685       | 18620D  | X2S-18685             | 2.8<br>0.11                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 74.0<br>2.91                               |                |                | 23.9           | 17.7           | 0.0725         | 0.78<br>1.73        |
| 25580       | 25520DC | X1S-25581             | 3.5<br>0.14                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 77.0<br>3.03                               | 9.4<br>0.37    | 2.3<br>0.09    | 35.2           | 14.3           | 0.0801         | 1.31<br>2.88        |
| 25580       | 25520D  | X3S-25580             | 3.5<br>0.14                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.31<br>2.88        |
| 25581       | 25520D  | X1S-25581             | 0.5<br>0.02                                    | 51.0<br>2.01                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.32<br>2.92        |
| 355         | 353D    | X3S-355               | 2.3<br>0.09                                    | 54.0<br>2.13                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.41<br>3.10        |
| 355A        | 353D    | X2S-355               | 0.8<br>0.03                                    | 51.0<br>2.01                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.41<br>3.11        |
| 355X        | 353D    |                       | 3.5<br>0.14                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.37<br>3.01        |
| 355X        | 353DC   | X3S-355               | 3.5<br>0.14                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 82.0<br>3.23                               | 7.9<br>0.31    | 3.8<br>0.15    | 30             | 12.2           | 0.0732         | 1.37<br>3.01        |
| 3782        | 3729D   | X1S-3782              | 3.5<br>0.14                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 2.06<br>4.53        |
| 435         | 432D    | R800002               | 0.8<br>0.03                                    | 52.0<br>2.05                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 2.00<br>4.41        |
| 438         | 432D    | R800002               | 3.5<br>0.14                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 1.98<br>4.37        |
| 33885       | 33821D  | X1S-33885             | 0.8<br>0.03                                    | 53.0<br>2.09                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 2.12<br>4.66        |
| 53176       | 53376D  |                       | 1.3<br>0.05                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 89.0<br>3.50                               |                |                | 26.7           | 9.63           | 0.0930         | 1.90<br>4.18        |
| 53177       | 53376D  | X2S-53176             | 3.5<br>0.14                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 89.0<br>3.50                               |                |                | 26.7           | 9.63           | 0.0930         | 1.88<br>4.15        |
| 53178       | 53376D  | X2S-53176             | 2.0<br>0.08                                    | 60.0<br>2.36                               | 0.8<br>0.03                                      | 89.0<br>3.50                               |                |                | 26.7           | 9.63           | 0.0930         | 1.89<br>4.18        |
| 460         | 452D    |                       | 3.5<br>0.14                                    | 60.0<br>2.36                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.91<br>6.42        |
| 535         | 533D    |                       | 3.5<br>0.14                                    | 60.0<br>2.36                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.74<br>8.24        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

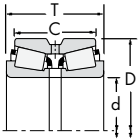
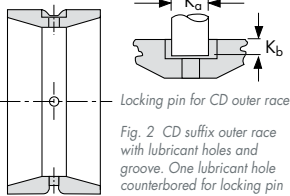
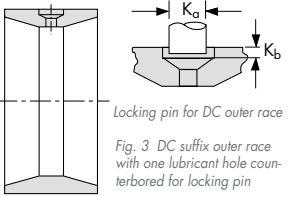


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



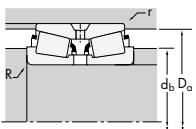
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                 |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|-----------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                 |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 44.450<br>1.7500        | 112.712<br>4.4375 | 65.088<br>2.5625 | 46.038<br>1.8125 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690   | 44500<br>10000     | 0.66 |
| 44.983<br>1.7710        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800   | 37800<br>8500      | 1.74 |
| 44.983<br>1.7710        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820   | 51000<br>11500     | 1.73 |
| 45.000<br>1.7717        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540   | 35900<br>8070      | 1.83 |
| 45.000<br>1.7717        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320   | 34200<br>7690      | 1.91 |
| 45.000<br>1.7717        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320   | 34200<br>7690      | 1.91 |
| 45.000<br>1.7717        | 100.000<br>3.9370 | 50.800<br>2.0000 | 39.690<br>1.5626 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750   | 36800<br>8260      | 1.73 |
| 45.618<br>1.7960        | 82.931<br>3.2650  | 57.150<br>2.2500 | 47.625<br>1.8750 | 146000<br>32800        | 0.33 | 2.02           | 3.00           | 21700<br>4880          | 12500<br>2800   | 37800<br>8500      | 1.74 |
| 46.038<br>1.8125        | 79.375<br>3.1250  | 41.272<br>1.6249 | 33.338<br>1.3125 | 83800<br>18800         | 0.37 | 1.80           | 2.69           | 12500<br>2810          | 7990<br>1800    | 21700<br>4890      | 1.56 |
| 46.038<br>1.8125        | 79.375<br>3.1250  | 41.272<br>1.6249 | 33.338<br>1.3125 | 83800<br>18800         | 0.37 | 1.80           | 2.69           | 12500<br>2810          | 7990<br>1800    | 21700<br>4890      | 1.56 |
| 46.038<br>1.8125        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320   | 34200<br>7690      | 1.91 |
| 46.038<br>1.8125        | 90.119<br>3.5480  | 50.795<br>1.9998 | 44.450<br>1.7500 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320   | 34200<br>7690      | 1.91 |
| 46.038<br>1.8125        | 95.250<br>3.7500  | 61.915<br>2.4376 | 50.800<br>2.0000 | 205000<br>46000        | 0.28 | 2.37           | 3.53           | 30500<br>6850          | 14800<br>3330   | 53000<br>11900     | 2.05 |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540   | 35900<br>8070      | 1.83 |
| 47.625<br>1.8750        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540   | 35900<br>8070      | 1.83 |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820   | 51000<br>11500     | 1.73 |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820   | 51000<br>11500     | 1.73 |
| 47.625<br>1.8750        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980   | 38000<br>8550      | 1.65 |
| 47.625<br>1.8750        | 100.000<br>3.9370 | 52.388<br>2.0625 | 42.862<br>1.6875 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980   | 38000<br>8550      | 1.65 |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200   | 56700<br>12700     | 1.74 |
| 47.625<br>1.8750        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200   | 56700<br>12700     | 1.74 |
| 47.625<br>1.8750        | 109.982<br>4.3300 | 63.500<br>2.5000 | 42.865<br>1.6876 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690   | 44500<br>10000     | 0.66 |
| 47.625<br>1.8750        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720   | 71900<br>16200     | 1.97 |
| 47.625<br>1.8750        | 112.712<br>4.4375 | 65.088<br>2.5625 | 46.038<br>1.8125 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690   | 44500<br>10000     | 0.66 |
| 47.625<br>1.8750        | 117.475<br>4.6250 | 73.025<br>2.8750 | 53.975<br>2.1250 | 240000<br>54000        | 0.63 | 1.08           | 1.60           | 35800<br>8040          | 38300<br>8620   | 62300<br>14000     | 0.93 |
| 47.625<br>1.8750        | 123.825<br>4.8750 | 77.788<br>3.0625 | 55.562<br>2.1875 | 266000<br>59800        | 0.74 | 0.92           | 1.36           | 39600<br>8910          | 50000<br>11200  | 69000<br>15500     | 0.79 |
| 49.212<br>1.9375        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820   | 51000<br>11500     | 1.73 |
| 49.212<br>1.9375        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720   | 71900<br>16200     | 1.97 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.



| Part Number |         |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|---------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |         |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer   | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 55175       | 55444D  | X2S-55176             | 3.5<br>0.14                                    | 67.0<br>2.64                               | 1.5<br>0.06                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 3.03<br>6.67        |
| 25584       | 25520D  | X1S-25584             | 1.5<br>0.06                                    | 53.0<br>2.09                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.30<br>2.87        |
| 3776        | 3729D   | X1S-3776              | 3.5<br>0.14                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 2.03<br>4.47        |
| 367         | 363D    | X3S-367               | 2.0<br>0.08                                    | 55.0<br>2.17                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.34<br>2.95        |
| 358         | 353D    | X2S-358               | 1.5<br>0.06                                    | 53.0<br>2.09                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.40<br>3.08        |
| 358A        | 353D    | X1S-358               | 3.5<br>0.14                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.39<br>3.06        |
| 376X        | 372D    |                       | 2.0<br>0.08                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 37.6           | 15.4           | 0.0816         | 1.76<br>3.88        |
| 25590       | 25520D  | X1S-25590             | 3.5<br>0.14                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 35.2           | 14.3           | 0.0801         | 1.27<br>2.80        |
| 18690       | 18620DC | X1S-18690             | 2.8<br>0.11                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 74.0<br>2.91                               | 4.6<br>0.18    | 2.3<br>0.09    | 23.9           | 17.7           | 0.0725         | 0.74<br>1.64        |
| 18690       | 18620D  | X2S-18690             | 2.8<br>0.11                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 74.0<br>2.91                               |                |                | 23.9           | 17.7           | 0.0725         | 0.74<br>1.64        |
| 359A        | 353D    |                       | 3.5<br>0.14                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.33<br>2.92        |
| 359-S       | 353D    | X1S-359-S             | 2.3<br>0.09                                    | 55.0<br>2.17                               | 0.8<br>0.03                                      | 82.0<br>3.23                               |                |                | 30             | 12.2           | 0.0732         | 1.36<br>3.01        |
| 436         | 432D    | X1S-436               | 3.5<br>0.14                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 87.0<br>3.43                               |                |                | 42.5           | 11.3           | 0.0805         | 1.95<br>4.29        |
| 369A        | 363D    | X1S-369A              | 3.5<br>0.14                                    | 60.0<br>2.36                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.26<br>2.78        |
| 369-S       | 363D    | X1S-369A              | 2.3<br>0.09                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.27<br>2.79        |
| 3778        | 3729D   |                       | 6.4<br>0.25                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.88<br>4.13        |
| 3779        | 3729D   | X1S-3779              | 3.5<br>0.14                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.94<br>4.27        |
| 386A        | 384ED   | X1S-386A              | 0.8<br>0.03                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.75<br>3.85        |
| 386A        | 384D    | X2S-386A              | 0.8<br>0.03                                    | 56.0<br>2.20                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.84<br>4.05        |
| 463         | 452D    |                       | 4.8<br>0.19                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.79<br>6.15        |
| 467         | 452D    | X1S-467               | 0.8<br>0.03                                    | 57.0<br>2.24                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.89<br>6.37        |
| 55187       | 55433D  | X2S-55187             | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.5<br>0.02                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.77<br>6.11        |
| 536         | 533D    |                       | 3.5<br>0.14                                    | 62.0<br>2.44                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.60<br>7.94        |
| 55187       | 55444D  | X1S-55187             | 3.5<br>0.14                                    | 69.0<br>2.72                               | 1.5<br>0.06                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.91<br>6.41        |
| 66187       | 66462D  | X1S-66187             | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 111.0<br>4.37                              |                |                | 50.2           | 16.4           | 0.0751         | 3.77<br>8.31        |
| 72187       | 72488D  | X1S-72187             | 3.5<br>0.14                                    | 72.0<br>2.83                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 47.7           | 14.1           | 0.0772         | 4.36<br>9.60        |
| 3781        | 3729D   | X1S-366               | 3.5<br>0.14                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.88<br>4.14        |
| 545         | 533D    |                       | 3.5<br>0.14                                    | 64.0<br>2.52                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.53<br>7.79        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

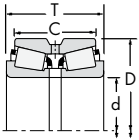


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove

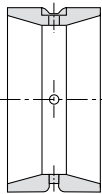


Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin

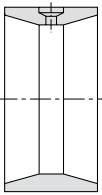
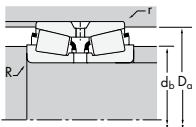


Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 49.975<br>1.9675        | 109.982<br>4.3300 | 63.500<br>2.5000 | 42.865<br>1.6876 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |
| 49.975<br>1.9675        | 112.712<br>4.4375 | 65.088<br>2.5625 | 46.038<br>1.8125 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |
| 49.982<br>1.9678        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.000<br>1.9685        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 50.800<br>2.0000        | 80.962<br>3.1875  | 42.865<br>1.6876 | 34.925<br>1.3750 | 98000<br>22000         | 0.36 | 1.90           | 2.83           | 14600<br>3280          | 8880<br>2000     | 25400<br>5710      | 1.64 |
| 50.800<br>2.0000        | 89.985<br>3.5427  | 50.400<br>1.9843 | 49.949<br>1.9665 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.800<br>2.0000        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 50.800<br>2.0000        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 50.800<br>2.0000        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 52.388<br>2.0625 | 42.862<br>1.6875 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 50.800<br>2.0000        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 50.800<br>2.0000        | 109.982<br>4.3300 | 63.500<br>2.5000 | 42.865<br>1.6876 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |
| 50.800<br>2.0000        | 109.982<br>4.3300 | 63.500<br>2.5000 | 42.865<br>1.6876 | 206000<br>46200        | 0.88 | 0.76           | 1.14           | 30600<br>6880          | 46300<br>10400   | 53300<br>12000     | 0.66 |
| 50.800<br>2.0000        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 50.800<br>2.0000        | 112.712<br>4.4375 | 65.088<br>2.5625 | 46.038<br>1.8125 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 55197       | 55433D   | X1S-55197             | 2.0<br>0.08                                    | 68.0<br>2.68                               | 0.5<br>0.02                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.69<br>5.93        |
| 55197       | 55444D   | X2S-55197             | 2.0<br>0.08                                    | 68.0<br>2.68                               | 1.5<br>0.06                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.83<br>6.24        |
| 546         | 533D     |                       | 3.5<br>0.14                                    | 65.0<br>2.56                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.50<br>7.71        |
| 365         | 363D     | X1S-366               | 2.0<br>0.08                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.20<br>2.64        |
| 366         | 363DC    | X1S-366               | 2.3<br>0.09                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 84.0<br>3.31                               | 7.9<br>0.31    | 2.3<br>0.09    | 33.8           | 14             | 0.0773         | 1.24<br>2.73        |
| 366         | 363D     | X3S-368               | 2.3<br>0.09                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.20<br>2.64        |
| 396         | 394D     | X2S-396               | 0.8<br>0.03                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 2.31<br>5.09        |
| L305649     | L305610D | L305649XC             | 1.5<br>0.06                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 77.0<br>3.03                               |                |                | 38.8           | 27.8           | 0.0841         | 0.78<br>1.73        |
| 368A        | 362XD    | X5S-368A              | 3.5<br>0.14                                    | 62.0<br>2.44                               | 0.5<br>0.02                                      | 86.5<br>3.40                               |                |                | 33.8           | 12.7           | 0.0773         | 1.27<br>2.79        |
| 368         | 363D     | X3S-368               | 1.5<br>0.06                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.18<br>2.60        |
| 368A        | 363DC    | X3S-368               | 3.5<br>0.14                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 84.0<br>3.31                               | 7.9<br>0.31    | 2.3<br>0.09    | 33.8           | 12.7           | 0.0773         | 1.21<br>2.66        |
| 368A        | 363D     | X2S-368A              | 3.5<br>0.14                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 12.7           | 0.0773         | 1.17<br>2.57        |
| 3775        | 3729DC   |                       | 0.8<br>0.03                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 88.0<br>3.46                               | 9.4<br>0.37    | 2.3<br>0.09    | 49.9           | 14.5           | 0.0903         | 1.81<br>3.99        |
| 3775        | 3729D    | X3S-3775              | 0.8<br>0.03                                    | 58.0<br>2.28                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.84<br>4.06        |
| 3780        | 3729DC   | X1S-3780              | 3.5<br>0.14                                    | 64.0<br>2.52                               | 0.8<br>0.03                                      | 88.0<br>3.46                               | 9.4<br>0.37    | 2.3<br>0.09    | 49.9           | 14.5           | 0.0903         | 1.82<br>4.02        |
| 3780        | 3729D    | X1S-3780              | 3.5<br>0.14                                    | 64.0<br>2.52                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.82<br>4.02        |
| 3784        | 3729D    | X1S-3780              | 6.4<br>0.25                                    | 70.0<br>2.76                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.78<br>3.93        |
| 33889       | 33821DC  | X1S-33889             | 3.5<br>0.14                                    | 64.0<br>2.52                               | 0.8<br>0.03                                      | 90.0<br>3.54                               | 10.9<br>0.43   | 2.3<br>0.09    | 52.5           | 18.5           | 0.0910         | 1.85<br>4.08        |
| 33889       | 33821D   | X1S-33889             | 3.5<br>0.14                                    | 64.0<br>2.52                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 1.85<br>4.08        |
| 385A        | 384EDC   | X2S-385A              | 2.3<br>0.09                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 93.0<br>3.66                               | 7.9<br>0.31    | 3.0<br>0.12    | 42             | 15.7           | 0.0859         | 1.62<br>3.58        |
| 385A        | 384ED    | X2S-385A              | 2.3<br>0.09                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.62<br>3.58        |
| 385A        | 384D     | X1S-385A              | 2.3<br>0.09                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.76<br>3.89        |
| 455         | 452D     | X2S-455               | 0.8<br>0.03                                    | 60.0<br>2.36                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.77<br>6.10        |
| 455-S       | 452D     | X1S-455               | 3.5<br>0.14                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.75<br>6.07        |
| 55200       | 55433D   | X4S-55200             | 3.5<br>0.14                                    | 71.0<br>2.80                               | 0.5<br>0.02                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.68<br>5.90        |
| 55200C      | 55433D   | X4S-55200             | 3.5<br>0.14                                    | 71.0<br>2.80                               | 0.5<br>0.02                                      | 105.0<br>4.13                              |                |                | 48.7           | 15.4           | 0.1198         | 2.85<br>6.29        |
| 398         | 394D     | X1S-398               | 0.8<br>0.03                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 2.29<br>5.04        |
| 55200       | 55444D   | X3S-55200             | 3.5<br>0.14                                    | 71.0<br>2.80                               | 1.5<br>0.06                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.79<br>6.15        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

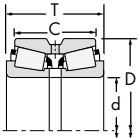
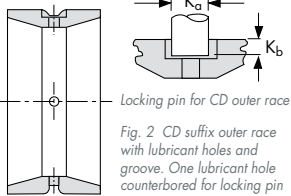
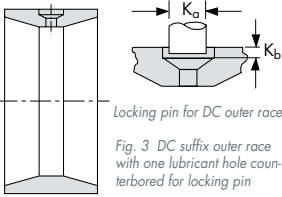


Fig. 1 D suffix outer race with lubricant holes and groove



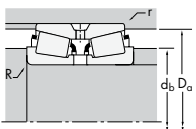
Locking pin for CD outer race

Fig. 2 CD suffix outer race with lubricant holes and groove. One lubricant hole counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race with one lubricant hole counterbored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 50.800<br>2.0000        | 117.475<br>4.6250 | 73.025<br>2.8750 | 53.975<br>2.1250 | 240000<br>54000        | 0.63 | 1.08           | 1.60           | 35800<br>8040          | 38300<br>8620    | 62300<br>14000     | 0.93 |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 77.785<br>3.0624 | 55.562<br>2.1875 | 291000<br>65500        | 0.74 | 0.92           | 1.36           | 43400<br>9760          | 54800<br>12300   | 75600<br>17000     | 0.79 |
| 50.800<br>2.0000        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 51.592<br>2.0312        | 90.000<br>3.5433  | 50.010<br>1.9689 | 42.070<br>1.6563 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 52.388<br>2.0625        | 93.264<br>3.6718  | 65.088<br>2.5625 | 52.388<br>2.0625 | 197000<br>44300        | 0.34 | 1.99           | 2.97           | 29300<br>6590          | 17000<br>3820    | 51000<br>11500     | 1.73 |
| 52.388<br>2.0625        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 52.388<br>2.0625        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 52.388<br>2.0625        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 52.388<br>2.0625        | 109.982<br>4.3300 | 63.500<br>2.5000 | 42.865<br>1.6876 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |
| 52.388<br>2.0625        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |
| 52.388<br>2.0625        | 112.712<br>4.4375 | 65.088<br>2.5625 | 46.038<br>1.8125 | 172000<br>38600        | 0.88 | 0.76           | 1.14           | 25500<br>5740          | 38600<br>8690    | 44500<br>10000     | 0.66 |
| 53.975<br>2.1250        | 95.250<br>3.7500  | 63.500<br>2.5000 | 52.385<br>2.0624 | 209000<br>47000        | 0.33 | 2.05           | 3.05           | 31100<br>7000          | 17600<br>3950    | 54200<br>12200     | 1.77 |
| 53.975<br>2.1250        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 53.975<br>2.1250        | 100.000<br>3.9370 | 52.388<br>2.0625 | 42.862<br>1.6875 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 53.975<br>2.1250        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 53.975<br>2.1250        | 111.125<br>4.3750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 277000<br>62400        | 0.30 | 2.28           | 3.39           | 41300<br>9290          | 21000<br>4720    | 71900<br>16200     | 1.97 |
| 53.975<br>2.1250        | 117.475<br>4.6250 | 73.025<br>2.8750 | 53.975<br>2.1250 | 240000<br>54000        | 0.63 | 1.08           | 1.60           | 35800<br>8040          | 38300<br>8620    | 62300<br>14000     | 0.93 |
| 53.975<br>2.1250        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 53.975<br>2.1250        | 136.525<br>5.3750 | 95.250<br>3.7500 | 76.200<br>3.0000 | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 53.975<br>2.1250        | 139.700<br>5.5000 | 77.790<br>3.0626 | 51.803<br>2.0395 | 322000<br>72300        | 0.87 | 0.78           | 1.16           | 47900<br>10800         | 71000<br>16000   | 83400<br>18800     | 0.67 |
| 54.987<br>2.1649        | 107.950<br>4.2500 | 65.090<br>2.5626 | 53.975<br>2.1250 | 219000<br>49200        | 0.34 | 2.01           | 3.00           | 32600<br>7320          | 18700<br>4200    | 56700<br>12700     | 1.74 |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 49.200<br>1.9370 | 39.675<br>1.5620 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 52.388<br>2.0625 | 42.862<br>1.6875 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 52.388<br>2.0625 | 42.862<br>1.6875 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 65.090<br>2.5626 | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |        |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|--------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |        |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer  | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 66200       | 66462D | X4S-55200             | 3.5<br>0.14                                    | 71.0<br>2.80                               | 0.8<br>0.03                                      | 111.0<br>4.37                              |                |                | 50.2           | 16.4           | 0.0751         | 3.65<br>8.05        |
| 72200C      | 72488D |                       | 3.5<br>0.14                                    | 77.0<br>3.03                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 57.4           | 13.5           | 0.0825         | 4.34<br>9.56        |
| 555         | 552D   | X1S-555               | 2.3<br>0.09                                    | 66.0<br>2.60                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.77<br>10.51       |
| 368-S       | 363D   | X1S-368-S             | 2.0<br>0.08                                    | 59.0<br>2.32                               | 0.8<br>0.03                                      | 84.0<br>3.31                               |                |                | 33.8           | 14             | 0.0773         | 1.15<br>2.54        |
| 3767        | 3729D  | X1S-3767              | 2.3<br>0.09                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 88.0<br>3.46                               |                |                | 49.9           | 14.5           | 0.0903         | 1.77<br>3.90        |
| 33890       | 33821D | X1S-33890             | 1.5<br>0.06                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 1.82<br>4.00        |
| 33891       | 33821D | X1S-33890             | 3.5<br>0.14                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 1.80<br>3.97        |
| 468         | 452D   | X1S-468               | 1.5<br>0.06                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.64<br>5.82        |
| 55206       | 55433D | X2S-55206             | 3.5<br>0.14                                    | 72.0<br>2.83                               | 0.5<br>0.02                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.60<br>5.73        |
| 540         | 533D   |                       | 3.5<br>0.14                                    | 67.0<br>2.64                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.39<br>7.46        |
| 55206       | 55444D | X1S-55206             | 3.5<br>0.14                                    | 72.0<br>2.83                               | 1.5<br>0.06                                      | 105.0<br>4.13                              |                |                | 36.8           | 13.2           | 0.1085         | 2.71<br>5.98        |
| 33895       | 33821D | X2S-33895             | 1.5<br>0.06                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 90.0<br>3.54                               |                |                | 52.5           | 18.5           | 0.0910         | 1.74<br>3.85        |
| 389A        | 384ED  | X2S-389A              | 0.8<br>0.03                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.55<br>3.41        |
| 389A        | 384D   | X1S-389A              | 0.8<br>0.03                                    | 61.0<br>2.40                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.66<br>3.65        |
| 456         | 452DC  |                       | 3.5<br>0.14                                    | 68.0<br>2.68                               | 0.8<br>0.03                                      | 100.0<br>3.94                              | 10.9<br>0.43   | 3.8<br>0.15    | 58.6           | 17.1           | 0.0946         | 2.57<br>5.66        |
| 456         | 452D   | X1S-456               | 3.5<br>0.14                                    | 68.0<br>2.68                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.61<br>5.76        |
| 539         | 533D   | X2S-539               | 3.5<br>0.14                                    | 68.0<br>2.68                               | 1.5<br>0.06                                      | 100.0<br>3.94                              |                |                | 64.3           | 16.1           | 0.0938         | 3.35<br>7.37        |
| 66212       | 66462D | X1S-66212             | 3.5<br>0.14                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 111.0<br>4.37                              |                |                | 50.2           | 16.4           | 0.0751         | 3.57<br>7.87        |
| 557-S       | 552D   | X1S-557-S             | 3.5<br>0.14                                    | 71.0<br>2.80                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.64<br>10.22       |
| 636         | 632D   |                       | 3.5<br>0.14                                    | 73.0<br>2.87                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 6.71<br>14.80       |
| 78215C      | 78549D | X1S-78215             | 3.5<br>0.14                                    | 84.0<br>3.31                               | 1.5<br>0.06                                      | 131.0<br>5.16                              |                |                | 71.3           | 17.6           | 0.0926         | 5.84<br>12.87       |
| 466         | 452D   | X1S-466               | 2.3<br>0.09                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.58<br>5.70        |
| 385         | 384EDC | X4S-385               | 2.3<br>0.09                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 93.0<br>3.66                               | 7.9<br>0.31    | 3.0<br>0.12    | 42             | 15.7           | 0.0859         | 1.50<br>3.32        |
| 385         | 384ED  | X4S-385               | 2.3<br>0.09                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.50<br>3.32        |
| 385X        | 384ED  | X4S-385               | 3.5<br>0.14                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.49<br>3.30        |
| 385         | 384D   | X1S-385               | 2.3<br>0.09                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.61<br>3.55        |
| 385X        | 384D   | X1S-385               | 3.5<br>0.14                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.60<br>3.53        |
| 475         | 472DC  | X1S-475               | 0.8<br>0.03                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 114.0<br>4.49                              | 14.2<br>0.56   | 3.0<br>0.12    | 77.2           | 23             | 0.1083         | 3.65<br>8.05        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 475         | 472D     | X1S-475               | 0.8<br>0.03                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.65<br>8.05        |
| 466-S       | 452DC    |                       | 2.3<br>0.09                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 100.0<br>3.94                              | 10.9<br>0.43   | 3.8<br>0.15    | 58.6           | 17.1           | 0.0946         | 2.52<br>5.55        |
| 466-S       | 452D     | X1S-466-S             | 2.3<br>0.09                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.56<br>5.65        |
| 389         | 384ED    | X2S-389               | 2.3<br>0.09                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.49<br>3.29        |
| L507949     | L507914D | L507949XS             | 1.5<br>0.06                                    | 65.0<br>2.56                               | 0.8<br>0.03                                      | 86.0<br>3.39                               |                |                | 46.1           | 36.9           | 0.0914         | 1.08<br>2.38        |
| 387         | 384ED    | X2S-387               | 2.3<br>0.09                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.44<br>3.18        |
| 387A        | 384EDC   | X1S-387               | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 93.0<br>3.66                               | 7.9<br>0.31    | 3.0<br>0.12    | 42             | 15.7           | 0.0859         | 1.43<br>3.16        |
| 387A        | 384ED    | X1S-387               | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.43<br>3.16        |
| 387AS       | 384ED    | X1S-387               | 5.0<br>0.20                                    | 72.0<br>2.83                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.41<br>3.11        |
| 387-S       | 384ED    | X1S-387               | 0.8<br>0.03                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.45<br>3.20        |
| 387         | 384D     | X1S-387A              | 2.3<br>0.09                                    | 66.0<br>2.60                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.54<br>3.40        |
| 387A        | 384D     | X1S-387A              | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.53<br>3.38        |
| 387AS       | 384D     | X1S-387A              | 5.0<br>0.20                                    | 72.0<br>2.83                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.51<br>3.33        |
| 387-S       | 384DC    | X1S-387A              | 0.8<br>0.03                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 93.0<br>3.66                               | 7.9<br>0.31    | 3.0<br>0.12    | 42             | 15.7           | 0.0859         | 1.55<br>3.42        |
| 387-S       | 384D     | X1S-387A              | 0.8<br>0.03                                    | 63.0<br>2.48                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.55<br>3.42        |
| 387A        | 384XD    | X4S-387A              | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 94.0<br>3.70                               |                |                | 42             | 15.7           | 0.0859         | 2.90<br>6.40        |
| 462         | 452DC    | X2S-462               | 2.3<br>0.09                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 100.0<br>3.94                              | 10.9<br>0.43   | 3.8<br>0.15    | 58.6           | 17.1           | 0.0946         | 2.51<br>5.53        |
| 462         | 452D     | X2S-469               | 2.3<br>0.09                                    | 67.0<br>2.64                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.51<br>5.53        |
| 469         | 452D     | X2S-469               | 3.5<br>0.14                                    | 70.0<br>2.76                               | 0.8<br>0.03                                      | 100.0<br>3.94                              |                |                | 58.6           | 17.1           | 0.0946         | 2.50<br>5.50        |
| 390         | 394D     | X2S-390               | 2.3<br>0.09                                    | 70.0<br>2.76                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 2.12<br>4.68        |
| 29665       | 29622D   | X1S-29665             | 3.5<br>0.14                                    | 75.0<br>2.95                               | 0.8<br>0.03                                      | 109.0<br>4.29                              |                |                | 77.7           | 43.3           | 0.1170         | 2.71<br>5.97        |
| 66225       | 66462D   | X1S-66225             | 3.5<br>0.14                                    | 76.0<br>2.99                               | 0.8<br>0.03                                      | 111.0<br>4.37                              |                |                | 50.2           | 16.4           | 0.0751         | 3.34<br>7.37        |
| 72225C      | 72488D   | X1S-72225             | 3.5<br>0.14                                    | 81.0<br>3.19                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 57.4           | 13.5           | 0.0825         | 4.15<br>9.15        |
| 555-S       | 552D     | X1S-555-S             | 3.5<br>0.14                                    | 73.0<br>2.87                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.47<br>9.86        |
| 635         | 632D     | X1S-635               | 3.5<br>0.14                                    | 75.0<br>2.95                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 6.77<br>14.93       |
| 78225       | 78549D   | X2S-78225             | 3.5<br>0.14                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 131.0<br>5.16                              |                |                | 62.6           | 19.1           | 0.0884         | 5.41<br>11.92       |
| 388A        | 384ED    | X2S-388A              | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.46<br>3.21        |
| 388A        | 384D     | X1S-388A              | 3.5<br>0.14                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 93.0<br>3.66                               |                |                | 42             | 15.7           | 0.0859         | 1.51<br>3.34        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B







# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

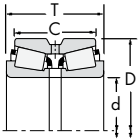
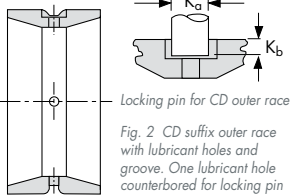
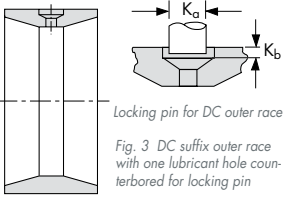


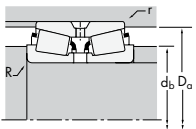
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 59.972<br>2.3611        | 129.982<br>5.1174 | 69.850<br>2.7500 | 47.625<br>1.8750 | 249000<br>56000        | 0.67 | 1.01           | 1.51           | 37100<br>8340          | 42300<br>9500    | 64600<br>14500     | 0.88 |
| 59.977<br>2.3613        | 100.000<br>3.9370 | 55.560<br>2.1874 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 59.987<br>2.3617        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 60.000<br>2.3622        | 120.000<br>4.7244 | 65.090<br>2.5626 | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 60.000<br>2.3622        | 129.982<br>5.1174 | 69.850<br>2.7500 | 47.625<br>1.8750 | 249000<br>56000        | 0.67 | 1.01           | 1.51           | 37100<br>8340          | 42300<br>9500    | 64600<br>14500     | 0.88 |
| 60.325<br>2.3750        | 100.000<br>3.9370 | 55.560<br>2.1874 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 60.325<br>2.3750        | 100.000<br>3.9370 | 55.560<br>2.1874 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 60.325<br>2.3750        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 60.325<br>2.3750        | 136.525<br>5.3750 | 95.250<br>3.7500 | 76.200<br>3.0000 | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 61.912<br>2.4375        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 61.912<br>2.4375        | 123.825<br>4.8750 | 79.375<br>3.1250 | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 61.976<br>2.4400        | 100.000<br>3.9370 | 53.975<br>2.1250 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 62.738<br>2.4700        | 100.000<br>3.9370 | 55.560<br>2.1874 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 62.738<br>2.4700        | 100.000<br>3.9370 | 55.560<br>2.1874 | 44.450<br>1.7500 | 171000<br>38400        | 0.43 | 1.59           | 2.36           | 25500<br>5720          | 18500<br>4170    | 44300<br>9960      | 1.37 |
| 63.500<br>2.5000        | 94.458<br>3.7188  | 42.860<br>1.6874 | 34.925<br>1.3750 | 108000<br>24300        | 0.42 | 1.59           | 2.37           | 16100<br>3620          | 11700<br>2630    | 28000<br>6300      | 1.38 |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 63.500<br>2.5000        | 110.000<br>4.3307 | 52.388<br>2.0625 | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 55.562<br>2.1875 | 42.862<br>1.6875 | 178000<br>39900        | 0.46 | 1.47           | 2.19           | 26400<br>5950          | 20800<br>4670    | 46000<br>10400     | 1.27 |
| 63.500<br>2.5000        | 117.475<br>4.6250 | 66.675<br>2.6250 | 53.975<br>2.1250 | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 65.090<br>2.5626 | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 65.090<br>2.5626 | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 63.500<br>2.5000        | 120.000<br>4.7244 | 65.090<br>2.5626 | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 66589       | 66522D   | X1S-66585             | 0.8<br>0.03                                    | 74.0<br>2.91                               | 0.8<br>0.03                                      | 118.0<br>4.65                              |                |                | 57             | 18.3           | 0.0797         | 3.94<br>8.68        |
| 28980       | 28921D   | X2S-28980             | 3.5<br>0.14                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 96.0<br>3.78                               |                |                | 60.1           | 24.5           | 0.1032         | 1.66<br>3.67        |
| 558-S       | 552D     | X1S-558-S             | 3.5<br>0.14                                    | 75.0<br>2.95                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.31<br>9.50        |
| 397         | 394DC    | X1S-397               | 0.8<br>0.03                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 104.5<br>4.11                              | 9.4<br>0.37    | 2.3<br>0.09    | 56             | 21.4           | 0.0984         | 2.01<br>4.43        |
| 397         | 394D     | X1S-397               | 0.8<br>0.03                                    | 69.0<br>2.72                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 2.01<br>4.43        |
| 476         | 472D     | X1S-476               | 2.0<br>0.08                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.42<br>7.54        |
| 66585       | 66522D   | X1S-66585             | 3.5<br>0.14                                    | 79.0<br>3.11                               | 0.8<br>0.03                                      | 118.0<br>4.65                              |                |                | 57             | 18.3           | 0.0797         | 3.92<br>8.64        |
| 28985       | 28921DC  | X2S-28985             | 3.5<br>0.14                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 96.0<br>3.78                               | 7.9<br>0.31    | 2.3<br>0.09    | 60.1           | 24.5           | 0.1032         | 1.65<br>3.64        |
| 28985       | 28921D   | X3S-28985             | 3.5<br>0.14                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 96.0<br>3.78                               |                |                | 60.1           | 24.5           | 0.1032         | 1.65<br>3.64        |
| 558         | 552DC    | X1S-558               | 2.3<br>0.09                                    | 73.0<br>2.87                               | 1.5<br>0.06                                      | 115.0<br>4.53                              | 14.2<br>0.56   | 4.6<br>0.18    | 91             | 21.1           | 0.1108         | 4.31<br>9.49        |
| 558         | 552D     | X1S-558               | 2.3<br>0.09                                    | 73.0<br>2.87                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.31<br>9.49        |
| 558A        | 552D     | X1S-558               | 3.5<br>0.14                                    | 76.0<br>2.99                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.29<br>9.47        |
| 637         | 632D     | X1S-637               | 3.5<br>0.14                                    | 78.0<br>3.07                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 6.55<br>14.44       |
| 392         | 394D     | X1S-392               | 0.8<br>0.03                                    | 70.0<br>2.76                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.97<br>4.35        |
| 554         | 552D     | X2S-554               | 3.5<br>0.14                                    | 77.0<br>3.03                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.17<br>9.19        |
| 28990       | 28921D   |                       | 2.0<br>0.08                                    | 72.0<br>2.83                               | 0.8<br>0.03                                      | 96.0<br>3.78                               |                |                | 60.1           | 24.5           | 0.1032         | 1.58<br>3.49        |
| 28995       | 28921DC  | X1S-28995             | 3.5<br>0.14                                    | 75.0<br>2.95                               | 0.8<br>0.03                                      | 96.0<br>3.78                               | 7.9<br>0.31    | 2.3<br>0.09    | 60.1           | 24.5           | 0.1032         | 1.55<br>3.42        |
| 28995       | 28921D   | X2S-28995             | 3.5<br>0.14                                    | 75.0<br>2.95                               | 0.8<br>0.03                                      | 96.0<br>3.78                               |                |                | 60.1           | 24.5           | 0.1032         | 1.55<br>3.42        |
| L610549     | L610510D | L610549XB             | 1.5<br>0.06                                    | 71.0<br>2.80                               | 0.8<br>0.03                                      | 91.0<br>3.58                               |                |                | 56.7           | 43.6           | 0.1006         | 0.97<br>2.15        |
| 390A        | 394DC    | X1S-395               | 1.5<br>0.06                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 104.5<br>4.11                              | 9.4<br>0.37    | 2.3<br>0.09    | 56             | 21.4           | 0.0984         | 1.90<br>4.18        |
| 390A        | 394D     | X1S-395               | 1.5<br>0.06                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.90<br>4.18        |
| 395         | 394DC    | X1S-395               | 3.5<br>0.14                                    | 77.0<br>3.03                               | 0.8<br>0.03                                      | 104.5<br>4.11                              | 9.4<br>0.37    | 2.3<br>0.09    | 56             | 21.4           | 0.0984         | 1.88<br>4.14        |
| 395         | 394D     | X3S-395               | 3.5<br>0.14                                    | 77.0<br>3.03                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.88<br>4.14        |
| 29586       | 29526D   | R800008               | 1.5<br>0.06                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 105.0<br>4.13                              |                |                | 70.3           | 25.8           | 0.1112         | 2.19<br>4.83        |
| 33251       | 33462D   | X2S-33251             | 0.8<br>0.03                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 112.0<br>4.41                              |                |                | 84.2           | 25.9           | 0.1162         | 3.18<br>7.02        |
| 477         | 472D     | X4S-477               | 0.8<br>0.03                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.28<br>7.23        |
| 483         | 472DC    | X3S-477               | 3.5<br>0.14                                    | 78.0<br>3.07                               | 0.8<br>0.03                                      | 114.0<br>4.49                              | 14.2<br>0.56   | 3.0<br>0.12    | 77.2           | 23             | 0.1083         | 3.26<br>7.19        |
| 483         | 472D     | X3S-477               | 3.5<br>0.14                                    | 78.0<br>3.07                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.26<br>7.19        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

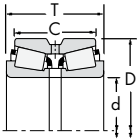
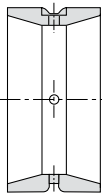
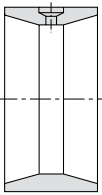


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



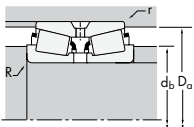
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 63.500<br>2.5000        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 63.500<br>2.5000        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625 | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000 | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 63.500<br>2.5000        | 139.700<br>5.5000 | 77.788<br>3.0625  | 51.803<br>2.0395 | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100     | 0.67 |
| 63.500<br>2.5000        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750 | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 64.960<br>2.5575        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000 | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 64.960<br>2.5575        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750 | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 64.963<br>2.5576        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625 | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 64.987<br>2.5586        | 139.700<br>5.5000 | 77.788<br>3.0625  | 51.803<br>2.0395 | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100     | 0.67 |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 52.388<br>2.0625  | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 66.675<br>2.6250        | 110.000<br>4.3307 | 52.388<br>2.0625  | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 66.675<br>2.6250        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250 | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 66.675<br>2.6250        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 66.675<br>2.6250        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 66.675<br>2.6250        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000 | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 52.388<br>2.0625  | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 52.388<br>2.0625  | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 68.262<br>2.6875        | 110.000<br>4.3307 | 52.388<br>2.0625  | 46.038<br>1.8125 | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290      | 1.45 |
| 68.262<br>2.6875        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250 | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 68.262<br>2.6875        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 68.262<br>2.6875        | 123.825<br>4.8750 | 79.375<br>3.1250  | 63.500<br>2.5000 | 307000<br>69100        | 0.35 | 1.95           | 2.90           | 45800<br>10300         | 27100<br>6100    | 79700<br>17900     | 1.69 |
| 68.262<br>2.6875        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625 | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 68.262<br>2.6875        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000 | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 68.262<br>2.6875        | 161.925<br>6.3750 | 105.562<br>4.1560 | 70.637<br>2.7810 | 480000<br>108000       | 0.71 | 0.95           | 1.42           | 71400<br>16100         | 86700<br>19500   | 124000<br>28000    | 0.82 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |        |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|--------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |        |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer  | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 559         | 552DC  | X2S-559               | 3.5<br>0.14                                    | 78.0<br>3.07                               | 1.5<br>0.06                                      | 115.0<br>4.53                              | 14.2<br>0.56   | 4.6<br>0.18    | 91             | 21.1           | 0.1108         | 4.25<br>9.38        |
| 559         | 552D   | X2S-559               | 3.5<br>0.14                                    | 78.0<br>3.07                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 4.25<br>9.38        |
| 565         | 563D   | X1S-565               | 3.5<br>0.14                                    | 80.0<br>3.15                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 4.53<br>9.99        |
| 639         | 632D   | X2S-639               | 3.5<br>0.14                                    | 81.0<br>3.19                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 6.31<br>13.92       |
| 78250       | 78549D | X1S-78250             | 2.3<br>0.09                                    | 85.0<br>3.35                               | 1.5<br>0.06                                      | 131.0<br>5.16                              |                |                | 62.6           | 19.1           | 0.0884         | 5.10<br>11.24       |
| 745-S       | 742D   | X2S-745-S             | 3.5<br>0.14                                    | 84.0<br>3.31                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 9.86<br>21.74       |
| 656         | 654DC  | X1S-656               | 3.5<br>0.14                                    | 85.0<br>3.35                               | 1.5<br>0.06                                      | 141.0<br>5.55                              | 17.3<br>0.68   | 5.3<br>0.21    | 137            | 27.3           | 0.0919         | 8.33<br>18.36       |
| 747-S       | 742D   | X1S-747-S             | 3.5<br>0.14                                    | 85.0<br>3.35                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 9.72<br>21.43       |
| 569         | 563D   | X1S-569               | 3.5<br>0.14                                    | 81.0<br>3.19                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 4.44<br>9.79        |
| 78255X      | 78549D | X1S-78255X            | 3.5<br>0.14                                    | 89.0<br>3.50                               | 1.5<br>0.06                                      | 131.0<br>5.16                              |                |                | 62.6           | 19.1           | 0.0884         | 4.99<br>11.00       |
| 478         | 472D   | X2S-478               | 2.3<br>0.09                                    | 77.0<br>3.03                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.18<br>7.02        |
| 395A        | 394D   | X1S-395-S             | 0.8<br>0.03                                    | 73.0<br>2.87                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.76<br>3.89        |
| 395-S       | 394DC  | X1S-395-S             | 3.5<br>0.14                                    | 79.0<br>3.11                               | 0.8<br>0.03                                      | 104.5<br>4.11                              | 9.4<br>0.37    | 2.3<br>0.09    | 56             | 21.4           | 0.0984         | 1.76<br>3.87        |
| 395-S       | 394D   | X3S-395-S             | 3.5<br>0.14                                    | 79.0<br>3.11                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.76<br>3.87        |
| 33262       | 33462D | X1S-33262             | 3.5<br>0.14                                    | 81.0<br>3.19                               | 0.8<br>0.03                                      | 112.0<br>4.41                              |                |                | 84.2           | 25.9           | 0.1162         | 2.96<br>6.52        |
| 479         | 472D   | X1S-479               | 2.3<br>0.09                                    | 78.0<br>3.07                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.10<br>6.83        |
| 560         | 552DC  | X2S-560               | 3.5<br>0.14                                    | 81.0<br>3.19                               | 1.5<br>0.06                                      | 115.0<br>4.53                              | 14.2<br>0.56   | 4.6<br>0.18    | 91             | 21.1           | 0.1108         | 3.90<br>8.61        |
| 560         | 552D   | X3S-560               | 3.5<br>0.14                                    | 81.0<br>3.19                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 3.90<br>8.61        |
| 641         | 632D   | X1S-641               | 3.5<br>0.14                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 6.08<br>13.40       |
| 399A        | 394D   | X4S-399A              | 2.3<br>0.09                                    | 78.0<br>3.07                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.69<br>3.72        |
| 399AS       | 394DC  | X1S-399A              | 5.0<br>0.20                                    | 83.0<br>3.27                               | 0.8<br>0.03                                      | 104.5<br>4.11                              | 9.4<br>0.37    | 2.3<br>0.09    | 56             | 21.4           | 0.0984         | 1.65<br>3.64        |
| 399AS       | 394D   | X4S-399A              | 5.0<br>0.20                                    | 83.0<br>3.27                               | 0.8<br>0.03                                      | 104.5<br>4.11                              |                |                | 56             | 21.4           | 0.0984         | 1.65<br>3.64        |
| 480         | 472D   | X2S-480               | 3.5<br>0.14                                    | 82.0<br>3.23                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 3.00<br>6.62        |
| 560-S       | 552DC  | X1S-560-S             | 3.5<br>0.14                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 115.0<br>4.53                              | 14.2<br>0.56   | 4.6<br>0.18    | 91             | 21.1           | 0.1108         | 3.79<br>8.35        |
| 560-S       | 552D   | X1S-560-S             | 3.5<br>0.14                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 115.0<br>4.53                              |                |                | 91             | 21.1           | 0.1108         | 3.79<br>8.35        |
| 570         | 563D   | X1S-570               | 3.5<br>0.14                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 4.23<br>9.31        |
| 642         | 632D   | X1S-642               | 3.5<br>0.14                                    | 85.0<br>3.35                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 5.93<br>13.08       |
| 9278        | 9220D  | X1S-9278              | 3.5<br>0.14                                    | 97.0<br>3.82                               | 0.8<br>0.03                                      | 153.0<br>6.03                              |                |                | 102            | 18.4           | 0.0984         | 9.41<br>20.76       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

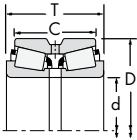
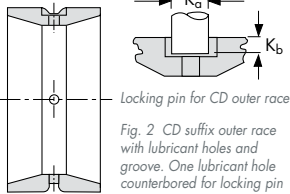
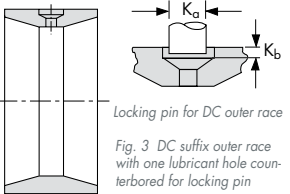


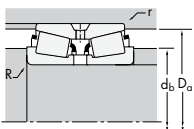
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 69.850<br>2.7500        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 69.850<br>2.7500        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 69.850<br>2.7500        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 69.850<br>2.7500        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250  | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 69.850<br>2.7500        | 120.000<br>4.7244 | 71.438<br>2.8125  | 58.738<br>2.3125  | 288000<br>64800        | 0.36 | 1.87           | 2.79           | 42900<br>9650          | 26500<br>5950    | 74700<br>16800     | 1.62 |
| 69.850<br>2.7500        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 69.850<br>2.7500        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000  | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 69.850<br>2.7500        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 69.850<br>2.7500        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 69.850<br>2.7500        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 69.850<br>2.7500        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 69.914<br>2.7525        | 177.800<br>7.0000 | 109.538<br>4.3125 | 74.612<br>2.9375  | 494000<br>111000       | 0.76 | 0.88           | 1.31           | 73500<br>16500         | 96200<br>21600   | 128000<br>28800    | 0.76 |
| 69.952<br>2.7540        | 121.442<br>4.7812 | 52.390<br>2.0626  | 38.100<br>1.5000  | 165000<br>37000        | 0.45 | 1.50           | 2.23           | 24500<br>5510          | 18900<br>4260    | 42700<br>9600      | 1.30 |
| 70.000<br>2.7559        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250  | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 70.000<br>2.7559        | 120.000<br>4.7244 | 65.090<br>2.5626  | 53.975<br>2.1250  | 231000<br>52000        | 0.38 | 1.75           | 2.61           | 34400<br>7740          | 22700<br>5100    | 59900<br>13500     | 1.52 |
| 70.637<br>2.7810        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 70.637<br>2.7810        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 71.438<br>2.8125        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 71.438<br>2.8125        | 120.000<br>4.7244 | 71.438<br>2.8125  | 58.738<br>2.3125  | 288000<br>64800        | 0.36 | 1.87           | 2.79           | 42900<br>9650          | 26500<br>5950    | 74700<br>16800     | 1.62 |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 71.438<br>2.8125        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000  | 376000<br>84500        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000  | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 71.438<br>2.8125        | 136.525<br>5.3750 | 95.250<br>3.7500  | 76.200<br>3.0000  | 376000<br>84500        | 0.36 | 1.86           | 2.78           | 55900<br>12600         | 34700<br>7790    | 97400<br>21900     | 1.61 |
| 73.025<br>2.8750        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 73.025<br>2.8750        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 73.025<br>2.8750        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |         |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|---------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |         |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                |                |                |                |                |                     |
| Inner       | Outer   | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                |                     |
| 29675       | 29622DC | X1S-29675             | 1.5<br>0.06                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 109.0<br>4.29                              | 7.9<br>0.31    | 2.3<br>0.09    | 77.7           | 43.3           | 0.1170         | 2.25<br>4.96   |                     |
| 29675       | 29622D  | X2S-29675             | 1.5<br>0.06                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 109.0<br>4.29                              |                |                | 77.7           | 43.3           | 0.1170         | 2.25<br>4.96   |                     |
| 33275       | 33462DC | X3S-33275             | 3.5<br>0.14                                    | 84.0<br>3.31                               | 0.8<br>0.03                                      | 112.0<br>4.41                              | 10.9<br>0.43   | 3.8<br>0.15    | 84.2           | 25.9           | 0.1162         | 2.80<br>6.16   |                     |
| 33275       | 33462D  | X4S-33275             | 3.5<br>0.14                                    | 84.0<br>3.31                               | 0.8<br>0.03                                      | 112.0<br>4.41                              |                |                | 84.2           | 25.9           | 0.1162         | 2.80<br>6.16   |                     |
| 482         | 472D    | X3S-482               | 3.5<br>0.14                                    | 83.0<br>3.27                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 2.92<br>6.44   |                     |
| 47487       | 47420D  | X1S-47487             | 3.5<br>0.14                                    | 84.0<br>3.31                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 98.4           | 26.3           | 0.1153         | 3.12<br>6.87   |                     |
| 566         | 563D    | X3S-566               | 3.5<br>0.14                                    | 85.0<br>3.35                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 4.16<br>9.16   |                     |
| 643         | 632D    | X2S-643               | 3.5<br>0.14                                    | 86.0<br>3.39                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 5.82<br>12.84  |                     |
| 655         | 654D    | X1S-655               | 3.5<br>0.14                                    | 88.0<br>3.46                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 8.08<br>17.81  |                     |
| 744A        | 742D    | X1S-744A              | 5.0<br>0.20                                    | 91.0<br>3.58                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 9.31<br>20.53  |                     |
| 745A        | 742D    | X1S-745A              | 3.5<br>0.14                                    | 88.0<br>3.46                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 9.15<br>20.17  |                     |
| 835         | 834D    | X1S-835               | 3.5<br>0.14                                    | 91.0<br>3.58                               | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 14.37<br>31.68 |                     |
| 9382        | 9320D   | X1S-9382              | 3.5<br>0.14                                    | 101.0<br>3.98                              | 2.3<br>0.09                                      | 164.0<br>6.46                              |                |                | 118            | 18.6           | 0.1053         | 12.79<br>28.19 |                     |
| 34274       | 34478D  | X1S-34274             | 2.0<br>0.08                                    | 81.0<br>3.19                               | 0.8<br>0.03                                      | 116.0<br>4.57                              |                |                | 69.3           | 27             | 0.1093         | 2.26<br>4.99   |                     |
| 484         | 472DC   | X2S-484               | 2.0<br>0.08                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 114.0<br>4.49                              | 14.2<br>0.56   | 3.0<br>0.12    | 77.2           | 23             | 0.1083         | 2.92<br>6.44   |                     |
| 484         | 472D    | X2S-484               | 2.0<br>0.08                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 77.2           | 23             | 0.1083         | 2.92<br>6.44   |                     |
| 29680       | 29622DC | X1S-29680             | 1.3<br>0.05                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 109.0<br>4.29                              | 7.9<br>0.31    | 2.3<br>0.09    | 77.7           | 43.3           | 0.1170         | 2.20<br>4.84   |                     |
| 29680       | 29622D  | X1S-29680             | 1.3<br>0.05                                    | 80.0<br>3.15                               | 0.8<br>0.03                                      | 109.0<br>4.29                              |                |                | 77.7           | 43.3           | 0.1170         | 2.20<br>4.84   |                     |
| 33281       | 33462D  | X1S-33281             | 3.5<br>0.14                                    | 85.0<br>3.35                               | 0.8<br>0.03                                      | 112.0<br>4.41                              |                |                | 84.2           | 24.4           | 0.1162         | 2.72<br>5.99   |                     |
| 47490       | 47420D  | X1S-47490             | 3.5<br>0.14                                    | 86.0<br>3.39                               | 0.8<br>0.03                                      | 114.0<br>4.49                              |                |                | 98.4           | 26.3           | 0.1153         | 3.02<br>6.65   |                     |
| 567A        | 563D    | X1S-567A              | 3.5<br>0.14                                    | 86.0<br>3.39                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 4.02<br>8.86   |                     |
| 567-S       | 563D    | X1S-567A              | 6.4<br>0.25                                    | 92.0<br>3.62                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 3.97<br>8.75   |                     |
| 495-S       | 493D    | X1S-495-S             | 3.5<br>0.14                                    | 88.0<br>3.46                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 4.40<br>9.70   |                     |
| 644         | 632D    | X1S-645               | 3.5<br>0.14                                    | 87.0<br>3.43                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 5.72<br>12.60  |                     |
| 645         | 632D    | X1S-645               | 6.4<br>0.25                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 125.0<br>4.92                              |                |                | 106            | 21             | 0.0814         | 5.65<br>12.45  |                     |
| 29685       | 29622DC | X1S-29685             | 3.5<br>0.14                                    | 86.0<br>3.39                               | 0.8<br>0.03                                      | 109.0<br>4.29                              | 7.9<br>0.31    | 2.3<br>0.09    | 77.7           | 43.3           | 0.1170         | 2.09<br>4.60   |                     |
| 29685       | 29622D  | X2S-29685             | 3.5<br>0.14                                    | 86.0<br>3.39                               | 0.8<br>0.03                                      | 109.0<br>4.29                              |                |                | 77.7           | 43.3           | 0.1170         | 2.09<br>4.60   |                     |
| 33287       | 33462DC | X3S-33287             | 3.5<br>0.14                                    | 87.0<br>3.43                               | 0.8<br>0.03                                      | 112.0<br>4.41                              | 10.9<br>0.43   | 3.8<br>0.15    | 84.2           | 24.4           | 0.1162         | 2.62<br>5.78   |                     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

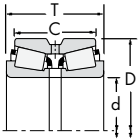
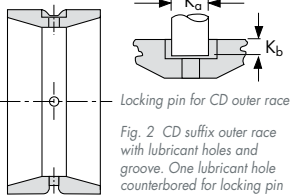
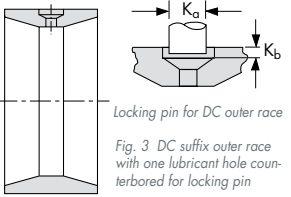


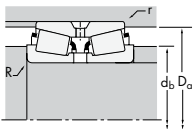
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 73.025<br>2.8750        | 117.475<br>4.6250 | 66.675<br>2.6250  | 53.975<br>2.1250  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 73.025<br>2.8750        | 120.000<br>4.7244 | 79.908<br>3.1460  | 67.285<br>2.6490  | 223000<br>50100        | 0.44 | 1.55           | 2.31           | 33200<br>7470          | 24800<br>5570    | 57800<br>13000     | 1.34 |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 73.025<br>2.8750        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 73.025<br>2.8750        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720    | 86400<br>19400     | 1.45 |
| 73.025<br>2.8750        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 73.025<br>2.8750        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 73.817<br>2.9062        | 114.287<br>4.4995 | 58.738<br>2.3125  | 46.038<br>1.8125  | 178000<br>40000        | 0.49 | 1.38           | 2.06           | 26500<br>5960          | 22100<br>4980    | 46200<br>10400     | 1.20 |
| 73.817<br>2.9062        | 127.000<br>5.0000 | 80.962<br>3.1875  | 65.088<br>2.5625  | 317000<br>71200        | 0.36 | 1.86           | 2.76           | 47100<br>10600         | 29400<br>6600    | 82100<br>18500     | 1.61 |
| 74.612<br>2.9375        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720    | 86400<br>19400     | 1.45 |
| 74.976<br>2.9518        | 121.442<br>4.7812 | 52.390<br>2.0626  | 38.100<br>1.5000  | 165000<br>37000        | 0.45 | 1.50           | 2.23           | 24500<br>5510          | 18900<br>4260    | 42700<br>9600      | 1.30 |
| 76.200<br>3.0000        | 109.538<br>4.3125 | 42.860<br>1.6874  | 34.925<br>1.3750  | 112000<br>25100        | 0.50 | 1.34           | 2.00           | 16600<br>3730          | 14300<br>3210    | 28900<br>6500      | 1.16 |
| 76.200<br>3.0000        | 121.442<br>4.7812 | 52.390<br>2.0626  | 38.100<br>1.5000  | 165000<br>37000        | 0.45 | 1.50           | 2.23           | 24500<br>5510          | 18900<br>4260    | 42700<br>9600      | 1.30 |
| 76.200<br>3.0000        | 121.442<br>4.7812 | 52.390<br>2.0626  | 38.100<br>1.5000  | 165000<br>37000        | 0.45 | 1.50           | 2.23           | 24500<br>5510          | 18900<br>4260    | 42700<br>9600      | 1.30 |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 76.200<br>3.0000        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720    | 86400<br>19400     | 1.45 |
| 76.200<br>3.0000        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720    | 86400<br>19400     | 1.45 |
| 76.200<br>3.0000        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 76.200<br>3.0000        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 76.200<br>3.0000        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 76.200<br>3.0000        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 76.200<br>3.0000        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700    | 1.71 |
| 76.200<br>3.0000        | 161.925<br>6.3750 | 105.562<br>4.1560 | 70.637<br>2.7810  | 480000<br>108000       | 0.71 | 0.95           | 1.42           | 71400<br>16100         | 86700<br>19500   | 124000<br>28000    | 0.82 |
| 76.200<br>3.0000        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 76.200<br>3.0000        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 76.200<br>3.0000        | 177.800<br>7.0000 | 109.538<br>4.3125 | 74.612<br>2.9375  | 494000<br>111000       | 0.76 | 0.88           | 1.31           | 73500<br>16500         | 96200<br>21600   | 128000<br>28800    | 0.76 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.



| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 33287       | 33462D   | X3S-33287             | 3.5<br>0.14                                    | 87.0<br>3.43                               | 0.8<br>0.03                                      | 112.0<br>4.41                              |                |                | 84.2           | 24.4           | 0.1162         | 2.62<br>5.78        |
| 33287       | 33472DC  | X1S-33287             | 3.5<br>0.14                                    | 87.0<br>3.43                               | 0.8<br>0.03                                      | 113.0<br>4.45                              | 10.9<br>0.43   | 3.8<br>0.15    | 84.2           | 24.4           | 0.1162         | 3.32<br>7.32        |
| 567         | 563D     | X5S-567               | 3.5<br>0.14                                    | 88.0<br>3.46                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 3.92<br>8.64        |
| 567X        | 563D     | X2S-567               | 4.8<br>0.19                                    | 90.0<br>3.54                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 3.93<br>8.66        |
| 576         | 572D     | X1S-576               | 3.5<br>0.14                                    | 90.0<br>3.54                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 5.47<br>12.05       |
| 657         | 654D     | X1S-657               | 3.5<br>0.14                                    | 91.0<br>3.58                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 7.81<br>17.21       |
| 744         | 742D     | X2S-744               | 3.5<br>0.14                                    | 91.0<br>3.58                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 9.05<br>19.95       |
| 29688       | 29622D   | X1S-29688             | 1.5<br>0.06                                    | 83.0<br>3.27                               | 0.8<br>0.03                                      | 109.0<br>4.29                              |                |                | 77.7           | 43.3           | 0.1170         | 2.05<br>4.51        |
| 568         | 563D     | X2S-568               | 0.8<br>0.03                                    | 83.0<br>3.27                               | 1.5<br>0.06                                      | 119.0<br>4.69                              |                |                | 101            | 24             | 0.1167         | 3.89<br>8.57        |
| 577         | 572D     | X1S-577               | 3.5<br>0.14                                    | 91.0<br>3.58                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 5.40<br>11.91       |
| 34294       | 34478D   | X1S-34294             | 2.0<br>0.08                                    | 85.0<br>3.35                               | 0.8<br>0.03                                      | 116.0<br>4.57                              |                |                | 69.3           | 27             | 0.1093         | 2.03<br>4.47        |
| L814749     | L814710D | L814749XA             | 1.5<br>0.06                                    | 84.0<br>3.31                               | 0.8<br>0.03                                      | 105.0<br>4.13                              |                |                | 76             | 59.6           | 0.1164         | 1.26<br>2.78        |
| 34300       | 34478D   | X5S-34300             | 2.0<br>0.08                                    | 86.0<br>3.39                               | 0.8<br>0.03                                      | 116.0<br>4.57                              |                |                | 69.3           | 27             | 0.1093         | 1.98<br>4.37        |
| 34301       | 34478D   | X2S-34301             | 3.5<br>0.14                                    | 89.0<br>3.50                               | 0.8<br>0.03                                      | 116.0<br>4.57                              |                |                | 69.3           | 27             | 0.1093         | 1.96<br>4.32        |
| 495A        | 493DC    | X1S-495A              | 3.5<br>0.14                                    | 92.0<br>3.62                               | 0.8<br>0.03                                      | 130.0<br>5.12                              | 12.4<br>0.49   | 4.6<br>0.18    | 105            | 29.3           | 0.1252         | 4.07<br>8.98        |
| 495A        | 493D     | X2S-495A              | 3.5<br>0.14                                    | 92.0<br>3.62                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 4.07<br>8.98        |
| 575         | 572DC    | X1S-575               | 3.5<br>0.14                                    | 92.0<br>3.62                               | 0.8<br>0.03                                      | 133.0<br>5.24                              | 15.7<br>0.62   | 4.6<br>0.18    | 126            | 32             | 0.1295         | 5.27<br>11.61       |
| 575         | 572D     | X2S-575               | 3.5<br>0.14                                    | 92.0<br>3.62                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 5.27<br>11.61       |
| 590A        | 592D     | X1S-590A              | 3.5<br>0.14                                    | 95.0<br>3.74                               | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 6.81<br>15.01       |
| 659         | 654DC    | X1S-659               | 3.5<br>0.14                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 141.0<br>5.55                              | 17.3<br>0.68   | 5.3<br>0.21    | 137            | 27.3           | 0.0919         | 7.53<br>16.61       |
| 659         | 654D     | X1S-659               | 3.5<br>0.14                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 7.53<br>16.61       |
| 748-S       | 742DC    | X2S-748-S             | 3.5<br>0.14                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 143.0<br>5.63                              | 19.0<br>0.75   | 6.4<br>0.25    | 160            | 26.3           | 0.0898         | 8.75<br>19.30       |
| 748-S       | 742D     | X3S-748-S             | 3.5<br>0.14                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 8.75<br>19.30       |
| 755         | 752D     | X2S-755               | 3.5<br>0.14                                    | 95.0<br>3.74                               | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 10.10<br>22.26      |
| 9285        | 9220D    | X4S-9285              | 3.5<br>0.14                                    | 103.0<br>4.06                              | 0.8<br>0.03                                      | 153.0<br>6.03                              |                |                | 102            | 18.4           | 0.0984         | 8.66<br>19.09       |
| 837         | 834D     | X1S-843               | 0.8<br>0.03                                    | 90.0<br>3.54                               | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 13.52<br>29.80      |
| 843         | 834D     | X1S-843               | 6.4<br>0.25                                    | 101.0<br>3.98                              | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 13.48<br>29.72      |
| 9380        | 9320D    | X1S-9380              | 3.5<br>0.14                                    | 105.0<br>4.13                              | 2.3<br>0.09                                      | 164.0<br>6.46                              |                |                | 118            | 18.6           | 0.1053         | 12.15<br>26.80      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

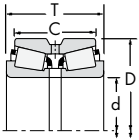
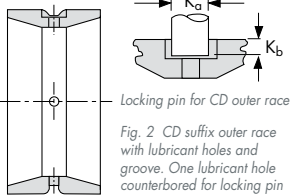
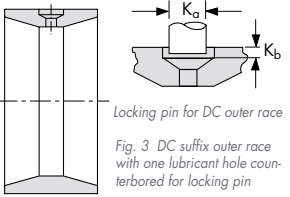


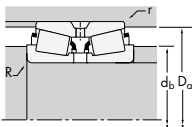
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                 |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|-----------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                 |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 76.200<br>3.0000        | 177.800<br>7.0000 | 115.888<br>4.5625 | 74.612<br>2.9375  | 494000<br>111000       | 0.76 | 0.88           | 1.31           | 73500<br>16500         | 96200<br>21600  | 128000<br>28800    | 0.76 |
| 76.200<br>3.0000        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500  | 223000<br>50100    | 1.74 |
| 77.788<br>3.0625        | 121.442<br>4.7812 | 52.390<br>2.0626  | 38.100<br>1.5000  | 165000<br>37000        | 0.45 | 1.50           | 2.23           | 24500<br>5510          | 18900<br>4260   | 42700<br>9600      | 1.30 |
| 77.788<br>3.0625        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340   | 64600<br>14500     | 1.31 |
| 77.788<br>3.0625        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340   | 64600<br>14500     | 1.31 |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820   | 90300<br>20300     | 1.32 |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330   | 103000<br>23200    | 1.43 |
| 79.375<br>3.1250        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330   | 103000<br>23200    | 1.43 |
| 79.375<br>3.1250        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550   | 133000<br>29900    | 1.80 |
| 79.985<br>3.1490        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720   | 86400<br>19400     | 1.45 |
| 79.985<br>3.1490        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820   | 90300<br>20300     | 1.32 |
| 80.000<br>3.1496        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550   | 133000<br>29900    | 1.80 |
| 80.000<br>3.1496        | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700 | 170000<br>38200    | 0.92 |
| 80.962<br>3.1875        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340   | 64600<br>14500     | 1.31 |
| 80.962<br>3.1875        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720   | 86400<br>19400     | 1.45 |
| 80.962<br>3.1875        | 152.400<br>6.0000 | 88.900<br>3.5000  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330   | 103000<br>23200    | 1.43 |
| 80.962<br>3.1875        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550   | 133000<br>29900    | 1.80 |
| 82.550<br>3.2500        | 115.888<br>4.5625 | 47.625<br>1.8750  | 39.690<br>1.5626  | 145000<br>32700        | 0.31 | 2.19           | 3.26           | 21700<br>4870          | 11400<br>2570   | 37700<br>8470      | 1.90 |
| 82.550<br>3.2500        | 115.888<br>4.5625 | 47.625<br>1.8750  | 39.690<br>1.5626  | 145000<br>32700        | 0.31 | 2.19           | 3.26           | 21700<br>4870          | 11400<br>2570   | 37700<br>8470      | 1.90 |
| 82.550<br>3.2500        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340   | 64600<br>14500     | 1.31 |
| 82.550<br>3.2500        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340   | 64600<br>14500     | 1.31 |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720   | 86400<br>19400     | 1.45 |
| 82.550<br>3.2500        | 139.992<br>5.5115 | 82.550<br>3.2500  | 66.675<br>2.6250  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720   | 86400<br>19400     | 1.45 |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820   | 90300<br>20300     | 1.32 |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820   | 90300<br>20300     | 1.32 |
| 82.550<br>3.2500        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330   | 103000<br>23200    | 1.43 |
| 82.550<br>3.2500        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550   | 133000<br>29900    | 1.80 |
| 82.550<br>3.2500        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300  | 137000<br>30700    | 1.71 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |           |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|-----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |           |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer     | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 9378        | 9320D     | X1S-9378              | 3.5<br>0.14                                    | 105.0<br>4.13                              | 2.3<br>0.09                                      | 164.0<br>6.46                              |                |                | 118            | 18.6           | 0.1053         | 12.69<br>27.98      |
| HH221430    | HH221410D | HH221430XA            | 3.5<br>0.14                                    | 101.0<br>3.98                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 18.92<br>41.71      |
| 34306       | 34478D    | X4S-34306             | 3.5<br>0.14                                    | 90.0<br>3.54                               | 0.8<br>0.03                                      | 116.0<br>4.57                              |                |                | 69.3           | 27             | 0.1093         | 1.87<br>4.12        |
| 495AS       | 493DC     | X1S-495AS             | 3.5<br>0.14                                    | 93.0<br>3.66                               | 0.8<br>0.03                                      | 130.0<br>5.12                              | 12.4<br>0.49   | 4.6<br>0.18    | 105            | 29.3           | 0.1252         | 3.99<br>8.80        |
| 495AS       | 493D      | X1S-495AS             | 3.5<br>0.14                                    | 93.0<br>3.66                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 3.99<br>8.80        |
| 595A        | 592D      | X1S-595A              | 3.5<br>0.14                                    | 98.0<br>3.86                               | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 6.54<br>14.42       |
| 661         | 654D      |                       | 3.5<br>0.14                                    | 96.0<br>3.78                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 7.07<br>15.58       |
| 661         | 654DC     | X2S-661               | 3.5<br>0.14                                    | 96.0<br>3.78                               | 1.5<br>0.06                                      | 141.0<br>5.55                              | 17.3<br>0.68   | 5.3<br>0.21    | 137            | 27.3           | 0.0919         | 7.24<br>15.95       |
| 750         | 742D      |                       | 3.5<br>0.14                                    | 96.0<br>3.78                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 8.33<br>18.37       |
| 578         | 572D      | X1S-578               | 3.5<br>0.14                                    | 95.0<br>3.74                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 4.96<br>10.94       |
| 590         | 592D      | X1S-590               | 3.5<br>0.14                                    | 98.0<br>3.86                               | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 6.53<br>14.41       |
| 748         | 742D      | X1S-748               | 3.0<br>0.12                                    | 96.0<br>3.78                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 8.36<br>18.44       |
| 98316       | 98789D    | X1S-98316             | 3.5<br>0.14                                    | 111.0<br>4.37                              | 2.3<br>0.09                                      | 188.0<br>7.40                              |                |                | 203            | 37.4           | 0.1197         | 17.29<br>38.11      |
| 496         | 493D      | X2S-496               | 3.5<br>0.14                                    | 95.0<br>3.74                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 3.76<br>8.29        |
| 581         | 572D      | X1S-581               | 3.5<br>0.14                                    | 96.0<br>3.78                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 4.88<br>10.75       |
| 662         | 654D      | X1S-662               | 3.5<br>0.14                                    | 98.0<br>3.86                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 6.77<br>14.93       |
| 740         | 742D      |                       | 5.0<br>0.20                                    | 101.0<br>3.98                              | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 8.16<br>17.98       |
| L116149     | L116110DC | L116149XA             | 1.5<br>0.06                                    | 90.0<br>3.54                               | 0.8<br>0.03                                      | 111.0<br>4.37                              | 6.1<br>0.24    | 2.3<br>0.09    | 97.2           | 64.3           | 0.1079         | 1.43<br>3.15        |
| L116149     | L116110D  | L116149XC             | 1.5<br>0.06                                    | 90.0<br>3.54                               | 0.8<br>0.03                                      | 111.0<br>4.37                              |                |                | 97.2           | 64.3           | 0.1079         | 1.43<br>3.15        |
| 495         | 493DC     | X1S-495               | 3.5<br>0.14                                    | 97.0<br>3.82                               | 0.8<br>0.03                                      | 130.0<br>5.12                              | 12.4<br>0.49   | 4.6<br>0.18    | 105            | 29.3           | 0.1252         | 3.65<br>8.04        |
| 495         | 493D      | X3S-495               | 3.5<br>0.14                                    | 97.0<br>3.82                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 3.65<br>8.04        |
| 580         | 572D      | X2S-580               | 3.5<br>0.14                                    | 98.0<br>3.86                               | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 4.76<br>10.50       |
| 582         | 572D      | X1S-580               | 6.8<br>0.27                                    | 104.0<br>4.09                              | 0.8<br>0.03                                      | 133.0<br>5.24                              |                |                | 126            | 32             | 0.1295         | 4.68<br>10.32       |
| 595         | 592DC     | X1S-595               | 3.5<br>0.14                                    | 100.0<br>3.94                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 36.8           | 0.1416         | 6.42<br>14.14       |
| 595         | 592D      | X2S-595               | 3.5<br>0.14                                    | 100.0<br>3.94                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 6.42<br>14.14       |
| 663         | 654D      | X4S-663               | 3.5<br>0.14                                    | 99.0<br>3.90                               | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 6.94<br>15.29       |
| 749A        | 742D      | X2S-749A              | 3.5<br>0.14                                    | 99.0<br>3.90                               | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 8.12<br>17.90       |
| 757         | 752D      | X2S-757               | 3.5<br>0.14                                    | 100.0<br>3.94                              | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 9.43<br>20.78       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

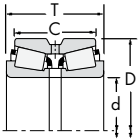
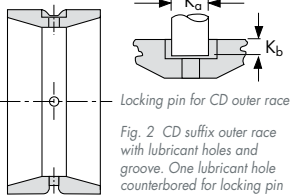
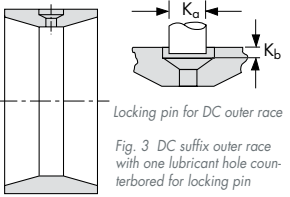


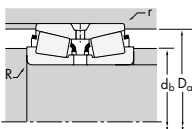
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 82.550<br>3.2500        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 83.345<br>3.2813        | 125.412<br>4.9375 | 55.560<br>2.1874  | 44.450<br>1.7500  | 189000<br>42500        | 0.42 | 1.62           | 2.42           | 28100<br>6320          | 20000<br>4500    | 49000<br>11000     | 1.40 |
| 84.138<br>3.3125        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 84.138<br>3.3125        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 84.138<br>3.3125        | 177.800<br>7.0000 | 109.538<br>4.3125 | 74.612<br>2.9375  | 494000<br>111000       | 0.76 | 0.88           | 1.31           | 73500<br>16500         | 96200<br>21600   | 128000<br>28800    | 0.76 |
| 85.000<br>3.3465        | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700  | 170000<br>38200    | 0.92 |
| 85.026<br>3.3475        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 85.026<br>3.3475        | 155.575<br>6.1250 | 101.600<br>4.0000 | 85.725<br>3.3750  | 512000<br>115000       | 0.33 | 2.08           | 3.09           | 76300<br>17100         | 42500<br>9550    | 133000<br>29900    | 1.80 |
| 85.725<br>3.3750        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 85.725<br>3.3750        | 136.525<br>5.3750 | 69.850<br>2.7500  | 53.975<br>2.1250  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500     | 1.31 |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 85.725<br>3.3750        | 152.400<br>6.0000 | 95.250<br>3.7500  | 76.200<br>3.0000  | 398000<br>89500        | 0.41 | 1.65           | 2.46           | 59300<br>13300         | 41500<br>9330    | 103000<br>23200    | 1.43 |
| 85.725<br>3.3750        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700    | 1.71 |
| 85.725<br>3.3750        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 85.725<br>3.3750        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 87.312<br>3.4375        | 123.825<br>4.8750 | 50.797<br>1.9999  | 42.862<br>1.6875  | 149000<br>33600        | 0.33 | 2.05           | 3.05           | 22200<br>5000          | 12600<br>2820    | 38700<br>8700      | 1.77 |
| 87.312<br>3.4375        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 87.312<br>3.4375        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 87.312<br>3.4375        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 87.960<br>3.4630        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 88.900<br>3.5000        | 123.825<br>4.8750 | 50.797<br>1.9999  | 42.862<br>1.6875  | 149000<br>33600        | 0.33 | 2.05           | 3.05           | 22200<br>5000          | 12600<br>2820    | 38700<br>8700      | 1.77 |
| 88.900<br>3.5000        | 123.825<br>4.8750 | 50.797<br>1.9999  | 42.862<br>1.6875  | 149000<br>33600        | 0.33 | 2.05           | 3.05           | 22200<br>5000          | 12600<br>2820    | 38700<br>8700      | 1.77 |
| 88.900<br>3.5000        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 88.900<br>3.5000        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700    | 1.71 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 842         | 834D       | X1S-842               | 3.5<br>0.14                                    | 101.0<br>3.98                              | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 12.90<br>28.45      |
| 27690       | 27620DA    | X2S-27690             | 3.5<br>0.14                                    | 96.0<br>3.78                               | 0.8<br>0.03                                      | 0.0<br>0.00                                | 14.2<br>0.56   | 2.3<br>0.09    | 98.2           | 41.8           | 0.1198         | 2.30<br>5.08        |
| 498         | 493D       | X4S-498               | 3.5<br>0.14                                    | 98.0<br>3.86                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 3.53<br>7.79        |
| 664         | 654D       | X1S-664               | 3.5<br>0.14                                    | 100.0<br>3.94                              | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 6.80<br>15.00       |
| 9386H       | 9320D      | X2S-9385              | 3.5<br>0.14                                    | 111.0<br>4.37                              | 2.3<br>0.09                                      | 164.0<br>6.46                              |                |                | 118            | 18.6           | 0.1053         | 11.28<br>24.87      |
| 98335       | 98789D     | X1S-98335             | 3.5<br>0.14                                    | 115.0<br>4.53                              | 2.3<br>0.09                                      | 188.0<br>7.40                              |                |                | 203            | 37.4           | 0.1197         | 16.86<br>37.17      |
| 749         | 742DC      | X2S-749               | 3.5<br>0.14                                    | 101.0<br>3.98                              | 1.5<br>0.06                                      | 143.0<br>5.63                              | 19.0<br>0.75   | 6.4<br>0.25    | 160            | 26.3           | 0.0898         | 7.90<br>17.41       |
| 749         | 742D       | X3S-749               | 3.5<br>0.14                                    | 101.0<br>3.98                              | 1.5<br>0.06                                      | 143.0<br>5.63                              |                |                | 160            | 26.3           | 0.0898         | 7.90<br>17.41       |
| 497         | 493DC      | X3S-497               | 3.5<br>0.14                                    | 99.0<br>3.90                               | 0.8<br>0.03                                      | 130.0<br>5.12                              | 12.4<br>0.49   | 4.6<br>0.18    | 105            | 29.3           | 0.1252         | 3.43<br>7.56        |
| 497         | 493D       | X3S-497               | 3.5<br>0.14                                    | 99.0<br>3.90                               | 0.8<br>0.03                                      | 130.0<br>5.12                              |                |                | 105            | 29.3           | 0.1252         | 3.43<br>7.56        |
| 596         | 592DC      | X1S-596               | 3.5<br>0.14                                    | 102.0<br>4.02                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 36.8           | 0.1416         | 6.10<br>13.46       |
| 596         | 592D       | X1S-596               | 3.5<br>0.14                                    | 102.0<br>4.02                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 6.10<br>13.46       |
| 665         | 654D       | X1S-665               | 3.5<br>0.14                                    | 102.0<br>4.02                              | 1.5<br>0.06                                      | 141.0<br>5.55                              |                |                | 137            | 27.3           | 0.0919         | 6.68<br>14.72       |
| 758         | 752D       | X2S-758               | 3.5<br>0.14                                    | 103.0<br>4.06                              | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 9.06<br>19.98       |
| 677         | 672D       | X1S-677               | 3.5<br>0.14                                    | 105.0<br>4.13                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 9.18<br>20.23       |
| 841         | 834D       | X2S-841               | 3.5<br>0.14                                    | 104.0<br>4.09                              | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 12.58<br>27.73      |
| L217847     | L217810D   | L217847XA             | 1.5<br>0.06                                    | 96.0<br>3.78                               | 0.8<br>0.03                                      | 119.0<br>4.69                              |                |                | 111            | 74.7           | 0.1152         | 1.78<br>3.92        |
| 596-S       | 592D       | X2S-596               | 3.5<br>0.14                                    | 103.0<br>4.06                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 5.99<br>13.20       |
| HH221432    | HH221410DC | HH221432XA            | 8.0<br>0.31                                    | 118.0<br>4.65                              | 1.5<br>0.06                                      | 179.0<br>7.05                              | 22.1<br>0.87   | 5.3<br>0.21    | 266            | 28.4           | 0.1072         | 17.58<br>38.76      |
| HH221432    | HH221410D  | HH221432XA            | 8.0<br>0.31                                    | 118.0<br>4.65                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 17.58<br>38.76      |
| 42346       | 42587D     | X1S-42346             | 3.0<br>0.12                                    | 103.0<br>4.06                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.57<br>10.06       |
| L217849     | L217810DC  | L217849XA             | 1.5<br>0.06                                    | 97.0<br>3.82                               | 0.8<br>0.03                                      | 119.0<br>4.69                              | 7.9<br>0.31    | 2.3<br>0.09    | 111            | 74.7           | 0.1152         | 1.69<br>3.72        |
| L217849     | L217810D   | L217849XB             | 1.5<br>0.06                                    | 97.0<br>3.82                               | 0.8<br>0.03                                      | 119.0<br>4.69                              |                |                | 111            | 74.7           | 0.1152         | 1.69<br>3.72        |
| 42350       | 42587D     | X1S-42350             | 3.0<br>0.12                                    | 104.0<br>4.09                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.50<br>9.93        |
| 593         | 592DC      | X1S-593               | 3.5<br>0.14                                    | 104.0<br>4.09                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 36.8           | 0.1416         | 5.84<br>12.88       |
| 593         | 592D       | X2S-593               | 3.5<br>0.14                                    | 104.0<br>4.09                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 5.84<br>12.88       |
| 593A        | 592D       | X1S-593               | 6.4<br>0.25                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 5.78<br>12.74       |
| 759         | 752D       | X8S-759               | 3.5<br>0.14                                    | 106.0<br>4.17                              | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 8.71<br>19.19       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

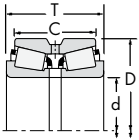
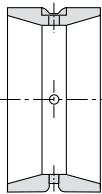
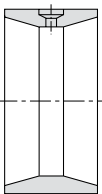


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



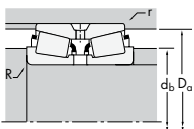
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700    | 1.71 |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 88.900<br>3.5000        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 88.900<br>3.5000        | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 88.900<br>3.5000        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 88.900<br>3.5000        | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700  | 170000<br>38200    | 0.92 |
| 89.891<br>3.5390        | 171.450<br>6.7500 | 125.412<br>4.9375 | 100.012<br>3.9375 | 659000<br>148000       | 0.30 | 2.26           | 3.36           | 98200<br>22100         | 50300<br>11300   | 171000<br>38400    | 1.95 |
| 89.916<br>3.5400        | 189.967<br>7.4790 | 85.852<br>3.3800  | 54.102<br>2.1300  | 462000<br>104000       | 0.87 | 0.78           | 1.16           | 68800<br>15500         | 102000<br>22900  | 120000<br>26900    | 0.67 |
| 89.980<br>3.5425        | 161.900<br>6.3740 | 69.850<br>2.7500  | 44.450<br>1.7500  | 327000<br>73600        | 0.73 | 0.92           | 1.37           | 48700<br>11000         | 61100<br>13700   | 84900<br>19100     | 0.80 |
| 90.488<br>3.5625        | 161.925<br>6.3750 | 104.775<br>4.1250 | 85.725<br>3.3750  | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700    | 1.71 |
| 92.075<br>3.6250        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 92.075<br>3.6250        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 92.075<br>3.6250        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 92.075<br>3.6250        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 92.075<br>3.6250        | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 93.662<br>3.6875        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 93.662<br>3.6875        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 95.250<br>3.7500        | 130.175<br>5.1250 | 47.622<br>1.8749  | 39.688<br>1.5625  | 154000<br>34600        | 0.35 | 1.93           | 2.88           | 22900<br>5150          | 13700<br>3080    | 39900<br>8960      | 1.67 |
| 95.250<br>3.7500        | 136.525<br>5.3750 | 68.260<br>2.6874  | 57.150<br>2.2500  | 225000<br>50600        | 0.28 | 2.38           | 3.54           | 33500<br>7530          | 16300<br>3660    | 58300<br>13100     | 2.06 |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 95.250<br>3.7500        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |           |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|-----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |           |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer     | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 766         | 752D      |                       | 7.0<br>0.28                                    | 113.0<br>4.45                              | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 8.52<br>18.78       |
| 679         | 672DC     | X1S-679               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 160.0<br>6.30                              | 15.7<br>0.62   | 4.6<br>0.18    | 182            | 37.2           | 0.1056         | 8.86<br>19.52       |
| 679         | 672D      | X2S-679               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 8.86<br>19.52       |
| 850         | 834D      | X2S-850               | 3.5<br>0.14                                    | 106.0<br>4.17                              | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 12.21<br>26.91      |
| 775         | 774D      | X2S-775               | 4.8<br>0.19                                    | 112.0<br>4.41                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 12.13<br>26.73      |
| HH221434    | HH221410D | HH221434XB            | 8.0<br>0.31                                    | 120.0<br>4.72                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 17.36<br>38.27      |
| 98350       | 98789D    | X3S-98350             | 3.5<br>0.14                                    | 118.0<br>4.65                              | 2.3<br>0.09                                      | 188.0<br>7.40                              |                |                | 203            | 37.4           | 0.1197         | 16.33<br>36.00      |
| 850A        | 834D      | X1S-850A              | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 155.0<br>6.10                              |                |                | 198            | 34.8           | 0.0937         | 12.08<br>26.64      |
| HM921343    | HM921310D | HM921343XA            | 3.5<br>0.14                                    | 117.0<br>4.61                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 137            | 32             | 0.1143         | 10.44<br>23.02      |
| M919048     | M919010D  | M919049XC             | 3.5<br>0.14                                    | 109.0<br>4.29                              | 1.5<br>0.06                                      | 154.0<br>6.06                              |                |                | 102            | 30.7           | 0.0990         | 5.40<br>11.90       |
| 760         | 752D      | X1S-760               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 1.5<br>0.06                                      | 150.0<br>5.91                              |                |                | 177            | 29.4           | 0.0945         | 8.56<br>18.87       |
| 42362       | 42587DC   | X1S-42362             | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 143.0<br>5.63                              | 10.9<br>0.43   | 3.8<br>0.15    | 130            | 37.2           | 0.1386         | 4.28<br>9.44        |
| 42362       | 42587D    | X3S-42362             | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.28<br>9.44        |
| 598         | 592DC     | X1S-598               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 36.8           | 0.1416         | 5.55<br>12.24       |
| 598         | 592D      | X3S-598               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 5.55<br>12.24       |
| 598X        | 592DC     | X1S-598               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 38.3           | 0.1416         | 5.54<br>12.22       |
| 598X        | 592D      | X1S-598               | 3.5<br>0.14                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 5.54<br>12.22       |
| 681         | 672D      | X1S-681               | 3.5<br>0.14                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 8.53<br>18.80       |
| 778         | 774D      | X1S-778               | 3.5<br>0.14                                    | 111.0<br>4.37                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 11.73<br>25.85      |
| 42368       | 42587D    | X1S-42368             | 3.0<br>0.12                                    | 107.0<br>4.21                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.17<br>9.20        |
| 597         | 592D      | X1S-597               | 3.5<br>0.14                                    | 109.0<br>4.29                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 38.3           | 0.1416         | 5.41<br>11.93       |
| L319249     | L319210D  | L319249XB             | 1.5<br>0.06                                    | 103.0<br>4.06                              | 0.8<br>0.03                                      | 125.0<br>4.92                              |                |                | 125            | 90.7           | 0.1220         | 1.75<br>3.87        |
| LM119348    | LM119311D | LM119348XA            | 2.3<br>0.09                                    | 105.0<br>4.13                              | 0.8<br>0.03                                      | 131.0<br>5.16                              |                |                | 149            | 69             | 0.1213         | 2.98<br>6.57        |
| 42375       | 42587D    | X1S-42376             | 3.0<br>0.12                                    | 108.0<br>4.25                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.05<br>8.92        |
| 42376       | 42587DC   | X1S-42376             | 3.5<br>0.14                                    | 109.0<br>4.29                              | 0.8<br>0.03                                      | 143.0<br>5.63                              | 10.9<br>0.43   | 3.8<br>0.15    | 130            | 37.2           | 0.1386         | 3.94<br>8.69        |
| 42376       | 42587D    | X1S-42376             | 3.5<br>0.14                                    | 109.0<br>4.29                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 4.02<br>8.87        |
| 594         | 592DC     | X2S-594               | 3.5<br>0.14                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 144.0<br>5.67                              | 14.2<br>0.56   | 5.3<br>0.21    | 151            | 36.8           | 0.1416         | 5.26<br>11.61       |
| 594         | 592D      | X3S-594               | 3.5<br>0.14                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 5.26<br>11.61       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B







# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

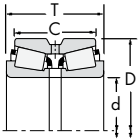
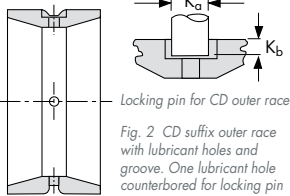
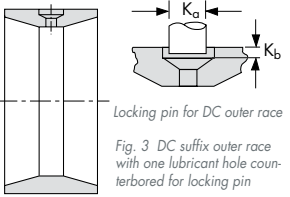


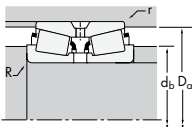
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 95.250<br>3.7500        | 152.400<br>6.0000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 348000<br>78300        | 0.44 | 1.53           | 2.27           | 51900<br>11700         | 39200<br>8820    | 90300<br>20300     | 1.32 |
| 95.250<br>3.7500        | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |
| 95.250<br>3.7500        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 95.250<br>3.7500        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 95.250<br>3.7500        | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 95.250<br>3.7500        | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 96.838<br>3.8125        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 96.838<br>3.8125        | 149.225<br>5.8750 | 66.672<br>2.6249  | 52.388<br>2.0625  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300     | 1.19 |
| 98.425<br>3.8750        | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |
| 98.425<br>3.8750        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 98.425<br>3.8750        | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 98.425<br>3.8750        | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 98.425<br>3.8750        | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 98.425<br>3.8750        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 98.425<br>3.8750        | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 99.975<br>3.9360        | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 99.980<br>3.9362        | 196.850<br>7.7500 | 103.378<br>4.0700 | 74.422<br>2.9300  | 608000<br>137000       | 0.61 | 1.11           | 1.66           | 90500<br>20300         | 93900<br>21100   | 158000<br>35400    | 0.96 |
| 99.982<br>3.9363        | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 100.000<br>3.9370       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 100.000<br>3.9370       | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 100.000<br>3.9370       | 190.500<br>7.5000 | 127.000<br>5.0000 | 101.600<br>4.0000 | 738000<br>166000       | 0.33 | 2.02           | 3.00           | 110000<br>24700        | 63000<br>14200   | 191000<br>43000    | 1.74 |
| 100.000<br>3.9370       | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700  | 170000<br>38200    | 0.92 |
| 100.012<br>3.9375       | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |
| 101.600<br>4.0000       | 146.050<br>5.7500 | 49.210<br>1.9374  | 38.895<br>1.5313  | 219000<br>49100        | 0.39 | 1.74           | 2.59           | 32500<br>7320          | 21600<br>4860    | 56700<br>12700     | 1.51 |
| 101.600<br>4.0000       | 146.050<br>5.7500 | 49.212<br>1.9375  | 39.688<br>1.5625  | 155000<br>34800        | 0.39 | 1.72           | 2.56           | 23100<br>5180          | 15500<br>3480    | 40100<br>9020      | 1.49 |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 594A        | 592D       | X2S-594               | 5.0<br>0.20                                    | 113.0<br>4.45                              | 0.8<br>0.03                                      | 144.0<br>5.67                              |                |                | 151            | 36.8           | 0.1416         | 5.23<br>11.53       |
| 52375       | 52637D     | X2S-52375             | 3.5<br>0.14                                    | 112.0<br>4.41                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 175            | 41.7           | 0.1519         | 6.50<br>14.33       |
| 683         | 672DC      | X1S-683               | 3.5<br>0.14                                    | 113.0<br>4.45                              | 0.8<br>0.03                                      | 160.0<br>6.30                              | 15.7<br>0.62   | 4.6<br>0.18    | 182            | 37.2           | 0.1056         | 8.19<br>18.06       |
| 683         | 672D       | X2S-683               | 3.5<br>0.14                                    | 113.0<br>4.45                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 8.19<br>18.06       |
| 776         | 774D       | X2S-776               | 3.5<br>0.14                                    | 114.0<br>4.49                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 11.37<br>25.06      |
| 777         | 774D       |                       | 9.7<br>0.38                                    | 126.0<br>4.96                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.97<br>24.19      |
| HH221440    | HH221410D  | HH221440XA            | 8.0<br>0.31                                    | 125.0<br>4.92                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 16.44<br>36.24      |
| 42381       | 42587DC    | X1S-42381             | 3.5<br>0.14                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 143.0<br>5.63                              | 10.9<br>0.43   | 3.8<br>0.15    | 130            | 37.2           | 0.1386         | 3.91<br>8.62        |
| 42381       | 42587D     | X2S-42381             | 3.5<br>0.14                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 143.0<br>5.63                              |                |                | 130            | 37.2           | 0.1386         | 3.91<br>8.62        |
| 52387       | 52637D     | X3S-52387             | 3.5<br>0.14                                    | 114.0<br>4.49                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 175            | 41.7           | 0.1519         | 6.18<br>13.62       |
| 685         | 672DC      | X1S-685               | 3.5<br>0.14                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 160.0<br>6.30                              | 15.7<br>0.62   | 4.6<br>0.18    | 182            | 37.2           | 0.1056         | 7.90<br>17.41       |
| 685         | 672D       | X3S-685               | 3.5<br>0.14                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 7.90<br>17.41       |
| 779         | 773D       | X4S-779               | 3.5<br>0.14                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.86<br>23.94      |
| 779         | 774D       | X3S-779               | 3.5<br>0.14                                    | 116.0<br>4.57                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.98<br>24.21      |
| HH221442    | HH221410D  | HH221442XB            | 3.5<br>0.14                                    | 119.0<br>4.69                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 16.09<br>35.46      |
| HH224332    | HH224310CD | HH224332XA            | 3.5<br>0.14                                    | 123.0<br>4.84                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 47.8           | 0.1182         | 23.31<br>51.40      |
| HH224334    | HH224310CD | HH224334XA            | 3.5<br>0.14                                    | 124.0<br>4.88                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 43.4           | 0.1182         | 23.13<br>51.00      |
| HM821547    | HM821511D  | HM821547XB            | 3.5<br>0.14                                    | 123.0<br>4.84                              | 1.5<br>0.06                                      | 187.0<br>7.36                              |                |                | 166            | 24.2           | 0.1100         | 12.48<br>27.52      |
| HH221447    | HH221410D  | HH221447XC            | 6.4<br>0.25                                    | 126.0<br>4.96                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 15.77<br>34.77      |
| 783         | 773D       | X3S-783               | 3.5<br>0.14                                    | 118.0<br>4.65                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.68<br>23.54      |
| 783         | 774D       | X3S-783               | 3.5<br>0.14                                    | 118.0<br>4.65                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.78<br>23.77      |
| 863X        | 854DC      | X1S-863X              | 6.0<br>0.24                                    | 124.0<br>4.88                              | 1.5<br>0.06                                      | 174.0<br>6.85                              | 22.1<br>0.87   | 6.4<br>0.25    | 264            | 44.9           | 0.1072         | 15.05<br>33.19      |
| 98394X      | 98789D     | X1S-98394X            | 3.5<br>0.14                                    | 126.0<br>4.96                              | 2.3<br>0.09                                      | 188.0<br>7.40                              |                |                | 203            | 37.4           | 0.1197         | 14.94<br>32.93      |
| 52393       | 52637D     | X2S-52393             | 3.5<br>0.14                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 175            | 41.7           | 0.1519         | 6.02<br>13.27       |
| LM520349    | LM520310D  | LM520349XA            | 1.5<br>0.06                                    | 110.0<br>4.33                              | 0.8<br>0.03                                      | 140.0<br>5.51                              |                |                | 121            | 58.7           | 0.1249         | 2.43<br>5.37        |
| L521945     | L521910D   | L521945XA             | 1.5<br>0.06                                    | 112.0<br>4.41                              | 0.8<br>0.03                                      | 141.0<br>5.55                              |                |                | 152            | 108            | 0.1346         | 2.54<br>5.60        |
| 52400       | 52637DC    | X1S-52400             | 3.5<br>0.14                                    | 117.0<br>4.61                              | 0.8<br>0.03                                      | 154.0<br>6.06                              | 14.2<br>0.56   | 5.3<br>0.21    | 175            | 41.7           | 0.1519         | 5.89<br>12.99       |
| 52400       | 52637D     | X7S-52400             | 3.5<br>0.14                                    | 117.0<br>4.61                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 175            | 41.7           | 0.1519         | 5.89<br>12.99       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

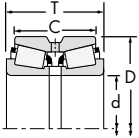
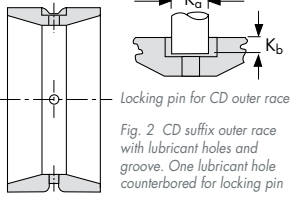
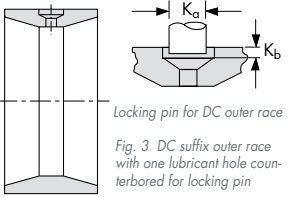


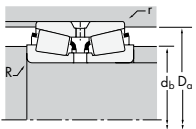
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 82.547<br>3.2499  | 61.912<br>2.4375  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000     | 1.23 |
| 101.600<br>4.0000       | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 101.600<br>4.0000       | 168.275<br>6.6250 | 92.075<br>3.6250  | 69.850<br>2.7500  | 427000<br>95900        | 0.47 | 1.43           | 2.14           | 63500<br>14300         | 51200<br>11500   | 111000<br>24900    | 1.24 |
| 101.600<br>4.0000       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 101.600<br>4.0000       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 101.600<br>4.0000       | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 127.000<br>5.0000 | 101.600<br>4.0000 | 738000<br>166000       | 0.33 | 2.02           | 3.00           | 110000<br>24700        | 63000<br>14200   | 191000<br>43000    | 1.74 |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 127.000<br>5.0000 | 104.775<br>4.1250 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100    | 1.74 |
| 101.600<br>4.0000       | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700  | 170000<br>38200    | 0.92 |
| 101.600<br>4.0000       | 200.025<br>7.8750 | 115.888<br>4.5625 | 80.216<br>3.1581  | 655000<br>147000       | 0.63 | 1.07           | 1.59           | 97500<br>21900         | 106000<br>23700  | 170000<br>38200    | 0.92 |
| 101.600<br>4.0000       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 922000<br>207000       | 0.33 | 2.07           | 3.09           | 137000<br>30900        | 76600<br>17200   | 239000<br>53700    | 1.79 |
| 101.600<br>4.0000       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 101.600<br>4.0000       | 214.312<br>8.4375 | 115.888<br>4.5625 | 84.138<br>3.3125  | 758000<br>170000       | 0.67 | 1.00           | 1.49           | 113000<br>25400        | 130000<br>29300  | 196000<br>44200    | 0.87 |
| 104.775<br>4.1250       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 180.000<br>7.0866 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 104.775<br>4.1250 | 85.725<br>3.3750  | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500    | 1.51 |
| 104.775<br>4.1250       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 106.362<br>4.1875       | 165.100<br>6.5000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 365000<br>82100        | 0.50 | 1.36           | 2.02           | 54400<br>12200         | 46300<br>10400   | 94600<br>21300     | 1.18 |
| 107.950<br>4.2500       | 146.050<br>5.7500 | 49.212<br>1.9375  | 39.688<br>1.5625  | 155000<br>34800        | 0.39 | 1.72           | 2.56           | 23100<br>5180          | 15500<br>3480    | 40100<br>9020      | 1.49 |
| 107.950<br>4.2500       | 146.050<br>5.7500 | 49.212<br>1.9375  | 39.688<br>1.5625  | 155000<br>34800        | 0.39 | 1.72           | 2.56           | 23100<br>5180          | 15500<br>3480    | 40100<br>9020      | 1.49 |
| 107.950<br>4.2500       | 158.750<br>6.2500 | 53.978<br>2.1251  | 39.688<br>1.5625  | 186000<br>41700        | 0.61 | 1.11           | 1.66           | 27600<br>6220          | 28700<br>6450    | 48100<br>10800     | 0.96 |
| 107.950<br>4.2500       | 159.987<br>6.2987 | 74.612<br>2.9375  | 58.738<br>2.3125  | 316000<br>70900        | 0.40 | 1.68           | 2.50           | 47000<br>10600         | 32300<br>7270    | 81800<br>18400     | 1.45 |
| 107.950<br>4.2500       | 165.100<br>6.5000 | 82.550<br>3.2500  | 63.500<br>2.5000  | 365000<br>82100        | 0.50 | 1.36           | 2.02           | 54400<br>12200         | 46300<br>10400   | 94600<br>21300     | 1.18 |
| 107.950<br>4.2500       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 52401       | 52637D     | X1S-52400             | 8.0<br>0.31                                    | 126.0<br>4.96                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 175            | 41.7           | 0.1519         | 5.89<br>12.99       |
| 687         | 672DC      | X1S-687               | 3.5<br>0.14                                    | 118.0<br>4.65                              | 0.8<br>0.03                                      | 160.0<br>6.30                              | 15.7<br>0.62   | 4.6<br>0.18    | 182            | 37.2           | 0.1056         | 7.64<br>16.85       |
| 687         | 672D       | X3S-687               | 3.5<br>0.14                                    | 118.0<br>4.65                              | 0.8<br>0.03                                      | 160.0<br>6.30                              |                |                | 182            | 37.2           | 0.1056         | 7.64<br>16.85       |
| 780         | 773DC      | X1S-780               | 3.5<br>0.14                                    | 119.0<br>4.69                              | 0.8<br>0.03                                      | 168.0<br>6.61                              | 19.0<br>0.75   | 6.4<br>0.25    | 227            | 38.2           | 0.1067         | 10.69<br>23.56      |
| 780         | 773D       | X2S-780               | 3.5<br>0.14                                    | 119.0<br>4.69                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 38.2           | 0.1067         | 10.69<br>23.56      |
| 780         | 774D       | X1S-780               | 3.5<br>0.14                                    | 119.0<br>4.69                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 38.2           | 0.1067         | 10.63<br>23.44      |
| 861         | 854DC      | X3S-861               | 8.0<br>0.31                                    | 129.0<br>5.08                              | 1.5<br>0.06                                      | 174.0<br>6.85                              | 22.1<br>0.87   | 6.4<br>0.25    | 264            | 44.9           | 0.1072         | 14.75<br>32.52      |
| HH221449    | HH221410DC | HH221449XA            | 8.0<br>0.31                                    | 131.0<br>5.16                              | 1.5<br>0.06                                      | 179.0<br>7.05                              | 22.1<br>0.87   | 5.3<br>0.21    | 266            | 28.4           | 0.1072         | 15.47<br>34.11      |
| HH221449    | HH221410D  | HH221449XB            | 8.0<br>0.31                                    | 131.0<br>5.16                              | 1.5<br>0.06                                      | 179.0<br>7.05                              |                |                | 266            | 28.4           | 0.1072         | 15.47<br>34.11      |
| 98400       | 98789DC    | X1S-98400             | 3.5<br>0.14                                    | 128.0<br>5.04                              | 2.3<br>0.09                                      | 188.0<br>7.40                              | 17.3<br>0.68   | 8.6<br>0.34    | 203            | 37.4           | 0.1197         | 14.67<br>32.35      |
| 98400       | 98789D     | X2S-98400             | 3.5<br>0.14                                    | 128.0<br>5.04                              | 2.3<br>0.09                                      | 188.0<br>7.40                              |                |                | 203            | 37.4           | 0.1197         | 14.67<br>32.34      |
| 941         | 932CD      | X2S-941               | 7.0<br>0.28                                    | 130.0<br>5.12                              | 1.5<br>0.06                                      | 193.0<br>7.60                              | 22.1<br>0.87   | 8.6<br>0.34    | 339            | 39.7           | 0.1153         | 22.54<br>49.69      |
| HH224335    | HH224310CD | HH224335XB            | 7.0<br>0.28                                    | 132.0<br>5.20                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 43.4           | 0.1182         | 22.75<br>50.15      |
| H924033     | H924010D   | H924033XA             | 3.5<br>0.14                                    | 132.0<br>5.20                              | 1.5<br>0.06                                      | 205.0<br>8.07                              |                |                | 246            | 32.2           | 0.1299         | 19.23<br>42.39      |
| 782         | 773D       | X3S-782               | 3.5<br>0.14                                    | 122.0<br>4.80                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 38.2           | 0.1067         | 10.26<br>22.62      |
| 786         | 773D       | X1S-786               | 6.4<br>0.25                                    | 128.0<br>5.04                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 38.2           | 0.1067         | 10.02<br>22.10      |
| 787         | 773D       | X3S-782               | 7.0<br>0.28                                    | 129.0<br>5.08                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 227            | 41.3           | 0.1067         | 10.16<br>22.39      |
| 782         | 774DC      | X3S-782               | 3.5<br>0.14                                    | 122.0<br>4.80                              | 1.5<br>0.06                                      | 168.0<br>6.61                              | 19.0<br>0.75   | 6.4<br>0.25    | 227            | 38.2           | 0.1067         | 10.51<br>23.18      |
| 782         | 774D       | X3S-782               | 3.5<br>0.14                                    | 122.0<br>4.80                              | 1.5<br>0.06                                      | 168.0<br>6.61                              |                |                | 227            | 38.2           | 0.1067         | 10.20<br>22.49      |
| 786         | 774DC      | X3S-782               | 6.4<br>0.25                                    | 128.0<br>5.04                              | 1.5<br>0.06                                      | 168.0<br>6.61                              | 19.0<br>0.75   | 6.4<br>0.25    | 227            | 38.2           | 0.1067         | 10.44<br>23.01      |
| 71412       | 71751D     | X2S-71412             | 3.5<br>0.14                                    | 124.0<br>4.88                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 12.40<br>27.34      |
| 56418       | 56650D     | X2S-56418             | 3.5<br>0.14                                    | 122.0<br>4.80                              | 0.8<br>0.03                                      | 159.0<br>6.26                              |                |                | 191            | 47.7           | 0.1584         | 5.95<br>13.12       |
| L521949     | L521910DC  | L521949XA             | 1.5<br>0.06                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 141.0<br>5.55                              | 7.9<br>0.31    | 3.0<br>0.12    | 152            | 108            | 0.1346         | 2.20<br>4.84        |
| L521949     | L521910D   | L521949XA             | 1.5<br>0.06                                    | 116.0<br>4.57                              | 0.8<br>0.03                                      | 141.0<br>5.55                              |                |                | 152            | 108            | 0.1346         | 2.20<br>4.84        |
| 37425       | 37626D     | X1S-37425             | 3.5<br>0.14                                    | 122.0<br>4.80                              | 0.8<br>0.03                                      | 152.0<br>5.98                              |                |                | 124            | 57             | 0.1443         | 3.21<br>7.07        |
| LM522546    | LM522510D  | LM522546XB            | 3.5<br>0.14                                    | 122.0<br>4.80                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 232            | 63.3           | 0.1576         | 5.07<br>11.19       |
| 56425       | 56650D     | X2S-56425             | 3.5<br>0.14                                    | 123.0<br>4.84                              | 0.8<br>0.03                                      | 159.0<br>6.26                              |                |                | 191            | 47.7           | 0.1584         | 5.80<br>12.78       |
| 71425       | 71751DC    | X2S-71425             | 3.5<br>0.14                                    | 126.0<br>4.96                              | 1.5<br>0.06                                      | 181.0<br>7.13                              | 17.3<br>0.68   | 5.3<br>0.21    | 269            | 45.7           | 0.1156         | 11.87<br>26.18      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

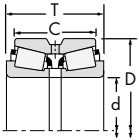
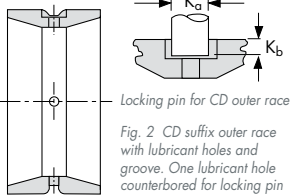
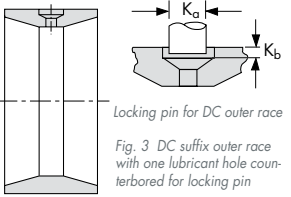


Fig. 1 D suffix outer race with lubricant holes and groove



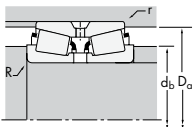
Locking pin for CD outer race

Fig. 2 CD suffix outer race with lubricant holes and groove. One lubricant hole counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race with one lubricant hole counterbored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 107.950<br>4.2500       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 922000<br>207000       | 0.33 | 2.07           | 3.09           | 137000<br>30900        | 76600<br>17200   | 239000<br>53700    | 1.79 |
| 107.950<br>4.2500       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 109.538<br>4.3125       | 158.750<br>6.2500 | 53.978<br>2.1251  | 39.688<br>1.5625  | 186000<br>41700        | 0.61 | 1.11           | 1.66           | 27600<br>6220          | 28700<br>6450    | 48100<br>10800     | 0.96 |
| 109.538<br>4.3125       | 158.750<br>6.2500 | 53.978<br>2.1251  | 39.688<br>1.5625  | 186000<br>41700        | 0.61 | 1.11           | 1.66           | 27600<br>6220          | 28700<br>6450    | 48100<br>10800     | 0.96 |
| 109.952<br>4.3288       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 110.000<br>4.3301       | 214.312<br>8.4375 | 115.888<br>4.5625 | 84.138<br>3.3125  | 758000<br>170000       | 0.67 | 1.00           | 1.49           | 113000<br>25400        | 130000<br>29300  | 196000<br>44200    | 0.87 |
| 109.987<br>4.3302       | 159.987<br>6.2987 | 74.612<br>2.9375  | 58.738<br>2.3125  | 316000<br>70900        | 0.40 | 1.68           | 2.50           | 47000<br>10600         | 32300<br>7270    | 81800<br>18400     | 1.45 |
| 109.987<br>4.3302       | 159.987<br>6.2987 | 74.612<br>2.9375  | 58.738<br>2.3125  | 316000<br>70900        | 0.40 | 1.68           | 2.50           | 47000<br>10600         | 32300<br>7270    | 81800<br>18400     | 1.45 |
| 109.992<br>4.3304       | 177.800<br>7.0000 | 92.075<br>3.6250  | 69.850<br>2.7500  | 443000<br>99600        | 0.52 | 1.31           | 1.95           | 65900<br>14800         | 58300<br>13100   | 115000<br>25800    | 1.13 |
| 110.000<br>4.3307       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 922000<br>207000       | 0.33 | 2.07           | 3.09           | 137000<br>30900        | 76600<br>17200   | 239000<br>53700    | 1.79 |
| 111.125<br>4.3750       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 111.125<br>4.3750       | 214.312<br>8.4375 | 115.888<br>4.5625 | 84.138<br>3.3125  | 758000<br>170000       | 0.67 | 1.00           | 1.49           | 113000<br>25400        | 130000<br>29300  | 196000<br>44200    | 0.87 |
| 111.125<br>4.3750       | 241.300<br>9.5000 | 158.750<br>6.2500 | 107.950<br>4.2500 | 1080000<br>243000      | 0.73 | 0.92           | 1.37           | 161000<br>36200        | 202000<br>45400  | 281000<br>63100    | 0.80 |
| 114.300<br>4.5000       | 152.400<br>6.0000 | 47.625<br>1.8750  | 38.100<br>1.5000  | 161000<br>36200        | 0.41 | 1.63           | 2.43           | 23900<br>5380          | 16900<br>3810    | 41700<br>9370      | 1.41 |
| 114.300<br>4.5000       | 177.800<br>7.0000 | 92.075<br>3.6250  | 69.850<br>2.7500  | 443000<br>99600        | 0.52 | 1.31           | 1.95           | 65900<br>14800         | 58300<br>13100   | 115000<br>25800    | 1.13 |
| 114.300<br>4.5000       | 177.800<br>7.0000 | 92.075<br>3.6250  | 69.850<br>2.7500  | 443000<br>99600        | 0.52 | 1.31           | 1.95           | 65900<br>14800         | 58300<br>13100   | 115000<br>25800    | 1.13 |
| 114.300<br>4.5000       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 114.300<br>4.5000       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 114.300<br>4.5000       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 922000<br>207000       | 0.33 | 2.07           | 3.09           | 137000<br>30900        | 76600<br>17200   | 239000<br>53700    | 1.79 |
| 114.300<br>4.5000       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 114.300<br>4.5000       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 798000<br>179000       | 0.74 | 0.92           | 1.36           | 119000<br>26700        | 150000<br>33700  | 207000<br>46500    | 0.79 |
| 114.975<br>4.5266       | 177.800<br>7.0000 | 92.075<br>3.6250  | 69.850<br>2.7500  | 443000<br>99600        | 0.52 | 1.31           | 1.95           | 65900<br>14800         | 58300<br>13100   | 115000<br>25800    | 1.13 |
| 114.975<br>4.5266       | 212.725<br>8.3750 | 142.875<br>5.6250 | 117.475<br>4.6250 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 115.087<br>4.5310       | 190.500<br>7.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 119.062<br>4.6875       | 194.873<br>7.6722 | 125.255<br>4.9313 | 131.351<br>5.1713 | 662000<br>149000       | 0.26 | 2.55           | 3.80           | 98600<br>22200         | 44600<br>10000   | 172000<br>38600    | 2.21 |
| 119.062<br>4.6875       | 195.262<br>7.6875 | 136.779<br>5.3850 | 142.875<br>5.6250 | 662000<br>149000       | 0.26 | 2.55           | 3.80           | 98600<br>22200         | 44600<br>10000   | 172000<br>38600    | 2.21 |
| 119.957<br>4.7227       | 194.873<br>7.6722 | 125.255<br>4.9313 | 131.351<br>5.1713 | 662000<br>149000       | 0.26 | 2.55           | 3.80           | 98600<br>22200         | 44600<br>10000   | 172000<br>38600    | 2.21 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| 71425       | 71751D     | X5S-71425             | 3.5<br>0.14                                    | 126.0<br>4.96                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 11.87<br>26.18      |
| 936         | 932CD      | X3S-936               | 8.0<br>0.31                                    | 137.0<br>5.39                              | 1.5<br>0.06                                      | 193.0<br>7.60                              | 22.1<br>0.87   | 8.6<br>0.34    | 339            | 39.7           | 0.1153         | 21.49<br>47.37      |
| HH224340    | HH224310CD | HH224340XA            | 8.0<br>0.31                                    | 139.0<br>5.47                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 47.8           | 0.1182         | 21.55<br>47.51      |
| 37431       | 37626DC    | X1S-37431             | 3.5<br>0.14                                    | 123.0<br>4.84                              | 0.8<br>0.03                                      | 152.0<br>5.98                              | 7.9<br>0.31    | 3.8<br>0.15    | 124            | 48.7           | 0.1443         | 3.13<br>6.91        |
| 37431       | 37626D     | X1S-37431             | 3.5<br>0.14                                    | 123.0<br>4.84                              | 0.8<br>0.03                                      | 152.0<br>5.98                              |                |                | 124            | 48.7           | 0.1443         | 3.13<br>6.91        |
| 71432       | 71751D     | X1S-71432             | 3.5<br>0.14                                    | 128.0<br>5.04                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 12.02<br>26.50      |
| H924043     | H924010D   | H924043XA             | 3.5<br>0.14                                    | 139.0<br>5.47                              | 1.5<br>0.06                                      | 205.0<br>8.07                              |                |                | 246            | 32.2           | 0.1299         | 17.81<br>39.27      |
| LM522548    | LM522510D  | LM522549XA            | 8.0<br>0.31                                    | 133.0<br>5.24                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 232            | 63.3           | 0.1576         | 4.72<br>10.41       |
| LM522549    | LM522510D  | LM522549XB            | 3.5<br>0.14                                    | 124.0<br>4.88                              | 0.8<br>0.03                                      | 154.0<br>6.06                              |                |                | 232            | 63.3           | 0.1576         | 4.87<br>10.73       |
| 64433       | 64700D     | X1S-64433             | 3.5<br>0.14                                    | 128.0<br>5.04                              | 0.8<br>0.03                                      | 172.0<br>6.77                              |                |                | 219            | 45.3           | 0.1153         | 8.31<br>18.31       |
| 942         | 932CD      | X1S-64433             | 6.4<br>0.25                                    | 136.0<br>5.35                              | 1.5<br>0.06                                      | 193.0<br>7.60                              | 22.1<br>0.87   | 8.6<br>0.34    | 339            | 39.7           | 0.1153         | 21.09<br>46.50      |
| 71437       | 71751D     | X2S-71437             | 3.5<br>0.14                                    | 129.0<br>5.08                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 11.50<br>25.35      |
| H924045     | H924010D   | H924045XB             | 3.5<br>0.14                                    | 139.0<br>5.47                              | 1.5<br>0.06                                      | 205.0<br>8.07                              |                |                | 246            | 32.2           | 0.1299         | 17.78<br>39.20      |
| HH924349    | HH924310D  | HH924349XA            | 6.4<br>0.25                                    | 157.0<br>6.18                              | 1.5<br>0.06                                      | 226.0<br>8.90                              |                |                | 306            | 37.3           | 0.1432         | 30.71<br>67.70      |
| L623149     | L623110D   | L623149XA             | 1.5<br>0.06                                    | 123.0<br>4.84                              | 0.8<br>0.03                                      | 147.0<br>5.79                              |                |                | 171            | 102            | 0.1422         | 2.16<br>4.75        |
| 64450       | 64700DC    | X1S-64450             | 3.5<br>0.14                                    | 131.0<br>5.16                              | 0.8<br>0.03                                      | 172.0<br>6.77                              | 17.3<br>0.68   | 5.3<br>0.21    | 219            | 45.3           | 0.1153         | 7.82<br>17.24       |
| 64450       | 64700D     | X5S-64450             | 3.5<br>0.14                                    | 131.0<br>5.16                              | 0.8<br>0.03                                      | 172.0<br>6.77                              |                |                | 219            | 45.3           | 0.1153         | 7.81<br>17.21       |
| 71450       | 71751DC    | X3S-71450             | 3.5<br>0.14                                    | 132.0<br>5.20                              | 1.5<br>0.06                                      | 181.0<br>7.13                              | 17.3<br>0.68   | 5.3<br>0.21    | 269            | 45.7           | 0.1156         | 11.08<br>24.43      |
| 71450       | 71751D     | X4S-71450             | 3.5<br>0.14                                    | 132.0<br>5.20                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 11.08<br>24.43      |
| 938         | 932CD      | X4S-938               | 7.0<br>0.28                                    | 141.0<br>5.55                              | 1.5<br>0.06                                      | 193.0<br>7.60                              | 22.1<br>0.87   | 8.6<br>0.34    | 339            | 39.7           | 0.1153         | 20.24<br>44.62      |
| HH224346    | HH224310CD | HH224346XB            | 7.0<br>0.28                                    | 143.0<br>5.63                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 47.8           | 0.1182         | 20.38<br>44.92      |
| HM926740    | HM926710D  | HM926740XC            | 3.5<br>0.14                                    | 146.0<br>5.75                              | 2.3<br>0.09                                      | 219.0<br>8.63                              |                |                | 295            | 39             | 0.1416         | 20.75<br>45.74      |
| 64452A      | 64700D     | X1S-64452             | 9.0<br>0.35                                    | 143.0<br>5.63                              | 0.8<br>0.03                                      | 172.0<br>6.77                              |                |                | 219            | 45.3           | 0.1153         | 7.54<br>16.62       |
| HH224349    | HH224310CD | HH224349XA            | 7.0<br>0.28                                    | 144.0<br>5.67                              | 1.5<br>0.06                                      | 201.5<br>7.94                              | 25.4<br>1.00   | 7.9<br>0.31    | 367            | 47.8           | 0.1182         | 20.26<br>44.67      |
| 71453       | 71751D     | X2S-71453             | 3.5<br>0.14                                    | 133.0<br>5.24                              | 1.5<br>0.06                                      | 181.0<br>7.13                              |                |                | 269            | 45.7           | 0.1156         | 10.91<br>24.04      |
| HM124646    | HM124616XD | HM124646XC            | 1.5<br>0.06                                    | 131.0<br>5.16                              | 1.0<br>0.04                                      | 183.0<br>7.20                              |                |                | 340            | 69.2           | 0.1076         | 14.54<br>32.06      |
| HM124646    | HM124618XD |                       | 1.5<br>0.06                                    | 131.0<br>5.16                              | 1.0<br>0.04                                      | 183.0<br>7.20                              |                |                | 340            | 69.2           | 0.1076         | 15.17<br>33.44      |
| HM124649    | HM124616XD |                       | 3.0<br>0.12                                    | 134.0<br>5.28                              | 1.0<br>0.04                                      | 183.0<br>7.20                              |                |                | 340            | 69.2           | 0.1076         | 14.14<br>31.16      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





**TDO**  
**DOUBLE**  
**OUTER RACE**

**B**

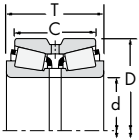
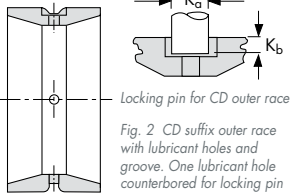
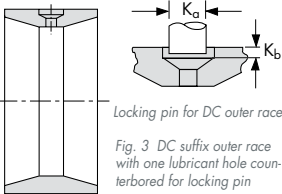


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



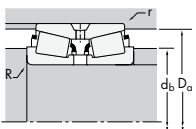
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 119.957<br>4.7227       | 195.262<br>7.6875 | 136.779<br>5.3850 | 142.875<br>5.6250 | 662000<br>149000       | 0.26 | 2.55           | 3.80           | 98600<br>22200         | 44600<br>10000   | 172000<br>38600    | 2.21 |
| 119.964<br>4.7230       | 215.900<br>8.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 119.975<br>4.7234       | 174.625<br>6.8750 | 77.788<br>3.0625  | 61.912<br>2.4375  | 394000<br>88600        | 0.33 | 2.03           | 3.02           | 58700<br>13200         | 33400<br>7510    | 102000<br>23000    | 1.76 |
| 119.975<br>4.7234       | 174.625<br>6.8750 | 77.788<br>3.0625  | 61.912<br>2.4375  | 394000<br>88600        | 0.33 | 2.03           | 3.02           | 58700<br>13200         | 33400<br>7510    | 102000<br>23000    | 1.76 |
| 120.650<br>4.7500       | 161.925<br>6.3750 | 63.500<br>2.5000  | 53.975<br>2.1250  | 170000<br>38200        | 0.43 | 1.55           | 2.31           | 25300<br>5680          | 18800<br>4230    | 44000<br>9890      | 1.34 |
| 120.650<br>4.7500       | 169.975<br>6.6919 | 58.738<br>2.3125  | 49.212<br>1.9375  | 230000<br>51700        | 0.33 | 2.03           | 3.02           | 34300<br>7710          | 19500<br>4390    | 59700<br>13400     | 1.76 |
| 120.650<br>4.7500       | 174.625<br>6.8750 | 77.788<br>3.0625  | 61.912<br>2.4375  | 394000<br>88600        | 0.33 | 2.03           | 3.02           | 58700<br>13200         | 33400<br>7510    | 102000<br>23000    | 1.76 |
| 120.650<br>4.7500       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 120.650<br>4.7500       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 120.650<br>4.7500       | 206.375<br>8.1250 | 107.950<br>4.2500 | 82.550<br>3.2500  | 610000<br>137000       | 0.46 | 1.47           | 2.19           | 90800<br>20400         | 71300<br>16000   | 158000<br>35500    | 1.27 |
| 120.650<br>4.7500       | 234.950<br>9.2500 | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 123.825<br>4.8750       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 123.825<br>4.8750       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 124.943<br>4.9190       | 234.950<br>9.2500 | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 125.298<br>4.9330       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 798000<br>179000       | 0.74 | 0.92           | 1.36           | 119000<br>26700        | 150000<br>33700  | 207000<br>46500    | 0.79 |
| 126.987<br>4.9995       | 207.962<br>8.1875 | 146.304<br>5.7600 | 152.400<br>6.0000 | 717000<br>161000       | 0.26 | 2.55           | 3.80           | 107000<br>24000        | 48400<br>10900   | 186000<br>41800    | 2.21 |
| 127.000<br>5.0000       | 169.975<br>6.6919 | 58.738<br>2.3125  | 49.212<br>1.9375  | 230000<br>51700        | 0.33 | 2.03           | 3.02           | 34300<br>7710          | 19500<br>4390    | 59700<br>13400     | 1.76 |
| 127.000<br>5.0000       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 127.000<br>5.0000       | 182.562<br>7.1875 | 85.728<br>3.3751  | 73.025<br>2.8750  | 432000<br>97100        | 0.31 | 2.21           | 3.29           | 64300<br>14500         | 33600<br>7550    | 112000<br>25200    | 1.91 |
| 127.000<br>5.0000       | 196.850<br>7.7500 | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 127.000<br>5.0000       | 196.850<br>7.7500 | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 127.000<br>5.0000       | 200.025<br>7.8750 | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 127.000<br>5.0000       | 215.900<br>8.5000 | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 127.000<br>5.0000       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 606000<br>136000       | 0.74 | 0.92           | 1.36           | 90200<br>20300         | 114000<br>25600  | 157000<br>35300    | 0.79 |
| 127.000<br>5.0000       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 798000<br>179000       | 0.74 | 0.92           | 1.36           | 119000<br>26700        | 150000<br>33700  | 207000<br>46500    | 0.79 |
| 127.000<br>5.0000       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 798000<br>179000       | 0.74 | 0.92           | 1.36           | 119000<br>26700        | 150000<br>33700  | 207000<br>46500    | 0.79 |
| 127.000<br>5.0000       | 234.950<br>9.2500 | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 127.792<br>5.0312       | 228.600<br>9.0000 | 115.888<br>4.5625 | 84.138<br>3.3125  | 798000<br>179000       | 0.74 | 0.92           | 1.36           | 119000<br>26700        | 150000<br>33700  | 207000<br>46500    | 0.79 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.



| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| HM124649    | HM124618XD |                       | 3.0<br>0.12                                    | 134.0<br>5.28                              | 1.0<br>0.04                                      | 183.0<br>7.20                              |                |                | 340            | 69.2           | 0.1076         | 15.00<br>33.06      |
| 74472       | 74851CD    | X1S-74472             | 3.5<br>0.14                                    | 142.0<br>5.59                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 68.5           | 0.1338         | 15.93<br>35.13      |
| M224748     | M224710DC  | M224748XA             | 3.5<br>0.14                                    | 134.0<br>5.28                              | 0.8<br>0.03                                      | 168.0<br>6.61                              | 14.2<br>0.56   | 3.8<br>0.15    | 279            | 86.6           | 0.1575         | 5.72<br>12.62       |
| M224748     | M224710D   | M224748XB             | 3.5<br>0.14                                    | 134.0<br>5.28                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 279            | 86.6           | 0.1575         | 5.72<br>12.62       |
| L624549     | L624514D   | L624549XB             | 1.5<br>0.06                                    | 129.0<br>5.08                              | 0.8<br>0.03                                      | 156.0<br>6.14                              |                |                | 195            | 139            | 0.1509         | 3.22<br>7.11        |
| L225842     | L225812D   | L225842XA             | 1.5<br>0.06                                    | 131.0<br>5.16                              | 1.0<br>0.04                                      | 164.0<br>6.46                              |                |                | 253            | 134            | 0.1511         | 3.92<br>8.65        |
| M224749     | M224710D   | M224749XC             | 3.5<br>0.14                                    | 135.0<br>5.31                              | 0.8<br>0.03                                      | 168.0<br>6.61                              |                |                | 279            | 86.6           | 0.1575         | 5.64<br>12.44       |
| 48282       | 48220DC    | X1S-48282             | 3.5<br>0.14                                    | 137.0<br>5.39                              | 0.8<br>0.03                                      | 176.0<br>6.93                              | 17.3<br>0.68   | 3.8<br>0.15    | 353            | 91.3           | 0.1138         | 7.88<br>17.38       |
| 48282       | 48220D     | X1S-48282             | 3.5<br>0.14                                    | 137.0<br>5.39                              | 0.8<br>0.03                                      | 176.0<br>6.93                              |                |                | 353            | 91.3           | 0.1138         | 7.88<br>17.38       |
| 795         | 792CD      | X4S-795               | 3.3<br>0.13                                    | 139.0<br>5.47                              | 0.8<br>0.03                                      | 198.0<br>7.80                              | 19.0<br>0.75   | 7.9<br>0.31    | 326            | 56.2           | 0.1269         | 13.68<br>30.17      |
| 95475       | 95927CD    | X2S-95475             | 6.4<br>0.25                                    | 149.0<br>5.87                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 59.3           | 0.1323         | 26.72<br>58.90      |
| 48286       | 48220DC    | X1S-48286             | 3.5<br>0.14                                    | 139.0<br>5.47                              | 0.8<br>0.03                                      | 176.0<br>6.93                              | 17.3<br>0.68   | 3.8<br>0.15    | 353            | 91.3           | 0.1138         | 7.59<br>16.73       |
| 48286       | 48220D     | X2S-48286             | 3.5<br>0.14                                    | 139.0<br>5.47                              | 0.8<br>0.03                                      | 176.0<br>6.93                              |                |                | 353            | 91.3           | 0.1138         | 7.59<br>16.73       |
| 95491       | 95927CD    | X2S-95491             | 6.4<br>0.25                                    | 152.0<br>5.98                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 59.3           | 0.1323         | 25.64<br>56.53      |
| HM926745    | HM926710D  | HM926745XA            | 3.5<br>0.14                                    | 154.0<br>6.06                              | 2.3<br>0.09                                      | 219.0<br>8.63                              |                |                | 295            | 39             | 0.1416         | 18.84<br>41.53      |
| HM127440    | HM127415XD |                       | 1.5<br>0.06                                    | 140.0<br>5.51                              | 1.0<br>0.04                                      | 198.0<br>7.79                              |                |                | 423            | 85.4           | 0.1156         | 17.67<br>38.95      |
| L225849     | L225812D   | L225849XA             | 1.5<br>0.06                                    | 136.0<br>5.35                              | 1.0<br>0.04                                      | 164.0<br>6.46                              |                |                | 253            | 106            | 0.1511         | 3.46<br>7.63        |
| 48290       | 48220DC    | X1S-48290             | 3.5<br>0.14                                    | 141.0<br>5.55                              | 0.8<br>0.03                                      | 176.0<br>6.93                              | 17.3<br>0.68   | 3.8<br>0.15    | 353            | 91.3           | 0.1138         | 7.12<br>15.70       |
| 48290       | 48220D     | X2S-48290             | 3.5<br>0.14                                    | 141.0<br>5.55                              | 0.8<br>0.03                                      | 176.0<br>6.93                              |                |                | 353            | 91.3           | 0.1138         | 7.12<br>15.70       |
| 67388       | 67322DC    | X1S-67388             | 3.5<br>0.14                                    | 144.0<br>5.67                              | 0.8<br>0.03                                      | 190.0<br>7.48                              | 19.0<br>0.75   | 4.6<br>0.18    | 384            | 70.1           | 0.1220         | 10.65<br>23.48      |
| 67388       | 67322D     | X3S-67388             | 3.5<br>0.14                                    | 144.0<br>5.67                              | 0.8<br>0.03                                      | 190.0<br>7.48                              |                |                | 384            | 70.1           | 0.1220         | 10.65<br>23.48      |
| 67388       | 67325D     | X1S-67388             | 3.5<br>0.14                                    | 144.0<br>5.67                              | 0.8<br>0.03                                      | 191.0<br>7.52                              |                |                | 384            | 70.1           | 0.1220         | 11.72<br>25.83      |
| 74500       | 74851CD    | X2S-74500             | 3.5<br>0.14                                    | 148.0<br>5.83                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 68.5           | 0.1338         | 14.89<br>32.83      |
| 97500       | 97901D     | X1S-97500             | 3.5<br>0.14                                    | 151.0<br>5.94                              | 2.3<br>0.09                                      | 213.0<br>8.38                              |                |                | 237            | 44.6           | 0.1311         | 17.45<br>38.47      |
| HM926747    | HM926710DC | HM926747XA            | 3.5<br>0.14                                    | 156.0<br>6.14                              | 2.3<br>0.09                                      | 219.0<br>8.63                              | 19.0<br>0.75   | 8.6<br>0.34    | 295            | 39             | 0.1416         | 18.59<br>40.98      |
| HM926747    | HM926710D  | HM926747XC            | 3.5<br>0.14                                    | 156.0<br>6.14                              | 2.3<br>0.09                                      | 219.0<br>8.63                              |                |                | 295            | 39             | 0.1416         | 18.59<br>40.98      |
| 95500       | 95927CD    | X8S-95500             | 6.4<br>0.25                                    | 154.0<br>6.06                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 53.8           | 0.1323         | 25.49<br>56.19      |
| HM926749    | HM926710D  | HM926749XE            | 3.5<br>0.14                                    | 156.0<br>6.14                              | 2.3<br>0.09                                      | 219.0<br>8.63                              |                |                | 295            | 39             | 0.1416         | 18.47<br>40.72      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

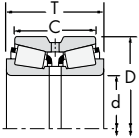


Fig. 1 D suffix outer race with lubricant holes and groove

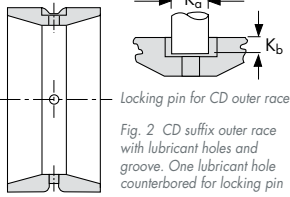


Fig. 2 CD suffix outer race with lubricant holes and groove. One lubricant hole counterbored for locking pin

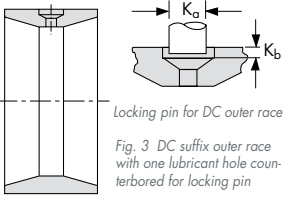
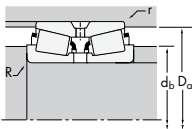


Fig. 3 DC suffix outer race with one lubricant hole counterbored for locking pin



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 128.588<br>5.0625       | 206.375<br>8.1250  | 107.950<br>4.2500 | 82.550<br>3.2500  | 610000<br>137000       | 0.46 | 1.47           | 2.19           | 90800<br>20400         | 71300<br>16000   | 158000<br>35500    | 1.27 |
| 129.967<br>5.1168       | 229.873<br>9.0501  | 150.002<br>5.9056 | 160.000<br>6.2992 | 816000<br>183000       | 0.26 | 2.55           | 3.80           | 122000<br>27300        | 55000<br>12400   | 212000<br>47600    | 2.21 |
| 129.967<br>5.1168       | 229.873<br>9.0501  | 150.043<br>5.9072 | 160.000<br>6.2992 | 914000<br>206000       | 0.26 | 2.55           | 3.80           | 136000<br>30600        | 61600<br>13900   | 237000<br>53300    | 2.21 |
| 129.967<br>5.1168       | 229.873<br>9.0501  | 150.043<br>5.9072 | 160.000<br>6.2992 | 816000<br>183000       | 0.26 | 2.55           | 3.80           | 122000<br>27300        | 55000<br>12400   | 212000<br>47600    | 2.21 |
| 129.975<br>5.1171       | 234.950<br>9.2500  | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 130.000<br>5.1181       | 206.375<br>8.1250  | 107.950<br>4.2500 | 82.550<br>3.2500  | 610000<br>137000       | 0.46 | 1.47           | 2.19           | 90800<br>20400         | 71300<br>16000   | 158000<br>35500    | 1.27 |
| 130.175<br>5.1250       | 196.850<br>7.7500  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 130.175<br>5.1250       | 196.850<br>7.7500  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 130.175<br>5.1250       | 200.025<br>7.8750  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 130.175<br>5.1250       | 206.375<br>8.1250  | 107.950<br>4.2500 | 82.550<br>3.2500  | 610000<br>137000       | 0.46 | 1.47           | 2.19           | 90800<br>20400         | 71300<br>16000   | 158000<br>35500    | 1.27 |
| 131.750<br>5.1870       | 207.962<br>8.1875  | 146.304<br>5.7600 | 152.400<br>6.0000 | 717000<br>161000       | 0.26 | 2.55           | 3.80           | 107000<br>24000        | 48400<br>10900   | 186000<br>41800    | 2.21 |
| 133.350<br>5.2500       | 177.008<br>6.9688  | 57.150<br>2.2500  | 47.625<br>1.8750  | 237000<br>53300        | 0.35 | 1.94           | 2.89           | 35300<br>7940          | 21000<br>4730    | 61500<br>13800     | 1.68 |
| 133.350<br>5.2500       | 190.500<br>7.5000  | 85.725<br>3.3750  | 73.025<br>2.8750  | 456000<br>103000       | 0.32 | 2.10           | 3.13           | 67900<br>15300         | 37300<br>8390    | 118000<br>26600    | 1.82 |
| 133.350<br>5.2500       | 190.500<br>7.5000  | 85.725<br>3.3750  | 73.025<br>2.8750  | 456000<br>103000       | 0.32 | 2.10           | 3.13           | 67900<br>15300         | 37300<br>8390    | 118000<br>26600    | 1.82 |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 133.350<br>5.2500       | 200.025<br>7.8750  | 101.600<br>4.0000 | 85.725<br>3.3750  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 133.350<br>5.2500       | 215.900<br>8.5000  | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 133.350<br>5.2500       | 234.950<br>9.2500  | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 133.350<br>5.2500       | 234.950<br>9.2500  | 142.875<br>5.6250 | 114.300<br>4.5000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 136.525<br>5.3750       | 190.500<br>7.5000  | 85.725<br>3.3750  | 73.025<br>2.8750  | 456000<br>103000       | 0.32 | 2.10           | 3.13           | 67900<br>15300         | 37300<br>8390    | 118000<br>26600    | 1.82 |
| 136.525<br>5.3750       | 190.500<br>7.5000  | 85.725<br>3.3750  | 73.025<br>2.8750  | 456000<br>103000       | 0.32 | 2.10           | 3.13           | 67900<br>15300         | 37300<br>8390    | 118000<br>26600    | 1.82 |
| 136.525<br>5.3750       | 215.900<br>8.5000  | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 136.525<br>5.3750       | 228.600<br>9.0000  | 123.825<br>4.8750 | 98.425<br>3.8750  | 839000<br>189000       | 0.42 | 1.60           | 2.39           | 125000<br>28100        | 90000<br>20200   | 218000<br>48900    | 1.39 |
| 136.525<br>5.3750       | 254.000<br>10.0000 | 149.225<br>5.8750 | 111.125<br>4.3750 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 136.525<br>5.3750       | 254.000<br>10.0000 | 152.400<br>6.0000 | 114.300<br>4.5000 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 139.700<br>5.5000       | 215.900<br>8.5000  | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            | Pin            |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 799         | 792CD      | X1S-799               | 3.3<br>0.13                                    | 146.0<br>5.75                              | 0.8<br>0.03                                      | 198.0<br>7.80                              | 19.0<br>0.75   | 7.9<br>0.31    | 326            | 61.9           | 0.1269         | 12.42<br>27.39      |
| H127747     | H127715D   |                       | 1.5<br>0.06                                    | 145.0<br>5.71                              | 1.0<br>0.04                                      | 0.0<br>0.00                                |                |                | 419            | 95.3           | 0.1151         | 26.62<br>58.69      |
| H127746     | H127715AD  |                       | 1.5<br>0.06                                    | 145.0<br>5.71                              | 10.0<br>0.00                                     | 0.0<br>0.00                                |                |                | 470            | 106            | 0.1198         | 26.51<br>58.44      |
| H127747     | H127715AD  |                       | 1.5<br>0.06                                    | 145.0<br>5.71                              | 10.0<br>0.00                                     | 0.0<br>0.00                                |                |                | 419            | 95.3           | 0.1151         | 26.02<br>57.37      |
| 95512       | 95927CD    | X1S-95512             | 6.4<br>0.25                                    | 157.0<br>6.18                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 59.3           | 0.1323         | 24.71<br>54.47      |
| 797         | 792CD      | X3S-797               | 3.5<br>0.14                                    | 148.0<br>5.83                              | 0.8<br>0.03                                      | 198.0<br>7.80                              | 19.0<br>0.75   | 7.9<br>0.31    | 326            | 61.9           | 0.1269         | 12.12<br>26.72      |
| 67389       | 67322DC    | X1S-67389             | 3.5<br>0.14                                    | 146.0<br>5.75                              | 0.8<br>0.03                                      | 190.0<br>7.48                              | 19.0<br>0.75   | 4.6<br>0.18    | 384            | 70.1           | 0.1220         | 10.16<br>22.39      |
| 67389       | 67322D     | X3S-67389             | 3.5<br>0.14                                    | 146.0<br>5.75                              | 0.8<br>0.03                                      | 190.0<br>7.48                              |                |                | 384            | 70.1           | 0.1220         | 10.16<br>22.39      |
| 67389       | 67325D     | X1S-67389             | 3.5<br>0.14                                    | 146.0<br>5.75                              | 0.8<br>0.03                                      | 191.0<br>7.52                              |                |                | 384            | 70.1           | 0.1220         | 11.23<br>24.75      |
| 799A        | 792CD      | X1S-799A              | 3.5<br>0.14                                    | 148.0<br>5.83                              | 0.8<br>0.03                                      | 198.0<br>7.80                              | 19.0<br>0.75   | 7.9<br>0.31    | 326            | 61.9           | 0.1269         | 12.15<br>26.78      |
| HM127446    | HM127415XD |                       | 1.5<br>0.06                                    | 144.0<br>5.67                              | 1.0<br>0.04                                      | 198.0<br>7.79                              |                |                | 423            | 85.4           | 0.1156         | 16.80<br>37.04      |
| L327249     | L327210D   | L327249XB             | 1.5<br>0.06                                    | 142.0<br>5.59                              | 0.8<br>0.03                                      | 171.0<br>6.73                              |                |                | 280            | 156            | 0.1585         | 3.66<br>8.06        |
| 48385       | 48320DC    | X1S-48385             | 3.5<br>0.14                                    | 148.0<br>5.83                              | 0.8<br>0.03                                      | 184.0<br>7.24                              | 17.3<br>0.68   | 3.8<br>0.15    | 404            | 95.6           | 0.1209         | 7.46<br>16.44       |
| 48385       | 48320D     | X2S-48385             | 3.5<br>0.14                                    | 148.0<br>5.83                              | 0.8<br>0.03                                      | 184.0<br>7.24                              |                |                | 404            | 95.6           | 0.1209         | 7.46<br>16.44       |
| 67390       | 67322DC    | X1S-67390             | 3.5<br>0.14                                    | 149.0<br>5.87                              | 0.8<br>0.03                                      | 190.0<br>7.48                              | 19.0<br>0.75   | 4.6<br>0.18    | 384            | 70.1           | 0.1220         | 9.66<br>21.29       |
| 67390       | 67322D     | X2S-67390             | 3.5<br>0.14                                    | 149.0<br>5.87                              | 0.8<br>0.03                                      | 190.0<br>7.48                              |                |                | 384            | 70.1           | 0.1220         | 9.66<br>21.29       |
| 67391       | 67322D     | X1S-67390             | 8.0<br>0.31                                    | 157.0<br>6.18                              | 0.8<br>0.03                                      | 190.0<br>7.48                              |                |                | 384            | 70.1           | 0.1220         | 9.63<br>21.23       |
| 67390       | 67325D     | X2S-67390             | 3.5<br>0.14                                    | 149.0<br>5.87                              | 0.8<br>0.03                                      | 191.0<br>7.52                              |                |                | 384            | 70.1           | 0.1220         | 10.72<br>23.64      |
| 74525       | 74851CD    | X4S-74525             | 3.5<br>0.14                                    | 152.0<br>5.98                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 63.3           | 0.1338         | 13.91<br>30.67      |
| 95525       | 95927CD    | X3S-95525             | 9.7<br>0.38                                    | 166.0<br>6.54                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 53.8           | 0.1323         | 23.61<br>52.05      |
| 95528       | 95927CD    | X1S-95525             | 4.8<br>0.19                                    | 157.0<br>6.18                              | 1.5<br>0.06                                      | 217.0<br>8.54                              | 22.1<br>0.87   | 8.6<br>0.34    | 454            | 59.3           | 0.1323         | 23.85<br>52.58      |
| 48393       | 48320DC    | X1S-48393             | 3.5<br>0.14                                    | 151.0<br>5.94                              | 0.8<br>0.03                                      | 184.0<br>7.24                              | 17.3<br>0.68   | 3.8<br>0.15    | 404            | 95.6           | 0.1209         | 7.01<br>15.45       |
| 48393       | 48320D     | X2S-48393             | 3.5<br>0.14                                    | 151.0<br>5.94                              | 0.8<br>0.03                                      | 184.0<br>7.24                              |                |                | 404            | 95.6           | 0.1209         | 7.01<br>15.45       |
| 74537       | 74851CD    | X1S-74537             | 3.5<br>0.14                                    | 155.0<br>6.10                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 68.5           | 0.1338         | 13.28<br>29.27      |
| 896         | 892CD      | X2S-896               | 3.5<br>0.14                                    | 156.0<br>6.14                              | 1.5<br>0.06                                      | 216.0<br>8.50                              | 22.1<br>0.87   | 7.1<br>0.28    | 430            | 78.2           | 0.1355         | 18.81<br>41.47      |
| 99537       | 99102CD    | X1S-99537             | 7.0<br>0.28                                    | 167.0<br>6.57                              | 1.5<br>0.06                                      | 238.0<br>9.37                              | 22.1<br>0.87   | 7.9<br>0.31    | 556            | 73.5           | 0.1459         | 30.70<br>67.67      |
| 99537       | 99101D     | X2S-99537             | 7.0<br>0.28                                    | 167.0<br>6.57                              | 1.5<br>0.06                                      | 238.0<br>9.37                              |                |                | 556            | 73.5           | 0.1459         | 32.18<br>70.95      |
| 74550       | 74851CD    | X3S-74550             | 3.5<br>0.14                                    | 158.0<br>6.22                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 63.3           | 0.1338         | 12.81<br>28.24      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

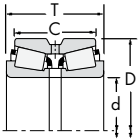
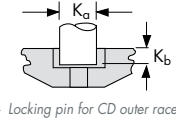
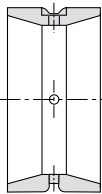
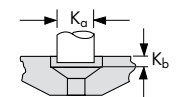
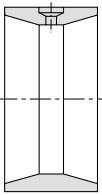


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



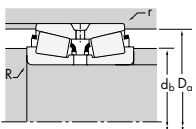
Locking pin for CD outer race

Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race

Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                 |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|-----------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                 |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 139.700<br>5.5000       | 215.900<br>8.5000  | 106.362<br>4.1875 | 80.962<br>3.1875  | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200  | 160000<br>35900    | 1.20 |
| 139.700<br>5.5000       | 222.250<br>8.7500  | 75.700<br>2.9803  | 53.975<br>2.1250  | 398000<br>89500        | 0.44 | 1.54           | 2.30           | 59300<br>13300         | 44400<br>9970   | 103000<br>23200    | 1.34 |
| 139.700<br>5.5000       | 228.600<br>9.0000  | 123.825<br>4.8750 | 98.425<br>3.8750  | 839000<br>189000       | 0.42 | 1.60           | 2.39           | 125000<br>28100        | 90000<br>20200  | 218000<br>48900    | 1.39 |
| 139.700<br>5.5000       | 228.600<br>9.0000  | 123.825<br>4.8750 | 98.425<br>3.8750  | 839000<br>189000       | 0.42 | 1.60           | 2.39           | 125000<br>28100        | 90000<br>20200  | 218000<br>48900    | 1.39 |
| 139.700<br>5.5000       | 236.538<br>9.3125  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |
| 139.700<br>5.5000       | 241.300<br>9.5000  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |
| 139.700<br>5.5000       | 254.000<br>10.0000 | 149.225<br>5.8750 | 111.125<br>4.3750 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800 | 276000<br>62000    | 1.43 |
| 139.700<br>5.5000       | 254.000<br>10.0000 | 152.400<br>6.0000 | 114.300<br>4.5000 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800 | 276000<br>62000    | 1.43 |
| 139.700<br>5.5000       | 307.975<br>12.1250 | 200.025<br>7.8750 | 155.575<br>6.1250 | 1970000<br>442000      | 0.33 | 2.07           | 3.08           | 293000<br>65900        | 164000<br>36800 | 510000<br>115000   | 1.79 |
| 139.700<br>5.5000       | 307.975<br>12.1250 | 200.025<br>7.8750 | 155.575<br>6.1250 | 1970000<br>442000      | 0.33 | 2.07           | 3.08           | 293000<br>65900        | 164000<br>36800 | 510000<br>115000   | 1.79 |
| 142.875<br>5.6250       | 193.675<br>7.6250  | 65.085<br>2.5624  | 53.975<br>2.1250  | 317000<br>71200        | 0.37 | 1.83           | 2.73           | 47100<br>10600         | 29700<br>6690   | 82100<br>18500     | 1.59 |
| 142.875<br>5.6250       | 200.025<br>7.8750  | 87.315<br>3.4376  | 73.025<br>2.8750  | 462000<br>104000       | 0.34 | 2.01           | 2.99           | 68800<br>15500         | 39600<br>8900   | 120000<br>26900    | 1.74 |
| 142.875<br>5.6250       | 200.025<br>7.8750  | 87.315<br>3.4376  | 73.025<br>2.8750  | 462000<br>104000       | 0.34 | 2.01           | 2.99           | 68800<br>15500         | 39600<br>8900   | 120000<br>26900    | 1.74 |
| 142.875<br>5.6250       | 222.250<br>8.7500  | 75.700<br>2.9803  | 53.975<br>2.1250  | 398000<br>89500        | 0.44 | 1.54           | 2.30           | 59300<br>13300         | 44400<br>9970   | 103000<br>23200    | 1.34 |
| 142.875<br>5.6250       | 241.300<br>9.5000  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |
| 144.450<br>5.6870       | 220.662<br>8.6875  | 155.839<br>6.1354 | 163.510<br>6.4374 | 751000<br>169000       | 0.26 | 2.55           | 3.80           | 112000<br>25100        | 50600<br>11400  | 195000<br>43800    | 2.21 |
| 146.050<br>5.7500       | 193.675<br>7.6250  | 65.085<br>2.5624  | 53.975<br>2.1250  | 317000<br>71200        | 0.37 | 1.83           | 2.73           | 47100<br>10600         | 29700<br>6690   | 82100<br>18500     | 1.59 |
| 146.050<br>5.7500       | 193.675<br>7.6250  | 65.085<br>2.5624  | 53.975<br>2.1250  | 317000<br>71200        | 0.37 | 1.83           | 2.73           | 47100<br>10600         | 29700<br>6690   | 82100<br>18500     | 1.59 |
| 146.050<br>5.7500       | 236.538<br>9.3125  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 131.762<br>5.1875 | 106.362<br>4.1875 | 830000<br>187000       | 0.44 | 1.53           | 2.27           | 124000<br>27800        | 93600<br>21000  | 215000<br>48400    | 1.32 |
| 146.050<br>5.7500       | 241.300<br>9.5000  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |
| 146.050<br>5.7500       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100  | 168000<br>37700    | 1.66 |
| 146.050<br>5.7500       | 254.000<br>10.0000 | 149.225<br>5.8750 | 111.125<br>4.3750 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800 | 276000<br>62000    | 1.43 |
| 146.050<br>5.7500       | 254.000<br>10.0000 | 152.400<br>6.0000 | 114.300<br>4.5000 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800 | 276000<br>62000    | 1.43 |
| 146.050<br>5.7500       | 268.288<br>10.5625 | 160.338<br>6.3125 | 125.412<br>4.9375 | 1260000<br>284000      | 0.39 | 1.74           | 2.59           | 188000<br>42300        | 125000<br>28100 | 328000<br>73700    | 1.51 |
| 146.050<br>5.7500       | 304.800<br>12.0000 | 135.733<br>5.3438 | 97.633<br>3.8438  | 1250000<br>281000      | 0.33 | 2.03           | 3.02           | 186000<br>41800        | 106000<br>23800 | 324000<br>72800    | 1.76 |
| 149.225<br>5.8750       | 236.538<br>9.3125  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600  | 249000<br>56100    | 1.83 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            | Pin            |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 74550A      | 74851CD    | X1S-74550             | 6.4<br>0.25                                    | 166.0<br>6.54                              | 1.5<br>0.06                                      | 208.0<br>8.19                              | 19.0<br>0.75   | 7.1<br>0.28    | 363            | 63.3           | 0.1338         | 12.79<br>28.19      |
| 73551       | 73876CD    | X2S-73551             | 3.5<br>0.14                                    | 156.0<br>6.14                              | 2.3<br>0.09                                      | 207.0<br>8.15                              | 10.9<br>0.43   | 6.4<br>0.25    | 244            | 82             | 0.1122         | 9.36<br>20.64       |
| 898         | 892CD      | X5S-898               | 3.5<br>0.14                                    | 160.0<br>6.30                              | 1.5<br>0.06                                      | 216.0<br>8.50                              | 22.1<br>0.87   | 7.1<br>0.28    | 430            | 78.2           | 0.1355         | 18.09<br>39.89      |
| 898A        | 892CD      | X4S-898               | 6.4<br>0.25                                    | 165.0<br>6.50                              | 1.5<br>0.06                                      | 216.0<br>8.50                              | 22.1<br>0.87   | 7.1<br>0.28    | 430            | 78.2           | 0.1355         | 17.99<br>39.67      |
| HM231132    | HM231111CD | HM231132XA            | 3.5<br>0.14                                    | 160.0<br>6.30                              | 1.5<br>0.06                                      | 224.0<br>8.82                              | 22.1<br>0.87   | 7.9<br>0.31    | 533            | 85.9           | 0.1327         | 21.68<br>47.79      |
| HM231132    | HM231116D  |                       | 3.5<br>0.14                                    | 160.0<br>6.30                              | 1.5<br>0.06                                      | 224.0<br>8.82                              |                |                | 533            | 85.9           | 0.1327         | 22.53<br>49.68      |
| 99550       | 99102CD    | X5S-99550             | 7.0<br>0.28                                    | 170.0<br>6.69                              | 1.5<br>0.06                                      | 238.0<br>9.37                              | 22.1<br>0.87   | 7.9<br>0.31    | 556            | 73.5           | 0.1459         | 30.10<br>66.35      |
| 99550       | 99101D     | X8S-99550             | 7.0<br>0.28                                    | 170.0<br>6.69                              | 1.5<br>0.06                                      | 238.0<br>9.37                              |                |                | 556            | 73.5           | 0.1459         | 31.24<br>68.86      |
| HH234031    | HH234011CD | HH234032XB            | 9.7<br>0.38                                    | 180.0<br>7.09                              | 2.3<br>0.09                                      | 285.5<br>11.24                             | 28.4<br>1.12   | 10.2<br>0.40   | 718            | 62.1           | 0.1157         | 65.45<br>144.29     |
| HH234032    | HH234011CD | HH234032XC            | 9.7<br>0.38                                    | 180.0<br>7.09                              | 2.3<br>0.09                                      | 285.5<br>11.24                             | 28.4<br>1.12   | 10.2<br>0.40   | 718            | 62.1           | 0.1157         | 62.85<br>138.55     |
| 36686       | 36620D     | X1S-48685             | 1.5<br>0.06                                    | 153.0<br>6.02                              | 0.8<br>0.03                                      | 188.0<br>7.40                              |                |                | 366            | 152            | 0.1768         | 5.27<br>11.62       |
| 48684       | 48620D     | X1S-48685             | 8.0<br>0.31                                    | 166.0<br>6.54                              | 0.8<br>0.03                                      | 193.0<br>7.60                              |                |                | 440            | 115            | 0.1261         | 7.76<br>17.10       |
| 48685       | 48620DC    | X1S-48685             | 3.5<br>0.14                                    | 158.0<br>6.22                              | 0.8<br>0.03                                      | 193.0<br>7.60                              | 17.3<br>0.68   | 4.6<br>0.18    | 440            | 115            | 0.1261         | 7.94<br>17.51       |
| 48685       | 48620D     | X4S-48685             | 3.5<br>0.14                                    | 158.0<br>6.22                              | 0.8<br>0.03                                      | 193.0<br>7.60                              |                |                | 440            | 115            | 0.1261         | 7.94<br>17.51       |
| 73562       | 73876CD    | X2S-73562             | 3.5<br>0.14                                    | 159.0<br>6.26                              | 2.3<br>0.09                                      | 207.0<br>8.15                              | 10.9<br>0.43   | 6.4<br>0.25    | 244            | 82             | 0.1122         | 8.95<br>19.74       |
| HM231136    | HM231116D  | HM231136XA            | 3.5<br>0.14                                    | 162.0<br>6.38                              | 1.5<br>0.06                                      | 224.0<br>8.82                              |                |                | 533            | 85.9           | 0.1327         | 22.53<br>49.66      |
| HM129848    | HM129814XD |                       | 1.5<br>0.06                                    | 156.0<br>6.14                              | 1.0<br>0.04                                      | 211.0<br>8.30                              |                |                | 494            | 101            | 0.1215         | 19.07<br>42.03      |
| 36690       | 36620DC    | X1S-36690             | 1.5<br>0.06                                    | 155.0<br>6.10                              | 0.8<br>0.03                                      | 188.0<br>7.40                              | 10.9<br>0.43   | 3.8<br>0.15    | 366            | 121            | 0.1768         | 4.94<br>10.88       |
| 36690       | 36620D     | X2S-36690             | 1.5<br>0.06                                    | 155.0<br>6.10                              | 0.8<br>0.03                                      | 188.0<br>7.40                              |                |                | 366            | 121            | 0.1768         | 4.93<br>10.87       |
| HM231140    | HM231111CD | HM231140XE            | 3.5<br>0.14                                    | 164.0<br>6.46                              | 1.5<br>0.06                                      | 224.0<br>8.82                              | 22.1<br>0.87   | 7.9<br>0.31    | 533            | 85.9           | 0.1327         | 20.26<br>44.66      |
| 82576       | 82951CD    | X1S-82576             | 3.5<br>0.14                                    | 166.0<br>6.54                              | 1.5<br>0.06                                      | 226.0<br>8.90                              | 22.1<br>0.87   | 8.6<br>0.34    | 460            | 81.1           | 0.1405         | 21.82<br>48.11      |
| HM231140    | HM231116D  | HM231140XA            | 3.5<br>0.14                                    | 164.0<br>6.46                              | 1.5<br>0.06                                      | 224.0<br>8.82                              |                |                | 533            | 85.9           | 0.1327         | 21.83<br>48.12      |
| 81575       | 81963CD    | X1S-81575             | 3.5<br>0.14                                    | 166.0<br>6.54                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 17.51<br>38.61      |
| 99575       | 99102CD    | X4S-99575             | 7.0<br>0.28                                    | 175.0<br>6.89                              | 1.5<br>0.06                                      | 238.0<br>9.37                              | 22.1<br>0.87   | 7.9<br>0.31    | 556            | 73.5           | 0.1459         | 28.51<br>62.84      |
| 99575       | 99101D     | X5S-99575             | 7.0<br>0.28                                    | 175.0<br>6.89                              | 1.5<br>0.06                                      | 238.0<br>9.37                              |                |                | 556            | 73.5           | 0.1459         | 29.64<br>65.35      |
| EE107057    | 107105CD   | X4S-107057            | 6.4<br>0.25                                    | 176.0<br>6.93                              | 1.5<br>0.06                                      | 249.5<br>9.82                              | 28.4<br>1.12   | 10.2<br>0.40   | 606            | 76.3           | 0.1163         | 36.36<br>80.17      |
| EE750576    | 751204D    | X3S-750576            | 3.3<br>0.13                                    | 167.0<br>6.57                              | 1.5<br>0.06                                      | 268.0<br>10.55                             |                |                | 431            | 54.4           | 0.0974         | 38.56<br>85.01      |
| HM231148    | HM231111CD | HM231149XB            | 6.4<br>0.25                                    | 172.0<br>6.77                              | 1.5<br>0.06                                      | 224.0<br>8.82                              | 22.1<br>0.87   | 7.9<br>0.31    | 533            | 85.9           | 0.1327         | 19.50<br>42.99      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

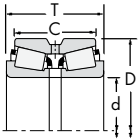
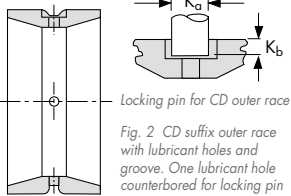
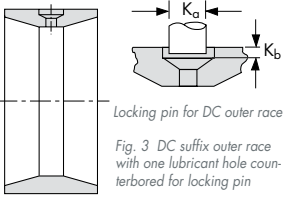


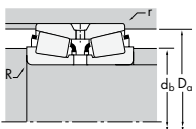
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 149.225<br>5.8750       | 236.538<br>9.3125  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600   | 249000<br>56100    | 1.83 |
| 149.225<br>5.8750       | 241.300<br>9.5000  | 131.762<br>5.1875 | 106.362<br>4.1875 | 962000<br>216000       | 0.32 | 2.12           | 3.15           | 143000<br>32200        | 78200<br>17600   | 249000<br>56100    | 1.83 |
| 149.225<br>5.8750       | 254.000<br>10.0000 | 149.225<br>5.8750 | 111.125<br>4.3750 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 149.225<br>5.8750       | 254.000<br>10.0000 | 152.400<br>6.0000 | 114.300<br>4.5000 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 149.967<br>5.9042       | 249.872<br>9.8375  | 153.764<br>6.0537 | 160.000<br>6.2992 | 1020000<br>230000      | 0.26 | 2.55           | 3.80           | 152000<br>34300        | 69100<br>15500   | 266000<br>59700    | 2.21 |
| 150.000<br>5.9055       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 150.812<br>5.9375       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 152.400<br>6.0000       | 203.200<br>8.0000  | 92.075<br>3.6250  | 79.375<br>3.1250  | 457000<br>103000       | 0.35 | 1.94           | 2.89           | 68000<br>15300         | 40400<br>9090    | 118000<br>26600    | 1.68 |
| 152.400<br>6.0000       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 152.400<br>6.0000       | 254.000<br>10.0000 | 149.225<br>5.8750 | 111.125<br>4.3750 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 152.400<br>6.0000       | 254.000<br>10.0000 | 152.400<br>6.0000 | 114.300<br>4.5000 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 152.400<br>6.0000       | 268.288<br>10.5625 | 160.338<br>6.3125 | 125.412<br>4.9375 | 1260000<br>284000      | 0.39 | 1.74           | 2.59           | 188000<br>42300        | 125000<br>28100  | 328000<br>73700    | 1.51 |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 200.025<br>7.8750 | 146.050<br>5.7500 | 1700000<br>382000      | 0.33 | 2.07           | 3.08           | 253000<br>56800        | 141000<br>31700  | 440000<br>98900    | 1.79 |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 200.025<br>7.8750 | 155.575<br>6.1250 | 1970000<br>442000      | 0.33 | 2.07           | 3.08           | 293000<br>65900        | 164000<br>36800  | 510000<br>115000   | 1.79 |
| 152.400<br>6.0000       | 307.975<br>12.1250 | 200.025<br>7.8750 | 155.575<br>6.1250 | 1970000<br>442000      | 0.33 | 2.07           | 3.08           | 293000<br>65900        | 164000<br>36800  | 510000<br>115000   | 1.79 |
| 158.750<br>6.2500       | 225.425<br>8.8750  | 85.725<br>3.3750  | 69.850<br>2.7500  | 489000<br>110000       | 0.38 | 1.76           | 2.62           | 72800<br>16400         | 47800<br>10700   | 127000<br>28500    | 1.52 |
| 159.951<br>6.2973       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 159.951<br>6.2973       | 244.475<br>9.6250  | 107.950<br>4.2500 | 79.375<br>3.1250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 160.325<br>6.3120       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 165.087<br>6.4995       | 276.225<br>10.8750 | 181.023<br>7.1269 | 185.725<br>7.3120 | 1180000<br>265000      | 0.26 | 2.55           | 3.80           | 175000<br>39400        | 79300<br>17800   | 305000<br>68600    | 2.21 |
| 165.100<br>6.5000       | 215.900<br>8.5000  | 58.740<br>2.3126  | 47.625<br>1.8750  | 288000<br>64800        | 0.36 | 1.85           | 2.76           | 42900<br>9640          | 26800<br>6010    | 74700<br>16800     | 1.60 |
| 165.100<br>6.5000       | 225.425<br>8.8750  | 85.725<br>3.3750  | 69.850<br>2.7500  | 489000<br>110000       | 0.38 | 1.76           | 2.62           | 72800<br>16400         | 47800<br>10700   | 127000<br>28500    | 1.52 |
| 165.100<br>6.5000       | 247.650<br>9.7500  | 103.188<br>4.0625 | 84.138<br>3.3125  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000    | 1.25 |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 165.100<br>6.5000       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 165.100<br>6.5000       | 298.450<br>11.7500 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000    | 1.25 |
| 166.687<br>6.5625       | 225.425<br>8.8750  | 85.725<br>3.3750  | 69.850<br>2.7500  | 489000<br>110000       | 0.38 | 1.76           | 2.62           | 72800<br>16400         | 47800<br>10700   | 127000<br>28500    | 1.52 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                |                | Factors        |                |                 | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|-----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                |                |                |                |                 |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                 |                     |
| HM231149    | HM231111CD | HM231149XB            | 3.5<br>0.14                                    | 167.0<br>6.57                              | 1.5<br>0.06                                      | 224.0<br>8.82                              | 22.1<br>0.87   | 7.9<br>0.31    | 533            | 85.9           | 0.1327         | 19.61<br>43.22  |                     |
| HM231149    | HM231116D  | HM231149XA            | 3.5<br>0.14                                    | 167.0<br>6.57                              | 1.5<br>0.06                                      | 224.0<br>8.82                              |                |                | 533            | 85.9           | 0.1327         | 21.17<br>46.68  |                     |
| 99587       | 99102CD    | X3S-99587             | 7.0<br>0.28                                    | 178.0<br>7.01                              | 1.5<br>0.06                                      | 238.0<br>9.37                              | 22.1<br>0.87   | 7.9<br>0.31    | 556            | 73.5           | 0.1459         | 27.83<br>61.35  |                     |
| 99587       | 99101D     |                       | 7.0<br>0.28                                    | 178.0<br>7.01                              | 1.5<br>0.06                                      | 238.0<br>9.37                              |                |                | 556            | 73.5           | 0.1459         | 28.18<br>62.11  |                     |
| HM133436    | HM133413XD |                       | 3.0<br>0.12                                    | 169.0<br>6.65                              | 1.0<br>0.04                                      | 239.0<br>9.41                              |                |                | 669            | 103            | 0.1344         | 30.05<br>66.24  |                     |
| 81590       | 81963CD    | X1S-81590             | 3.5<br>0.14                                    | 169.0<br>6.65                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 16.87<br>37.20  |                     |
| 81593       | 81963CD    | X1S-81593             | 3.5<br>0.14                                    | 169.0<br>6.65                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 16.69<br>36.78  |                     |
| LM330448    | LM330410D  | LM330448XA            | 3.3<br>0.13                                    | 166.0<br>6.54                              | 0.8<br>0.03                                      | 197.0<br>7.76                              |                |                | 456            | 135            | 0.1289         | 7.60<br>16.75   |                     |
| 81600       | 81963CD    | X4S-81600             | 3.5<br>0.14                                    | 171.0<br>6.73                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 16.88<br>37.21  |                     |
| 99600       | 99102CD    | X7S-99600             | 7.0<br>0.28                                    | 181.0<br>7.13                              | 1.5<br>0.06                                      | 238.0<br>9.37                              | 22.1<br>0.87   | 7.9<br>0.31    | 556            | 66.7           | 0.1459         | 26.93<br>59.37  |                     |
| 99600       | 99101D     | X4S-99600             | 7.0<br>0.28                                    | 181.0<br>7.13                              | 1.5<br>0.06                                      | 238.0<br>9.37                              |                |                | 556            | 66.7           | 0.1459         | 28.13<br>62.02  |                     |
| EE107060    | 107105CD   | X3S-107060            | 6.4<br>0.25                                    | 181.0<br>7.13                              | 1.5<br>0.06                                      | 249.5<br>9.82                              | 28.4<br>1.12   | 10.2<br>0.40   | 606            | 76.3           | 0.1163         | 34.63<br>76.35  |                     |
| EE450601    | 451215CD   | X7S-450601            | 9.7<br>0.38                                    | 189.0<br>7.44                              | 2.3<br>0.09                                      | 275.0<br>10.82                             | 28.4<br>1.12   | 11.7<br>0.46   | 747            | 76.3           | 0.1176         | 59.88<br>132.01 |                     |
| HH234048    | HH234011CD | HH234048XA            | 9.7<br>0.38                                    | 191.0<br>7.52                              | 2.3<br>0.09                                      | 285.5<br>11.24                             | 28.4<br>1.12   | 10.2<br>0.40   | 718            | 62.1           | 0.1157         | 60.93<br>134.32 |                     |
| HH234049    | HH234011CD | HH234049XA            | 9.7<br>0.38                                    | 191.0<br>7.52                              | 2.3<br>0.09                                      | 285.5<br>11.24                             | 28.4<br>1.12   | 10.2<br>0.40   | 718            | 62.1           | 0.1157         | 58.33<br>128.58 |                     |
| 46780       | 46720CD    | X2S-46780             | 3.5<br>0.14                                    | 176.0<br>6.93                              | 0.8<br>0.03                                      | 218.0<br>8.58                              | 15.7<br>0.62   | 5.3<br>0.21    | 572            | 133            | 0.1432         | 10.71<br>23.60  |                     |
| 81629       | 81963CD    |                       | 3.5<br>0.14                                    | 176.0<br>6.93                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 14.91<br>32.87  |                     |
| 81630       | 81963CD    | X1S-81630             | 3.5<br>0.14                                    | 176.0<br>6.93                              | 1.5<br>0.06                                      | 229.0<br>9.02                              | 19.0<br>0.75   | 7.9<br>0.31    | 413            | 98.4           | 0.1250         | 15.09<br>33.27  |                     |
| HM237532    | HM237510CD | HM237532XC            | 7.0<br>0.28                                    | 192.0<br>7.56                              | 1.5<br>0.06                                      | 271.5<br>10.68                             | 22.1<br>0.87   | 8.6<br>0.34    | 751            | 101            | 0.1168         | 36.92<br>81.40  |                     |
| HM136940    | HM136916XD |                       | 1.5<br>0.06                                    | 183.0<br>7.20                              | 1.0<br>0.04                                      | 261.5<br>10.30                             |                |                | 828            | 112            | 0.1135         | 40.98<br>90.35  |                     |
| L433749     | L433710D   | L433749XA             | 1.5<br>0.06                                    | 174.0<br>6.85                              | 0.8<br>0.03                                      | 209.0<br>8.23                              |                |                | 365            | 168            | 0.1748         | 5.11<br>11.27   |                     |
| 46790       | 46720CD    | X2S-46790             | 3.5<br>0.14                                    | 181.0<br>7.13                              | 0.8<br>0.03                                      | 218.0<br>8.58                              | 15.7<br>0.62   | 5.3<br>0.21    | 572            | 175            | 0.1432         | 9.69<br>21.36   |                     |
| 67780       | 67720CD    | X2S-67780             | 3.5<br>0.14                                    | 185.0<br>7.28                              | 0.8<br>0.03                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.1<br>0.28    | 622            | 122            | 0.1214         | 17.18<br>37.87  |                     |
| 94649       | 94114CD    | X5S-94650             | 7.0<br>0.28                                    | 197.0<br>7.76                              | 1.5<br>0.06                                      | 272.0<br>10.71                             | 22.1<br>0.87   | 10.2<br>0.40   | 692            | 93.8           | 0.1287         | 36.66<br>80.81  |                     |
| HM237535    | HM237510CD | HM237535XC            | 7.0<br>0.28                                    | 195.0<br>7.68                              | 1.5<br>0.06                                      | 271.5<br>10.68                             | 22.1<br>0.87   | 8.6<br>0.34    | 751            | 101            | 0.1168         | 35.86<br>79.05  |                     |
| HM237536    | HM237510CD | HM237535XB            | 7.0<br>0.28                                    | 195.0<br>7.68                              | 1.5<br>0.06                                      | 271.5<br>10.68                             | 22.1<br>0.87   | 8.6<br>0.34    | 751            | 101            | 0.1168         | 35.83<br>78.98  |                     |
| 94649       | 94118D     | X3S-94650             | 7.0<br>0.28                                    | 197.0<br>7.76                              | 1.5<br>0.06                                      | 272.0<br>10.71                             |                |                | 692            | 93.8           | 0.1287         | 41.10<br>90.61  |                     |
| 46792       | 46720CD    | X2S-46792             | 3.5<br>0.14                                    | 182.0<br>7.17                              | 0.8<br>0.03                                      | 218.0<br>8.58                              | 15.7<br>0.62   | 5.3<br>0.21    | 572            | 154            | 0.1432         | 9.39<br>20.69   |                     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B







# ROLLER BEARINGS

## TDO

### DOUBLE OUTER RACE

B

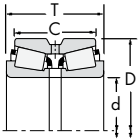
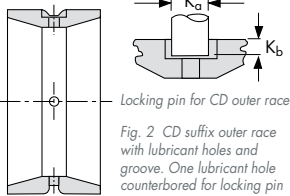
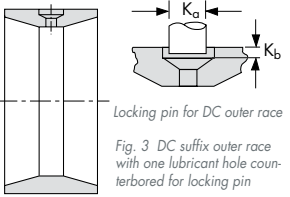


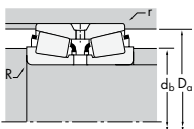
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 168.275<br>6.6250       | 247.650<br>9.7500  | 103.188<br>4.0625 | 84.138<br>3.3125  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |
| 170.000<br>6.6929       | 254.000<br>10.0000 | 101.600<br>4.0000 | 76.200<br>3.0000  | 763000<br>172000       | 0.32 | 2.12           | 3.15           | 114000<br>25500        | 62000<br>13900   | 198000<br>44500    | 1.83 |
| 174.625<br>6.8750       | 247.650<br>9.7500  | 103.188<br>4.0625 | 84.138<br>3.3125  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |
| 174.625<br>6.8750       | 247.650<br>9.7500  | 103.188<br>4.0625 | 84.138<br>3.3125  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000    | 1.25 |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 177.787<br>6.9995       | 276.225<br>10.8750 | 181.023<br>7.1269 | 185.725<br>7.3120 | 1180000<br>265000      | 0.26 | 2.55           | 3.80           | 175000<br>39400        | 79300<br>17800   | 305000<br>68600    | 2.21 |
| 177.800<br>7.0000       | 227.012<br>8.9375  | 66.672<br>2.6249  | 52.388<br>2.0625  | 337000<br>75800        | 0.44 | 1.53           | 2.28           | 50200<br>11300         | 37900<br>8510    | 87400<br>19600     | 1.33 |
| 177.800<br>7.0000       | 247.650<br>9.7500  | 103.188<br>4.0625 | 84.138<br>3.3125  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000    | 1.25 |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 177.800<br>7.0000       | 298.450<br>11.7500 | 142.875<br>5.6250 | 111.125<br>4.3750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000    | 1.25 |
| 177.800<br>7.0000       | 320.675<br>12.6250 | 185.738<br>7.3125 | 138.112<br>5.4375 | 1790000<br>402000      | 0.32 | 2.12           | 3.15           | 267000<br>59900        | 145000<br>32700  | 464000<br>104000   | 1.83 |
| 179.975<br>7.0856       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700    | 1.12 |
| 184.150<br>7.2500       | 266.700<br>10.5000 | 103.188<br>4.0625 | 84.138<br>3.3125  | 671000<br>151000       | 0.48 | 1.41           | 2.11           | 99900<br>22500         | 81700<br>18400   | 174000<br>39100    | 1.22 |
| 187.325<br>7.3750       | 266.700<br>10.5000 | 103.188<br>4.0625 | 84.138<br>3.3125  | 671000<br>151000       | 0.48 | 1.41           | 2.11           | 99900<br>22500         | 81700<br>18400   | 174000<br>39100    | 1.22 |
| 187.325<br>7.3750       | 269.875<br>10.6250 | 119.062<br>4.6875 | 93.663<br>3.6875  | 884000<br>199000       | 0.33 | 2.03           | 3.02           | 132000<br>29600        | 74900<br>16800   | 229000<br>51500    | 1.76 |
| 187.325<br>7.3750       | 282.575<br>11.1250 | 107.950<br>4.2500 | 79.375<br>3.1250  | 692000<br>156000       | 0.42 | 1.62           | 2.42           | 103000<br>23200        | 73300<br>16500   | 180000<br>40400    | 1.41 |
| 187.325<br>7.3750       | 320.675<br>12.6250 | 185.738<br>7.3125 | 138.112<br>5.4375 | 1790000<br>402000      | 0.32 | 2.12           | 3.15           | 267000<br>59900        | 145000<br>32700  | 464000<br>104000   | 1.83 |
| 190.500<br>7.5000       | 266.700<br>10.5000 | 103.188<br>4.0625 | 84.138<br>3.3125  | 671000<br>151000       | 0.48 | 1.41           | 2.11           | 99900<br>22500         | 81700<br>18400   | 174000<br>39100    | 1.22 |
| 190.500<br>7.5000       | 282.575<br>11.1250 | 107.950<br>4.2500 | 79.375<br>3.1250  | 692000<br>156000       | 0.42 | 1.62           | 2.42           | 103000<br>23200        | 73300<br>16500   | 180000<br>40400    | 1.41 |
| 190.500<br>7.5000       | 282.575<br>11.1250 | 107.950<br>4.2500 | 79.375<br>3.1250  | 692000<br>156000       | 0.42 | 1.62           | 2.42           | 103000<br>23200        | 73300<br>16500   | 180000<br>40400    | 1.41 |
| 190.500<br>7.5000       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700    | 1.12 |
| 190.500<br>7.5000       | 368.300<br>14.5000 | 193.675<br>7.6250 | 136.525<br>5.3750 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300  | 488000<br>110000   | 1.45 |
| 192.088<br>7.5625       | 266.700<br>10.5000 | 103.188<br>4.0625 | 84.138<br>3.3125  | 671000<br>151000       | 0.48 | 1.41           | 2.11           | 99900<br>22500         | 81700<br>18400   | 174000<br>39100    | 1.22 |
| 193.675<br>7.6250       | 282.575<br>11.1250 | 107.950<br>4.2500 | 79.375<br>3.1250  | 692000<br>156000       | 0.42 | 1.62           | 2.42           | 103000<br>23200        | 73300<br>16500   | 180000<br>40400    | 1.41 |
| 193.675<br>7.6250       | 282.575<br>11.1250 | 107.950<br>4.2500 | 79.375<br>3.1250  | 692000<br>156000       | 0.42 | 1.62           | 2.42           | 103000<br>23200        | 73300<br>16500   | 180000<br>40400    | 1.41 |
| 196.850<br>7.7500       | 254.000<br>10.0000 | 61.910<br>2.4374  | 47.625<br>1.8750  | 340000<br>76400        | 0.40 | 1.70           | 2.53           | 50600<br>11400         | 34400<br>7730    | 88100<br>19800     | 1.47 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            | Pin            |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| 67782       | 67720CD    | X1S-67782             | 3.5<br>0.14                                    | 187.0<br>7.36                              | 0.8<br>0.03                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.1<br>0.28    | 622            | 122            | 0.1214         | 16.39<br>36.13      |
| M235149     | M235113CD  | M235149XB             | 4.8<br>0.19                                    | 189.0<br>7.44                              | 1.5<br>0.06                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.9<br>0.31    | 531            | 107            | 0.1037         | 15.37<br>33.89      |
| 67786       | 67720CD    | X1S-67787             | 8.0<br>0.31                                    | 200.0<br>7.87                              | 0.8<br>0.03                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.1<br>0.28    | 622            | 122            | 0.1214         | 14.89<br>32.82      |
| 67787       | 67720CD    | X2S-67787             | 3.5<br>0.14                                    | 192.0<br>7.56                              | 0.8<br>0.03                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.1<br>0.28    | 622            | 122            | 0.1214         | 15.11<br>33.31      |
| 94687       | 94114CD    | X1S-94687             | 7.0<br>0.28                                    | 204.0<br>8.03                              | 1.5<br>0.06                                      | 272.0<br>10.71                             | 22.1<br>0.87   | 10.2<br>0.40   | 692            | 93.8           | 0.1287         | 34.02<br>74.99      |
| HM237542    | HM237510CD | HM237542XB            | 7.0<br>0.28                                    | 202.0<br>7.95                              | 1.5<br>0.06                                      | 271.5<br>10.68                             | 22.1<br>0.87   | 8.6<br>0.34    | 751            | 101            | 0.1168         | 33.15<br>73.07      |
| HM136948    | HM136916XD |                       | 1.5<br>0.06                                    | 192.0<br>7.56                              | 1.0<br>0.04                                      | 261.5<br>10.30                             |                |                | 828            | 112            | 0.1135         | 36.99<br>81.54      |
| 36990       | 36920CD    | X2S-36990             | 1.5<br>0.06                                    | 188.0<br>7.40                              | 0.8<br>0.03                                      | 221.0<br>8.70                              | 10.9<br>0.43   | 4.6<br>0.18    | 515            | 241            | 0.1434         | 6.14<br>13.53       |
| 67790       | 67720CD    | X2S-67790             | 3.5<br>0.14                                    | 194.0<br>7.64                              | 0.8<br>0.03                                      | 240.0<br>9.45                              | 19.0<br>0.75   | 7.1<br>0.28    | 622            | 122            | 0.1214         | 14.41<br>31.78      |
| 94700       | 94114CD    | X6S-94700             | 7.0<br>0.28                                    | 207.0<br>8.15                              | 1.5<br>0.06                                      | 272.0<br>10.71                             | 22.1<br>0.87   | 10.2<br>0.40   | 692            | 93.8           | 0.1287         | 32.98<br>72.72      |
| HM237545    | HM237510CD | HM237545XC            | 7.0<br>0.28                                    | 205.0<br>8.07                              | 1.5<br>0.06                                      | 271.5<br>10.68                             | 22.1<br>0.87   | 8.6<br>0.34    | 751            | 101            | 0.1168         | 32.16<br>70.91      |
| 94700       | 94118D     | X6S-94700             | 7.0<br>0.28                                    | 207.0<br>8.15                              | 1.5<br>0.06                                      | 272.0<br>10.71                             |                |                | 692            | 93.8           | 0.1287         | 36.71<br>80.93      |
| H239640     | H239612CD  | H239640XB             | 3.5<br>0.14                                    | 202.0<br>7.95                              | 1.5<br>0.06                                      | 300.5<br>11.84                             | 28.4<br>1.12   | 10.2<br>0.40   | 906            | 90.3           | 0.1242         | 56.99<br>125.63     |
| 93708       | 93127CD    | X1S-93708             | 3.5<br>0.14                                    | 209.0<br>8.23                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 47.28<br>104.23     |
| 67883       | 67820CD    | X2S-67883             | 3.5<br>0.14                                    | 204.0<br>8.03                              | 0.8<br>0.03                                      | 259.0<br>10.20                             | 22.1<br>0.87   | 7.1<br>0.28    | 728            | 147            | 0.1310         | 18.17<br>40.07      |
| 67884       | 67820CD    | X3S-67884             | 3.5<br>0.14                                    | 206.0<br>8.11                              | 0.8<br>0.03                                      | 259.0<br>10.20                             | 22.1<br>0.87   | 7.1<br>0.28    | 728            | 147            | 0.1310         | 17.45<br>38.47      |
| M238849     | M238810CD  | M238849XB             | 3.5<br>0.14                                    | 205.0<br>8.07                              | 1.5<br>0.06                                      | 256.0<br>10.08                             | 19.0<br>0.75   | 7.9<br>0.31    | 788            | 118            | 0.1201         | 20.36<br>44.89      |
| 87737       | 87112D     | X1S-87737             | 3.5<br>0.14                                    | 207.0<br>8.15                              | 1.5<br>0.06                                      | 266.5<br>10.50                             |                |                | 575            | 131            | 0.1155         | 20.89<br>46.05      |
| H239649     | H239612CD  | H239649XB             | 5.5<br>0.22                                    | 214.0<br>8.43                              | 1.5<br>0.06                                      | 300.5<br>11.84                             | 28.4<br>1.12   | 10.2<br>0.40   | 906            | 90.3           | 0.1242         | 52.92<br>116.66     |
| 67885       | 67820CD    | X2S-67885             | 3.5<br>0.14                                    | 209.0<br>8.23                              | 0.8<br>0.03                                      | 259.0<br>10.20                             | 22.1<br>0.87   | 7.1<br>0.28    | 728            | 147            | 0.1310         | 16.69<br>36.81      |
| 87750       | 87112DC    | X1S-87750             | 3.5<br>0.14                                    | 209.0<br>8.23                              | 1.5<br>0.06                                      | 266.5<br>10.50                             | 17.3<br>0.68   | 5.3<br>0.21    | 575            | 131            | 0.1155         | 20.68<br>45.59      |
| 87750       | 87112D     | X1S-87750             | 3.5<br>0.14                                    | 209.0<br>8.23                              | 1.5<br>0.06                                      | 266.5<br>10.50                             |                |                | 575            | 131            | 0.1155         | 20.16<br>44.45      |
| 93750       | 93127CD    | X4S-93750             | 4.3<br>0.17                                    | 218.0<br>8.58                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 43.76<br>96.48      |
| EE420751    | 421451CD   | X2S-420750            | 6.4<br>0.25                                    | 227.0<br>8.94                              | 1.5<br>0.06                                      | 334.5<br>13.16                             | 25.4<br>1.00   | 11.7<br>0.46   | 1150           | 128            | 0.1450         | 84.09<br>185.38     |
| 67887       | 67820CD    | X1S-67887             | 10.5<br>0.41                                   | 223.0<br>8.78                              | 0.8<br>0.03                                      | 259.0<br>10.20                             | 22.1<br>0.87   | 7.1<br>0.28    | 728            | 147            | 0.1310         | 15.89<br>35.04      |
| 87762       | 87112DC    | X1S-87762             | 3.5<br>0.14                                    | 211.0<br>8.31                              | 1.5<br>0.06                                      | 266.5<br>10.50                             | 17.3<br>0.68   | 5.3<br>0.21    | 575            | 131            | 0.1155         | 19.88<br>43.82      |
| 87762       | 87112D     | X1S-87762             | 3.5<br>0.14                                    | 211.0<br>8.31                              | 1.5<br>0.06                                      | 266.5<br>10.50                             |                |                | 575            | 131            | 0.1155         | 19.36<br>42.68      |
| L540049     | L540010D   | L540049XA             | 1.5<br>0.06                                    | 207.0<br>8.15                              | 0.8<br>0.03                                      | 247.0<br>9.72                              |                |                | 504            | 226            | 0.1371         | 7.12<br>15.70       |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

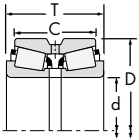
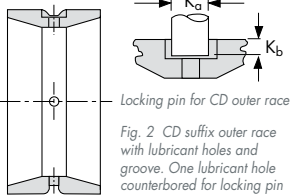
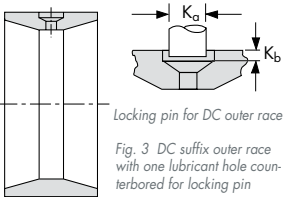


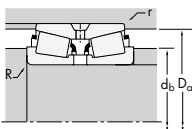
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                 |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|-----------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                 |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 196.850<br>7.7500       | 257.175<br>10.1250 | 85.725<br>3.3750  | 66.675<br>2.6250  | 513000<br>115000       | 0.45 | 1.51           | 2.25           | 76400<br>17200         | 58400<br>13100  | 133000<br>29900    | 1.31 |
| 196.850<br>7.7500       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300 | 306000<br>68700    | 1.12 |
| 200.025<br>7.8750       | 292.100<br>11.5000 | 125.415<br>4.9376 | 101.600<br>4.0000 | 1020000<br>230000      | 0.33 | 2.03           | 3.02           | 152000<br>34300        | 86800<br>19500  | 265000<br>59700    | 1.76 |
| 200.025<br>7.8750       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300 | 306000<br>68700    | 1.12 |
| 200.025<br>7.8750       | 384.175<br>15.1250 | 238.125<br>9.3750 | 193.675<br>7.6250 | 2860000<br>643000      | 0.33 | 2.03           | 3.02           | 426000<br>95700        | 242000<br>54500 | 741000<br>167000   | 1.76 |
| 203.200<br>8.0000       | 276.225<br>10.8750 | 90.485<br>3.5624  | 73.025<br>2.8750  | 707000<br>159000       | 0.32 | 2.12           | 3.15           | 105000<br>23700        | 57500<br>12900  | 183000<br>41200    | 1.83 |
| 203.200<br>8.0000       | 282.575<br>11.1250 | 101.600<br>4.0000 | 82.550<br>3.2500  | 684000<br>154000       | 0.51 | 1.33           | 1.97           | 102000<br>22900        | 88700<br>19900  | 177000<br>39800    | 1.15 |
| 203.200<br>8.0000       | 292.100<br>11.5000 | 109.538<br>4.3125 | 84.138<br>3.3125  | 914000<br>205000       | 0.40 | 1.69           | 2.51           | 136000<br>30600        | 93300<br>21000  | 237000<br>53200    | 1.46 |
| 203.200<br>8.0000       | 292.100<br>11.5000 | 125.415<br>4.9376 | 101.600<br>4.0000 | 1020000<br>230000      | 0.33 | 2.03           | 3.02           | 152000<br>34300        | 86800<br>19500  | 265000<br>59700    | 1.76 |
| 203.200<br>8.0000       | 301.625<br>11.8750 | 125.453<br>4.9391 | 140.005<br>5.5120 | 1020000<br>230000      | 0.33 | 2.03           | 3.02           | 152000<br>34300        | 86800<br>19500  | 265000<br>59700    | 1.76 |
| 203.200<br>8.0000       | 301.625<br>11.8750 | 125.453<br>4.9391 | 140.005<br>5.5120 | 1020000<br>230000      | 0.33 | 2.03           | 3.02           | 152000<br>34300        | 86800<br>19500  | 265000<br>59700    | 1.76 |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 127.000<br>5.0000 | 88.900<br>3.5000  | 901000<br>203000       | 0.31 | 2.15           | 3.21           | 134000<br>30200        | 72000<br>16200  | 234000<br>52500    | 1.86 |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300 | 306000<br>68700    | 1.12 |
| 203.200<br>8.0000       | 368.300<br>14.5000 | 193.675<br>7.6250 | 136.525<br>5.3750 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300 | 488000<br>110000   | 1.45 |
| 204.788<br>8.0625       | 292.100<br>11.5000 | 125.415<br>4.9376 | 101.600<br>4.0000 | 1020000<br>230000      | 0.33 | 2.03           | 3.02           | 152000<br>34300        | 86800<br>19500  | 265000<br>59700    | 1.76 |
| 206.375<br>8.1250       | 282.575<br>11.1250 | 101.600<br>4.0000 | 82.550<br>3.2500  | 684000<br>154000       | 0.51 | 1.33           | 1.97           | 102000<br>22900        | 88700<br>19900  | 177000<br>39800    | 1.15 |
| 206.375<br>8.1250       | 317.500<br>12.5000 | 127.000<br>5.0000 | 88.900<br>3.5000  | 901000<br>203000       | 0.31 | 2.15           | 3.21           | 134000<br>30200        | 72000<br>16200  | 234000<br>52500    | 1.86 |
| 206.375<br>8.1250       | 336.550<br>13.2500 | 211.138<br>8.3125 | 168.862<br>6.6875 | 2180000<br>491000      | 0.33 | 2.03           | 3.02           | 325000<br>73100        | 185000<br>41600 | 566000<br>127000   | 1.76 |
| 209.550<br>8.2500       | 282.575<br>11.1250 | 101.600<br>4.0000 | 82.550<br>3.2500  | 684000<br>154000       | 0.51 | 1.33           | 1.97           | 102000<br>22900        | 88700<br>19900  | 177000<br>39800    | 1.15 |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300 | 306000<br>68700    | 1.12 |
| 209.550<br>8.2500       | 317.500<br>12.5000 | 146.050<br>5.7500 | 111.125<br>4.3750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300 | 306000<br>68700    | 1.12 |
| 209.550<br>8.2500       | 355.600<br>14.0000 | 152.400<br>6.0000 | 111.125<br>4.3750 | 1220000<br>275000      | 0.59 | 1.14           | 1.70           | 182000<br>41000        | 184000<br>41400 | 317000<br>71300    | 0.99 |
| 212.725<br>8.3750       | 285.750<br>11.2500 | 98.425<br>3.8750  | 76.200<br>3.0000  | 693000<br>156000       | 0.48 | 1.40           | 2.09           | 103000<br>23200        | 85000<br>19100  | 180000<br>40400    | 1.21 |
| 215.900<br>8.5000       | 285.750<br>11.2500 | 98.425<br>3.8750  | 76.200<br>3.0000  | 646000<br>145000       | 0.48 | 1.40           | 2.09           | 96200<br>21600         | 79200<br>17800  | 167000<br>37600    | 1.21 |
| 215.900<br>8.5000       | 285.750<br>11.2500 | 98.425<br>3.8750  | 76.200<br>3.0000  | 693000<br>156000       | 0.48 | 1.40           | 2.09           | 103000<br>23200        | 85000<br>19100  | 180000<br>40400    | 1.21 |
| 215.900<br>8.5000       | 406.400<br>16.0000 | 195.262<br>7.6875 | 147.638<br>5.8125 | 2510000<br>565000      | 0.39 | 1.72           | 2.55           | 374000<br>84200        | 252000<br>56700 | 652000<br>147000   | 1.48 |
| 220.663<br>8.6875       | 314.325<br>12.3750 | 131.762<br>5.1875 | 106.362<br>4.1875 | 1190000<br>267000      | 0.33 | 2.03           | 3.02           | 177000<br>39700        | 101000<br>22600 | 308000<br>69200    | 1.76 |
| 225.425<br>8.8750       | 400.050<br>15.7500 | 187.325<br>7.3750 | 136.525<br>5.3750 | 1920000<br>431000      | 0.44 | 1.54           | 2.29           | 286000<br>64200        | 215000<br>48300 | 497000<br>112000   | 1.33 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            | Pin            |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| LM739749    | LM739710CD | LM739749XA            | 3.5<br>0.14                                    | 213.0<br>8.39                              | 0.8<br>0.03                                      | 251.0<br>9.88                              | 14.2<br>0.56   | 6.4<br>0.25    | 762            | 232            | 0.1296         | 11.08<br>24.43      |
| 93775       | 93127CD    | X1S-93775             | 4.3<br>0.17                                    | 223.0<br>8.78                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 41.54<br>91.58      |
| M241543     | M241510CD  | M241543XA             | 3.5<br>0.14                                    | 219.0<br>8.62                              | 1.5<br>0.06                                      | 279.0<br>10.98                             | 19.0<br>0.75   | 8.6<br>0.34    | 954            | 128            | 0.1279         | 26.09<br>57.52      |
| 93787       | 93127CD    | X3S-93787             | 4.3<br>0.17                                    | 225.0<br>8.86                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 40.58<br>89.46      |
| H247535     | H247510CD  | H247535XA             | 6.4<br>0.25                                    | 241.0<br>9.49                              | 1.5<br>0.06                                      | 362.0<br>14.26                             | 28.4<br>1.12   | 11.7<br>0.46   | 1960           | 148            | 0.1638         | 123.53<br>272.34    |
| LM241149    | LM241110D  | LM241149XA            | 3.5<br>0.14                                    | 220.0<br>8.66                              | 0.8<br>0.03                                      | 267.0<br>10.51                             |                |                | 774            | 182            | 0.1170         | 14.52<br>32.02      |
| 67983       | 67920CD    | X2S-67983             | 3.5<br>0.14                                    | 222.0<br>8.74                              | 0.8<br>0.03                                      | 275.0<br>10.83                             | 19.0<br>0.75   | 7.1<br>0.28    | 820            | 172            | 0.1388         | 18.66<br>41.14      |
| M541349     | M541310CD  | M541349XA             | 3.5<br>0.14                                    | 221.0<br>8.70                              | 0.8<br>0.03                                      | 281.0<br>11.06                             | 19.0<br>0.75   | 7.9<br>0.31    | 752            | 147            | 0.1253         | 21.43<br>47.24      |
| M241547     | M241510CD  | X2S-67983             | 3.5<br>0.14                                    | 221.0<br>8.70                              | 1.5<br>0.06                                      | 279.0<br>10.98                             | 19.0<br>0.75   | 8.6<br>0.34    | 954            | 128            | 0.1279         | 25.12<br>55.37      |
| M241547C    | M241513D   | M241547XA             | 3.5<br>0.14                                    | 221.0<br>8.70                              | 0.8<br>0.03                                      | 290.0<br>11.42                             |                |                | 954            | 128            | 0.1279         | 31.06<br>68.46      |
| M241547     | M241513XD  | M241547XA             | 3.5<br>0.14                                    | 221.0<br>8.70                              | 0.8<br>0.03                                      | 286.5<br>11.28                             |                |                | 954            | 128            | 0.1279         | 31.73<br>69.95      |
| EE132083    | 132126D    | X1S-132081            | 4.0<br>0.16                                    | 225.0<br>8.86                              | 1.5<br>0.06                                      | 293.0<br>11.54                             |                |                | 798            | 125            | 0.1174         | 34.36<br>75.74      |
| 93800       | 93127CD    | X5S-93800             | 4.3<br>0.17                                    | 227.0<br>8.94                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 39.58<br>87.26      |
| EE420801    | 421451CD   | X3S-420801            | 3.3<br>0.13                                    | 230.0<br>9.06                              | 1.5<br>0.06                                      | 334.5<br>13.16                             | 25.4<br>1.00   | 11.7<br>0.46   | 1150           | 128            | 0.1450         | 78.57<br>173.20     |
| M241549     | M241510CD  | M241549XA             | 3.5<br>0.14                                    | 223.0<br>8.78                              | 1.5<br>0.06                                      | 279.0<br>10.98                             | 19.0<br>0.75   | 8.6<br>0.34    | 954            | 128            | 0.1279         | 24.60<br>54.24      |
| 67985       | 67920CD    | X2S-67985             | 3.5<br>0.14                                    | 224.0<br>8.82                              | 0.8<br>0.03                                      | 275.0<br>10.83                             | 19.0<br>0.75   | 7.1<br>0.28    | 820            | 172            | 0.1388         | 17.87<br>39.39      |
| EE132084    | 132126D    | X2S-132084            | 4.0<br>0.16                                    | 227.0<br>8.94                              | 1.5<br>0.06                                      | 293.0<br>11.54                             |                |                | 798            | 125            | 0.1174         | 33.32<br>73.45      |
| H242649     | H242610CD  | H242649XB             | 3.3<br>0.13                                    | 231.0<br>9.09                              | 1.5<br>0.06                                      | 318.0<br>12.51                             | 28.4<br>1.12   | 10.2<br>0.40   | 1400           | 135            | 0.1465         | 68.93<br>151.97     |
| 67989       | 67920CD    | X1S-67989             | 3.5<br>0.14                                    | 227.0<br>8.94                              | 0.8<br>0.03                                      | 275.0<br>10.83                             | 19.0<br>0.75   | 7.1<br>0.28    | 820            | 172            | 0.1388         | 17.21<br>37.95      |
| 93825       | 93127CD    | X3S-93825             | 4.3<br>0.17                                    | 233.0<br>9.17                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 37.26<br>82.14      |
| 93825A      | 93127CD    | X1S-93825             | 12.7<br>0.50                                   | 250.0<br>9.84                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 10.2<br>0.40   | 912            | 126            | 0.1460         | 36.49<br>80.45      |
| 96825       | 96140CD    | X1S-96825             | 7.0<br>0.28                                    | 246.0<br>9.69                              | 1.5<br>0.06                                      | 334.0<br>13.15                             | 25.4<br>1.00   | 9.4<br>0.37    | 1140           | 160            | 0.1626         | 57.19<br>126.08     |
| LM742745    | LM742710CD | LM742745XB            | 3.5<br>0.14                                    | 230.0<br>9.06                              | 0.8<br>0.03                                      | 279.0<br>10.98                             | 17.3<br>0.68   | 7.1<br>0.28    | 867            | 225            | 0.1388         | 16.55<br>36.48      |
| LM742748    | LM742710CD |                       | 3.5<br>0.14                                    | 233.0<br>9.17                              | 0.8<br>0.03                                      | 279.0<br>10.98                             | 17.3<br>0.68   | 7.1<br>0.28    | 808            | 211            | 0.1354         | 15.50<br>34.18      |
| LM742749    | LM742710CD | LM742749XC            | 3.5<br>0.14                                    | 233.0<br>9.17                              | 0.8<br>0.03                                      | 279.0<br>10.98                             | 17.3<br>0.68   | 7.1<br>0.28    | 867            | 225            | 0.1388         | 15.74<br>34.70      |
| EE820085    | 820161CD   | X1S-820085            | 6.4<br>0.25                                    | 251.0<br>9.88                              | 1.5<br>0.06                                      | 372.0<br>14.65                             | 28.4<br>1.12   | 11.7<br>0.46   | 1330           | 112            | 0.1509         | 102.16<br>225.21    |
| M244249     | M244210CD  | M244249XA             | 6.4<br>0.25                                    | 245.0<br>9.65                              | 1.5<br>0.06                                      | 300.0<br>11.81                             | 22.1<br>0.87   | 9.4<br>0.37    | 1150           | 141            | 0.1360         | 31.22<br>68.83      |
| EE430888    | 431576CD   | X1S-430888            | 1.5<br>0.06                                    | 251.0<br>9.88                              | 1.5<br>0.06                                      | 364.0<br>14.34                             | 28.4<br>1.12   | 11.7<br>0.46   | 1350           | 143            | 0.1572         | 90.91<br>200.41     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

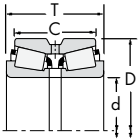
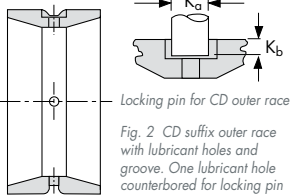
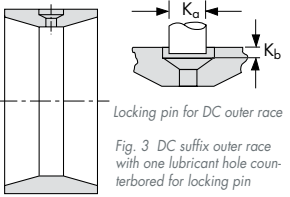


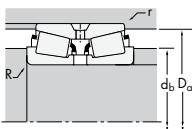
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                    |                   | Load Ratings, N (lbf.) |      |                |                        |                  |                        |                    |      |                        |
|-------------------------|--------------------|--------------------|-------------------|------------------------|------|----------------|------------------------|------------------|------------------------|--------------------|------|------------------------|
| d                       | D                  | T                  | B                 | Dynamic <sup>(1)</sup> |      |                | Factors <sup>(5)</sup> |                  | Dynamic <sup>(2)</sup> |                    |      | Factors <sup>(5)</sup> |
|                         |                    |                    |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub>         | C <sub>90</sub>  | Ca <sub>90</sub>       | C <sub>90(2)</sub> | K    |                        |
| 228.397<br>8.9920       | 431.800<br>17.0000 | 196.850<br>7.7500  | 111.125<br>4.3750 | 1900000<br>426000      | 0.88 | 0.76           | 1.14                   | 282000<br>63500  | 427000<br>96000        | 492000<br>111000   | 0.66 |                        |
| 228.460<br>8.9945       | 431.800<br>17.0000 | 196.850<br>7.7500  | 111.125<br>4.3750 | 1900000<br>426000      | 0.88 | 0.76           | 1.14                   | 282000<br>63500  | 427000<br>96000        | 492000<br>111000   | 0.66 |                        |
| 228.600<br>9.0000       | 327.025<br>12.8750 | 114.300<br>4.5000  | 82.550<br>3.2500  | 900000<br>202000       | 0.41 | 1.66           | 2.47                   | 134000<br>30100  | 93300<br>21000         | 233000<br>52500    | 1.44 |                        |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 152.400<br>6.0000  | 111.125<br>4.3750 | 1220000<br>275000      | 0.59 | 1.14           | 1.70                   | 182000<br>41000  | 184000<br>41400        | 317000<br>71300    | 0.99 |                        |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 152.400<br>6.0000  | 111.125<br>4.3750 | 1360000<br>306000      | 0.33 | 2.04           | 3.04                   | 202000<br>45500  | 114000<br>25700        | 352000<br>79200    | 1.77 |                        |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 152.400<br>6.0000  | 114.300<br>4.5000 | 1620000<br>365000      | 0.47 | 1.43           | 2.12                   | 242000<br>54300  | 196000<br>44000        | 421000<br>94600    | 1.24 |                        |
| 228.600<br>9.0000       | 358.775<br>14.1250 | 152.400<br>6.0000  | 117.475<br>4.6250 | 1560000<br>351000      | 0.33 | 2.03           | 3.02                   | 232000<br>52200  | 132000<br>29700        | 405000<br>91000    | 1.76 |                        |
| 228.600<br>9.0000       | 400.050<br>15.7500 | 187.325<br>7.3750  | 136.525<br>5.3750 | 1920000<br>431000      | 0.44 | 1.54           | 2.29                   | 286000<br>64200  | 215000<br>48300        | 497000<br>112000   | 1.33 |                        |
| 228.600<br>9.0000       | 400.050<br>15.7500 | 187.325<br>7.3750  | 136.525<br>5.3750 | 1920000<br>431000      | 0.44 | 1.54           | 2.29                   | 286000<br>64200  | 215000<br>48300        | 497000<br>112000   | 1.33 |                        |
| 228.600<br>9.0000       | 488.950<br>19.2500 | 254.000<br>10.0000 | 152.400<br>6.0000 | 3050000<br>686000      | 0.94 | 0.72           | 1.07                   | 455000<br>102000 | 730000<br>164000       | 792000<br>178000   | 0.62 |                        |
| 231.775<br>9.1250       | 358.775<br>14.1250 | 152.400<br>6.0000  | 117.475<br>4.6250 | 1560000<br>351000      | 0.33 | 2.03           | 3.02                   | 232000<br>52200  | 132000<br>29700        | 405000<br>91000    | 1.76 |                        |
| 234.950<br>9.2500       | 311.150<br>12.2500 | 98.425<br>3.8750   | 73.025<br>2.8750  | 753000<br>169000       | 0.36 | 1.86           | 2.77                   | 112000<br>25200  | 69600<br>15600         | 195000<br>43900    | 1.61 |                        |
| 234.950<br>9.2500       | 327.025<br>12.8750 | 114.300<br>4.5000  | 82.550<br>3.2500  | 866000<br>195000       | 0.41 | 1.66           | 2.47                   | 129000<br>29000  | 89700<br>20200         | 224000<br>50500    | 1.44 |                        |
| 234.950<br>9.2500       | 327.025<br>12.8750 | 114.300<br>4.5000  | 82.550<br>3.2500  | 900000<br>202000       | 0.41 | 1.66           | 2.47                   | 134000<br>30100  | 93300<br>21000         | 233000<br>52500    | 1.44 |                        |
| 234.950<br>9.2500       | 355.600<br>14.0000 | 152.400<br>6.0000  | 111.125<br>4.3750 | 1220000<br>275000      | 0.59 | 1.14           | 1.70                   | 182000<br>41000  | 184000<br>41400        | 317000<br>71300    | 0.99 |                        |
| 234.950<br>9.2500       | 384.175<br>15.1250 | 238.125<br>9.3750  | 193.675<br>7.6250 | 3020000<br>680000      | 0.33 | 2.03           | 3.02                   | 450000<br>101000 | 256000<br>57600        | 784000<br>176000   | 1.76 |                        |
| 234.950<br>9.2500       | 384.175<br>15.1250 | 238.125<br>9.3750  | 193.675<br>7.6250 | 2860000<br>643000      | 0.33 | 2.03           | 3.02                   | 426000<br>95700  | 242000<br>54500        | 741000<br>167000   | 1.76 |                        |
| 237.330<br>9.3437       | 358.775<br>14.1250 | 152.400<br>6.0000  | 117.475<br>4.6250 | 1560000<br>351000      | 0.33 | 2.03           | 3.02                   | 232000<br>52200  | 132000<br>29700        | 405000<br>91000    | 1.76 |                        |
| 241.300<br>9.5000       | 327.025<br>12.8750 | 114.300<br>4.5000  | 82.550<br>3.2500  | 900000<br>202000       | 0.41 | 1.66           | 2.47                   | 134000<br>30100  | 93300<br>21000         | 233000<br>52500    | 1.44 |                        |
| 241.300<br>9.5000       | 349.148<br>13.7460 | 127.000<br>5.0000  | 101.600<br>4.0000 | 1130000<br>253000      | 0.35 | 1.91           | 2.85                   | 168000<br>37700  | 101000<br>22800        | 292000<br>65700    | 1.65 |                        |
| 241.300<br>9.5000       | 368.300<br>14.5000 | 120.650<br>4.7500  | 85.725<br>3.3750  | 956000<br>215000       | 0.36 | 1.86           | 2.77                   | 142000<br>32000  | 88500<br>19900         | 248000<br>55700    | 1.61 |                        |
| 241.300<br>9.5000       | 406.400<br>16.0000 | 155.575<br>6.1250  | 107.950<br>4.2500 | 1510000<br>339000      | 0.40 | 1.68           | 2.50                   | 224000<br>50400  | 154000<br>34700        | 391000<br>87800    | 1.45 |                        |
| 241.300<br>9.5000       | 406.400<br>16.0000 | 215.900<br>8.5000  | 184.150<br>7.2500 | 2780000<br>625000      | 0.33 | 2.03           | 3.02                   | 414000<br>93100  | 236000<br>53000        | 721000<br>162000   | 1.76 |                        |
| 244.475<br>9.6250       | 380.898<br>14.9960 | 171.450<br>6.7500  | 127.000<br>5.0000 | 1550000<br>348000      | 0.52 | 1.31           | 1.95                   | 231000<br>51800  | 204000<br>45800        | 402000<br>90300    | 1.13 |                        |
| 244.475<br>9.6250       | 381.000<br>15.0000 | 171.450<br>6.7500  | 127.000<br>5.0000 | 1550000<br>348000      | 0.52 | 1.31           | 1.95                   | 231000<br>51800  | 204000<br>45800        | 402000<br>90300    | 1.13 |                        |
| 247.650<br>9.7500       | 368.300<br>14.5000 | 120.650<br>4.7500  | 85.725<br>3.3750  | 956000<br>215000       | 0.36 | 1.86           | 2.77                   | 142000<br>32000  | 88500<br>19900         | 248000<br>55700    | 1.61 |                        |
| 247.650<br>9.7500       | 381.000<br>15.0000 | 158.750<br>6.2500  | 123.825<br>4.8750 | 1710000<br>384000      | 0.33 | 2.03           | 3.02                   | 255000<br>57200  | 145000<br>32600        | 443000<br>99600    | 1.76 |                        |
| 249.250<br>9.8130       | 380.898<br>14.9960 | 171.450<br>6.7500  | 127.000<br>5.0000 | 1550000<br>348000      | 0.52 | 1.31           | 1.95                   | 231000<br>51800  | 204000<br>45800        | 402000<br>90300    | 1.13 |                        |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                |                | Factors        |                |                  | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|------------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                |                |                |                |                  |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                  |                     |
| EE113089    | 113171D    | X1S-113089            | 6.4<br>0.25                                    | 274.0<br>10.79                             | 3.3<br>0.13                                      | 397.5<br>15.64                             |                |                | 967            | 98.1           | 0.1723         | 104.99<br>231.46 |                     |
| EE113091    | 113171D    | X1S-113091            | 6.4<br>0.25                                    | 274.0<br>10.79                             | 3.3<br>0.13                                      | 397.5<br>15.64                             |                |                | 967            | 98.1           | 0.1723         | 104.99<br>231.46 |                     |
| 8573        | 8520CD     | X3S-8573              | 6.4<br>0.25                                    | 255.0<br>10.04                             | 1.5<br>0.06                                      | 313.0<br>12.32                             | 19.0<br>0.75   | 7.9<br>0.31    | 1050           | 172            | 0.1401         | 28.35<br>62.49   |                     |
| 96900       | 96140CD    | X5S-96900             | 7.0<br>0.28                                    | 260.0<br>10.24                             | 1.5<br>0.06                                      | 334.0<br>13.15                             | 25.4<br>1.00   | 9.4<br>0.37    | 1140           | 160            | 0.1626         | 49.51<br>109.14  |                     |
| EE130902    | 131401CD   | X1S-130902            | 6.8<br>0.27                                    | 257.0<br>10.12                             | 1.5<br>0.06                                      | 330.0<br>12.99                             | 22.1<br>0.87   | 8.6<br>0.34    | 1160           | 168            | 0.1358         | 48.30<br>106.48  |                     |
| HM746646    | HM746610CD | HM746646XC            | 6.4<br>0.25                                    | 258.0<br>10.16                             | 1.5<br>0.06                                      | 339.0<br>13.34                             | 25.4<br>1.00   | 9.4<br>0.37    | 1190           | 149            | 0.1542         | 55.05<br>121.37  |                     |
| M249732     | M249710CD  | M249732XA             | 3.5<br>0.14                                    | 256.0<br>10.08                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 25.4<br>1.00   | 8.6<br>0.34    | 1630           | 168            | 0.1526         | 56.44<br>124.42  |                     |
| EE430900    | 431576CD   | X3S-430900            | 10.5<br>0.41                                   | 271.0<br>10.67                             | 1.5<br>0.06                                      | 364.0<br>14.34                             | 28.4<br>1.12   | 11.7<br>0.46   | 1350           | 143            | 0.1572         | 88.47<br>195.04  |                     |
| EE430902    | 431576CD   | X2S-430900            | 19.8<br>0.78                                   | 290.0<br>11.42                             | 1.5<br>0.06                                      | 364.0<br>14.34                             | 28.4<br>1.12   | 11.7<br>0.46   | 1350           | 143            | 0.1572         | 86.76<br>191.28  |                     |
| HH949549    | HH949510DC | HH949549XA            | 6.4<br>0.25                                    | 297.0<br>11.69                             | 1.5<br>0.06                                      | 456.0<br>17.95                             | 28.4<br>1.12   | 11.7<br>0.46   | 1300           | 91.5           | 0.1931         | 197.00<br>434.31 |                     |
| M249734     | M249710CD  | M249734XB             | 6.4<br>0.25                                    | 263.0<br>10.35                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 25.4<br>1.00   | 8.6<br>0.34    | 1630           | 168            | 0.1526         | 54.98<br>121.22  |                     |
| LM446349    | LM446310D  | LM446349XA            | 3.5<br>0.14                                    | 252.0<br>9.92                              | 0.8<br>0.03                                      | 301.0<br>11.85                             |                |                | 1010           | 243            | 0.1328         | 18.37<br>40.49   |                     |
| 8574        | 8520CD     | X1S-8575              | 6.4<br>0.25                                    | 259.0<br>10.20                             | 1.5<br>0.06                                      | 313.0<br>12.32                             | 19.0<br>0.75   | 7.9<br>0.31    | 1010           | 166            | 0.1382         | 26.12<br>57.59   |                     |
| 8575        | 8520CD     | X2S-8575              | 6.4<br>0.25                                    | 259.0<br>10.20                             | 1.5<br>0.06                                      | 313.0<br>12.32                             | 19.0<br>0.75   | 7.9<br>0.31    | 1050           | 172            | 0.1401         | 26.16<br>57.67   |                     |
| 96925       | 96140CD    | X1S-96925             | 7.0<br>0.28                                    | 265.0<br>10.43                             | 1.5<br>0.06                                      | 334.0<br>13.15                             | 25.4<br>1.00   | 9.4<br>0.37    | 1140           | 160            | 0.1626         | 46.71<br>102.98  |                     |
| H247548     | H247510CD  | H247549XB             | 6.4<br>0.25                                    | 269.0<br>10.59                             | 1.5<br>0.06                                      | 362.0<br>14.26                             | 28.4<br>1.12   | 11.7<br>0.46   | 2080           | 156            | 0.1671         | 101.24<br>223.20 |                     |
| H247549     | H247510CD  | H247549XB             | 6.4<br>0.25                                    | 269.0<br>10.59                             | 1.5<br>0.06                                      | 362.0<br>14.26                             | 28.4<br>1.12   | 11.7<br>0.46   | 1960           | 148            | 0.1638         | 102.18<br>225.26 |                     |
| M249736     | M249710CD  | M249736XA             | 6.4<br>0.25                                    | 267.0<br>10.51                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 25.4<br>1.00   | 8.6<br>0.34    | 1630           | 168            | 0.1526         | 51.88<br>114.37  |                     |
| 8578        | 8520CD     | X2S-8578              | 6.4<br>0.25                                    | 264.0<br>10.39                             | 1.5<br>0.06                                      | 313.0<br>12.32                             | 19.0<br>0.75   | 7.9<br>0.31    | 1050           | 172            | 0.1401         | 24.10<br>53.12   |                     |
| EE127095    | 127136CD   | X2S-127095            | 6.4<br>0.25                                    | 267.0<br>10.51                             | 1.5<br>0.06                                      | 329.0<br>12.95                             | 22.1<br>0.87   | 9.4<br>0.37    | 1180           | 164            | 0.1392         | 34.96<br>77.06   |                     |
| EE170950    | 171451CD   | X1S-170951            | 6.4<br>0.25                                    | 269.0<br>10.59                             | 1.5<br>0.06                                      | 337.0<br>13.27                             | 19.0<br>0.75   | 10.2<br>0.40   | 1070           | 172            | 0.1354         | 39.99<br>88.17   |                     |
| EE275095    | 275161D    | X3S-275095            | 6.4<br>0.25                                    | 278.0<br>10.94                             | 1.5<br>0.06                                      | 378.0<br>14.89                             |                |                | 1450           | 201            | 0.1555         | 73.44<br>161.91  |                     |
| H249148     | H249111CD  | H249148XB             | 6.4<br>0.25                                    | 273.0<br>10.75                             | 1.5<br>0.06                                      | 385.0<br>15.16                             | 28.4<br>1.12   | 11.7<br>0.46   | 1710           | 135            | 0.1556         | 104.29<br>229.92 |                     |
| EE126097    | 126149D    |                       | 6.4<br>0.25                                    | 275.0<br>10.83                             | 1.5<br>0.06                                      | 358.0<br>14.09                             |                |                | 1320           | 169            | 0.1640         | 63.77<br>140.58  |                     |
| EE126097    | 126151CD   | X1S-126097            | 6.4<br>0.25                                    | 275.0<br>10.83                             | 1.5<br>0.06                                      | 358.0<br>14.09                             | 28.4<br>1.12   | 11.7<br>0.46   | 1320           | 169            | 0.1640         | 65.08<br>143.47  |                     |
| EE170975    | 171451CD   | X1S-170975            | 6.4<br>0.25                                    | 274.0<br>10.79                             | 1.5<br>0.06                                      | 337.0<br>13.27                             | 19.0<br>0.75   | 10.2<br>0.40   | 1070           | 172            | 0.1354         | 37.53<br>82.73   |                     |
| M252337     | M252310CD  | LM249748XA            | 6.4<br>0.25                                    | 280.0<br>11.02                             | 1.5<br>0.06                                      | 363.5<br>14.32                             | 28.4<br>1.12   | 10.2<br>0.40   | 1840           | 226            | 0.1588         | 62.36<br>137.48  |                     |
| EE126098    | 126149D    | X1S-126098            | 6.4<br>0.25                                    | 279.0<br>10.98                             | 1.5<br>0.06                                      | 358.0<br>14.09                             |                |                | 1320           | 169            | 0.1640         | 62.71<br>138.24  |                     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.

B





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

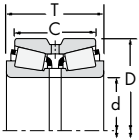
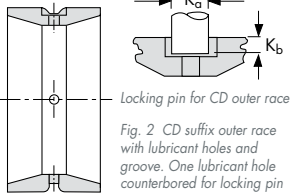
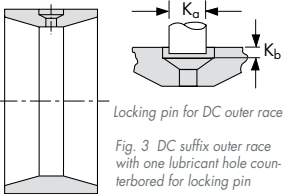


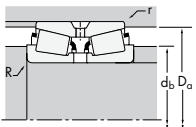
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



Locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



Locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                    |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|--------------------|--------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                  | T                  | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                    |                    |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>a90</sub> | C <sub>90(2)</sub> | K    |
| 249.250<br>9.8130       | 381.000<br>15.0000 | 171.450<br>6.7500  | 127.000<br>5.0000 | 1550000<br>348000      | 0.52 | 1.31           | 1.95           | 231000<br>51800        | 204000<br>45800  | 402000<br>90300    | 1.13 |
| 254.000<br>10.0000      | 323.850<br>12.7500 | 63.500<br>2.5000   | 50.800<br>2.0000  | 258000<br>57900        | 0.35 | 1.95           | 2.90           | 38400<br>8630          | 22800<br>5120    | 66800<br>15000     | 1.69 |
| 254.000<br>10.0000      | 347.662<br>13.6875 | 95.250<br>3.7500   | 69.850<br>2.7500  | 912000<br>205000       | 0.33 | 2.03           | 3.02           | 136000<br>30500        | 77300<br>17400   | 236000<br>53200    | 1.76 |
| 254.000<br>10.0000      | 358.775<br>14.1250 | 152.400<br>6.0000  | 117.475<br>4.6250 | 1560000<br>351000      | 0.33 | 2.03           | 3.02           | 232000<br>52200        | 132000<br>29700  | 405000<br>91000    | 1.76 |
| 254.000<br>10.0000      | 365.125<br>14.3750 | 130.175<br>5.1250  | 98.425<br>3.8750  | 1160000<br>261000      | 0.37 | 1.80           | 2.69           | 173000<br>38800        | 111000<br>24900  | 301000<br>67600    | 1.56 |
| 254.000<br>10.0000      | 406.400<br>16.0000 | 155.575<br>6.1250  | 107.950<br>4.2500 | 1510000<br>339000      | 0.40 | 1.68           | 2.50           | 224000<br>50400        | 154000<br>34700  | 391000<br>87800    | 1.45 |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2300000<br>517000      | 0.33 | 2.03           | 3.02           | 343000<br>77000        | 195000<br>43900  | 597000<br>134000   | 1.76 |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 178.592<br>7.0312  | 139.700<br>5.5000 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 254.000<br>10.0000      | 422.275<br>16.6250 | 178.592<br>7.0312  | 139.700<br>5.5000 | 2300000<br>517000      | 0.33 | 2.03           | 3.02           | 343000<br>77000        | 195000<br>43900  | 597000<br>134000   | 1.76 |
| 254.000<br>10.0000      | 431.724<br>16.9970 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 254.000<br>10.0000      | 431.724<br>16.9970 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2300000<br>517000      | 0.33 | 2.03           | 3.02           | 343000<br>77000        | 195000<br>43900  | 597000<br>134000   | 1.76 |
| 254.000<br>10.0000      | 533.400<br>21.0000 | 276.225<br>10.8750 | 165.100<br>6.5000 | 3650000<br>820000      | 0.94 | 0.72           | 1.07           | 543000<br>122000       | 872000<br>196000 | 946000<br>213000   | 0.62 |
| 260.350<br>10.2500      | 365.125<br>14.3750 | 130.175<br>5.1250  | 98.425<br>3.8750  | 1160000<br>261000      | 0.37 | 1.80           | 2.69           | 173000<br>38800        | 111000<br>24900  | 301000<br>67600    | 1.56 |
| 260.350<br>10.2500      | 400.050<br>15.7500 | 155.580<br>6.1250  | 107.950<br>4.2500 | 1410000<br>318000      | 0.39 | 1.71           | 2.55           | 210000<br>47300        | 142000<br>31900  | 366000<br>82300    | 1.48 |
| 260.350<br>10.2500      | 419.100<br>16.5000 | 184.150<br>7.2500  | 136.525<br>5.3750 | 1920000<br>431000      | 0.60 | 1.12           | 1.66           | 286000<br>64200        | 296000<br>66500  | 497000<br>112000   | 0.97 |
| 260.350<br>10.2500      | 419.100<br>16.5000 | 184.150<br>7.2500  | 136.525<br>5.3750 | 1920000<br>431000      | 0.60 | 1.12           | 1.66           | 286000<br>64200        | 296000<br>66500  | 497000<br>112000   | 0.97 |
| 260.350<br>10.2500      | 422.275<br>16.6250 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 260.350<br>10.2500      | 422.275<br>16.6250 | 178.592<br>7.0312  | 139.700<br>5.5000 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 260.350<br>10.2500      | 422.275<br>16.6250 | 178.592<br>7.0312  | 139.700<br>5.5000 | 2300000<br>517000      | 0.33 | 2.03           | 3.02           | 343000<br>77000        | 195000<br>43900  | 597000<br>134000   | 1.76 |
| 260.350<br>10.2500      | 431.724<br>16.9970 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2230000<br>502000      | 0.33 | 2.03           | 3.02           | 332000<br>74700        | 189000<br>42500  | 578000<br>130000   | 1.76 |
| 260.350<br>10.2500      | 431.724<br>16.9970 | 173.038<br>6.8125  | 128.588<br>5.0625 | 2300000<br>517000      | 0.33 | 2.03           | 3.02           | 343000<br>77000        | 195000<br>43900  | 597000<br>134000   | 1.76 |
| 263.525<br>10.3750      | 355.600<br>14.0000 | 127.000<br>5.0000  | 101.600<br>4.0000 | 1200000<br>269000      | 0.36 | 1.87           | 2.79           | 178000<br>40100        | 110000<br>24700  | 310000<br>69800    | 1.62 |
| 266.700<br>10.5000      | 323.850<br>12.7500 | 63.500<br>2.5000   | 50.800<br>2.0000  | 258000<br>57900        | 0.35 | 1.95           | 2.90           | 38400<br>8630          | 22800<br>5120    | 66800<br>15000     | 1.69 |
| 266.700<br>10.5000      | 323.850<br>12.7500 | 63.500<br>2.5000   | 50.800<br>2.0000  | 258000<br>57900        | 0.35 | 1.95           | 2.90           | 38400<br>8630          | 22800<br>5120    | 66800<br>15000     | 1.69 |
| 266.700<br>10.5000      | 355.600<br>14.0000 | 127.000<br>5.0000  | 101.600<br>4.0000 | 1200000<br>269000      | 0.36 | 1.87           | 2.79           | 178000<br>40100        | 110000<br>24700  | 310000<br>69800    | 1.62 |
| 266.700<br>10.5000      | 393.700<br>15.5000 | 157.162<br>6.1875  | 109.538<br>4.3125 | 1510000<br>339000      | 0.40 | 1.68           | 2.50           | 224000<br>50400        | 154000<br>34700  | 391000<br>87800    | 1.45 |
| 266.700<br>10.5000      | 406.400<br>16.0000 | 155.575<br>6.1250  | 107.950<br>4.2500 | 1510000<br>339000      | 0.40 | 1.68           | 2.50           | 224000<br>50400        | 154000<br>34700  | 391000<br>87800    | 1.45 |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.  
 (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $C_{a90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) If a spacer with provision for lubricant passage is required, consult your Timken representative.



| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| EE126098    | 126151CD   | X1S-126098            | 6.4<br>0.25                                    | 279.0<br>10.98                             | 1.5<br>0.06                                      | 358.0<br>14.09                             | 28.4<br>1.12   | 11.7<br>0.46   | 1320           | 169            | 0.1640         | 62.59<br>137.99     |
| 29875       | 29820D     | X2S-29875             | 1.5<br>0.06                                    | 267.0<br>10.51                             | 0.8<br>0.03                                      | 312.0<br>12.28                             |                |                | 907            | 657            | 0.1567         | 11.03<br>24.31      |
| LM249748    | LM249710CD | LM249748XA            | 3.5<br>0.14                                    | 272.0<br>10.71                             | 1.5<br>0.06                                      | 333.0<br>13.11                             | 15.7<br>0.62   | 7.1<br>0.28    | 1000           | 166            | 0.1287         | 22.69<br>50.02      |
| M249749     | M249710CD  | M249749XC             | 3.5<br>0.14                                    | 274.0<br>10.79                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 25.4<br>1.00   | 8.6<br>0.34    | 1630           | 168            | 0.1526         | 44.80<br>98.76      |
| EE134100    | 134144CD   | X1S-134100            | 6.4<br>0.25                                    | 281.0<br>11.06                             | 1.5<br>0.06                                      | 347.0<br>13.66                             | 22.1<br>0.87   | 10.2<br>0.40   | 1330           | 187            | 0.1474         | 38.97<br>85.91      |
| EE275100    | 275161D    | X2S-275100            | 6.4<br>0.25                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 378.0<br>14.89                             |                |                | 1450           | 201            | 0.1555         | 68.38<br>150.76     |
| HM252343    | HM252311D  | HM252343XA            | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 399.5<br>15.73                             |                |                | 1500           | 148            | 0.1482         | 84.11<br>185.43     |
| HM252344    | HM252311D  | HM252343XA            | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 399.5<br>15.73                             |                |                | 1550           | 152            | 0.1498         | 84.43<br>186.13     |
| HM252343    | HM252310CD | HM252343XC            | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 399.5<br>15.73                             | 28.4<br>1.12   | 11.7<br>0.46   | 1500           | 148            | 0.1482         | 85.43<br>188.34     |
| HM252344    | HM252310CD | HM252343XB            | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 399.5<br>15.73                             | 28.4<br>1.12   | 11.7<br>0.46   | 1550           | 152            | 0.1498         | 90.24<br>198.95     |
| HM252343    | HM252315D  | HM252343XA            | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 398.5<br>15.68                             |                |                | 1500           | 148            | 0.1482         | 90.46<br>199.44     |
| HM252344    | HM252315D  |                       | 6.8<br>0.27                                    | 287.0<br>11.30                             | 1.5<br>0.06                                      | 398.5<br>15.68                             |                |                | 1550           | 152            | 0.1498         | 89.42<br>197.14     |
| HH953749    | HH953710D  | HH953749XA            | 6.4<br>0.25                                    | 328.0<br>12.91                             | 1.5<br>0.06                                      | 495.5<br>19.51                             |                |                | 1670           | 104            | 0.2101         | 252.22<br>556.05    |
| EE134102    | 134144CD   | X1S-134102            | 6.4<br>0.25                                    | 286.0<br>11.26                             | 1.5<br>0.06                                      | 347.0<br>13.66                             | 22.1<br>0.87   | 10.2<br>0.40   | 1330           | 187            | 0.1474         | 36.45<br>80.36      |
| EE221026    | 221576CD   | X1S-221025            | 9.7<br>0.38                                    | 296.0<br>11.65                             | 1.5<br>0.06                                      | 371.5<br>14.63                             | 22.1<br>0.87   | 10.2<br>0.40   | 1320           | 207            | 0.1497         | 59.70<br>131.62     |
| EE435102    | 435165DC   |                       | 6.4<br>0.25                                    | 295.0<br>11.61                             | 1.5<br>0.06                                      | 395.0<br>15.56                             | 28.4<br>1.12   | 10.2<br>0.40   | 1480           | 123            | 0.1787         | 87.65<br>193.23     |
| EE435102    | 435165D    | X2S-435102            | 6.4<br>0.25                                    | 295.0<br>11.61                             | 1.5<br>0.06                                      | 395.0<br>15.56                             |                |                | 1480           | 123            | 0.1787         | 88.83<br>195.83     |
| HM252348    | HM252311D  | HM252347XB            | 6.8<br>0.27                                    | 292.0<br>11.50                             | 1.5<br>0.06                                      | 399.5<br>15.73                             |                |                | 1500           | 148            | 0.1482         | 81.33<br>179.29     |
| HM252348    | HM252310CD | HM252349XB            | 6.8<br>0.27                                    | 292.0<br>11.50                             | 1.5<br>0.06                                      | 399.5<br>15.73                             | 28.4<br>1.12   | 11.7<br>0.46   | 1500           | 148            | 0.1482         | 82.22<br>181.26     |
| HM252349    | HM252310CD | HM252349XC            | 6.8<br>0.27                                    | 292.0<br>11.50                             | 1.5<br>0.06                                      | 399.5<br>15.73                             | 28.4<br>1.12   | 11.7<br>0.46   | 1550           | 152            | 0.1498         | 86.70<br>191.14     |
| HM252348    | HM252315D  | HM252347XB            | 6.8<br>0.27                                    | 292.0<br>11.50                             | 1.5<br>0.06                                      | 398.5<br>15.68                             |                |                | 1500           | 148            | 0.1482         | 87.68<br>193.30     |
| HM252349    | HM252315D  | HM252347XB            | 6.8<br>0.27                                    | 292.0<br>11.50                             | 1.5<br>0.06                                      | 398.5<br>15.68                             |                |                | 1550           | 152            | 0.1498         | 87.67<br>193.27     |
| LM451345    | LM451310CD | LM451345XA            | 3.5<br>0.14                                    | 283.0<br>11.14                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 22.1<br>0.87   | 8.6<br>0.34    | 1550           | 212            | 0.1536         | 32.91<br>72.55      |
| 29880       | 29820DC    | X1S-29880             | 1.5<br>0.06                                    | 277.0<br>10.91                             | 0.8<br>0.03                                      | 312.0<br>12.28                             | 10.9<br>0.43   | 5.3<br>0.21    | 907            | 657            | 0.1567         | 9.05<br>19.95       |
| 29880       | 29820D     | X1S-29880             | 1.5<br>0.06                                    | 277.0<br>10.91                             | 0.8<br>0.03                                      | 312.0<br>12.28                             |                |                | 907            | 657            | 0.1567         | 9.04<br>19.93       |
| LM451349    | LM451310CD | LM451349XB            | 3.5<br>0.14                                    | 285.0<br>11.22                             | 1.5<br>0.06                                      | 343.0<br>13.50                             | 22.1<br>0.87   | 8.6<br>0.34    | 1550           | 212            | 0.1536         | 31.73<br>69.96      |
| EE275105    | 275156CD   | X1S-275105            | 6.4<br>0.25                                    | 296.0<br>11.65                             | 1.5<br>0.06                                      | 378.0<br>14.89                             | 25.4<br>1.00   | 9.4<br>0.37    | 1450           | 201            | 0.1555         | 55.21<br>121.71     |
| EE275105    | 275161D    | X2S-275105            | 6.4<br>0.25                                    | 296.0<br>11.65                             | 1.5<br>0.06                                      | 378.0<br>14.89                             |                |                | 1450           | 201            | 0.1555         | 62.05<br>136.80     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

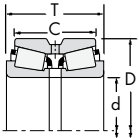


Fig. 1  
D suffix outer race  
with lubricant holes  
and groove

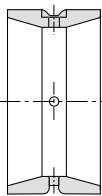


Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin

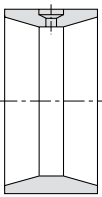
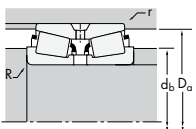


Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                    |                    |                    | Load Ratings, N (lbf.) |      |                |                        |                  |                        |                    |      |                        |
|-------------------------|--------------------|--------------------|--------------------|------------------------|------|----------------|------------------------|------------------|------------------------|--------------------|------|------------------------|
| d                       | D                  | T                  | B                  | Dynamic <sup>(1)</sup> |      |                | Factors <sup>(5)</sup> |                  | Dynamic <sup>(2)</sup> |                    |      | Factors <sup>(5)</sup> |
|                         |                    |                    |                    | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub>         | C <sub>90</sub>  | Ca <sub>90</sub>       | C <sub>90(2)</sub> | K    |                        |
| 269.875<br>10.6250      | 381.000<br>15.0000 | 158.750<br>6.2500  | 123.825<br>4.8750  | 1710000<br>384000      | 0.33 | 2.03           | 3.02                   | 255000<br>57200  | 145000<br>32600        | 443000<br>99600    | 1.76 |                        |
| 273.050<br>10.7500      | 393.700<br>15.5000 | 157.162<br>6.1875  | 109.538<br>4.3125  | 1510000<br>339000      | 0.40 | 1.68           | 2.50                   | 224000<br>50400  | 154000<br>34700        | 391000<br>87800    | 1.45 |                        |
| 273.050<br>10.7500      | 406.400<br>16.0000 | 155.575<br>6.1250  | 107.950<br>4.2500  | 1510000<br>339000      | 0.40 | 1.68           | 2.50                   | 224000<br>50400  | 154000<br>34700        | 391000<br>87800    | 1.45 |                        |
| 279.400<br>11.0000      | 469.900<br>18.5000 | 200.025<br>7.8750  | 149.225<br>5.8750  | 2400000<br>540000      | 0.38 | 1.79           | 2.66                   | 357000<br>80300  | 231000<br>52000        | 622000<br>140000   | 1.55 |                        |
| 279.982<br>11.0229      | 380.898<br>14.9960 | 139.700<br>5.5000  | 107.950<br>4.2500  | 1230000<br>277000      | 0.43 | 1.56           | 2.33                   | 184000<br>41300  | 136000<br>30500        | 320000<br>71800    | 1.35 |                        |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 120.650<br>4.7500  | 85.725<br>3.3750   | 1030000<br>231000      | 0.41 | 1.65           | 2.46                   | 153000<br>34400  | 107000<br>24000        | 266000<br>59900    | 1.43 |                        |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 149.225<br>5.8750  | 117.475<br>4.6250  | 1580000<br>355000      | 0.39 | 1.75           | 2.60                   | 235000<br>52800  | 155000<br>34900        | 409000<br>92000    | 1.51 |                        |
| 280.192<br>11.0312      | 406.400<br>16.0000 | 149.225<br>5.8750  | 117.475<br>4.6250  | 1480000<br>333000      | 0.39 | 1.75           | 2.60                   | 221000<br>49600  | 146000<br>32800        | 384000<br>86400    | 1.51 |                        |
| 285.750<br>11.2500      | 358.775<br>14.1250 | 76.200<br>3.0000   | 53.975<br>2.1250   | 440000<br>98900        | 0.49 | 1.37           | 2.04                   | 65500<br>14700   | 55200<br>12400         | 114000<br>25600    | 1.19 |                        |
| 285.750<br>11.2500      | 501.650<br>19.7500 | 203.200<br>8.0000  | 120.650<br>4.7500  | 2330000<br>523000      | 0.83 | 0.81           | 1.20                   | 346000<br>77900  | 495000<br>111000       | 603000<br>136000   | 0.70 |                        |
| 288.925<br>11.3750      | 406.400<br>16.0000 | 165.100<br>6.5000  | 130.175<br>5.1250  | 2030000<br>457000      | 0.34 | 2.00           | 2.97                   | 302000<br>68000  | 175000<br>39300        | 526000<br>118000   | 1.73 |                        |
| 292.100<br>11.5000      | 469.900<br>18.5000 | 200.025<br>7.8750  | 149.225<br>5.8750  | 2400000<br>540000      | 0.38 | 1.79           | 2.66                   | 357000<br>80300  | 231000<br>52000        | 622000<br>140000   | 1.55 |                        |
| 299.975<br>11.8100      | 495.300<br>19.5000 | 301.625<br>11.8750 | 247.650<br>9.7500  | 4900000<br>1100000     | 0.33 | 2.03           | 3.02                   | 729000<br>164000 | 415000<br>93300        | 1270000<br>285000  | 1.76 |                        |
| 300.038<br>11.8125      | 422.275<br>16.6250 | 174.625<br>6.8750  | 136.525<br>5.3750  | 2210000<br>498000      | 0.34 | 2.00           | 2.99                   | 330000<br>74100  | 190000<br>42700        | 574000<br>129000   | 1.73 |                        |
| 304.800<br>12.0000      | 393.700<br>15.5000 | 107.950<br>4.2500  | 82.550<br>3.2500   | 1000000<br>225000      | 0.36 | 1.88           | 2.80                   | 149000<br>33500  | 91600<br>20600         | 259000<br>58300    | 1.63 |                        |
| 304.800<br>12.0000      | 444.500<br>17.5000 | 146.050<br>5.7500  | 98.425<br>3.8750   | 1320000<br>297000      | 0.38 | 1.79           | 2.66                   | 196000<br>44200  | 127000<br>28600        | 342000<br>76900    | 1.55 |                        |
| 317.500<br>12.5000      | 444.500<br>17.5000 | 146.050<br>5.7500  | 98.425<br>3.8750   | 1320000<br>297000      | 0.38 | 1.79           | 2.66                   | 196000<br>44200  | 127000<br>28600        | 342000<br>76900    | 1.55 |                        |
| 330.200<br>13.0000      | 482.600<br>19.0000 | 177.800<br>7.0000  | 127.000<br>5.0000  | 2130000<br>480000      | 0.39 | 1.73           | 2.57                   | 318000<br>71400  | 213000<br>47800        | 553000<br>124000   | 1.49 |                        |
| 333.375<br>13.1250      | 469.900<br>18.5000 | 190.500<br>7.5000  | 152.400<br>6.0000  | 2730000<br>614000      | 0.33 | 2.02           | 3.00                   | 407000<br>91400  | 233000<br>52400        | 708000<br>159000   | 1.74 |                        |
| 339.949<br>13.3838      | 589.949<br>23.2263 | 340.002<br>13.3859 | 278.000<br>10.9449 | 6660000<br>1500000     | 0.33 | 2.03           | 3.02                   | 992000<br>223000 | 565000<br>127000       | 1730000<br>388000  | 1.76 |                        |
| 342.900<br>13.5000      | 457.098<br>17.9960 | 142.875<br>5.6250  | 101.600<br>4.0000  | 1400000<br>316000      | 0.71 | 0.95           | 1.41                   | 209000<br>47000  | 255000<br>57400        | 364000<br>81900    | 0.82 |                        |
| 346.075<br>13.6250      | 482.600<br>19.0000 | 133.350<br>5.2500  | 88.900<br>3.5000   | 935000<br>210000       | 0.50 | 1.35           | 2.01                   | 139000<br>31300  | 119000<br>26800        | 242000<br>54500    | 1.17 |                        |
| 346.075<br>13.6250      | 488.950<br>19.2500 | 200.025<br>7.8750  | 158.750<br>6.2500  | 2770000<br>624000      | 0.33 | 2.02           | 3.00                   | 413000<br>92900  | 237000<br>53200        | 719000<br>162000   | 1.74 |                        |
| 346.075<br>13.6250      | 488.950<br>19.2500 | 200.025<br>7.8750  | 158.750<br>6.2500  | 2950000<br>663000      | 0.33 | 2.02           | 3.00                   | 439000<br>98700  | 252000<br>56600        | 765000<br>172000   | 1.74 |                        |
| 349.250<br>13.7500      | 514.350<br>20.2500 | 193.675<br>7.6250  | 152.400<br>6.0000  | 2300000<br>518000      | 0.37 | 1.84           | 2.74                   | 343000<br>77200  | 216000<br>48500        | 598000<br>134000   | 1.59 |                        |
| 354.012<br>13.9375      | 482.600<br>19.0000 | 133.350<br>5.2500  | 88.900<br>3.5000   | 935000<br>210000       | 0.50 | 1.35           | 2.01                   | 139000<br>31300  | 119000<br>26800        | 242000<br>54500    | 1.17 |                        |
| 355.600<br>14.0000      | 444.500<br>17.5000 | 136.525<br>5.3750  | 111.125<br>4.3750  | 1250000<br>281000      | 0.31 | 2.20           | 3.27                   | 186000<br>41900  | 98000<br>22000         | 324000<br>72900    | 1.90 |                        |
| 355.600<br>14.0000      | 501.650<br>19.7500 | 155.575<br>6.1250  | 107.950<br>4.2500  | 1570000<br>352000      | 0.44 | 1.53           | 2.28                   | 233000<br>52400  | 176000<br>39500        | 406000<br>91200    | 1.33 |                        |

(1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.

(2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            |                |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            | Pin            |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                |                     |
| M252349     | M252310CD  | M252349XC             | 6.4<br>0.25                                    | 296.0<br>11.65                             | 1.5<br>0.06                                      | 363.5<br>14.32                             | 28.4<br>1.12   | 10.2<br>0.40   | 1840           | 226            | 0.1588         | 52.17<br>115.01     |
| EE275108    | 275156CD   | X1S-275108            | 6.4<br>0.25                                    | 301.0<br>11.85                             | 1.5<br>0.06                                      | 378.0<br>14.89                             | 25.4<br>1.00   | 9.4<br>0.37    | 1450           | 201            | 0.1555         | 51.95<br>114.53     |
| EE275108    | 275161D    | X2S-275108            | 6.4<br>0.25                                    | 301.0<br>11.85                             | 1.5<br>0.06                                      | 378.0<br>14.89                             |                |                | 1450           | 201            | 0.1555         | 58.76<br>129.55     |
| EE722110    | 722186CD   | X2S-722110            | 9.7<br>0.38                                    | 321.0<br>12.64                             | 1.5<br>0.06                                      | 433.0<br>17.04                             | 28.4<br>1.12   | 11.7<br>0.46   | 1890           | 143            | 0.1669         | 120.44<br>265.52    |
| LM654642    | LM654610CD | LM654642XC            | 3.5<br>0.14                                    | 302.0<br>11.89                             | 1.5<br>0.06                                      | 368.0<br>14.49                             | 22.1<br>0.87   | 10.2<br>0.40   | 1920           | 265            | 0.1744         | 43.44<br>95.78      |
| EE101103    | 101601CD   | X2S-101103            | 6.8<br>0.27                                    | 309.0<br>12.17                             | 1.5<br>0.06                                      | 376.0<br>14.80                             | 19.0<br>0.75   | 10.2<br>0.40   | 1380           | 227            | 0.1527         | 45.04<br>99.30      |
| EE128110    | 128160CD   | X2S-128111            | 6.8<br>0.27                                    | 309.0<br>12.17                             | 1.5<br>0.06                                      | 384.0<br>15.12                             | 25.4<br>1.00   | 9.4<br>0.37    | 1730           | 255            | 0.1628         | 55.92<br>123.28     |
| EE128111    | 128160CD   | X2S-128111            | 6.8<br>0.27                                    | 309.0<br>12.17                             | 1.5<br>0.06                                      | 384.0<br>15.12                             | 25.4<br>1.00   | 9.4<br>0.37    | 1620           | 240            | 0.1592         | 56.22<br>123.95     |
| 545112      | 545142CD   | X2S-545112            | 3.5<br>0.14                                    | 302.0<br>11.89                             | 1.5<br>0.06                                      | 345.0<br>13.58                             | 14.2<br>0.56   | 7.9<br>0.31    | 1020           | 477            | 0.1446         | 15.27<br>33.66      |
| EE147112    | 147198DC   | X1S-147112            | 6.4<br>0.25                                    | 329.0<br>12.95                             | 3.3<br>0.13                                      | 468.0<br>18.43                             | 28.4<br>1.12   | 11.7<br>0.46   | 1490           | 138            | 0.1954         | 145.20<br>320.10    |
| M255449     | M255410CD  | M255449XB             | 6.4<br>0.25                                    | 316.0<br>12.44                             | 1.5<br>0.06                                      | 388.0<br>15.27                             | 28.4<br>1.12   | 10.9<br>0.43   | 2300           | 287            | 0.1722         | 62.80<br>138.46     |
| EE722115    | 722186CD   | X2S-722115            | 9.7<br>0.38                                    | 330.0<br>12.99                             | 1.5<br>0.06                                      | 433.0<br>17.04                             | 28.4<br>1.12   | 11.7<br>0.46   | 1890           | 143            | 0.1669         | 111.31<br>245.38    |
| HH258248    | HH258210CD | HH258248XB            | 6.4<br>0.25                                    | 342.0<br>13.46                             | 1.5<br>0.06                                      | 467.5<br>18.40                             | 28.4<br>1.12   | 14.2<br>0.56   | 3850           | 220            | 0.2048         | 229.00<br>504.84    |
| HM256849    | HM256810CD | HM256849XC            | 6.4<br>0.25                                    | 328.0<br>12.91                             | 1.5<br>0.06                                      | 403.5<br>15.88                             | 28.4<br>1.12   | 11.7<br>0.46   | 2550           | 282            | 0.1779         | 72.15<br>159.06     |
| L357049     | L357010CD  | L357049XA             | 6.4<br>0.25                                    | 329.0<br>12.95                             | 1.5<br>0.06                                      | 380.0<br>14.96                             | 19.0<br>0.75   | 7.9<br>0.31    | 1750           | 301            | 0.1585         | 29.83<br>65.76      |
| EE291201    | 291751CD   | X1S-291201            | 8.0<br>0.31                                    | 337.0<br>13.27                             | 1.5<br>0.06                                      | 414.0<br>16.30                             | 22.1<br>0.87   | 11.7<br>0.46   | 1580           | 245            | 0.1557         | 62.62<br>138.05     |
| EE291250    | 291751CD   | X1S-291250            | 8.0<br>0.31                                    | 346.0<br>13.62                             | 1.5<br>0.06                                      | 414.0<br>16.30                             | 22.1<br>0.87   | 11.7<br>0.46   | 1580           | 245            | 0.1557         | 55.13<br>121.55     |
| EE526130    | 526191CD   | X1S-526132            | 6.4<br>0.25                                    | 360.0<br>14.17                             | 1.5<br>0.06                                      | 454.0<br>17.87                             | 28.4<br>1.12   | 11.7<br>0.46   | 2280           | 287            | 0.1790         | 92.08<br>203.00     |
| HM261049    | HM261010CD | HM261049XC            | 6.4<br>0.25                                    | 363.0<br>14.29                             | 1.5<br>0.06                                      | 449.5<br>17.69                             | 28.4<br>1.12   | 11.7<br>0.46   | 3310           | 324            | 0.1935         | 95.17<br>209.80     |
| HH264149    | HH264110CD | HH264149XA            | 14.0<br>0.55                                   | 402.0<br>15.83                             | 3.5<br>0.14                                      | 552.0<br>21.73                             | 28.4<br>1.12   | 15.0<br>0.59   | 5000           | 238            | 0.2228         | 378.88<br>835.26    |
| LM961548    | LM961511D  | LM961548XB            | 3.3<br>0.13                                    | 367.0<br>14.45                             | 1.5<br>0.06                                      | 443.0<br>17.44                             |                |                | 2280           | 300            | 0.2146         | 59.66<br>131.52     |
| EE161363    | 161901CD   | X1S-161362            | 7.0<br>0.28                                    | 379.0<br>14.92                             | 1.5<br>0.06                                      | 455.0<br>17.91                             | 22.1<br>0.87   | 11.7<br>0.46   | 1730           | 299            | 0.1741         | 61.90<br>136.45     |
| HM262748    | HM262710CD | HM262749XC            | 6.4<br>0.25                                    | 377.0<br>14.84                             | 1.5<br>0.06                                      | 467.0<br>18.39                             | 28.4<br>1.12   | 11.7<br>0.46   | 3430           | 322            | 0.1956         | 110.39<br>243.37    |
| HM262749    | HM262710CD | HM262749XC            | 6.4<br>0.25                                    | 377.0<br>14.84                             | 1.5<br>0.06                                      | 467.0<br>18.39                             | 28.4<br>1.12   | 11.7<br>0.46   | 3650           | 342            | 0.1999         | 114.34<br>252.06    |
| EE333137    | 333203CD   | X1S-333137            | 6.4<br>0.25                                    | 382.0<br>15.04                             | 1.5<br>0.06                                      | 478.5<br>18.83                             | 28.4<br>1.12   | 11.7<br>0.46   | 3040           | 337            | 0.1928         | 123.32<br>271.86    |
| EE161394    | 161901CD   | X1S-161393            | 7.0<br>0.28                                    | 385.0<br>15.16                             | 1.5<br>0.06                                      | 455.0<br>17.91                             | 22.1<br>0.87   | 11.7<br>0.46   | 1730           | 299            | 0.1741         | 58.34<br>128.62     |
| L163149     | L163110CD  | L163149XE             | 3.5<br>0.14                                    | 374.0<br>14.72                             | 1.5<br>0.06                                      | 430.0<br>16.93                             | 22.1<br>0.87   | 9.4<br>0.37    | 3210           | 621            | 0.1838         | 46.06<br>101.53     |
| EE231400    | 231976CD   | X2S-161400            | 6.4<br>0.25                                    | 388.0<br>15.28                             | 1.5<br>0.06                                      | 481.0<br>18.94                             | 22.1<br>0.87   | 11.7<br>0.46   | 2390           | 366            | 0.1874         | 81.86<br>180.48     |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

## TDO DOUBLE OUTER RACE

B

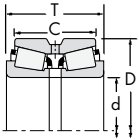
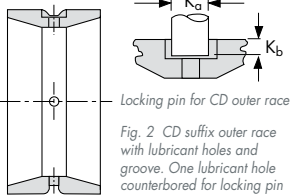
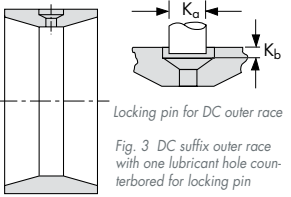


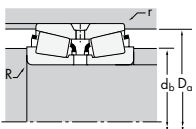
Fig. 1  
D suffix outer race  
with lubricant holes  
and groove



locking pin for CD outer race  
Fig. 2 CD suffix outer race  
with lubricant holes and  
groove. One lubricant hole  
counterbored for locking pin



locking pin for DC outer race  
Fig. 3 DC suffix outer race  
with one lubricant hole counter-  
bored for locking pin



| Dimensions, mm (inches) |                     |                    |                    | Load Ratings, N (lbf.) |      |                |                |                        |                   |                    |      |
|-------------------------|---------------------|--------------------|--------------------|------------------------|------|----------------|----------------|------------------------|-------------------|--------------------|------|
| d                       | D                   | T                  | B                  | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                   |                    |      |
|                         |                     |                    |                    | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | C <sub>a90</sub>  | C <sub>90(2)</sub> | K    |
| 355.600<br>14.0000      | 514.350<br>20.2500  | 155.575<br>6.1250  | 107.950<br>4.2500  | 1570000<br>352000      | 0.44 | 1.53           | 2.28           | 233000<br>52400        | 176000<br>39500   | 406000<br>91200    | 1.33 |
| 355.600<br>14.0000      | 514.350<br>20.2500  | 193.675<br>7.6250  | 152.400<br>6.0000  | 2300000<br>518000      | 0.37 | 1.84           | 2.74           | 343000<br>77200        | 216000<br>48500   | 598000<br>134000   | 1.59 |
| 361.950<br>14.2500      | 477.838<br>18.8125  | 138.112<br>5.4375  | 103.188<br>4.0625  | 1730000<br>389000      | 0.47 | 1.43           | 2.12           | 257000<br>57900        | 208000<br>46900   | 448000<br>101000   | 1.24 |
| 368.250<br>14.4980      | 523.875<br>20.6250  | 214.312<br>8.4375  | 169.862<br>6.6875  | 3380000<br>760000      | 0.33 | 2.03           | 3.02           | 504000<br>113000       | 287000<br>64500   | 877000<br>197000   | 1.76 |
| 371.475<br>14.6250      | 501.650<br>19.7500  | 155.575<br>6.1250  | 107.950<br>4.2500  | 1570000<br>352000      | 0.44 | 1.53           | 2.28           | 233000<br>52400        | 176000<br>39500   | 406000<br>91200    | 1.33 |
| 371.475<br>14.6250      | 514.350<br>20.2500  | 155.575<br>6.1250  | 107.950<br>4.2500  | 1570000<br>352000      | 0.44 | 1.53           | 2.28           | 233000<br>52400        | 176000<br>39500   | 406000<br>91200    | 1.33 |
| 381.000<br>15.0000      | 590.550<br>23.2500  | 244.475<br>9.6250  | 193.675<br>7.6250  | 4250000<br>955000      | 0.33 | 2.03           | 3.02           | 633000<br>142000       | 360000<br>81000   | 1100000<br>248000  | 1.76 |
| 385.762<br>15.1875      | 514.350<br>20.2500  | 177.800<br>7.0000  | 139.700<br>5.5000  | 2310000<br>519000      | 0.42 | 1.61           | 2.40           | 344000<br>77300        | 246000<br>55400   | 599000<br>135000   | 1.40 |
| 393.700<br>15.5000      | 539.750<br>21.2500  | 142.875<br>5.6250  | 101.600<br>4.0000  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100   | 419000<br>94200    | 1.23 |
| 393.700<br>15.5000      | 558.800<br>22.0000  | 146.050<br>5.7500  | 104.775<br>4.1250  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100   | 419000<br>94200    | 1.23 |
| 406.400<br>16.0000      | 539.750<br>21.2500  | 142.875<br>5.6250  | 101.600<br>4.0000  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100   | 419000<br>94200    | 1.23 |
| 406.400<br>16.0000      | 558.800<br>22.0000  | 146.050<br>5.7500  | 104.775<br>4.1250  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100   | 419000<br>94200    | 1.23 |
| 406.400<br>16.0000      | 762.000<br>30.0000  | 368.300<br>14.5000 | 222.250<br>8.7500  | 7140000<br>1610000     | 0.94 | 0.72           | 1.07           | 1060000<br>239000      | 1710000<br>384000 | 1850000<br>416000  | 0.62 |
| 415.925<br>16.3750      | 590.550<br>23.2500  | 244.475<br>9.6250  | 193.675<br>7.6250  | 4250000<br>955000      | 0.33 | 2.03           | 3.02           | 633000<br>142000       | 360000<br>81000   | 1100000<br>248000  | 1.76 |
| 430.212<br>16.9375      | 603.250<br>23.7500  | 159.639<br>6.2850  | 104.775<br>4.1250  | 1680000<br>377000      | 0.52 | 1.29           | 1.92           | 250000<br>56100        | 224000<br>50400   | 435000<br>97700    | 1.11 |
| 431.800<br>17.0000      | 603.250<br>23.7500  | 159.639<br>6.2850  | 104.775<br>4.1250  | 1680000<br>377000      | 0.52 | 1.29           | 1.92           | 250000<br>56100        | 224000<br>50400   | 435000<br>97700    | 1.11 |
| 431.902<br>17.0040      | 685.698<br>26.9960  | 365.125<br>14.3750 | 295.275<br>11.6250 | 7920000<br>1780000     | 0.32 | 2.08           | 3.09           | 1180000<br>265000      | 656000<br>147000  | 2050000<br>462000  | 1.80 |
| 457.200<br>18.0000      | 596.900<br>23.5000  | 165.100<br>6.5000  | 120.650<br>4.7500  | 2100000<br>473000      | 0.40 | 1.67           | 2.48           | 313000<br>70500        | 217000<br>48800   | 546000<br>123000   | 1.44 |
| 457.200<br>18.0000      | 730.148<br>28.7460  | 254.000<br>10.0000 | 177.800<br>7.0000  | 4820000<br>1080000     | 0.39 | 1.72           | 2.56           | 718000<br>161000       | 483000<br>109000  | 1250000<br>281000  | 1.49 |
| 488.950<br>19.2500      | 634.873<br>24.9950  | 180.975<br>7.1250  | 136.525<br>5.3750  | 2770000<br>622000      | 0.47 | 1.43           | 2.12           | 412000<br>92700        | 334000<br>75000   | 718000<br>161000   | 1.24 |
| 549.275<br>21.6250      | 692.150<br>27.2500  | 174.625<br>6.8750  | 136.525<br>5.3750  | 2590000<br>583000      | 0.38 | 1.79           | 2.67           | 386000<br>86800        | 249000<br>55900   | 672000<br>151000   | 1.55 |
| 558.800<br>22.0000      | 736.600<br>29.0000  | 165.100<br>6.5000  | 114.300<br>4.5000  | 2390000<br>537000      | 0.51 | 1.33           | 1.98           | 356000<br>80000        | 310000<br>69600   | 619000<br>139000   | 1.15 |
| 558.800<br>22.0000      | 736.600<br>29.0000  | 225.425<br>8.8750  | 177.800<br>7.0000  | 4390000<br>987000      | 0.35 | 1.95           | 2.90           | 653000<br>147000       | 387000<br>87100   | 1140000<br>256000  | 1.69 |
| 711.200<br>28.0000      | 914.400<br>36.0000  | 190.500<br>7.5000  | 139.700<br>5.5000  | 3550000<br>798000      | 0.38 | 1.77           | 2.64           | 529000<br>119000       | 344000<br>77400   | 920000<br>207000   | 1.54 |
| 723.900<br>28.5000      | 914.400<br>36.0000  | 187.325<br>7.3750  | 139.700<br>5.5000  | 3550000<br>798000      | 0.38 | 1.77           | 2.64           | 529000<br>119000       | 344000<br>77400   | 920000<br>207000   | 1.54 |
| 723.900<br>28.5000      | 977.900<br>38.5000  | 187.325<br>7.3750  | 139.700<br>5.5000  | 3550000<br>798000      | 0.38 | 1.77           | 2.64           | 529000<br>119000       | 344000<br>77400   | 920000<br>207000   | 1.54 |
| 723.900<br>28.5000      | 1003.300<br>39.5000 | 187.325<br>7.3750  | 139.700<br>5.5000  | 3550000<br>798000      | 0.38 | 1.77           | 2.64           | 529000<br>119000       | 344000<br>77400   | 920000<br>207000   | 1.54 |
| 1784.350<br>70.2500     | 2006.600<br>79.0000 | 241.300<br>9.5000  | 177.800<br>7.0000  | 8250000<br>1850000     | 0.44 | 1.54           | 2.29           | 1230000<br>276000      | 924000<br>208000  | 2140000<br>481000  | 1.33 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

(3) These maximum fillet radii will be cleared by the bearing corners.

(4) If a spacer with provision for lubricant passage is required, consult your Timken representative.

| Part Number |            |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Pin            |                | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|------------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|             |            |                       | Shaft                                          |                                            | Housing                                          |                                            |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer      | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>b</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>a</sub> | K <sub>a</sub> | K <sub>b</sub> |                |                |                | G <sub>1</sub>      |
| EE231400    | 232026D    | X1S-231401            | 6.4<br>0.25                                    | 388.0<br>15.28                             | 1.5<br>0.06                                      | 481.0<br>18.94                             |                |                | 2390           | 366            | 0.1874         | 92.55<br>204.04     |
| EE333140    | 333203CD   | X1S-333140            | 6.4<br>0.25                                    | 387.0<br>15.24                             | 1.5<br>0.06                                      | 478.5<br>18.83                             | 28.4<br>1.12   | 11.7<br>0.46   | 3040           | 337            | 0.1928         | 117.25<br>258.50    |
| LM763848    | LM763811DC | LM763848XA            | 3.3<br>0.13                                    | 383.0<br>15.08                             | 1.5<br>0.06                                      | 461.5<br>18.16                             | 22.1<br>0.87   | 7.1<br>0.28    | 2600           | 418            | 0.1980         | 59.39<br>130.93     |
| HM265049    | HM265010CD | HM265049XC            | 6.4<br>0.25                                    | 400.0<br>15.75                             | 1.5<br>0.06                                      | 498.5<br>19.63                             | 28.4<br>1.12   | 11.7<br>0.46   | 4300           | 372            | 0.2106         | 140.91<br>310.64    |
| EE231462    | 231976CD   | X2S-231462            | 6.4<br>0.25                                    | 400.0<br>15.75                             | 1.5<br>0.06                                      | 481.0<br>18.94                             | 22.1<br>0.87   | 11.7<br>0.46   | 2390           | 366            | 0.1874         | 72.19<br>159.14     |
| EE231462    | 232026D    | X1S-231462            | 6.4<br>0.25                                    | 400.0<br>15.75                             | 1.5<br>0.06                                      | 481.0<br>18.94                             |                |                | 2390           | 366            | 0.1874         | 82.88<br>182.71     |
| M268730     | M268710CD  | M268730XA             | 6.4<br>0.25                                    | 425.0<br>16.73                             | 1.5<br>0.06                                      | 562.0<br>22.13                             | 28.4<br>1.12   | 14.2<br>0.56   | 5750           | 421            | 0.2319         | 236.50<br>521.39    |
| LM665949    | LM665910CD | LM665949XB            | 6.4<br>0.25                                    | 415.0<br>16.34                             | 1.5<br>0.06                                      | 495.0<br>19.49                             | 28.4<br>1.12   | 12.7<br>0.50   | 3740           | 480            | 0.2155         | 93.50<br>206.14     |
| EE234154    | 234213CD   | X3S-234154            | 6.4<br>0.25                                    | 426.0<br>16.77                             | 1.5<br>0.06                                      | 515.5<br>20.30                             | 22.1<br>0.87   | 12.7<br>0.50   | 2780           | 448            | 0.2018         | 83.95<br>185.07     |
| EE234154    | 234221D    | X1S-234154            | 6.4<br>0.25                                    | 426.0<br>16.77                             | 1.5<br>0.06                                      | 515.5<br>20.30                             |                |                | 2780           | 448            | 0.2018         | 99.47<br>219.28     |
| EE234160    | 234213CD   | X1S-234160            | 6.4<br>0.25                                    | 435.0<br>17.13                             | 1.5<br>0.06                                      | 515.5<br>20.30                             | 22.1<br>0.87   | 12.7<br>0.50   | 2780           | 448            | 0.2018         | 75.19<br>165.77     |
| EE234160    | 234221D    | X3S-234160            | 6.4<br>0.25                                    | 435.0<br>17.13                             | 1.5<br>0.06                                      | 515.5<br>20.30                             |                |                | 2780           | 448            | 0.2018         | 90.77<br>200.11     |
| H969249     | H969210D   | H969249XA             | 12.7<br>0.50                                   | 513.0<br>20.20                             | 3.3<br>0.13                                      | 719.5<br>28.32                             |                |                | 4610           | 207            | 0.2945         | 649.84<br>1432.63   |
| M268749     | M268710CD  | M268749XE             | 6.4<br>0.25                                    | 451.0<br>17.76                             | 1.5<br>0.06                                      | 562.0<br>22.13                             | 28.4<br>1.12   | 14.2<br>0.56   | 5750           | 421            | 0.2319         | 205.00<br>451.94    |
| EE241693    | 242377CD   | X2S-241693            | 6.4<br>0.25                                    | 465.0<br>18.31                             | 1.5<br>0.06                                      | 561.0<br>22.09                             | 22.1<br>0.87   | 13.5<br>0.53   | 3350           | 551            | 0.2207         | 121.97<br>268.90    |
| EE241701    | 242377CD   | X2S-241701            | 6.4<br>0.25                                    | 466.0<br>18.35                             | 1.5<br>0.06                                      | 561.0<br>22.09                             | 22.1<br>0.87   | 13.5<br>0.53   | 3350           | 551            | 0.2207         | 121.18<br>267.15    |
| EE650170    | 650270D    | X1S-650170            | 6.4<br>0.25                                    | 477.0<br>18.78                             | 3.3<br>0.13                                      | 648.5<br>25.53                             |                |                | 7670           | 341            | 0.2542         | 484.91<br>1069.04   |
| EE244180    | 244236CD   | X1S-244180            | 9.7<br>0.38                                    | 494.0<br>19.45                             | 1.5<br>0.06                                      | 570.5<br>22.47                             | 28.4<br>1.12   | 11.7<br>0.46   | 4410           | 627            | 0.2233         | 105.26<br>232.06    |
| EE671801    | 672875D    | X1S-671801            | 9.7<br>0.38                                    | 507.0<br>19.96                             | 1.5<br>0.06                                      | 680.5<br>26.79                             |                |                | 4970           | 343            | 0.2315         | 366.55<br>808.08    |
| LM772748    | LM772710CD | LM772748XB            | 6.4<br>0.25                                    | 522.0<br>20.55                             | 1.5<br>0.06                                      | 612.0<br>24.09                             | 28.4<br>1.12   | 14.2<br>0.56   | 5450           | 602            | 0.2525         | 134.20<br>295.86    |
| L476549     | L476510CD  | L476549XA             | 6.4<br>0.25                                    | 579.0<br>22.80                             | 1.5<br>0.06                                      | 666.0<br>26.22                             | 28.4<br>1.12   | 14.2<br>0.56   | 7260           | 889            | 0.2567         | 142.18<br>313.45    |
| EE542220    | 542291CD   | X2S-542220            | 6.4<br>0.25                                    | 594.0<br>23.39                             | 3.3<br>0.13                                      | 705.0<br>27.76                             | 25.4<br>1.00   | 13.5<br>0.53   | 5730           | 782            | 0.2604         | 166.76<br>367.63    |
| LM377449    | LM377410CD | LM377449XB            | 6.4<br>0.25                                    | 594.0<br>23.39                             | 1.5<br>0.06                                      | 708.0<br>27.87                             | 28.4<br>1.12   | 16.5<br>0.65   | 9310           | 907            | 0.2735         | 245.75<br>541.77    |
| EE755280    | 755361CD   | X1S-755280            | 6.4<br>0.25                                    | 750.0<br>29.53                             | 3.3<br>0.13                                      | 877.0<br>34.53                             | 28.4<br>1.12   | 15.7<br>0.62   | 11100          | 1280           | 0.2952         | 292.59<br>645.04    |
| EE755285    | 755361CD   | X2S-755285            | 5.5<br>0.22                                    | 756.0<br>29.76                             | 3.3<br>0.13                                      | 877.0<br>34.53                             | 28.4<br>1.12   | 15.7<br>0.62   | 11100          | 1280           | 0.2952         | 269.33<br>593.76    |
| EE755285    | 755365CD   |                       | 5.5<br>0.22                                    | 756.0<br>29.76                             | 3.3<br>0.13                                      | 900.0<br>35.43                             | 28.4<br>1.12   | 19.8<br>0.78   | 11100          | 1280           | 0.2952         | 344.62<br>759.74    |
| EE755285    | 755367CD   | X1S-755285            | 5.5<br>0.22                                    | 756.0<br>29.76                             | 3.3<br>0.13                                      | 912.0<br>35.91                             | 28.4<br>1.12   | 19.8<br>0.78   | 11100          | 1280           | 0.2952         | 396.42<br>873.94    |
| LL789849    | LL789810D  | LL789849XA            | 12.7<br>0.50                                   | 1840.0<br>72.44                            | 3.3<br>0.13                                      | 1966.0<br>77.40                            |                |                | 93400          | 10400          | 0.6160         | 937.57<br>2066.96   |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.





## **ROLLER BEARINGS**



### **NOTES**

**B**





**TDI**  
DOUBLE  
INNER RACE

**TAPERED ROLLER BEARINGS**

- TDI style consists of a single piece (double) inner race plus two single outer races.
- Normally supplied complete with an outer race spacer as a pre-set assembly.
- To suit the application duty, the built-in setting value needs to be established by your Timken representative before an order is placed.
- Groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.
- To obtain a price quotation, specify the bearing and spacer part numbers.

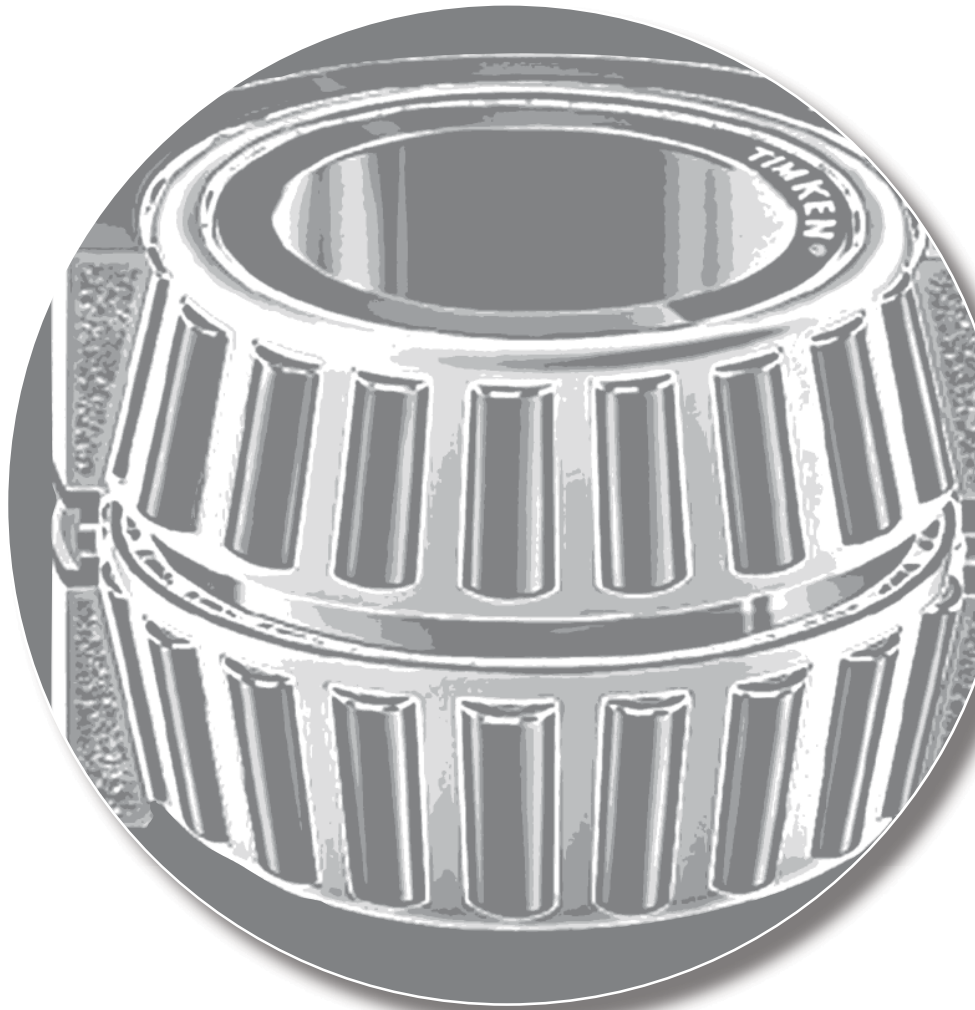
Example:      inner race                      outer race  
                         17116D - 17244  
                         Y3S - 17244 spacer

**BEARING DATA TABLES**

In the following bearing data tables, part numbers are listed in ascending order of bore, outside diameter and width.

Bearing ratings shown in tables are based on environmental reference conditions. Effects of known operating conditions on bearing performance in an application should be investigated before final bearing selection is made.

Approximate mass is listed for every part number. For weight-critical applications or exact freight cost evaluation purposes, a more accurate value should be obtained from your Timken representative.





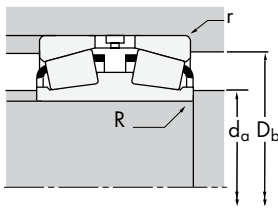
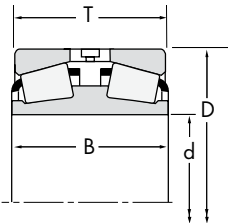


# ROLLER BEARINGS

## TDI

### DOUBLE INNER RACE

B



| Dimensions, mm (inches) |                   |                  |                  | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|-------------------|------------------|------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                 | T                | B                | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                   |                  |                  | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 25.400<br>1.0000        | 51.994<br>2.0470  | 30.079<br>1.1842 | 36.512<br>1.4375 | 46900<br>10500         | 0.40 | 1.68           | 2.50           | 6990<br>1570           | 4810<br>1080     | 12200<br>2730      | 1.45 |
| 30.162<br>1.1875        | 62.000<br>2.4409  | 33.797<br>1.3306 | 34.925<br>1.3750 | 69700<br>15700         | 0.38 | 1.77           | 2.63           | 10400<br>2330          | 6800<br>1530     | 18100<br>4060      | 1.53 |
| 31.750<br>1.2500        | 69.012<br>2.7170  | 39.705<br>1.5632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 31.750<br>1.2500        | 69.012<br>2.7170  | 39.705<br>1.5632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 31.750<br>1.2500        | 72.085<br>2.8380  | 44.785<br>1.7632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 33.338<br>1.3125        | 69.012<br>2.7170  | 39.705<br>1.5632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 33.338<br>1.3125        | 69.012<br>2.7170  | 39.705<br>1.5632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 33.338<br>1.3125        | 72.085<br>2.8380  | 44.785<br>1.7632 | 39.182<br>1.5426 | 88000<br>19800         | 0.38 | 1.77           | 2.63           | 13100<br>2950          | 8570<br>1930     | 22800<br>5130      | 1.53 |
| 36.512<br>1.4375        | 68.262<br>2.6875  | 36.810<br>1.4492 | 38.100<br>1.5000 | 81700<br>18400         | 0.44 | 1.52           | 2.26           | 12200<br>2740          | 9260<br>2080     | 21200<br>4760      | 1.31 |
| 36.512<br>1.4375        | 71.438<br>2.8125  | 36.810<br>1.4492 | 38.100<br>1.5000 | 81700<br>18400         | 0.44 | 1.52           | 2.26           | 12200<br>2740          | 9260<br>2080     | 21200<br>4760      | 1.31 |
| 36.512<br>1.4375        | 72.000<br>2.8346  | 39.096<br>1.5392 | 38.100<br>1.5000 | 81700<br>18400         | 0.44 | 1.52           | 2.26           | 12200<br>2740          | 9260<br>2080     | 21200<br>4760      | 1.31 |
| 42.862<br>1.6875        | 80.962<br>3.1875  | 34.925<br>1.3750 | 31.750<br>1.2500 | 81900<br>18400         | 0.53 | 1.28           | 1.90           | 12200<br>2740          | 11000<br>2480    | 21200<br>4770      | 1.11 |
| 42.862<br>1.6875        | 85.000<br>3.3465  | 50.262<br>1.9788 | 52.375<br>2.0620 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 42.862<br>1.6875        | 90.119<br>3.5480  | 54.991<br>2.1650 | 52.375<br>2.0620 | 132000<br>29700        | 0.31 | 2.20           | 3.28           | 19600<br>4420          | 10300<br>2320    | 34200<br>7690      | 1.91 |
| 44.450<br>1.7500        | 80.962<br>3.1875  | 34.925<br>1.3750 | 31.750<br>1.2500 | 81900<br>18400         | 0.53 | 1.28           | 1.90           | 12200<br>2740          | 11000<br>2480    | 21200<br>4770      | 1.11 |
| 47.625<br>1.8750        | 93.264<br>3.6718  | 50.013<br>1.9690 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 47.625<br>1.8750        | 96.838<br>3.8125  | 53.188<br>2.0940 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 47.625<br>1.8750        | 100.000<br>3.9370 | 58.735<br>2.3124 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 49.212<br>1.9375        | 93.264<br>3.6718  | 50.013<br>1.9690 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 49.212<br>1.9375        | 96.838<br>3.8125  | 53.188<br>2.0940 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 49.212<br>1.9375        | 100.000<br>3.9370 | 58.735<br>2.3124 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 50.800<br>2.0000        | 88.900<br>3.5000  | 41.275<br>1.6250 | 61.112<br>2.4060 | 138000<br>31100        | 0.32 | 2.11           | 3.14           | 20600<br>4640          | 11300<br>2540    | 35900<br>8070      | 1.83 |
| 50.800<br>2.0000        | 93.264<br>3.6718  | 50.013<br>1.9690 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 50.800<br>2.0000        | 96.838<br>3.8125  | 53.188<br>2.0940 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 50.800<br>2.0000        | 100.000<br>3.9370 | 58.735<br>2.3124 | 53.188<br>2.0940 | 142000<br>31900        | 0.34 | 1.99           | 2.97           | 21100<br>4750          | 12200<br>2750    | 36800<br>8260      | 1.73 |
| 54.987<br>2.1649        | 140.030<br>5.5130 | 66.091<br>2.6020 | 65.989<br>2.5980 | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100     | 0.67 |
| 55.562<br>2.1875        | 96.838<br>3.8125  | 51.298<br>2.0196 | 53.188<br>2.0940 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |
| 55.562<br>2.1875        | 100.000<br>3.9370 | 51.298<br>2.0196 | 53.188<br>2.0940 | 147000<br>33000        | 0.35 | 1.91           | 2.84           | 21800<br>4910          | 13200<br>2980    | 38000<br>8550      | 1.65 |

<sup>(1)</sup> Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

<sup>(2)</sup> Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

<sup>(3)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(4)</sup> A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.

| Part Number |       |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|-------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|---------------------|
|             |       |                       | Shaft                                          |                                            | Housing                                          |                                            | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>b</sub> |                |                |                |                     |
| 07100D      | 07204 |                       | 0.8<br>0.03                                    | 30.0<br>1.18                               | 1.3<br>0.05                                      | 45.0<br>1.77                               | 7.6            | 6.99           | 0.0509         | 0.30<br>0.67        |
| 17116D      | 17244 |                       | 0.8<br>0.03                                    | 35.5<br>1.40                               | 1.5<br>0.06                                      | 54.0<br>2.13                               | 11.8           | 7.49           | 0.0579         | 0.46<br>1.02        |
| 14126D      | 14274 |                       | 1.5<br>0.06                                    | 40.0<br>1.57                               | 3.3<br>0.13                                      | 59.0<br>2.32                               | 18             | 9.4            | 0.0668         | 0.70<br>1.54        |
| 14126D      | 14276 | Y2S-14276             | 1.5<br>0.06                                    | 40.0<br>1.57                               | 1.3<br>0.05                                      | 60.0<br>2.36                               | 18             | 9.4            | 0.0668         | 0.71<br>1.57        |
| 14126D      | 14283 |                       | 1.5<br>0.06                                    | 40.0<br>1.57                               | 2.3<br>0.09                                      | 60.0<br>2.36                               | 18             | 9.4            | 0.0668         | 0.86<br>1.90        |
| 14134D      | 14274 |                       | 1.5<br>0.06                                    | 41.0<br>1.61                               | 3.3<br>0.13                                      | 59.0<br>2.32                               | 18             | 9.4            | 0.0668         | 0.67<br>1.48        |
| 14134D      | 14276 |                       | 1.5<br>0.06                                    | 41.0<br>1.61                               | 1.3<br>0.05                                      | 60.0<br>2.36                               | 18             | 9.4            | 0.0668         | 0.69<br>1.51        |
| 14134D      | 14283 |                       | 1.5<br>0.06                                    | 41.0<br>1.61                               | 2.3<br>0.09                                      | 60.0<br>2.36                               | 18             | 9.4            | 0.0668         | 0.84<br>1.85        |
| 19145D      | 19268 |                       | 0.8<br>0.03                                    | 42.5<br>1.67                               | 1.5<br>0.06                                      | 61.0<br>2.40                               | 17.5           | 11.5           | 0.0694         | 0.60<br>1.32        |
| 19145D      | 19281 |                       | 0.8<br>0.03                                    | 42.5<br>1.67                               | 1.0<br>0.04                                      | 63.0<br>2.48                               | 17.5           | 11.5           | 0.0694         | 0.66<br>1.46        |
| 19145D      | 19283 |                       | 0.8<br>0.03                                    | 42.5<br>1.67                               | 1.5<br>0.06                                      | 63.0<br>2.48                               | 17.5           | 11.5           | 0.0694         | 0.72<br>1.58        |
| 13169D      | 13318 | Y2S-13318             | 0.8<br>0.03                                    | 50.0<br>1.97                               | 1.5<br>0.06                                      | 72.0<br>2.83                               | 23             | 15.4           | 0.0799         | 0.74<br>1.64        |
| 358D        | 354A  |                       | 1.5<br>0.06                                    | 51.0<br>2.01                               | 1.3<br>0.05                                      | 77.0<br>3.03                               | 30             | 12.2           | 0.0732         | 1.27<br>2.79        |
| 358D        | 352   |                       | 1.5<br>0.06                                    | 51.0<br>2.01                               | 2.3<br>0.09                                      | 78.0<br>3.07                               | 30             | 12.2           | 0.0732         | 1.56<br>3.44        |
| 13176D      | 13318 | Y1S-13318             | 0.1<br>0.01                                    | 50.0<br>1.97                               | 1.5<br>0.06                                      | 72.0<br>2.83                               | 23             | 15.4           | 0.0799         | 0.72<br>1.58        |
| 376DE       | 374   |                       | 0.8<br>0.03                                    | 55.0<br>2.17                               | 1.3<br>0.05                                      | 85.0<br>3.35                               | 37.6           | 15.4           | 0.0816         | 1.52<br>3.35        |
| 376DE       | 372A  |                       | 0.8<br>0.03                                    | 55.0<br>2.17                               | 1.5<br>0.06                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 1.73<br>3.82        |
| 376DE       | 372   |                       | 0.8<br>0.03                                    | 55.0<br>2.17                               | 2.0<br>0.08                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 2.01<br>4.43        |
| 378DE       | 374   |                       | 0.8<br>0.03                                    | 56.0<br>2.20                               | 1.3<br>0.05                                      | 85.0<br>3.35                               | 37.6           | 15.4           | 0.0816         | 1.47<br>3.25        |
| 378DE       | 372A  |                       | 0.8<br>0.03                                    | 56.0<br>2.20                               | 1.5<br>0.06                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 1.69<br>3.72        |
| 378DE       | 372   |                       | 0.8<br>0.03                                    | 56.0<br>2.20                               | 2.0<br>0.08                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 1.96<br>4.33        |
| 368D        | 362A  |                       | 0.8<br>0.03                                    | 57.0<br>2.24                               | 1.3<br>0.05                                      | 81.0<br>3.19                               | 33.8           | 12.5           | 0.0773         | 1.22<br>2.68        |
| 375D        | 374   | Y1S-374               | 0.8<br>0.03                                    | 57.0<br>2.24                               | 1.3<br>0.05                                      | 85.0<br>3.35                               | 37.6           | 15.4           | 0.0816         | 1.40<br>3.09        |
| 375D        | 372A  | Y1S-372A              | 0.8<br>0.03                                    | 57.0<br>2.24                               | 1.5<br>0.06                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 1.61<br>3.56        |
| 375D        | 372   |                       | 0.8<br>0.03                                    | 57.0<br>2.24                               | 2.0<br>0.08                                      | 86.0<br>3.39                               | 37.6           | 15.4           | 0.0816         | 1.89<br>4.17        |
| 78216D      | 78551 |                       | 2.3<br>0.09                                    | 79.0<br>3.11                               | 2.3<br>0.09                                      | 117.0<br>4.61                              | 62.6           | 19.1           | 0.0884         | 5.19<br>11.45       |
| 389DE       | 382A  | Y2S-382A              | 0.8<br>0.03                                    | 62.0<br>2.44                               | 0.8<br>0.03                                      | 89.0<br>3.50                               | 42             | 15.7           | 0.0859         | 2.04<br>4.50        |
| 389DE       | 383A  |                       | 0.8<br>0.03                                    | 62.0<br>2.44                               | 2.0<br>0.08                                      | 89.0<br>3.50                               | 42             | 15.7           | 0.0859         | 1.59<br>3.49        |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.



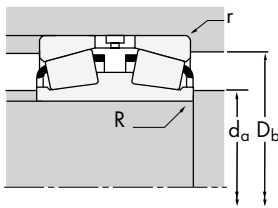
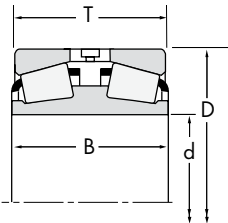


# ROLLER BEARINGS

## TDI

### DOUBLE INNER RACE

B



| Dimensions, mm (inches) |                   |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                        |      |
|-------------------------|-------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|------------------------|------|
| d                       | D                 | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  | Dynamic <sup>(2)</sup> |      |
|                         |                   |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub>     | K    |
| 61.912<br>2.4375        | 110.000<br>4.3307 | 55.550<br>2.1870  | 55.550<br>2.1870  | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290          | 1.45 |
| 61.912<br>2.4375        | 110.000<br>4.3307 | 55.550<br>2.1870  | 55.550<br>2.1870  | 159000<br>35800        | 0.40 | 1.68           | 2.50           | 23700<br>5340          | 16300<br>3670    | 41300<br>9290          | 1.45 |
| 63.500<br>2.5000        | 112.712<br>4.4375 | 60.325<br>2.3750  | 60.325<br>2.3750  | 269000<br>60500        | 0.34 | 1.99           | 2.96           | 40100<br>9010          | 23300<br>5230    | 69800<br>15700         | 1.72 |
| 63.500<br>2.5000        | 136.525<br>5.3750 | 66.091<br>2.6020  | 65.989<br>2.5980  | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100         | 0.67 |
| 63.500<br>2.5000        | 140.030<br>5.5130 | 66.091<br>2.6020  | 65.989<br>2.5980  | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100         | 0.67 |
| 64.987<br>2.5586        | 136.525<br>5.3750 | 66.091<br>2.6020  | 65.989<br>2.5980  | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100         | 0.67 |
| 64.987<br>2.5586        | 140.030<br>5.5130 | 66.091<br>2.6020  | 65.989<br>2.5980  | 276000<br>62000        | 0.87 | 0.78           | 1.16           | 41100<br>9230          | 60900<br>13700   | 71500<br>16100         | 0.67 |
| 80.962<br>3.1875        | 133.350<br>5.2500 | 60.325<br>2.3750  | 59.538<br>2.3440  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500         | 1.31 |
| 80.962<br>3.1875        | 136.525<br>5.3750 | 60.325<br>2.3750  | 59.538<br>2.3440  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500         | 1.31 |
| 80.962<br>3.1875        | 139.992<br>5.5115 | 80.962<br>3.1875  | 80.134<br>3.1549  | 333000<br>75000        | 0.40 | 1.67           | 2.49           | 49600<br>11200         | 34300<br>7720    | 86400<br>19400         | 1.45 |
| 84.138<br>3.3125        | 133.350<br>5.2500 | 76.200<br>3.0000  | 75.413<br>2.9690  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500         | 1.31 |
| 84.138<br>3.3125        | 136.525<br>5.3750 | 76.200<br>3.0000  | 75.413<br>2.9690  | 249000<br>56000        | 0.44 | 1.52           | 2.26           | 37100<br>8330          | 28200<br>6340    | 64600<br>14500         | 1.31 |
| 85.725<br>3.3750        | 123.825<br>4.8750 | 41.278<br>1.6251  | 44.450<br>1.7500  | 149000<br>33600        | 0.33 | 2.05           | 3.05           | 22200<br>5000          | 12600<br>2820    | 38700<br>8700          | 1.77 |
| 85.725<br>3.3750        | 127.000<br>5.0000 | 41.278<br>1.6251  | 44.450<br>1.7500  | 149000<br>33600        | 0.33 | 2.05           | 3.05           | 22200<br>5000          | 12600<br>2820    | 38700<br>8700          | 1.77 |
| 88.900<br>3.5000        | 161.925<br>6.3750 | 101.549<br>3.9980 | 107.950<br>4.2500 | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700        | 1.71 |
| 88.900<br>3.5000        | 168.275<br>6.6250 | 101.549<br>3.9980 | 107.950<br>4.2500 | 528000<br>119000       | 0.34 | 1.98           | 2.95           | 78500<br>17700         | 45900<br>10300   | 137000<br>30700        | 1.71 |
| 92.075<br>3.6250        | 148.430<br>5.8437 | 57.150<br>2.2500  | 57.942<br>2.2812  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300         | 1.19 |
| 92.075<br>3.6250        | 149.225<br>5.8750 | 63.500<br>2.5000  | 57.942<br>2.2812  | 263000<br>59000        | 0.49 | 1.37           | 2.04           | 39100<br>8790          | 33000<br>7410    | 68100<br>15300         | 1.19 |
| 95.250<br>3.7500        | 136.525<br>5.3750 | 57.150<br>2.2500  | 57.150<br>2.2500  | 225000<br>50600        | 0.28 | 2.38           | 3.54           | 33500<br>7530          | 16300<br>3660    | 58300<br>13100         | 2.06 |
| 95.250<br>3.7500        | 190.500<br>7.5000 | 117.475<br>4.6250 | 127.000<br>5.0000 | 860000<br>193000       | 0.33 | 2.02           | 3.00           | 128000<br>28800        | 73400<br>16500   | 223000<br>50100        | 1.74 |
| 98.425<br>3.8750        | 180.975<br>7.1250 | 101.600<br>4.0000 | 102.362<br>4.0300 | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500        | 1.51 |
| 101.600<br>4.0000       | 157.162<br>6.1875 | 80.167<br>3.1562  | 79.375<br>3.1250  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000         | 1.23 |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 80.167<br>3.1562  | 79.375<br>3.1250  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000         | 1.23 |
| 101.600<br>4.0000       | 161.925<br>6.3750 | 86.517<br>3.4062  | 79.375<br>3.1250  | 360000<br>81000        | 0.47 | 1.42           | 2.12           | 53600<br>12100         | 43600<br>9800    | 93400<br>21000         | 1.23 |
| 101.600<br>4.0000       | 190.500<br>7.5000 | 117.475<br>4.6250 | 127.000<br>5.0000 | 738000<br>166000       | 0.33 | 2.02           | 3.00           | 110000<br>24700        | 63000<br>14200   | 191000<br>43000        | 1.74 |
| 104.775<br>4.1250       | 180.975<br>7.1250 | 101.600<br>4.0000 | 102.362<br>4.0300 | 558000<br>125000       | 0.39 | 1.75           | 2.61           | 83100<br>18700         | 54800<br>12300   | 145000<br>32500        | 1.51 |
| 107.950<br>4.2500       | 190.500<br>7.5000 | 98.425<br>3.8750  | 101.600<br>4.0000 | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200        | 1.40 |
| 107.950<br>4.2500       | 191.976<br>7.5581 | 98.425<br>3.8750  | 101.600<br>4.0000 | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200        | 1.40 |

<sup>(1)</sup> Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

<sup>(2)</sup> Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

<sup>(3)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(4)</sup> A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.

| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>b</sub> |                |                |                |                     |
| 399D        | 394A     |                       | 0.8<br>0.03                                    | 70.0<br>2.76                               | 1.3<br>0.05                                      | 101.0<br>3.98                              | 56             | 21.4           | 0.0984         | 2.04<br>4.50        |
| 399D        | 394AS    |                       | 0.8<br>0.03                                    | 70.0<br>2.76                               | 3.3<br>0.13                                      | 99.0<br>3.90                               | 56             | 21.4           | 0.0984         | 2.01<br>4.44        |
| 39585D      | 39520    | Y8S-39520             | 0.8<br>0.03                                    | 72.0<br>2.83                               | 3.3<br>0.13                                      | 101.0<br>3.98                              | 84.3           | 23.7           | 0.1074         | 2.59<br>5.70        |
| 78251D      | 78537    | Y2S-78537             | 2.3<br>0.09                                    | 79.0<br>3.11                               | 3.3<br>0.13                                      | 115.0<br>4.53                              | 62.6           | 19.1           | 0.0884         | 4.49<br>9.90        |
| 78251D      | 78551    | Y1S-78551             | 2.3<br>0.09                                    | 79.0<br>3.11                               | 2.3<br>0.09                                      | 117.0<br>4.61                              | 62.6           | 19.1           | 0.0884         | 4.76<br>10.50       |
| 78255D      | 78537    | Y1S-78537             | 1.5<br>0.06                                    | 79.0<br>3.11                               | 3.3<br>0.13                                      | 115.0<br>4.53                              | 62.6           | 19.1           | 0.0884         | 4.48<br>9.89        |
| 78255D      | 78551    | Y3S-78551             | 1.5<br>0.06                                    | 79.0<br>3.11                               | 2.3<br>0.09                                      | 117.0<br>4.61                              | 62.6           | 19.1           | 0.0884         | 4.75<br>10.48       |
| 496D        | 492A     | Y2S-492A              | 1.5<br>0.06                                    | 91.0<br>3.58                               | 3.3<br>0.13                                      | 120.0<br>4.72                              | 105            | 29.3           | 0.1252         | 3.37<br>7.43        |
| 496D        | 493      | Y4S-493               | 1.5<br>0.06                                    | 91.0<br>3.58                               | 3.3<br>0.13                                      | 122.0<br>4.80                              | 105            | 29.3           | 0.1252         | 3.52<br>7.77        |
| 581D        | 572      | Y5S-572               | 1.5<br>0.06                                    | 92.0<br>3.62                               | 3.3<br>0.13                                      | 125.0<br>4.92                              | 126            | 32             | 0.1295         | 5.22<br>11.51       |
| 498D        | 492A     | Y3S-492A              | 0.8<br>0.03                                    | 92.0<br>3.62                               | 3.3<br>0.13                                      | 120.0<br>4.72                              | 105            | 29.3           | 0.1252         | 3.68<br>8.11        |
| 498D        | 493      | Y5S-493               | 0.8<br>0.03                                    | 92.0<br>3.62                               | 3.3<br>0.13                                      | 122.0<br>4.80                              | 105            | 29.3           | 0.1252         | 3.95<br>8.70        |
| L217845D    | L217810  | L217810EA             | 0.8<br>0.03                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 116.0<br>4.57                              | 111            | 74.7           | 0.1152         | 1.72<br>3.80        |
| L217845D    | L217813  | L217813EA             | 0.8<br>0.03                                    | 93.0<br>3.66                               | 1.5<br>0.06                                      | 117.0<br>4.61                              | 111            | 74.7           | 0.1152         | 1.94<br>4.28        |
| 767D        | 752      | Y7S-752               | 1.5<br>0.06                                    | 101.5<br>3.99                              | 3.3<br>0.13                                      | 144.0<br>5.67                              | 177            | 32.4           | 0.0945         | 8.76<br>19.32       |
| 767D        | 753      |                       | 1.5<br>0.06                                    | 101.5<br>3.99                              | 3.3<br>0.13                                      | 147.0<br>5.79                              | 177            | 32.4           | 0.0945         | 9.66<br>21.30       |
| 42362D      | 42584    | Y3S-42584             | 1.5<br>0.06                                    | 103.0<br>4.06                              | 3.0<br>0.12                                      | 134.0<br>5.28                              | 130            | 37.2           | 0.1386         | 3.84<br>8.48        |
| 42362D      | 42587    |                       | 1.5<br>0.06                                    | 103.0<br>4.06                              | 3.3<br>0.13                                      | 134.0<br>5.28                              | 130            | 37.2           | 0.1386         | 4.15<br>9.14        |
| LM119348D   | LM119311 | LM119311EA            | 0.8<br>0.03                                    | 102.0<br>4.02                              | 2.3<br>0.09                                      | 126.0<br>4.96                              | 149            | 69             | 0.1213         | 2.71<br>5.97        |
| HH221440D   | HH221410 |                       | 6.4<br>0.25                                    | 116.0<br>4.56                              | 3.3<br>0.13                                      | 171.0<br>6.73                              | 266            | 30.7           | 0.1072         | 15.16<br>33.42      |
| 779D        | 772      | Y5S-772               | 1.5<br>0.06                                    | 112.0<br>4.41                              | 3.3<br>0.13                                      | 161.0<br>6.34                              | 227            | 41.3           | 0.1067         | 11.34<br>25.01      |
| 52400D      | 52618    | Y23S-52618            | 1.5<br>0.06                                    | 112.5<br>4.43                              | 3.3<br>0.13                                      | 142.0<br>5.59                              | 175            | 41.7           | 0.1519         | 5.27<br>11.61       |
| 52400D      | 52637    |                       | 1.5<br>0.06                                    | 112.5<br>4.43                              | 3.3<br>0.13                                      | 144.0<br>5.67                              | 175            | 41.7           | 0.1519         | 7.48<br>16.50       |
| 52400D      | 52638    | Y1S-52638             | 1.5<br>0.06                                    | 112.5<br>4.43                              | 3.3<br>0.13                                      | 143.0<br>5.63                              | 175            | 41.7           | 0.1519         | 6.28<br>13.83       |
| 868D        | 854      |                       | 1.5<br>0.06                                    | 116.0<br>4.57                              | 3.3<br>0.13                                      | 170.0<br>6.69                              | 264            | 44.9           | 0.1072         | 23.29<br>51.35      |
| 782D        | 772      | Y6S-772               | 1.5<br>0.06                                    | 118.0<br>4.64                              | 3.3<br>0.13                                      | 161.0<br>6.34                              | 227            | 41.3           | 0.1067         | 10.53<br>23.20      |
| 71426D      | 71750    |                       | 1.5<br>0.06                                    | 122.0<br>4.80                              | 3.3<br>0.13                                      | 171.0<br>6.73                              | 269            | 45.7           | 0.1156         | 12.30<br>27.11      |
| 71426D      | 71753    |                       | 1.5<br>0.06                                    | 122.0<br>4.80                              | 3.3<br>0.13                                      | 172.0<br>6.77                              | 269            | 45.7           | 0.1156         | 12.93<br>28.50      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.



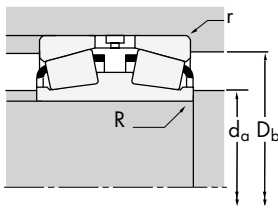
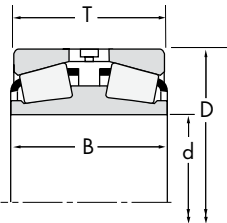


# ROLLER BEARINGS

## TDI

### DOUBLE INNER RACE

B



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                    |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|--------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  |                    |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub> | K    |
| 107.950<br>4.2500       | 212.725<br>8.3750  | 142.875<br>5.6250 | 152.400<br>6.0000 | 922000<br>207000       | 0.33 | 2.07           | 3.09           | 137000<br>30900        | 76600<br>17200   | 239000<br>53700    | 1.79 |
| 114.300<br>4.5000       | 190.500<br>7.5000  | 98.425<br>3.8750  | 101.600<br>4.0000 | 586000<br>132000       | 0.42 | 1.62           | 2.42           | 87300<br>19600         | 62200<br>14000   | 152000<br>34200    | 1.40 |
| 114.300<br>4.5000       | 212.725<br>8.3750  | 142.875<br>5.6250 | 152.400<br>6.0000 | 1100000<br>246000      | 0.33 | 2.07           | 3.09           | 163000<br>36700        | 91000<br>20500   | 284000<br>63900    | 1.79 |
| 114.300<br>4.5000       | 234.950<br>9.2500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 114.300<br>4.5000       | 247.650<br>9.7500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 120.650<br>4.7500       | 174.625<br>6.8750  | 66.678<br>2.6251  | 68.262<br>2.6875  | 394000<br>88600        | 0.33 | 2.03           | 3.02           | 58700<br>13200         | 33400<br>7510    | 102000<br>23000    | 1.76 |
| 120.650<br>4.7500       | 234.950<br>9.2500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 120.650<br>4.7500       | 247.650<br>9.7500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 127.000<br>5.0000       | 196.850<br>7.7500  | 92.075<br>3.6250  | 92.075<br>3.6250  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 127.000<br>5.0000       | 228.600<br>9.0000  | 160.338<br>6.3125 | 151.244<br>5.9545 | 606000<br>136000       | 0.74 | 0.92           | 1.36           | 90200<br>20300         | 114000<br>25600  | 157000<br>35300    | 0.79 |
| 127.000<br>5.0000       | 234.950<br>9.2500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 127.000<br>5.0000       | 247.650<br>9.7500  | 139.700<br>5.5000 | 152.400<br>6.0000 | 1010000<br>228000      | 0.37 | 1.83           | 2.72           | 151000<br>33900        | 95500<br>21500   | 263000<br>59100    | 1.58 |
| 130.005<br>5.1183       | 215.900<br>8.5000  | 123.825<br>4.8750 | 123.825<br>4.8750 | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 130.005<br>5.1183       | 217.488<br>8.5625  | 123.825<br>4.8750 | 123.825<br>4.8750 | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 130.175<br>5.1250       | 215.900<br>8.5000  | 101.600<br>4.0000 | 101.600<br>4.0000 | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 130.175<br>5.1250       | 217.488<br>8.5625  | 101.600<br>4.0000 | 101.600<br>4.0000 | 616000<br>138000       | 0.49 | 1.38           | 2.06           | 91700<br>20600         | 76500<br>17200   | 160000<br>35900    | 1.20 |
| 133.350<br>5.2500       | 196.850<br>7.7500  | 92.075<br>3.6250  | 92.075<br>3.6250  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 133.350<br>5.2500       | 203.200<br>8.0000  | 92.075<br>3.6250  | 92.075<br>3.6250  | 593000<br>133000       | 0.34 | 1.96           | 2.92           | 88200<br>19800         | 52000<br>11700   | 154000<br>34500    | 1.70 |
| 136.525<br>5.3750       | 190.500<br>7.5000  | 77.788<br>3.0625  | 77.788<br>3.0625  | 456000<br>103000       | 0.32 | 2.10           | 3.13           | 67900<br>15300         | 37300<br>8390    | 118000<br>26600    | 1.82 |
| 136.525<br>5.3750       | 225.425<br>8.8750  | 120.650<br>4.7500 | 120.650<br>4.7500 | 1040000<br>234000      | 0.33 | 2.03           | 3.02           | 155000<br>34900        | 88400<br>19900   | 270000<br>60800    | 1.76 |
| 149.225<br>5.8750       | 236.538<br>9.3125  | 106.362<br>4.1875 | 105.346<br>4.1475 | 830000<br>187000       | 0.44 | 1.53           | 2.27           | 124000<br>27800        | 93600<br>21000   | 215000<br>48400    | 1.32 |
| 149.225<br>5.8750       | 241.300<br>9.5000  | 106.362<br>4.1875 | 105.346<br>4.1475 | 830000<br>187000       | 0.44 | 1.53           | 2.27           | 124000<br>27800        | 93600<br>21000   | 215000<br>48400    | 1.32 |
| 149.225<br>5.8750       | 254.000<br>10.0000 | 120.650<br>4.7500 | 120.650<br>4.7500 | 1060000<br>239000      | 0.41 | 1.66           | 2.47           | 158000<br>35600        | 110000<br>24800  | 276000<br>62000    | 1.43 |
| 152.400<br>6.0000       | 244.475<br>9.6250  | 87.312<br>3.4375  | 92.075<br>3.6250  | 648000<br>146000       | 0.35 | 1.92           | 2.86           | 96400<br>21700         | 58100<br>13100   | 168000<br>37700    | 1.66 |
| 155.575<br>6.1250       | 247.650<br>9.7500  | 122.238<br>4.8125 | 122.238<br>4.8125 | 1080000<br>243000      | 0.37 | 1.83           | 2.73           | 161000<br>36100        | 101000<br>22800  | 280000<br>62900    | 1.59 |
| 165.100<br>6.5000       | 225.425<br>8.8750  | 79.375<br>3.1250  | 76.200<br>3.0000  | 489000<br>110000       | 0.38 | 1.76           | 2.62           | 72800<br>16400         | 47800<br>10700   | 127000<br>28500    | 1.52 |
| 174.625<br>6.8750       | 288.925<br>11.3750 | 123.825<br>4.8750 | 123.825<br>4.8750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400    | 1.83 |
| 177.800<br>7.0000       | 247.650<br>9.7500  | 90.488<br>3.5625  | 90.488<br>3.5625  | 653000<br>147000       | 0.44 | 1.54           | 2.29           | 97200<br>21900         | 73200<br>16500   | 169000<br>38100    | 1.33 |

<sup>(1)</sup> Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

<sup>(2)</sup> Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

<sup>(3)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(4)</sup> A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.

| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>b</sub> |                |                |                |                     |
| 946D        | 932      | Y9S-932               | 3.3<br>0.13                                    | 128.0<br>5.04                              | 3.3<br>0.13                                      | 187.0<br>7.36                              | 339            | 43.8           | 0.1153         | 22.36<br>49.30      |
| 71450D      | 71750    | Y7S-71750             | 1.5<br>0.06                                    | 128.0<br>5.04                              | 3.3<br>0.13                                      | 171.0<br>6.73                              | 269            | 49.5           | 0.1156         | 11.00<br>24.25      |
| HH224346DD  | HH224310 | HH224310EA            | 3.3<br>0.13                                    | 133.0<br>5.24                              | 3.3<br>0.13                                      | 192.0<br>7.56                              | 367            | 47.8           | 0.1182         | 21.93<br>48.35      |
| 95451D      | 95925    |                       | 13.2<br>0.52                                   | 153.0<br>6.03                              | 3.3<br>0.13                                      | 209.0<br>8.23                              | 454            | 59.3           | 0.1323         | 28.51<br>62.84      |
| 95451D      | 95975    |                       | 13.2<br>0.52                                   | 153.0<br>6.03                              | 3.3<br>0.13                                      | 214.0<br>8.43                              | 454            | 59.3           | 0.1323         | 34.69<br>76.47      |
| M224749D    | M224710  | M224710EA             | 0.8<br>0.03                                    | 129.0<br>5.08                              | 1.5<br>0.06                                      | 162.0<br>6.38                              | 279            | 86.6           | 0.1575         | 5.82<br>12.83       |
| 95474D      | 95925    |                       | 6.4<br>0.25                                    | 149.0<br>5.87                              | 3.3<br>0.13                                      | 209.0<br>8.23                              | 454            | 59.3           | 0.1323         | 27.14<br>59.83      |
| 95474D      | 95975    |                       | 6.4<br>0.25                                    | 149.0<br>5.87                              | 3.3<br>0.13                                      | 214.0<br>8.43                              | 454            | 59.3           | 0.1323         | 33.32<br>73.46      |
| 67388D      | 67322    | Y1S-67322             | 1.5<br>0.06                                    | 140.0<br>5.51                              | 3.3<br>0.13                                      | 180.0<br>7.09                              | 384            | 70.1           | 0.1220         | 10.63<br>23.44      |
| 97500D      | 97900    | Y3S-97900             | 1.5<br>0.06                                    | 144.0<br>5.67                              | 3.3<br>0.13                                      | 197.0<br>7.76                              | 237            | 44.6           | 0.1311         | 24.43<br>53.85      |
| 95499D      | 95925    | Y4S-95925             | 5.0<br>0.20                                    | 152.0<br>5.98                              | 3.3<br>0.13                                      | 209.0<br>8.23                              | 454            | 59.3           | 0.1323         | 25.94<br>57.18      |
| 95499D      | 95975    |                       | 5.0<br>0.20                                    | 152.0<br>5.98                              | 3.3<br>0.13                                      | 214.0<br>8.43                              | 454            | 59.3           | 0.1323         | 31.93<br>70.38      |
| 74510D      | 74850    | Y5S-74850             | 1.5<br>0.06                                    | 146.0<br>5.75                              | 3.3<br>0.13                                      | 196.0<br>7.72                              | 363            | 68.5           | 0.1338         | 17.54<br>38.66      |
| 74510D      | 74856    |                       | 1.5<br>0.06                                    | 146.0<br>5.75                              | 3.3<br>0.13                                      | 197.0<br>7.76                              | 363            | 68.5           | 0.1338         | 17.32<br>38.18      |
| 74512D      | 74850    | Y7S-74850             | 1.5<br>0.06                                    | 146.0<br>5.75                              | 3.3<br>0.13                                      | 196.0<br>7.72                              | 363            | 68.5           | 0.1338         | 15.05<br>33.17      |
| 74512D      | 74856    |                       | 1.5<br>0.06                                    | 146.0<br>5.75                              | 3.3<br>0.13                                      | 197.0<br>7.76                              | 363            | 68.5           | 0.1338         | 15.44<br>34.04      |
| 67390D      | 67322    | Y1S-67322             | 1.5<br>0.06                                    | 145.0<br>5.71                              | 3.3<br>0.13                                      | 180.0<br>7.09                              | 384            | 70.1           | 0.1220         | 9.69<br>21.37       |
| 67390D      | 67320    |                       | 1.5<br>0.06                                    | 145.0<br>5.71                              | 3.3<br>0.13                                      | 183.0<br>7.20                              | 384            | 70.1           | 0.1220         | 12.12<br>26.72      |
| 48393D      | 48320    |                       | 1.5<br>0.06                                    | 144.0<br>5.67                              | 3.3<br>0.13                                      | 177.0<br>6.97                              | 404            | 105            | 0.1209         | 6.86<br>15.11       |
| H228649D    | H228610  | H228610EB             | 1.5<br>0.06                                    | 152.0<br>5.98                              | 3.3<br>0.13                                      | 203.0<br>7.99                              | 540            | 76.7           | 0.1358         | 19.61<br>43.22      |
| 82587D      | 82931    | Y1S-82931             | 1.5<br>0.06                                    | 165.0<br>6.50                              | 3.3<br>0.13                                      | 213.0<br>8.39                              | 460            | 81.1           | 0.1405         | 17.53<br>38.65      |
| 82587D      | 82950    | Y5S-82950             | 1.5<br>0.06                                    | 165.0<br>6.50                              | 3.3<br>0.13                                      | 215.0<br>8.46                              | 460            | 81.1           | 0.1405         | 19.15<br>42.22      |
| 99587D      | 99100    | Y18S-99100            | 1.5<br>0.06                                    | 167.0<br>6.57                              | 3.3<br>0.13                                      | 227.0<br>8.94                              | 556            | 73.5           | 0.1459         | 25.91<br>57.12      |
| 81601D      | 81962    | Y1S-81963             | 1.5<br>0.06                                    | 166.0<br>6.54                              | 3.3<br>0.13                                      | 225.0<br>8.86                              | 413            | 98.4           | 0.1250         | 14.89<br>32.82      |
| H432549D    | H432510  | H432510EA             | 1.5<br>0.06                                    | 172.0<br>6.77                              | 3.3<br>0.13                                      | 224.0<br>8.82                              | 658            | 97.7           | 0.1178         | 23.65<br>52.15      |
| 46790D      | 46720    | Y5S-46720             | 0.8<br>0.03                                    | 175.0<br>6.89                              | 3.3<br>0.13                                      | 209.0<br>8.23                              | 572            | 175            | 0.1432         | 9.38<br>20.68       |
| HM237542D   | HM237510 | HM237510EA            | 1.5<br>0.06                                    | 191.0<br>7.52                              | 3.3<br>0.13                                      | 266.0<br>10.47                             | 751            | 101            | 0.1168         | 31.74<br>69.98      |
| 67790D      | 67720    | Y2S-67720             | 1.5<br>0.06                                    | 190.0<br>7.48                              | 3.3<br>0.13                                      | 229.0<br>9.02                              | 622            | 122            | 0.1214         | 13.31<br>29.35      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.



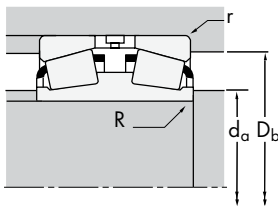
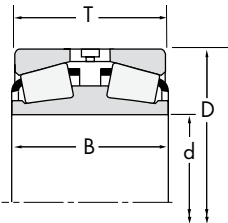


# ROLLER BEARINGS

## TDI

### DOUBLE INNER RACE

B



| Dimensions, mm (inches) |                    |                   |                   | Load Ratings, N (lbf.) |      |                |                |                        |                  |                        |      |
|-------------------------|--------------------|-------------------|-------------------|------------------------|------|----------------|----------------|------------------------|------------------|------------------------|------|
| d                       | D                  | T                 | B                 | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  | Dynamic <sup>(2)</sup> |      |
|                         |                    |                   |                   | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub>     | K    |
| 177.800<br>7.0000       | 279.400<br>11.0000 | 112.710<br>4.4374 | 112.712<br>4.4375 | 911000<br>205000       | 0.52 | 1.29           | 1.92           | 136000<br>30500        | 122000<br>27400  | 236000<br>53100        | 1.11 |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 123.825<br>4.8750 | 123.825<br>4.8750 | 1060000<br>239000      | 0.47 | 1.44           | 2.15           | 159000<br>35600        | 127000<br>28600  | 276000<br>62000        | 1.25 |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 123.825<br>4.8750 | 123.825<br>4.8750 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400        | 1.83 |
| 177.800<br>7.0000       | 288.925<br>11.3750 | 158.750<br>6.2500 | 158.750<br>6.2500 | 1330000<br>299000      | 0.32 | 2.12           | 3.15           | 198000<br>44500        | 108000<br>24300  | 344000<br>77400        | 1.83 |
| 177.800<br>7.0000       | 304.800<br>12.0000 | 109.438<br>4.3086 | 114.300<br>4.5000 | 1030000<br>231000      | 0.36 | 1.87           | 2.79           | 153000<br>34500        | 94500<br>21200   | 267000<br>60000        | 1.62 |
| 187.325<br>7.3750       | 319.964<br>12.5970 | 168.275<br>6.6250 | 161.925<br>6.3750 | 1790000<br>402000      | 0.32 | 2.12           | 3.15           | 267000<br>59900        | 145000<br>32700  | 464000<br>104000       | 1.83 |
| 187.325<br>7.3750       | 320.675<br>12.6250 | 168.275<br>6.6250 | 161.925<br>6.3750 | 1790000<br>402000      | 0.32 | 2.12           | 3.15           | 267000<br>59900        | 145000<br>32700  | 464000<br>104000       | 1.83 |
| 190.500<br>7.5000       | 317.500<br>12.5000 | 133.350<br>5.2500 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 190.500<br>7.5000       | 317.500<br>12.5000 | 142.875<br>5.6250 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 190.500<br>7.5000       | 365.049<br>14.3720 | 158.750<br>6.2500 | 152.400<br>6.0000 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300  | 488000<br>110000       | 1.45 |
| 190.500<br>7.5000       | 368.300<br>14.5000 | 158.750<br>6.2500 | 152.400<br>6.0000 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300  | 488000<br>110000       | 1.45 |
| 199.975<br>7.8730       | 317.500<br>12.5000 | 133.350<br>5.2500 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 199.975<br>7.8730       | 317.500<br>12.5000 | 142.875<br>5.6250 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 123.825<br>4.8750 | 123.825<br>4.8750 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 133.350<br>5.2500 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 203.200<br>8.0000       | 317.500<br>12.5000 | 142.875<br>5.6250 | 133.350<br>5.2500 | 1180000<br>265000      | 0.52 | 1.29           | 1.92           | 175000<br>39500        | 157000<br>35300  | 306000<br>68700        | 1.12 |
| 203.200<br>8.0000       | 365.049<br>14.3720 | 158.750<br>6.2500 | 152.400<br>6.0000 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300  | 488000<br>110000       | 1.45 |
| 203.200<br>8.0000       | 368.300<br>14.5000 | 158.750<br>6.2500 | 152.400<br>6.0000 | 1880000<br>423000      | 0.40 | 1.68           | 2.50           | 280000<br>63000        | 193000<br>43300  | 488000<br>110000       | 1.45 |
| 206.375<br>8.1250       | 282.575<br>11.1250 | 87.312<br>3.4375  | 87.312<br>3.4375  | 684000<br>154000       | 0.51 | 1.33           | 1.97           | 102000<br>22900        | 88700<br>19900   | 177000<br>39800        | 1.15 |
| 206.375<br>8.1250       | 336.550<br>13.2500 | 180.975<br>7.1250 | 184.150<br>7.2500 | 2180000<br>491000      | 0.33 | 2.03           | 3.02           | 325000<br>73100        | 185000<br>41600  | 566000<br>127000       | 1.76 |
| 215.900<br>8.5000       | 355.600<br>14.0000 | 127.000<br>5.0000 | 130.175<br>5.1250 | 1220000<br>275000      | 0.59 | 1.14           | 1.70           | 182000<br>41000        | 184000<br>41400  | 317000<br>71300        | 0.99 |
| 219.075<br>8.6250       | 358.775<br>14.1250 | 196.850<br>7.7500 | 200.025<br>7.8750 | 2470000<br>555000      | 0.33 | 2.03           | 3.02           | 367000<br>82600        | 209000<br>47000  | 639000<br>144000       | 1.76 |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 120.650<br>4.7500 | 120.650<br>4.7500 | 1360000<br>306000      | 0.33 | 2.04           | 3.04           | 202000<br>45500        | 114000<br>25700  | 352000<br>79200        | 1.77 |
| 228.600<br>9.0000       | 355.600<br>14.0000 | 120.650<br>4.7500 | 120.650<br>4.7500 | 1360000<br>306000      | 0.33 | 2.04           | 3.04           | 202000<br>45500        | 114000<br>25700  | 352000<br>79200        | 1.77 |
| 228.600<br>9.0000       | 400.050<br>15.7500 | 139.700<br>5.5000 | 139.700<br>5.5000 | 1900000<br>428000      | 0.31 | 2.19           | 3.25           | 283000<br>63700        | 150000<br>33700  | 493000<br>111000       | 1.89 |
| 234.950<br>9.2500       | 384.175<br>15.1250 | 209.550<br>8.2500 | 209.550<br>8.2500 | 2860000<br>643000      | 0.33 | 2.03           | 3.02           | 426000<br>95700        | 242000<br>54500  | 741000<br>167000       | 1.76 |
| 241.224<br>9.4970       | 355.600<br>14.0000 | 107.950<br>4.2500 | 107.950<br>4.2500 | 1130000<br>253000      | 0.35 | 1.91           | 2.85           | 168000<br>37700        | 101000<br>22800  | 292000<br>65700        | 1.65 |
| 254.000<br>10.0000      | 355.600<br>14.0000 | 92.710<br>3.6500  | 92.862<br>3.6560  | 956000<br>215000       | 0.36 | 1.86           | 2.77           | 142000<br>32000        | 88500<br>19900   | 248000<br>55700        | 1.61 |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.  
 (2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.  
 (3) These maximum fillet radii will be cleared by the bearing corners.  
 (4) A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.



| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>b</sub> |                |                |                |                     |
| 82680D      | 82620    | Y1S-82620             | 1.5<br>0.06                                    | 195.0<br>7.68                              | 3.3<br>0.13                                      | 251.0<br>9.88                              | 661            | 119            | 0.1313         | 26.31<br>57.99      |
| 94706D      | 94113    | Y7S-94113             | 1.5<br>0.06                                    | 195.0<br>7.68                              | 3.3<br>0.13                                      | 259.0<br>10.20                             | 692            | 93.8           | 0.1287         | 32.48<br>71.61      |
| HM237546D   | HM237510 | HM237510EF            | 1.5<br>0.06                                    | 194.0<br>7.64                              | 3.3<br>0.13                                      | 266.0<br>10.47                             | 751            | 101            | 0.1168         | 30.92<br>68.17      |
| HM237546DD  | HM237510 |                       | 1.5<br>0.06                                    | 194.0<br>7.64                              | 3.3<br>0.13                                      | 266.0<br>10.47                             | 751            | 101            | 0.1168         | 36.67<br>80.84      |
| EE280700D   | 281200   | Y1S-281200            | 3.3<br>0.13                                    | 200.0<br>7.87                              | 3.3<br>0.13                                      | 279.0<br>10.98                             | 591            | 86             | 0.1115         | 31.88<br>70.29      |
| H239649D    | H239610  | H239610EA             | 3.3<br>0.13                                    | 209.0<br>8.23                              | 4.8<br>0.19                                      | 293.0<br>11.54                             | 906            | 90.3           | 0.1242         | 52.48<br>115.70     |
| H239649D    | H239612  | H239612EE             | 3.3<br>0.13                                    | 209.0<br>8.23                              | 4.8<br>0.19                                      | 293.0<br>11.54                             | 906            | 90.3           | 0.1242         | 53.02<br>116.90     |
| 93751D      | 93125    | Y1S-93126             | 6.4<br>0.25                                    | 222.0<br>8.74                              | 3.3<br>0.13                                      | 286.0<br>11.26                             | 912            | 126            | 0.1460         | 41.77<br>92.09      |
| 93751D      | 93126    |                       | 6.4<br>0.25                                    | 222.0<br>8.74                              | 3.3<br>0.13                                      | 285.0<br>11.22                             | 912            | 126            | 0.1460         | 43.57<br>96.06      |
| EE420750D   | 421437   |                       | 3.3<br>0.13                                    | 221.0<br>8.70                              | 3.3<br>0.13                                      | 329.0<br>12.95                             | 1150           | 128            | 0.1450         | 76.29<br>168.18     |
| EE420750D   | 421450   | Y4S-421450            | 3.3<br>0.13                                    | 221.0<br>8.70                              | 3.3<br>0.13                                      | 331.0<br>13.03                             | 1150           | 128            | 0.1450         | 76.88<br>169.49     |
| 93788D      | 93125    | Y15S-93125            | 6.4<br>0.25                                    | 227.0<br>8.93                              | 3.3<br>0.13                                      | 286.0<br>11.26                             | 912            | 126            | 0.1460         | 46.94<br>103.49     |
| 93788D      | 93126    |                       | 6.4<br>0.25                                    | 227.0<br>8.93                              | 3.3<br>0.13                                      | 285.0<br>11.22                             | 912            | 126            | 0.1460         | 40.54<br>89.37      |
| 93800D      | 93125    | Y11S-93125            | 1.5<br>0.06                                    | 222.0<br>8.74                              | 3.3<br>0.13                                      | 286.0<br>11.26                             | 912            | 126            | 0.1460         | 42.43<br>93.53      |
| 93801D      | 93125    | Y1S-93126             | 6.4<br>0.25                                    | 227.0<br>8.93                              | 3.3<br>0.13                                      | 286.0<br>11.26                             | 912            | 126            | 0.1460         | 37.13<br>81.85      |
| 93801D      | 93126    | Y1S-93126             | 6.4<br>0.25                                    | 227.0<br>8.93                              | 3.3<br>0.13                                      | 285.0<br>11.22                             | 912            | 126            | 0.1460         | 38.93<br>85.83      |
| EE420800D   | 421437   | Y1S-421437            | 3.3<br>0.13                                    | 230.0<br>9.06                              | 3.3<br>0.13                                      | 329.0<br>12.95                             | 1150           | 128            | 0.1450         | 70.53<br>155.49     |
| EE420800D   | 421450   |                       | 3.3<br>0.13                                    | 230.0<br>9.06                              | 3.3<br>0.13                                      | 331.0<br>13.03                             | 1150           | 128            | 0.1450         | 71.12<br>156.80     |
| 67985D      | 67920    | Y1S-67920             | 0.8<br>0.03                                    | 219.0<br>8.62                              | 3.3<br>0.13                                      | 260.0<br>10.24                             | 820            | 172            | 0.1388         | 16.46<br>36.29      |
| H242649D    | H242610  | H242610EA             | 1.5<br>0.06                                    | 227.0<br>8.94                              | 3.3<br>0.13                                      | 306.0<br>12.05                             | 1400           | 135            | 0.1465         | 64.57<br>142.36     |
| 96851D      | 96140    | Y4S-96140             | 6.4<br>0.25                                    | 249.0<br>9.80                              | 3.3<br>0.13                                      | 318.0<br>12.52                             | 1140           | 160            | 0.1626         | 50.93<br>112.27     |
| H244849D    | H244810  | H244810EA             | 1.5<br>0.06                                    | 242.0<br>9.53                              | 6.4<br>0.25                                      | 323.0<br>12.72                             | 1630           | 150            | 0.1540         | 83.42<br>183.91     |
| EE130900D   | 131400   | Y5S-131400            | 1.5<br>0.06                                    | 247.0<br>9.72                              | 1.5<br>0.06                                      | 329.0<br>12.95                             | 1160           | 168            | 0.1358         | 43.36<br>95.59      |
| EE130901D   | 131400   |                       | 5.5<br>0.22                                    | 255.0<br>10.04                             | 1.5<br>0.06                                      | 329.0<br>12.95                             | 1160           | 168            | 0.1358         | 46.82<br>103.22     |
| EE529091D   | 529157   |                       | 3.3<br>0.13                                    | 256.0<br>10.08                             | 3.3<br>0.13                                      | 367.0<br>14.45                             | 1400           | 153            | 0.1415         | 73.75<br>162.60     |
| H247549D    | H247510  | H247510EA             | 1.5<br>0.06                                    | 259.0<br>10.20                             | 6.4<br>0.25                                      | 346.0<br>13.62                             | 1960           | 148            | 0.1638         | 97.43<br>214.79     |
| EE127094D   | 127140   |                       | 1.5<br>0.06                                    | 257.0<br>10.12                             | 3.3<br>0.13                                      | 327.0<br>12.87                             | 1180           | 164            | 0.1392         | 36.32<br>80.08      |
| EE171000D   | 171400   | Y1S-171400            | 1.5<br>0.06                                    | 269.0<br>10.59                             | 3.3<br>0.13                                      | 334.0<br>13.15                             | 1070           | 172            | 0.1354         | 27.99<br>61.70      |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.



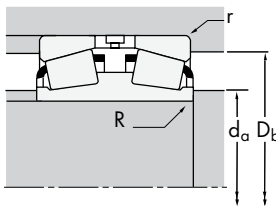
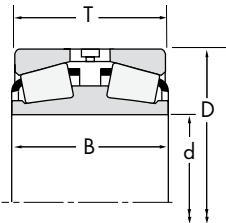


# ROLLER BEARINGS

## TDI

### DOUBLE INNER RACE

B



| Dimensions, mm (inches) |                    |                    |                    | Load Ratings, N (lbf.) |      |                |                |                        |                  |                        |      |
|-------------------------|--------------------|--------------------|--------------------|------------------------|------|----------------|----------------|------------------------|------------------|------------------------|------|
| d                       | D                  | T                  | B                  | Dynamic <sup>(1)</sup> |      |                |                | Dynamic <sup>(2)</sup> |                  | Dynamic <sup>(2)</sup> |      |
|                         |                    |                    |                    | C <sub>1</sub>         | e    | Y <sub>1</sub> | Y <sub>2</sub> | C <sub>90</sub>        | Ca <sub>90</sub> | C <sub>90(2)</sub>     | K    |
| 254.000<br>10.0000      | 358.775<br>14.1250 | 130.175<br>5.1250  | 130.175<br>5.1250  | 1560000<br>351000      | 0.33 | 2.03           | 3.02           | 232000<br>52200        | 132000<br>29700  | 405000<br>91000        | 1.76 |
| 254.000<br>10.0000      | 365.049<br>14.3720 | 92.710<br>3.6500   | 92.862<br>3.6560   | 956000<br>215000       | 0.36 | 1.86           | 2.77           | 142000<br>32000        | 88500<br>19900   | 248000<br>55700        | 1.61 |
| 254.000<br>10.0000      | 368.300<br>14.5000 | 92.710<br>3.6500   | 92.862<br>3.6560   | 956000<br>215000       | 0.36 | 1.86           | 2.77           | 142000<br>32000        | 88500<br>19900   | 248000<br>55700        | 1.61 |
| 260.350<br>10.2500      | 365.125<br>14.3750 | 107.950<br>4.2500  | 107.950<br>4.2500  | 1160000<br>261000      | 0.37 | 1.80           | 2.69           | 173000<br>38800        | 111000<br>24900  | 301000<br>67600        | 1.56 |
| 260.350<br>10.2500      | 400.050<br>15.7500 | 119.060<br>4.6874  | 114.300<br>4.5000  | 1410000<br>318000      | 0.39 | 1.71           | 2.55           | 210000<br>47300        | 142000<br>31900  | 366000<br>82300        | 1.48 |
| 269.875<br>10.6250      | 381.000<br>15.0000 | 136.525<br>5.3750  | 136.525<br>5.3750  | 1710000<br>384000      | 0.33 | 2.03           | 3.02           | 255000<br>57200        | 145000<br>32600  | 443000<br>99600        | 1.76 |
| 276.225<br>10.8750      | 393.700<br>15.5000 | 130.175<br>5.1250  | 130.175<br>5.1250  | 1510000<br>339000      | 0.40 | 1.68           | 2.50           | 224000<br>50400        | 154000<br>34700  | 391000<br>87800        | 1.45 |
| 276.225<br>10.8750      | 406.400<br>16.0000 | 122.240<br>4.8126  | 130.175<br>5.1250  | 1510000<br>339000      | 0.40 | 1.68           | 2.50           | 224000<br>50400        | 154000<br>34700  | 391000<br>87800        | 1.45 |
| 288.925<br>11.3750      | 406.400<br>16.0000 | 144.462<br>5.6875  | 144.462<br>5.6875  | 2030000<br>457000      | 0.34 | 2.00           | 2.97           | 302000<br>68000        | 175000<br>39300  | 526000<br>118000       | 1.73 |
| 300.038<br>11.8125      | 422.275<br>16.6250 | 150.812<br>5.9375  | 150.812<br>5.9375  | 2210000<br>498000      | 0.34 | 2.00           | 2.99           | 330000<br>74100        | 190000<br>42700  | 574000<br>129000       | 1.73 |
| 304.648<br>11.9940      | 438.048<br>17.2460 | 131.762<br>5.1875  | 131.762<br>5.1875  | 1880000<br>423000      | 0.33 | 2.04           | 3.03           | 280000<br>63000        | 159000<br>35800  | 488000<br>110000       | 1.76 |
| 304.648<br>11.9940      | 438.048<br>17.2460 | 131.762<br>5.1875  | 131.762<br>5.1875  | 1840000<br>414000      | 0.33 | 2.04           | 3.03           | 274000<br>61700        | 156000<br>35000  | 478000<br>107000       | 1.76 |
| 304.648<br>11.9940      | 438.048<br>17.2460 | 138.112<br>5.4375  | 128.588<br>5.0625  | 1880000<br>422000      | 0.47 | 1.43           | 2.12           | 279000<br>62800        | 226000<br>50800  | 486000<br>109000       | 1.24 |
| 304.800<br>12.0000      | 495.300<br>19.5000 | 137.952<br>5.4312  | 134.938<br>5.3125  | 2310000<br>519000      | 0.40 | 1.68           | 2.50           | 343000<br>77200        | 236000<br>53100  | 598000<br>134000       | 1.45 |
| 304.800<br>12.0000      | 495.300<br>19.5000 | 171.450<br>6.7500  | 165.100<br>6.5000  | 2510000<br>564000      | 0.40 | 1.68           | 2.50           | 374000<br>84000        | 257000<br>57800  | 651000<br>146000       | 1.45 |
| 317.500<br>12.5000      | 447.675<br>17.6250 | 158.750<br>6.2500  | 158.750<br>6.2500  | 2500000<br>561000      | 0.33 | 2.02           | 3.00           | 372000<br>83600        | 213000<br>47900  | 647000<br>145000       | 1.74 |
| 330.302<br>13.0040      | 438.023<br>17.2450 | 120.650<br>4.7500  | 114.300<br>4.5000  | 1250000<br>282000      | 0.46 | 1.47           | 2.19           | 187000<br>41900        | 146000<br>32900  | 325000<br>73000        | 1.27 |
| 346.075<br>13.6250      | 488.950<br>19.2500 | 174.625<br>6.8750  | 174.625<br>6.8750  | 2950000<br>663000      | 0.33 | 2.02           | 3.00           | 439000<br>98700        | 252000<br>56600  | 765000<br>172000       | 1.74 |
| 355.600<br>14.0000      | 457.200<br>18.0000 | 120.650<br>4.7500  | 120.650<br>4.7500  | 1610000<br>361000      | 0.32 | 2.12           | 3.15           | 239000<br>53800        | 131000<br>29400  | 417000<br>93600        | 1.83 |
| 393.700<br>15.5000      | 546.100<br>21.5000 | 141.288<br>5.5625  | 120.650<br>4.7500  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100  | 419000<br>94200        | 1.23 |
| 393.700<br>15.5000      | 558.800<br>22.0000 | 119.062<br>4.6875  | 120.650<br>4.7500  | 1620000<br>363000      | 0.48 | 1.42           | 2.11           | 241000<br>54100        | 196000<br>44100  | 419000<br>94200        | 1.23 |
| 406.400<br>16.0000      | 590.550<br>23.2500 | 193.675<br>7.6250  | 193.675<br>7.6250  | 3940000<br>886000      | 0.33 | 2.08           | 3.09           | 587000<br>132000       | 327000<br>73400  | 1020000<br>230000      | 1.80 |
| 449.949<br>17.7145      | 594.949<br>23.4232 | 178.000<br>7.0079  | 178.000<br>7.0079  | 3400000<br>765000      | 0.33 | 2.03           | 3.02           | 507000<br>114000       | 289000<br>64900  | 882000<br>198000       | 1.76 |
| 457.200<br>18.0000      | 863.498<br>33.9960 | 368.300<br>14.5000 | 368.300<br>14.5000 | 9200000<br>2070000     | 0.36 | 1.87           | 2.79           | 1370000<br>308000      | 845000<br>190000 | 2390000<br>536000      | 1.62 |
| 585.788<br>23.0625      | 771.525<br>30.3750 | 230.188<br>9.0625  | 230.188<br>9.0625  | 5620000<br>1260000     | 0.33 | 2.03           | 3.02           | 836000<br>188000       | 476000<br>107000 | 1460000<br>327000      | 1.76 |
| 595.312<br>23.4375      | 844.550<br>33.2500 | 296.862<br>11.6875 | 296.862<br>11.6875 | 8300000<br>1870000     | 0.33 | 2.03           | 3.02           | 1240000<br>278000      | 704000<br>158000 | 2150000<br>484000      | 1.76 |
| 660.400<br>26.0000      | 812.800<br>32.0000 | 176.212<br>6.9375  | 176.213<br>6.9375  | 4070000<br>915000      | 0.33 | 2.03           | 3.02           | 606000<br>136000       | 345000<br>77600  | 1060000<br>237000      | 1.76 |
| 682.625<br>26.8750      | 965.200<br>38.0000 | 338.138<br>13.3125 | 338.138<br>13.3125 | 10700000<br>2400000    | 0.33 | 2.03           | 3.02           | 1590000<br>357000      | 903000<br>203000 | 2760000<br>621000      | 1.76 |

<sup>(1)</sup> Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

<sup>(2)</sup> Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and Ca<sub>90</sub> are radial and thrust values for a single-row, C<sub>90(2)</sub> is the two-row radial value.

<sup>(3)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(4)</sup> A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.

| Part Number |          |                       | Dimensions, mm (inches)                        |                                            |                                                  |                                            | Factors        |                |                | Weight<br>kg (lbs.) |
|-------------|----------|-----------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------------|--------------------------------------------|----------------|----------------|----------------|---------------------|
|             |          |                       | Shaft                                          |                                            | Housing                                          |                                            | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| Inner       | Outer    | Spacer <sup>(4)</sup> | max shaft<br>fillet radius<br>R <sup>(3)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | max housing<br>fillet radius<br>r <sup>(3)</sup> | backing<br>shoulder dia.<br>D <sub>b</sub> |                |                |                |                     |
| M249748D    | M249710  | M249710EA             | 3.3<br>0.13                                    | 272.5<br>10.73                             | 3.3<br>0.13                                      | 335.0<br>13.19                             | 1630           | 168            | 0.1526         | 42.26<br>93.16      |
| EE171000D   | 171436   | Y2S-171436            | 1.5<br>0.06                                    | 269.0<br>10.59                             | 3.3<br>0.13                                      | 338.0<br>13.31                             | 1070           | 172            | 0.1354         | 30.85<br>68.02      |
| EE171000D   | 171450   | Y2S-171450            | 1.5<br>0.06                                    | 269.0<br>10.59                             | 3.3<br>0.13                                      | 340.0<br>13.39                             | 1070           | 172            | 0.1354         | 32.05<br>70.66      |
| EE134102D   | 134143   | Y1S-134143            | 3.3<br>0.13                                    | 280.0<br>11.02                             | 6.4<br>0.25                                      | 339.0<br>13.35                             | 1330           | 187            | 0.1474         | 33.77<br>74.46      |
| EE221025D   | 221575   |                       | 6.4<br>0.25                                    | 290.0<br>11.42                             | 6.4<br>0.25                                      | 366.0<br>14.41                             | 1320           | 207            | 0.1497         | 51.08<br>112.61     |
| M252349D    | M252310  | M252310EB             | 3.3<br>0.13                                    | 290.0<br>11.42                             | 3.3<br>0.13                                      | 356.0<br>14.02                             | 1840           | 226            | 0.1588         | 49.31<br>108.70     |
| EE275109D   | 275155   | Y1S-275155            | 1.5<br>0.06                                    | 293.5<br>11.56                             | 6.4<br>0.25                                      | 366.0<br>14.41                             | 1450           | 201            | 0.1555         | 49.64<br>109.44     |
| EE275109D   | 275160   |                       | 1.5<br>0.06                                    | 293.5<br>11.56                             | 6.4<br>0.25                                      | 373.0<br>14.69                             | 1450           | 201            | 0.1555         | 65.71<br>144.87     |
| M255449D    | M255410  | M255410EA             | 3.3<br>0.13                                    | 310.0<br>12.20                             | 3.3<br>0.13                                      | 379.0<br>14.92                             | 2300           | 287            | 0.1722         | 58.31<br>128.54     |
| HM256849D   | HM256810 | HM256810EA            | 3.3<br>0.13                                    | 322.0<br>12.68                             | 3.3<br>0.13                                      | 394.0<br>15.51                             | 2550           | 282            | 0.1779         | 66.34<br>146.25     |
| EE329117D   | 329172   | Y1S-329172            | 3.3<br>0.13                                    | 327.0<br>12.87                             | 3.3<br>0.13                                      | 410.0<br>16.14                             | 2100           | 262            | 0.1651         | 61.46<br>135.49     |
| EE329119D   | 329172   |                       | 3.3<br>0.13                                    | 327.0<br>12.87                             | 3.3<br>0.13                                      | 410.0<br>16.14                             | 2050           | 257            | 0.1638         | 62.83<br>138.51     |
| M757447D    | M757410  | M757410EA             | 3.3<br>0.13                                    | 328.0<br>12.91                             | 4.8<br>0.19                                      | 407.0<br>16.02                             | 1840           | 253            | 0.1775         | 64.12<br>141.35     |
| EE941206D   | 941950   |                       | 1.5<br>0.06                                    | 329.0<br>12.95                             | 3.3<br>0.13                                      | 459.0<br>18.07                             | 1770           | 187            | 0.1657         | 97.13<br>214.13     |
| EE724121D   | 724195   | Y1S-724195            | 3.3<br>0.13                                    | 334.0<br>13.15                             | 6.4<br>0.25                                      | 450.0<br>17.72                             | 2180           | 166            | 0.1783         | 124.80<br>275.14    |
| HM259049D   | HM259010 | HM259010EA            | 3.3<br>0.13                                    | 340.0<br>13.39                             | 3.3<br>0.13                                      | 418.0<br>16.46                             | 2940           | 304            | 0.1863         | 78.83<br>173.78     |
| EE138131D   | 138172   | Y1S-138172            | 1.5<br>0.06                                    | 347.0<br>13.66                             | 3.3<br>0.13                                      | 412.0<br>16.22                             | 1970           | 290            | 0.1786         | 46.18<br>101.82     |
| HM262749D   | HM262710 | HM262710EB            | 3.3<br>0.13                                    | 371.0<br>14.61                             | 3.3<br>0.13                                      | 456.0<br>17.95                             | 3650           | 342            | 0.1999         | 105.90<br>233.47    |
| LM263149D   | LM263110 | LM263110EA            | 1.5<br>0.06                                    | 372.0<br>14.65                             | 3.3<br>0.13                                      | 434.0<br>17.09                             | 3090           | 470            | 0.1845         | 50.39<br>111.09     |
| EE234157D   | 234215   |                       | 3.3<br>0.13                                    | 420.0<br>16.54                             | 6.4<br>0.25                                      | 504.0<br>19.84                             | 2780           | 448            | 0.2018         | 93.77<br>206.72     |
| EE234157D   | 234220   | Y1S-234220            | 3.3<br>0.13                                    | 420.0<br>16.54                             | 6.4<br>0.25                                      | 516.0<br>20.31                             | 2780           | 448            | 0.2018         | 95.13<br>209.73     |
| EE833161XD  | 833232   | Y1S-833232            | 3.3<br>0.13                                    | 435.0<br>17.13                             | 6.4<br>0.25                                      | 549.0<br>21.61                             | 4960           | 446            | 0.2186         | 175.96<br>387.92    |
| M270449DA   | M270410  | M270410EA             | 3.0<br>0.12                                    | 474.0<br>18.66                             | 6.0<br>0.24                                      | 561.0<br>22.09                             | 6020           | 562            | 0.2343         | 130.94<br>288.68    |
| EE480181D   | 480340   | Y2S-480340            | 6.4<br>0.25                                    | 516.0<br>20.31                             | 6.4<br>0.25                                      | 780.0<br>30.71                             | 7380           | 343            | 0.2575         | 935.42<br>2062.22   |
| LM278848D   | LM278810 | LM278810EA            | 6.4<br>0.25                                    | 616.0<br>24.25                             | 6.4<br>0.25                                      | 726.0<br>28.58                             | 11600          | 784            | 0.2906         | 285.67<br>629.78    |
| M280049D    | M280010  |                       | 3.3<br>0.13                                    | 633.0<br>24.92                             | 6.4<br>0.25                                      | 786.0<br>30.94                             | 13600          | 704            | 0.3081         | 536.88<br>1183.60   |
| L281149D    | L281110  | L281110EA             | 3.3<br>0.13                                    | 683.0<br>26.88                             | 6.4<br>0.25                                      | 777.0<br>30.59                             | 12600          | 984            | 0.2968         | 195.70<br>431.45    |
| M282249D    | M282210  | M282210EA             | 3.3<br>0.13                                    | 723.0<br>28.46                             | 6.4<br>0.25                                      | 900.0<br>35.43                             | 18800          | 843            | 0.3426         | 808.16<br>1781.66   |

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

Continued on next page.





# ROLLER BEARINGS

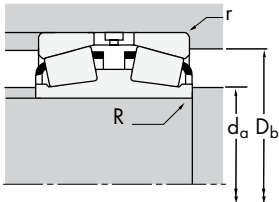
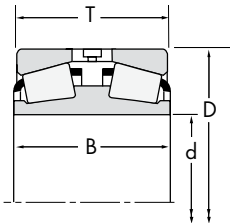
## TDI TWO-ROW

B



| Dimensions, mm (inches)   |                            |                           |                           | Load Ratings, N (lbf.)     |             |                  |                  |                          |                          |                          |                        |                        |
|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------|-------------|------------------|------------------|--------------------------|--------------------------|--------------------------|------------------------|------------------------|
| d                         | D                          | T                         | B                         | Dynamic <sup>(1)</sup>     |             |                  | Factors          |                          | Dynamic <sup>(2)</sup>   |                          | Dynamic <sup>(2)</sup> | Factors <sup>(5)</sup> |
|                           |                            |                           |                           | C <sup>(1)</sup>           | e           | Y <sup>(1)</sup> | Y <sup>(2)</sup> | C <sub>90</sub>          | Ca <sub>90</sub>         | C <sub>90(2)</sub>       | K                      |                        |
| <b>708.025</b><br>27.8750 | <b>930.275</b><br>36.6250  | <b>273.050</b><br>10.7500 | <b>273.050</b><br>10.7500 | <b>7910000</b><br>1780000  | <b>0.33</b> | <b>2.03</b>      | <b>3.02</b>      | <b>1180000</b><br>265000 | <b>670000</b><br>151000  | <b>2050000</b><br>461000 | <b>1.76</b>            |                        |
| <b>749.300</b><br>29.5000 | <b>1066.800</b><br>42.0000 | <b>361.950</b><br>14.2500 | <b>349.250</b><br>13.7500 | <b>12200000</b><br>2730000 | <b>0.33</b> | <b>2.05</b>      | <b>3.05</b>      | <b>1810000</b><br>407000 | <b>1020000</b><br>230000 | <b>3150000</b><br>709000 | <b>1.77</b>            |                        |
| <b>762.000</b><br>30.0000 | <b>1295.400</b><br>51.0000 | <b>311.153</b><br>12.2501 | <b>311.150</b><br>12.2500 | <b>12700000</b><br>2860000 | <b>0.38</b> | <b>1.76</b>      | <b>2.62</b>      | <b>1890000</b><br>425000 | <b>1240000</b><br>279000 | <b>3290000</b><br>741000 | <b>1.52</b>            |                        |
| <b>938.212</b><br>36.9375 | <b>1270.000</b><br>50.0000 | <b>400.050</b><br>15.7500 | <b>400.050</b><br>15.7500 | <b>15600000</b><br>3500000 | <b>0.33</b> | <b>2.03</b>      | <b>3.02</b>      | <b>2320000</b><br>521000 | <b>1320000</b><br>297000 | <b>4040000</b><br>907000 | <b>1.76</b>            |                        |

- (1) Based on  $1 \times 10^6$  revolutions  $L_{10}$  life, for the ISO life calculation method.
- (2) Based on  $90 \times 10^6$  revolutions  $L_{10}$  life, for The Timken Company life calculation method.  $C_{90}$  and  $Ca_{90}$  are radial and thrust values for a single-row,  $C_{90(2)}$  is the two-row radial value.
- (3) These maximum fillet radii will be cleared by the bearing corners.
- (4) A groove and holes in the outer race spacer allow for lubricant passage from the bearing housing.







## **ROLLER BEARINGS**



### **NOTES**



**B**





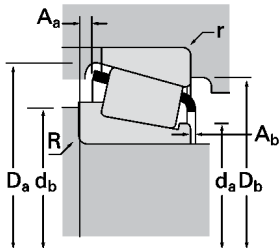
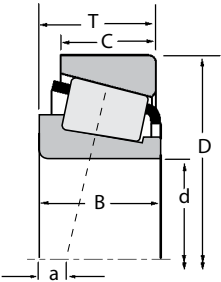




# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                  |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |           |
|-------------------------|------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|-----------|
| d                       | D                | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static          | Inner       | Outer     |
|                         |                  |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |           |
| 17.000<br>0.6693        | 40.000<br>1.5748 | 13.250<br>0.5217 | 19800<br>4440          | 0.35 | 1.74 | 5120<br>1150           | 3030<br>680      | 1.69 | 19900<br>4460   | 30203       | 30203     |
| 20.000<br>0.7874        | 42.000<br>1.6535 | 15.000<br>0.5906 | 25700<br>5770          | 0.37 | 1.60 | 6660<br>1500           | 4260<br>959      | 1.56 | 29400<br>6600   | 32004X      | 32004X    |
| 20.000<br>0.7874        | 42.000<br>1.6535 | 15.000<br>0.5906 | 25700<br>5770          | 0.37 | 1.60 | 6660<br>1500           | 4260<br>959      | 1.56 | 29400<br>6600   | XAA32004X   | YAA32004X |
| 20.000<br>0.7874        | 52.000<br>2.0472 | 16.250<br>0.6398 | 35700<br>8020          | 0.30 | 2.00 | 9250<br>2080           | 4750<br>1070     | 1.95 | 34500<br>7760   | 30304       | 30304     |
| 20.000<br>0.7874        | 52.000<br>2.0472 | 22.250<br>0.8760 | 46400<br>10400         | 0.30 | 2.00 | 12000<br>2710          | 6180<br>1390     | 1.95 | 48300<br>10900  | 32304       | 32304     |
| 25.000<br>0.9843        | 47.000<br>1.8504 | 15.000<br>0.5906 | 28500<br>6410          | 0.43 | 1.39 | 7390<br>1660           | 5440<br>1220     | 1.36 | 35400<br>7950   | XAA32005X   | YAA32005X |
| 25.000<br>0.9843        | 52.000<br>2.0472 | 16.250<br>0.6398 | 31600<br>7100          | 0.38 | 1.60 | 8190<br>1840           | 5260<br>1180     | 1.56 | 34400<br>7730   | 30205       | 30205     |
| 25.000<br>0.9843        | 52.000<br>2.0472 | 22.000<br>0.8661 | 51100<br>11500         | 0.35 | 1.71 | 13200<br>2980          | 7950<br>1790     | 1.66 | 63600<br>14300  | 33205       | 33205     |
| 25.000<br>0.9843        | 62.000<br>2.4409 | 25.250<br>0.9941 | 67100<br>15100         | 0.30 | 2.00 | 17400<br>3910          | 8930<br>2010     | 1.95 | 72400<br>16300  | 32305       | 32305     |
| 30.000<br>1.1811        | 55.000<br>2.1654 | 17.000<br>0.6693 | 36300<br>8160          | 0.43 | 1.39 | 9410<br>2120           | 6930<br>1560     | 1.36 | 45300<br>10200  | 32006X      | 32006X    |
| 30.000<br>1.1811        | 62.000<br>2.4409 | 17.250<br>0.6791 | 45700<br>10300         | 0.38 | 1.60 | 11800<br>2660          | 7580<br>1710     | 1.56 | 51800<br>11600  | 30206       | 30206     |
| 30.000<br>1.1811        | 62.000<br>2.4409 | 21.250<br>0.8366 | 59400<br>13400         | 0.38 | 1.60 | 15400<br>3460          | 9890<br>2220     | 1.56 | 71900<br>16200  | 32206       | 32206     |
| 30.000<br>1.1811        | 62.000<br>2.4409 | 21.250<br>0.8366 | 51700<br>11600         | 0.56 | 1.07 | 13400<br>3010          | 12900<br>2900    | 1.04 | 62300<br>14000  | 32206-B     | 32206-B   |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 20.750<br>0.8169 | 60600<br>13600         | 0.32 | 1.90 | 15700<br>3530          | 8470<br>1900     | 1.85 | 61900<br>13900  | 30306       | 30306     |
| 30.000<br>1.1811        | 72.000<br>2.8346 | 28.750<br>1.1319 | 81200<br>18200         | 0.32 | 1.90 | 21000<br>4730          | 11300<br>2550    | 1.85 | 89800<br>20200  | 32306       | 32306     |
| 35.000<br>1.3780        | 62.000<br>2.4409 | 18.000<br>0.7087 | 44100<br>9920          | 0.45 | 1.32 | 11400<br>2570          | 8890<br>2000     | 1.29 | 57600<br>12900  | 32007X      | 32007X    |
| 35.000<br>1.3780        | 72.000<br>2.8346 | 24.250<br>0.9547 | 69400<br>15600         | 0.38 | 1.60 | 18000<br>4040          | 11500<br>2600    | 1.56 | 82300<br>18500  | 32207       | 32207     |
| 35.000<br>1.3780        | 80.000<br>3.1496 | 22.750<br>0.8957 | 80500<br>18100         | 0.32 | 1.90 | 20900<br>4690          | 11300<br>2530    | 1.85 | 86100<br>19400  | 30307       | 30307     |
| 40.000<br>1.5748        | 68.000<br>2.6772 | 19.000<br>0.7480 | 51400<br>11600         | 0.38 | 1.58 | 13300<br>3000          | 8640<br>1940     | 1.54 | 71600<br>16100  | 32008X      | 32008X    |
| 40.000<br>1.5748        | 68.000<br>2.6772 | 19.000<br>0.7480 | 51400<br>11600         | 0.38 | 1.58 | 13300<br>3000          | 8640<br>1940     | 1.54 | 71600<br>16100  | XAA32008X   | Y32008X   |
| 40.000<br>1.5748        | 75.000<br>2.9528 | 26.000<br>1.0236 | 81500<br>18300         | 0.36 | 1.69 | 21100<br>4750          | 12900<br>2890    | 1.64 | 105000<br>23600 | XAA33108    | Y33108    |
| 40.000<br>1.5748        | 80.000<br>3.1496 | 24.750<br>0.9744 | 74900<br>16800         | 0.38 | 1.60 | 19400<br>4370          | 12500<br>2800    | 1.56 | 86500<br>19400  | 32208       | 32208     |
| 40.000<br>1.5748        | 80.000<br>3.1496 | 32.000<br>1.2598 | 112000<br>25200        | 0.36 | 1.68 | 29000<br>6520          | 17800<br>4000    | 1.63 | 144000<br>32400 | 33208       | 33208     |
| 40.000<br>1.5748        | 90.000<br>3.5433 | 25.250<br>0.9941 | 91500<br>20600         | 0.35 | 1.74 | 23700<br>5330          | 14000<br>3150    | 1.69 | 102000<br>23000 | 30308       | 30308     |
| 40.000<br>1.5748        | 90.000<br>3.5433 | 25.250<br>0.9941 | 79000<br>17800         | 0.83 | 0.73 | 20500<br>4610          | 28900<br>6510    | 0.71 | 88100<br>19800  | 31308       | 31308     |
| 40.000<br>1.5748        | 90.000<br>3.5433 | 35.250<br>1.3878 | 123000<br>27500        | 0.55 | 1.10 | 31800<br>7140          | 29700<br>6670    | 1.07 | 160000<br>36100 | XBA32308-B  | Y32308-B  |
| 45.000<br>1.7717        | 75.000<br>2.9528 | 20.000<br>0.7874 | 61500<br>13800         | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | 32009X      | 32009X    |
| 45.000<br>1.7717        | 75.000<br>2.9528 | 20.000<br>0.7874 | 61500<br>13800         | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | XAA32009X   | Y32009X   |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

Tapered - IsoClass™ Metric 3000 Series

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                |                | Factors        |                |                     | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub>      |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> | Weight<br>kg (lbs.) |                     |
| 12.000<br>0.4724 | 11.000<br>0.4331 | -3.6<br>-0.14    | 1.0<br>0.04                | 21.0<br>0.83                      | 22.0<br>0.87             | 1.0<br>0.04                         | 37.0<br>1.46   | 35.0<br>1.38   | 0.10<br>0.00   | 1.60<br>0.06   | 4.2            | 5.96           | 0.0398         | 0.08<br>0.18        |                     |
| 15.000<br>0.5906 | 12.000<br>0.4724 | -4.6<br>-0.18    | 0.6<br>0.02                | 25.5<br>1.00                      | 26.5<br>1.04             | 0.6<br>0.02                         | 39.5<br>1.56   | 37.0<br>1.46   | 0.40<br>0.02   | 1.40<br>0.06   | 6.2            | 6.1            | 0.0469         | 0.10<br>0.21        |                     |
| 15.000<br>0.5906 | 12.000<br>0.4724 | -4.6<br>-0.18    | 2.0<br>0.08                | 25.5<br>1.00                      | 29.0<br>1.14             | 1.0<br>0.04                         | 39.5<br>1.56   | 36.5<br>1.44   | 0.40<br>0.02   | 1.40<br>0.06   | 6.2            | 6.1            | 0.0469         | 0.10<br>0.21        |                     |
| 15.000<br>0.5906 | 13.000<br>0.5118 | -4.8<br>-0.19    | 1.5<br>0.06                | 24.5<br>0.96                      | 27.0<br>1.06             | 1.5<br>0.06                         | 47.5<br>1.87   | 45.5<br>1.79   | -0.60<br>-0.02 | 2.60<br>0.10   | 7.5            | 5.5            | 0.0458         | 0.17<br>0.38        |                     |
| 21.000<br>0.8268 | 18.000<br>0.7087 | -8.4<br>-0.33    | 1.5<br>0.06                | 26.0<br>1.02                      | 28.0<br>1.10             | 1.5<br>0.06                         | 47.5<br>1.87   | 44.5<br>1.75   | 0.90<br>0.04   | 2.20<br>0.09   | 9.3            | 5.73           | 0.0495         | 0.24<br>0.52        |                     |
| 15.000<br>0.5906 | 11.500<br>0.4528 | -3.3<br>-0.13    | 3.3<br>0.13                | 30.0<br>1.18                      | 37.0<br>1.46             | 1.0<br>0.04                         | 44.5<br>1.75   | 41.0<br>1.61   | 0.60<br>0.02   | 1.20<br>0.05   | 8.6            | 8.7            | 0.0546         | 0.11<br>0.25        |                     |
| 15.000<br>0.5906 | 13.000<br>0.5118 | -3.6<br>-0.14    | 1.0<br>0.04                | 30.5<br>1.20                      | 32.0<br>1.26             | 1.0<br>0.04                         | 48.5<br>1.91   | 46.0<br>1.81   | 0.4<br>0.02    | 1.60<br>0.06   | 8.4            | 6.21           | 0.0514         | 0.15<br>0.34        |                     |
| 22.000<br>0.8661 | 18.000<br>0.7087 | -7.6<br>-0.30    | 1.0<br>0.04                | 30.5<br>1.20                      | 34.0<br>1.34             | 1.0<br>0.04                         | 49.0<br>1.93   | 44.5<br>1.75   | 0.70<br>0.03   | 1.90<br>0.08   | 13.4           | 8.6            | 0.0594         | 0.22<br>0.50        |                     |
| 24.000<br>0.9449 | 20.000<br>0.7874 | -9.7<br>-0.38    | 1.5<br>0.06                | 31.5<br>1.24                      | 35.0<br>1.38             | 1.5<br>0.06                         | 57.0<br>2.24   | 54.0<br>2.13   | 2.20<br>0.09   | 2.30<br>0.09   | 15.1           | 5.58           | 0.0580         | 0.37<br>0.81        |                     |
| 17.000<br>0.6693 | 13.000<br>0.5118 | -3.3<br>-0.13    | 1.0<br>0.04                | 36.0<br>1.42                      | 37.5<br>1.48             | 1.0<br>0.04                         | 52.5<br>2.07   | 49.0<br>1.93   | 1.00<br>0.04   | 1.30<br>0.05   | 12.1           | 10.5           | 0.0611         | 0.17<br>0.38        |                     |
| 16.000<br>0.6299 | 14.000<br>0.5512 | -3.6<br>-0.14    | 1.0<br>0.04                | 36.5<br>1.44                      | 38.0<br>1.50             | 1.0<br>0.04                         | 58.0<br>2.28   | 55.0<br>2.17   | 0.20<br>0.01   | 2.30<br>0.09   | 13.4           | 10.7           | 0.0601         | 0.24<br>0.52        |                     |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -5.6<br>-0.22    | 1.0<br>0.04                | 37.0<br>1.46                      | 43.0<br>1.69             | 1.0<br>0.04                         | 59.0<br>2.32   | 54.0<br>2.13   | 2.00<br>0.08   | 2.90<br>0.11   | 16.8           | 10.9           | 0.0652         | 0.29<br>0.63        |                     |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -3.3<br>-0.13    | 1.0<br>0.04                | 36.5<br>1.44                      | 39.5<br>1.56             | 1.0<br>0.04                         | 59.0<br>2.32   | 53.0<br>2.09   | 1.60<br>0.06   | 2.80<br>0.11   | 14.1           | 8.92           | 0.0700         | 0.30<br>0.65        |                     |
| 19.000<br>0.7480 | 16.000<br>0.6299 | -5.8<br>-0.23    | 1.5<br>0.06                | 35.5<br>1.40                      | 38.0<br>1.50             | 1.5<br>0.06                         | 66.0<br>2.60   | 64.0<br>2.52   | 0.90<br>0.04   | 3.10<br>0.12   | 16.2           | 8.17           | 0.0600         | 0.39<br>0.87        |                     |
| 27.000<br>1.0630 | 23.000<br>0.9055 | -10.7<br>-0.42   | 1.5<br>0.06                | 37.0<br>1.46                      | 40.5<br>1.59             | 1.5<br>0.06                         | 66.0<br>2.60   | 62.0<br>2.44   | 2.90<br>0.11   | 2.70<br>0.11   | 20.6           | 8.55           | 0.0654         | 0.56<br>1.23        |                     |
| 18.000<br>0.7087 | 14.000<br>0.5512 | -2.5<br>-0.10    | 1.0<br>0.04                | 41.5<br>1.63                      | 43.0<br>1.69             | 1.0<br>0.04                         | 59.5<br>2.34   | 55.0<br>2.17   | 0.80<br>0.03   | 1.40<br>0.06   | 16.7           | 15.7           | 0.0691         | 0.23<br>0.50        |                     |
| 23.000<br>0.9055 | 19.000<br>0.7480 | -6.4<br>-0.25    | 1.5<br>0.06                | 41.5<br>1.63                      | 43.5<br>1.71             | 1.5<br>0.06                         | 67.0<br>2.64   | 63.0<br>2.48   | 1.90<br>0.08   | 1.80<br>0.07   | 21.5           | 11.4           | 0.0705         | 0.44<br>0.96        |                     |
| 21.000<br>0.8268 | 18.000<br>0.7087 | -5.8<br>-0.23    | 2.0<br>0.08                | 43.5<br>1.71                      | 46.5<br>1.83             | 1.5<br>0.06                         | 75.0<br>2.95   | 72.0<br>2.83   | 0.50<br>0.02   | 3.90<br>0.15   | 22.9           | 12.6           | 0.0675         | 0.52<br>1.16        |                     |
| 19.000<br>0.7480 | 14.500<br>0.5709 | -3.8<br>-0.15    | 1.0<br>0.04                | 45.5<br>1.79                      | 47.0<br>1.85             | 1.0<br>0.04                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 1.70<br>0.07   | 23.8           | 16.1           | 0.0732         | 0.27<br>0.61        |                     |
| 19.000<br>0.7480 | 14.500<br>0.5709 | -3.8<br>-0.15    | 3.5<br>0.14                | 45.5<br>1.79                      | 52.0<br>2.05             | 1.0<br>0.04                         | 65.0<br>2.56   | 61.0<br>2.40   | 0.90<br>0.04   | 1.70<br>0.07   | 23.8           | 16.1           | 0.0732         | 0.27<br>0.61        |                     |
| 26.000<br>1.0236 | 20.500<br>0.8071 | -7.6<br>-0.30    | 3.5<br>0.14                | 47.0<br>1.85                      | 55.0<br>2.17             | 1.5<br>0.06                         | 71.0<br>2.80   | 67.0<br>2.64   | 1.80<br>0.07   | 1.70<br>0.07   | 29.4           | 14.9           | 0.0771         | 0.50<br>1.09        |                     |
| 23.000<br>0.9055 | 19.000<br>0.7480 | -5.6<br>-0.22    | 1.5<br>0.06                | 46.0<br>1.81                      | 48.5<br>1.91             | 1.5<br>0.06                         | 75.0<br>2.95   | 71.0<br>2.80   | 1.60<br>0.06   | 2.40<br>0.10   | 25             | 11.4           | 0.0738         | 0.53<br>1.17        |                     |
| 32.000<br>1.2598 | 25.000<br>0.9843 | -10.9<br>-0.43   | 1.5<br>0.06                | 47.0<br>1.85                      | 51.0<br>2.01             | 1.5<br>0.06                         | 76.0<br>2.99   | 70.0<br>2.76   | 2.80<br>0.11   | 2.40<br>0.10   | 35.9           | 11.2           | 0.0827         | 0.73<br>1.61        |                     |
| 23.000<br>0.9055 | 20.000<br>0.7874 | -5.8<br>-0.23    | 2.0<br>0.08                | 46.5<br>1.83                      | 50.0<br>1.97             | 1.5<br>0.06                         | 84.0<br>3.31   | 80.0<br>3.15   | 1.80<br>0.07   | 2.80<br>0.11   | 30.1           | 11.6           | 0.0762         | 0.73<br>1.61        |                     |
| 23.000<br>0.9055 | 17.000<br>0.6693 | 4.1<br>0.16      | 2.0<br>0.08                | 52.0<br>2.05                      | 61.0<br>2.40             | 1.5<br>0.06                         | 86.0<br>3.39   | 76.0<br>2.99   | 4.10<br>0.16   | 3.10<br>0.12   | 22.9           | 9.14           | 0.0910         | 0.72<br>1.58        |                     |
| 33.500<br>1.3189 | 27.000<br>1.0630 | -7.4<br>-0.29    | 2.0<br>0.08                | 49.0<br>1.93                      | 58.0<br>2.28             | 1.5<br>0.06                         | 84.0<br>3.31   | 76.0<br>2.99   | 3.50<br>0.14   | 2.90<br>0.11   | 38.1           | 14             | 0.0966         | 1.10<br>2.43        |                     |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 1.0<br>0.04                | 51.0<br>2.01                      | 53.0<br>2.09             | 1.0<br>0.04                         | 72.0<br>2.83   | 68.0<br>2.68   | 0.60<br>0.02   | 2.10<br>0.08   | 28.7           | 16.2           | 0.0788         | 0.34<br>0.76        |                     |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 3.0<br>0.12                | 51.0<br>2.01                      | 57.0<br>2.24             | 1.0<br>0.04                         | 72.0<br>2.83   | 68.0<br>2.68   | 0.60<br>0.02   | 2.10<br>0.08   | 28.7           | 16.2           | 0.0788         | 0.34<br>0.76        |                     |

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

Continued on next page.

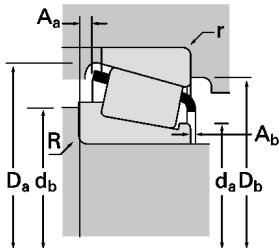
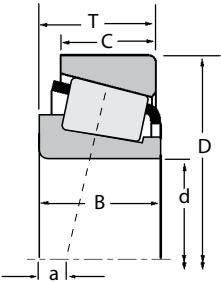




# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                 | Part Number |            |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|-----------------|-------------|------------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>  | Inner Outer |            |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                 |             |            |
| 45.000<br>1.7717        | 75.000<br>2.9528  | 20.000<br>0.7874 | 61500<br>13800         | 0.39 | 1.53 | 15900<br>3580          | 10700<br>2410    | 1.49 | 84300<br>19000  | XAB-32009X  | Y32009X    |
| 45.000<br>1.7717        | 80.000<br>3.1496  | 26.000<br>1.0236 | 88000<br>19800         | 0.38 | 1.57 | 22800<br>5130          | 15000<br>3370    | 1.52 | 119000<br>26800 | 33109       | 33109      |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 20.750<br>0.8169 | 74100<br>16700         | 0.40 | 1.48 | 19200<br>4320          | 13300<br>3000    | 1.44 | 89000<br>20000  | 30209       | 30209      |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 24.750<br>0.9744 | 81100<br>18200         | 0.40 | 1.48 | 21000<br>4730          | 14600<br>3280    | 1.44 | 98700<br>22200  | 32209       | 32209      |
| 45.000<br>1.7717        | 85.000<br>3.3465  | 32.000<br>1.2598 | 116000<br>26100        | 0.39 | 1.56 | 30100<br>6770          | 19900<br>4470    | 1.51 | 155000<br>34800 | 33209       | 33209      |
| 45.000<br>1.7717        | 100.000<br>3.9370 | 27.250<br>1.0728 | 97900<br>22000         | 0.83 | 0.73 | 25400<br>5700          | 35900<br>8050    | 0.71 | 113000<br>25400 | 31309       | 31309      |
| 45.000<br>1.7717        | 100.000<br>3.9370 | 38.250<br>1.5059 | 147000<br>33100        | 0.55 | 1.10 | 38100<br>8580          | 35600<br>8020    | 1.07 | 187000<br>42000 | 32309-B     | 32309-B    |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | 32010X      | 32010X     |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | XAA32010X   | Y32010X    |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | XAB-32010X  | Y32010X    |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | XAD32010X   | Y32010X    |
| 50.000<br>1.9685        | 80.000<br>3.1496  | 20.000<br>0.7874 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | XAE32010X   | Y32010X    |
| 50.000<br>1.9685        | 82.000<br>3.2283  | 21.500<br>0.8465 | 64700<br>14500         | 0.42 | 1.42 | 16800<br>3770          | 12200<br>2730    | 1.38 | 92700<br>20800  | XAB-32010X  | YKB-32010X |
| 50.000<br>1.9685        | 85.000<br>3.3465  | 26.000<br>1.0236 | 89500<br>20100         | 0.41 | 1.46 | 23200<br>5220          | 16300<br>3670    | 1.42 | 125000<br>28100 | 33110       | 33110      |
| 50.000<br>1.9685        | 90.000<br>3.5433  | 21.750<br>0.8563 | 73600<br>16500         | 0.42 | 1.43 | 19100<br>4290          | 13700<br>3080    | 1.39 | 87400<br>19700  | 30210       | 30210      |
| 50.000<br>1.9685        | 100.000<br>3.9370 | 33.500<br>1.3189 | 150000<br>33700        | 0.40 | 1.50 | 38900<br>8750          | 26600<br>5980    | 1.46 | 202000<br>45300 | XLA33211    | Y33211     |
| 50.000<br>1.9685        | 110.000<br>4.3307 | 29.250<br>1.1516 | 131000<br>29600        | 0.35 | 1.74 | 34100<br>7660          | 20100<br>4530    | 1.69 | 150000<br>33800 | 30310       | 30310      |
| 50.000<br>1.9685        | 110.000<br>4.3307 | 29.250<br>1.1516 | 115000<br>25900        | 0.83 | 0.73 | 29900<br>6720          | 42200<br>9490    | 0.71 | 132000<br>29700 | 31310       | 31310      |
| 50.000<br>1.9685        | 110.000<br>4.3307 | 42.250<br>1.6634 | 173000<br>38900        | 0.35 | 1.74 | 44900<br>10100         | 26500<br>5960    | 1.69 | 211000<br>47500 | 32310       | 32310      |
| 50.000<br>1.9685        | 110.000<br>4.3307 | 42.250<br>1.6634 | 179000<br>40200        | 0.55 | 1.10 | 46300<br>10400         | 43300<br>9740    | 1.07 | 241000<br>54300 | 32310-B     | 32310-B    |
| 50.815<br>2.0006        | 100.000<br>3.9370 | 35.000<br>1.3780 | 150000<br>33700        | 0.40 | 1.50 | 38900<br>8750          | 26600<br>5980    | 1.46 | 202000<br>45300 | XGA33211    | Y33211     |
| 52.000<br>2.0472        | 90.000<br>3.5433  | 21.750<br>0.8563 | 73600<br>16500         | 0.42 | 1.43 | 19100<br>4290          | 13700<br>3080    | 1.39 | 87400<br>19700  | XGA30210    | Y30210     |
| 55.000<br>2.1654        | 90.000<br>3.5433  | 23.000<br>0.9055 | 87900<br>19800         | 0.41 | 1.48 | 22800<br>5120          | 15900<br>3560    | 1.44 | 126000<br>28300 | 32011X      | 32011X     |
| 55.000<br>2.1654        | 90.000<br>3.5433  | 27.000<br>1.0630 | 92100<br>20700         | 0.31 | 1.92 | 23900<br>5370          | 12800<br>2870    | 1.87 | 141000<br>31700 | 33011       | 33011      |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 22.750<br>0.8957 | 99100<br>22300         | 0.40 | 1.48 | 25700<br>5780          | 17800<br>4010    | 1.44 | 122000<br>27400 | 30211       | 30211      |
| 55.000<br>2.1654        | 100.000<br>3.9370 | 35.000<br>1.3780 | 150000<br>33700        | 0.40 | 1.50 | 38900<br>8750          | 26600<br>5980    | 1.46 | 202000<br>45300 | 33211       | 33211      |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 31.500<br>1.2402 | 134000<br>30200        | 0.83 | 0.73 | 34800<br>7830          | 49200<br>11100   | 0.71 | 157000<br>35300 | 31311       | 31311      |
| 55.000<br>2.1654        | 120.000<br>4.7244 | 45.500<br>1.7913 | 206000<br>46400        | 0.55 | 1.10 | 53500<br>12000         | 50000<br>11200   | 1.07 | 286000<br>64300 | 32311-B     | 32311-B    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

Tapered - IsoClass™ Metric 3000 Series

| Bearing          |                  |                  | Dimensions, mm (inches)    |                                   |                          |                                     |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -3.3<br>-0.13    | 2.3<br>0.09                | 51.0<br>2.01                      | 58.0<br>2.28             | 1.0<br>0.04                         | 72.0<br>2.83   | 68.0<br>2.68   | 0.60<br>0.02   | 2.10<br>0.08   | 28.7           | 16.2           | 0.0788         | 0.34<br>0.75        |
| 26.000<br>1.0236 | 20.500<br>0.8071 | -6.6<br>-0.26    | 1.5<br>0.06                | 52.0<br>2.05                      | 55.0<br>2.17             | 1.5<br>0.06                         | 76.0<br>2.99   | 71.0<br>2.80   | 1.90<br>0.08   | 1.70<br>0.07   | 35.7           | 14.5           | 0.0843         | 0.53<br>1.17        |
| 19.000<br>0.7480 | 16.000<br>0.6299 | -2.5<br>-0.10    | 1.5<br>0.06                | 53.0<br>2.09                      | 55.0<br>2.17             | 1.5<br>0.06                         | 80.0<br>3.15   | 76.0<br>2.99   | 1.10<br>0.04   | 3.80<br>0.15   | 28.3           | 16.4           | 0.0789         | 0.49<br>1.08        |
| 23.000<br>0.9055 | 19.000<br>0.7480 | -4.3<br>-0.17    | 1.5<br>0.06                | 51.0<br>2.01                      | 54.0<br>2.13             | 1.5<br>0.06                         | 81.0<br>3.19   | 76.0<br>2.99   | 1.10<br>0.04   | 3.80<br>0.15   | 30.5           | 12.4           | 0.0809         | 0.58<br>1.27        |
| 32.000<br>1.2598 | 25.000<br>0.9843 | -9.9<br>-0.39    | 1.5<br>0.06                | 52.0<br>2.05                      | 57.0<br>2.24             | 1.5<br>0.06                         | 81.0<br>3.19   | 74.0<br>2.91   | 2.90<br>0.12   | 2.40<br>0.10   | 41.9           | 13.2           | 0.0892         | 0.79<br>1.73        |
| 25.000<br>0.9843 | 18.000<br>0.7087 | 4.3<br>0.17      | 2.0<br>0.08                | 56.0<br>2.20                      | 67.0<br>2.64             | 1.5<br>0.06                         | 100.0<br>3.94  | 86.0<br>3.39   | 5.40<br>0.21   | 4.40<br>0.17   | 30.4           | 12.7           | 0.1001         | 0.94<br>2.07        |
| 36.000<br>1.4173 | 30.000<br>1.1811 | -7.9<br>-0.31    | 2.0<br>0.08                | 55.0<br>2.17                      | 54.0<br>2.13             | 1.5<br>0.06                         | 95.0<br>3.74   | 85.0<br>3.35   | 4.50<br>0.18   | 2.50<br>0.10   | 44.9           | 18.7           | 0.1017         | 1.42<br>3.14        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 1.0<br>0.04                | 56.0<br>2.20                      | 58.0<br>2.28             | 1.0<br>0.04                         | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 2.3<br>0.09                | 56.0<br>2.20                      | 60.0<br>2.36             | 1.0<br>0.04                         | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 3.0<br>0.12                | 55.0<br>2.17                      | 62.0<br>2.44             | 1.0<br>0.04                         | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 1.5<br>0.06                | 56.0<br>2.20                      | 59.0<br>2.32             | 1.0<br>0.04                         | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 15.500<br>0.6102 | -2.0<br>-0.08    | 0.3<br>0.01                | 55.0<br>2.17                      | 56.0<br>2.20             | 1.0<br>0.04                         | 77.0<br>3.03   | 73.0<br>2.87   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.37<br>0.82        |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -2.0<br>-0.08    | 3.0<br>0.12                | 55.0<br>2.17                      | 62.0<br>2.44             | 0.5<br>0.02                         | 77.0<br>3.03   | 76.0<br>2.99   | 0.90<br>0.04   | 2.10<br>0.08   | 34             | 20.3           | 0.0853         | 0.42<br>0.93        |
| 26.000<br>1.0236 | 20.000<br>0.7874 | -5.3<br>-0.21    | 1.5<br>0.06                | 57.0<br>2.24                      | 61.0<br>2.40             | 1.5<br>0.06                         | 82.0<br>3.23   | 76.0<br>2.99   | 2.30<br>0.09   | 1.70<br>0.07   | 40.6           | 20.6           | 0.0899         | 0.58<br>1.29        |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -2.0<br>-0.08    | 1.5<br>0.06                | 56.0<br>2.20                      | 59.0<br>2.32             | 1.5<br>0.06                         | 85.0<br>3.35   | 81.0<br>3.19   | 1.40<br>0.05   | 3.10<br>0.12   | 30.3           | 14.9           | 0.0814         | 0.54<br>1.19        |
| 33.500<br>1.3189 | 27.000<br>1.0630 | -8.1<br>-0.32    | 2.0<br>0.08                | 62.0<br>2.44                      | 67.0<br>2.64             | 1.5<br>0.06                         | 96.0<br>3.78   | 89.0<br>3.50   | 1.40<br>0.05   | 2.80<br>0.11   | 59.3           | 15.3           | 0.1010         | 1.24<br>2.73        |
| 27.000<br>1.0630 | 23.000<br>0.9055 | -6.1<br>-0.24    | 2.5<br>0.10                | 58.0<br>2.28                      | 62.0<br>2.44             | 2.0<br>0.08                         | 103.0<br>4.06  | 98.0<br>3.86   | 2.00<br>0.08   | 3.20<br>0.12   | 48.7           | 16.7           | 0.0892         | 1.26<br>2.77        |
| 27.000<br>1.0630 | 19.000<br>0.7480 | 5.6<br>0.22      | 2.5<br>0.10                | 63.0<br>2.48                      | 75.0<br>2.95             | 2.0<br>0.08                         | 104.5<br>4.11  | 93.0<br>3.66   | 5.20<br>0.20   | 4.20<br>0.16   | 37.1           | 14.6           | 0.0690         | 1.21<br>2.68        |
| 40.000<br>1.5748 | 33.000<br>1.2992 | -14.2<br>-0.56   | 2.5<br>0.10                | 60.0<br>2.36                      | 65.0<br>2.56             | 2.0<br>0.08                         | 103.0<br>4.06  | 95.0<br>3.74   | 4.60<br>0.18   | 2.90<br>0.11   | 60.6           | 16             | 0.0965         | 1.83<br>4.03        |
| 40.000<br>1.5748 | 33.000<br>1.2992 | -8.6<br>-0.34    | 2.5<br>0.10                | 60.0<br>2.36                      | 71.0<br>2.80             | 2.0<br>0.08                         | 103.0<br>4.06  | 93.0<br>3.66   | 4.30<br>0.17   | 3.30<br>0.13   | 62.7           | 17.9           | 0.0783         | 1.94<br>4.28        |
| 35.000<br>1.3780 | 27.000<br>1.0630 | -9.7<br>-0.38    | 2.0<br>0.08                | 62.0<br>2.44                      | 67.0<br>2.64             | 1.5<br>0.06                         | 96.0<br>3.78   | 89.0<br>3.50   | 2.90<br>0.11   | 2.80<br>0.11   | 59.3           | 15.3           | 0.1010         | 1.25<br>2.76        |
| 20.000<br>0.7874 | 17.000<br>0.6693 | -2.0<br>-0.08    | 4.0<br>0.16                | 59.0<br>2.32                      | 66.0<br>2.60             | 1.5<br>0.06                         | 85.0<br>3.35   | 81.0<br>3.19   | 1.40<br>0.05   | 3.10<br>0.12   | 30.3           | 15.9           | 0.0814         | 0.51<br>1.13        |
| 23.000<br>0.9055 | 17.500<br>0.6890 | -3.0<br>-0.12    | 1.5<br>0.06                | 62.0<br>2.44                      | 65.0<br>2.56             | 1.5<br>0.06                         | 86.5<br>3.41   | 82.0<br>3.23   | 1.80<br>0.07   | 2.00<br>0.08   | 46             | 28             | 0.0931         | 0.57<br>1.25        |
| 27.000<br>1.0630 | 21.000<br>0.8268 | -7.9<br>-0.31    | 1.5<br>0.06                | 61.0<br>2.40                      | 63.0<br>2.48             | 1.5<br>0.06                         | 87.0<br>3.43   | 82.0<br>3.23   | 2.40<br>0.09   | 1.90<br>0.07   | 56.5           | 27.9           | 0.0915         | 0.66<br>1.46        |
| 21.000<br>0.8268 | 18.000<br>0.7087 | -1.8<br>-0.07    | 2.0<br>0.08                | 64.0<br>2.52                      | 67.0<br>2.64             | 1.5<br>0.06                         | 95.0<br>3.74   | 91.0<br>3.58   | 1.50<br>0.06   | 4.40<br>0.17   | 41.9           | 22.8           | 0.0897         | 0.72<br>1.58        |
| 35.000<br>1.3780 | 27.000<br>1.0630 | -9.7<br>-0.38    | 2.0<br>0.08                | 62.0<br>2.44                      | 68.0<br>2.68             | 1.5<br>0.06                         | 96.0<br>3.78   | 89.0<br>3.50   | 2.90<br>0.11   | 2.80<br>0.11   | 59.3           | 15.3           | 0.1010         | 1.16<br>2.55        |
| 29.000<br>1.1417 | 21.000<br>0.8268 | 6.9<br>0.27      | 2.5<br>0.10                | 68.0<br>2.68                      | 82.0<br>3.23             | 2.0<br>0.08                         | 115.0<br>4.53  | 103.0<br>4.06  | 4.80<br>0.19   | 4.30<br>0.17   | 45.5           | 15.9           | 0.0739         | 1.57<br>3.45        |
| 43.000<br>1.6929 | 35.000<br>1.3780 | -8.6<br>-0.34    | 2.5<br>0.10                | 66.0<br>2.60                      | 82.0<br>3.23             | 2.0<br>0.08                         | 114.0<br>4.49  | 101.0<br>3.98  | 4.50<br>0.18   | 3.50<br>0.14   | 78.8           | 24.6           | 0.0794         | 2.45<br>5.40        |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

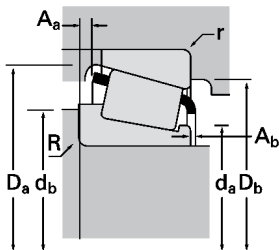
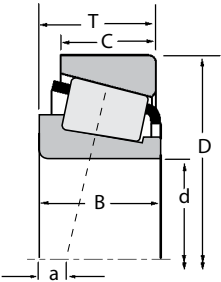
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |        |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|--------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | C <sub>0</sub>   | Inner       | Outer  |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |        |
| 60.000<br>2.3622        | 95.000<br>3.7402  | 23.000<br>0.9055 | 89600<br>20100         | 0.43 | 1.39 | 23200<br>5220          | 17100<br>3840    | 1.36 | 132000<br>29600  | 32012X      | 32012X |
| 60.000<br>2.3622        | 95.000<br>3.7402  | 27.000<br>1.0630 | 95100<br>21400         | 0.33 | 1.83 | 24600<br>5540          | 13800<br>3110    | 1.78 | 150000<br>33600  | 33012       | 33012  |
| 60.000<br>2.3622        | 100.000<br>3.9370 | 30.000<br>1.1811 | 127000<br>28500        | 0.40 | 1.51 | 32800<br>7380          | 22300<br>5020    | 1.47 | 180000<br>40500  | 33112       | 33112  |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 23.750<br>0.9350 | 99100<br>22300         | 0.40 | 1.48 | 25700<br>5770          | 17800<br>4000    | 1.44 | 117000<br>26200  | 30212       | 30212  |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 38.000<br>1.4961 | 183000<br>41200        | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800  | 33212       | 33212  |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 38.000<br>1.4961 | 183000<br>41200        | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800  | XAA33212    | Y33212 |
| 60.000<br>2.3622        | 110.000<br>4.3307 | 38.000<br>1.4961 | 183000<br>41200        | 0.40 | 1.48 | 47500<br>10700         | 32800<br>7380    | 1.44 | 253000<br>56800  | XAB-33212   | Y33212 |
| 60.000<br>2.3622        | 130.000<br>5.1181 | 33.500<br>1.3189 | 186000<br>41900        | 0.35 | 1.74 | 48300<br>10900         | 28500<br>6420    | 1.69 | 221000<br>49800  | 30312       | 30312  |
| 60.000<br>2.3622        | 130.000<br>5.1181 | 33.500<br>1.3189 | 159000<br>35700        | 0.83 | 0.73 | 41200<br>9250          | 58200<br>13100   | 0.71 | 188000<br>42200  | 31312       | 31312  |
| 60.000<br>2.3622        | 130.000<br>5.1181 | 48.500<br>1.9094 | 245000<br>55000        | 0.35 | 1.74 | 63400<br>14300         | 37500<br>8420    | 1.69 | 310000<br>69800  | 32312       | 32312  |
| 65.000<br>2.5591        | 100.000<br>3.9370 | 23.000<br>0.9055 | 90800<br>20400         | 0.46 | 1.31 | 23500<br>5290          | 18500<br>4160    | 1.27 | 137000<br>30900  | 32013X      | 32013X |
| 65.000<br>2.5591        | 100.000<br>3.9370 | 27.000<br>1.0630 | 99100<br>22300         | 0.35 | 1.72 | 25700<br>5780          | 15300<br>3450    | 1.68 | 162000<br>36400  | 33013       | 33013  |
| 65.000<br>2.5591        | 110.000<br>4.3307 | 34.000<br>1.3386 | 155000<br>34700        | 0.39 | 1.55 | 40100<br>9010          | 26600<br>5980    | 1.51 | 225000<br>50600  | 33113       | 33113  |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 24.750<br>0.9744 | 128000<br>28800        | 0.40 | 1.48 | 33300<br>7480          | 23100<br>5190    | 1.44 | 158000<br>35500  | 30213       | 30213  |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 32.750<br>1.2894 | 161000<br>36200        | 0.40 | 1.48 | 41700<br>9380          | 28900<br>6500    | 1.44 | 209000<br>46900  | 32213       | 32213  |
| 65.000<br>2.5591        | 120.000<br>4.7244 | 41.000<br>1.6142 | 182000<br>40900        | 0.39 | 1.54 | 47200<br>10600         | 31500<br>7080    | 1.50 | 280000<br>63000  | 33213       | 33213  |
| 65.000<br>2.5591        | 140.000<br>5.5118 | 36.000<br>1.4173 | 206000<br>46300        | 0.35 | 1.74 | 53400<br>12000         | 31500<br>7090    | 1.69 | 242000<br>54400  | 30313       | 30313  |
| 65.000<br>2.5591        | 140.000<br>5.5118 | 36.000<br>1.4173 | 182000<br>40800        | 0.83 | 0.73 | 47100<br>10600         | 66500<br>15000   | 0.71 | 217000<br>48700  | 31313       | 31313  |
| 70.000<br>2.7559        | 110.000<br>4.3307 | 25.000<br>0.9843 | 104000<br>23400        | 0.43 | 1.38 | 27000<br>6060          | 20100<br>4510    | 1.34 | 163000<br>36700  | 32014X      | 32014X |
| 70.000<br>2.7559        | 110.000<br>4.3307 | 31.000<br>1.2205 | 142000<br>31900        | 0.28 | 2.11 | 36800<br>8280          | 17900<br>4040    | 2.05 | 236000<br>53000  | 33014       | 33014  |
| 70.000<br>2.7559        | 120.000<br>4.7244 | 37.000<br>1.4567 | 183000<br>41200        | 0.38 | 1.58 | 47500<br>10700         | 30800<br>6930    | 1.54 | 270000<br>60800  | 33114       | 33114  |
| 70.000<br>2.7559        | 125.000<br>4.9213 | 26.250<br>1.0335 | 128000<br>28800        | 0.42 | 1.43 | 33200<br>7450          | 23800<br>5360    | 1.39 | 157000<br>35300  | 30214       | 30214  |
| 70.000<br>2.7559        | 125.000<br>4.9213 | 33.250<br>1.3091 | 169000<br>38000        | 0.42 | 1.43 | 43800<br>9840          | 31500<br>7080    | 1.39 | 224000<br>50400  | 32214       | 32214  |
| 70.000<br>2.7559        | 150.000<br>5.9055 | 38.000<br>1.4961 | 197000<br>44400        | 0.83 | 0.73 | 51200<br>11500         | 72300<br>16200   | 0.71 | 235000<br>52900  | 31314       | 31314  |
| 70.000<br>2.7559        | 150.000<br>5.9055 | 54.000<br>2.1260 | 339000<br>76200        | 0.35 | 1.74 | 87900<br>19800         | 51900<br>11700   | 1.69 | 448000<br>101000 | 32314       | 32314  |
| 75.000<br>2.9528        | 115.000<br>4.5276 | 25.000<br>0.9842 | 106000<br>23700        | 0.46 | 1.31 | 27400<br>6150          | 21500<br>4830    | 1.27 | 170000<br>38200  | 32015X      | 32015X |
| 75.000<br>2.9528        | 115.000<br>4.5276 | 31.000<br>1.2205 | 146000<br>32800        | 0.30 | 2.01 | 37800<br>8510          | 19300<br>4340    | 1.96 | 239000<br>53700  | 33015       | 33015  |
| 75.000<br>2.9528        | 125.000<br>4.9213 | 37.000<br>1.4567 | 189000<br>42600        | 0.40 | 1.51 | 49100<br>11000         | 33400<br>7510    | 1.47 | 287000<br>64500  | 33115       | 33115  |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

Tapered - IsoClass™ Metric 3000 Series

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 23.000  | 17.500 | -1.8             | 1.5                                            | 66.0                                       | 68.0                                       | 1.5                                          | 91.0           | 86.0           | 1.80           | 2.00           | 51.2           | 31.4           | 0.0982         | 0.60                |
| 0.9055  | 0.6890 | -0.07            | 0.06                                           | 2.60                                       | 2.68                                       | 0.06                                         | 3.58           | 3.39           | 0.07           | 0.08           |                |                |                | 1.32                |
| 27.000  | 21.000 | -7.1             | 1.5                                            | 65.0                                       | 69.0                                       | 1.5                                          | 91.0           | 86.0           | 2.50           | 1.90           | 63             | 31.1           | 0.0964         | 0.69                |
| 1.0630  | 0.8268 | -0.28            | 0.06                                           | 2.56                                       | 2.72                                       | 0.06                                         | 3.58           | 3.39           | 0.10           | 0.07           |                |                |                | 1.53                |
| 30.000  | 23.000 | -6.4             | 1.5                                            | 67.0                                       | 72.0                                       | 1.5                                          | 96.0           | 90.0           | 2.40           | 2.50           | 61.7           | 24             | 0.1021         | 0.91                |
| 1.1811  | 0.9055 | -0.25            | 0.06                                           | 2.64                                       | 2.83                                       | 0.06                                         | 3.78           | 3.54           | 0.10           | 0.10           |                |                |                | 2.00                |
| 22.000  | 19.000 | -1.8             | 2.0                                            | 66.0                                       | 70.0                                       | 1.5                                          | 103.0          | 99.0           | 1.50           | 3.50           | 44.1           | 27             | 0.0909         | 0.89                |
| 0.8661  | 0.7480 | -0.07            | 0.08                                           | 2.60                                       | 2.76                                       | 0.06                                         | 4.06           | 3.90           | 0.06           | 0.14           |                |                |                | 1.96                |
| 38.000  | 29.000 | -9.9             | 2.0                                            | 68.0                                       | 74.0                                       | 1.5                                          | 105.0          | 98.0           | 4.00           | 2.50           | 76.2           | 18.1           | 0.0758         | 1.53                |
| 1.4961  | 1.1417 | -0.39            | 0.08                                           | 2.68                                       | 2.91                                       | 0.06                                         | 4.13           | 3.86           | 0.16           | 0.10           |                |                |                | 3.37                |
| 38.000  | 29.000 | -9.9             | 6.0                                            | 68.0                                       | 85.0                                       | 1.5                                          | 105.0          | 98.0           | 4.00           | 2.50           | 76.2           | 18.1           | 0.0758         | 1.53                |
| 1.4961  | 1.1417 | -0.39            | 0.24                                           | 2.68                                       | 3.35                                       | 0.06                                         | 4.13           | 3.86           | 0.16           | 0.10           |                |                |                | 3.37                |
| 38.000  | 29.000 | -9.9             | 5.0                                            | 68.0                                       | 83.0                                       | 1.5                                          | 105.0          | 98.0           | 4.00           | 2.50           | 76.2           | 18.1           | 0.0758         | 1.53                |
| 1.4961  | 1.1417 | -0.39            | 0.20                                           | 2.68                                       | 3.27                                       | 0.06                                         | 4.13           | 3.86           | 0.16           | 0.10           |                |                |                | 3.37                |
| 31.000  | 26.000 | -7.1             | 3.0                                            | 69.0                                       | 74.0                                       | 2.5                                          | 121.0          | 116.0          | 2.50           | 3.90           | 75.8           | 16.7           | 0.0710         | 1.96                |
| 1.2205  | 1.0236 | -0.28            | 0.12                                           | 2.72                                       | 2.91                                       | 0.10                                         | 4.76           | 4.57           | 0.10           | 0.16           |                |                |                | 4.32                |
| 31.000  | 22.000 | 7.6              | 3.0                                            | 74.0                                       | 89.0                                       | 2.5                                          | 123.0          | 111.0          | 5.80           | 4.10           | 56.2           | 25.1           | 0.0792         | 1.97                |
| 1.2205  | 0.8661 | 0.30             | 0.12                                           | 2.91                                       | 3.50                                       | 0.10                                         | 4.84           | 4.37           | 0.23           | 0.16           |                |                |                | 4.33                |
| 46.000  | 37.000 | -16.5            | 3.0                                            | 72.0                                       | 78.0                                       | 2.5                                          | 121.0          | 113.0          | 7.00           | 3.40           | 94.1           | 21.2           | 0.0768         | 2.88                |
| 1.8110  | 1.4567 | -0.65            | 0.12                                           | 2.83                                       | 3.07                                       | 0.10                                         | 4.76           | 4.45           | 0.28           | 0.13           |                |                |                | 6.35                |
| 23.000  | 17.500 | -0.3             | 1.5                                            | 71.0                                       | 73.0                                       | 1.5                                          | 97.0           | 91.0           | 2.00           | 2.00           | 57.4           | 35.6           | 0.1039         | 0.64                |
| 0.9055  | 0.6890 | -0.01            | 0.06                                           | 2.80                                       | 2.87                                       | 0.06                                         | 3.82           | 3.58           | 0.08           | 0.08           |                |                |                | 1.40                |
| 27.000  | 21.000 | -6.1             | 1.5                                            | 70.0                                       | 74.0                                       | 1.5                                          | 96.0           | 91.0           | 2.50           | 1.90           | 72.4           | 36.1           | 0.1029         | 0.74                |
| 1.0630  | 0.8268 | -0.24            | 0.06                                           | 2.76                                       | 2.91                                       | 0.06                                         | 3.78           | 3.58           | 0.10           | 0.08           |                |                |                | 1.64                |
| 34.000  | 26.500 | -7.9             | 1.5                                            | 73.0                                       | 77.0                                       | 1.5                                          | 106.0          | 99.0           | 2.40           | 2.50           | 80.1           | 24.5           | 0.1105         | 1.26                |
| 1.3386  | 1.0433 | -0.31            | 0.06                                           | 2.87                                       | 3.03                                       | 0.06                                         | 4.17           | 3.90           | 0.10           | 0.10           |                |                |                | 2.78                |
| 23.000  | 20.000 | -1.5             | 2.0                                            | 74.0                                       | 77.0                                       | 1.5                                          | 114.0          | 110.0          | 2.10           | 4.30           | 60.4           | 27.4           | 0.0653         | 1.15                |
| 0.9055  | 0.7874 | -0.06            | 0.08                                           | 2.91                                       | 3.03                                       | 0.06                                         | 4.49           | 4.33           | 0.08           | 0.17           |                |                |                | 2.53                |
| 31.000  | 27.000 | -5.6             | 2.0                                            | 73.0                                       | 77.0                                       | 1.5                                          | 114.0          | 108.0          | 3.70           | 3.10           | 72.9           | 20.5           | 0.0742         | 1.51                |
| 1.2205  | 1.0630 | -0.22            | 0.08                                           | 2.87                                       | 3.03                                       | 0.06                                         | 4.49           | 4.25           | 0.14           | 0.12           |                |                |                | 3.34                |
| 41.000  | 32.000 | -11.2            | 2.0                                            | 74.0                                       | 79.0                                       | 1.5                                          | 115.0          | 107.0          | 3.40           | 2.70           | 90.3           | 21.8           | 0.0745         | 1.97                |
| 1.6142  | 1.2598 | -0.44            | 0.08                                           | 2.91                                       | 3.11                                       | 0.06                                         | 4.53           | 4.21           | 0.14           | 0.11           |                |                |                | 4.35                |
| 33.000  | 28.000 | -7.6             | 3.0                                            | 75.0                                       | 80.0                                       | 2.5                                          | 131.0          | 125.0          | 2.50           | 4.70           | 87.4           | 22.9           | 0.0743         | 2.46                |
| 1.2992  | 1.1024 | -0.30            | 0.12                                           | 2.95                                       | 3.15                                       | 0.10                                         | 5.16           | 4.92           | 0.10           | 0.18           |                |                |                | 5.43                |
| 33.000  | 23.000 | 8.1              | 3.0                                            | 80.0                                       | 96.0                                       | 2.5                                          | 132.5          | 120.0          | 6.20           | 4.70           | 67.1           | 22.2           | 0.0839         | 2.40                |
| 1.2992  | 0.9055 | 0.32             | 0.12                                           | 3.15                                       | 3.78                                       | 0.10                                         | 5.22           | 4.72           | 0.24           | 0.18           |                |                |                | 5.30                |
| 25.000  | 19.000 | -1.0             | 1.5                                            | 76.0                                       | 78.0                                       | 1.5                                          | 105.0          | 100.0          | 2.40           | 1.80           | 74.1           | 44.8           | 0.1112         | 0.87                |
| 0.9843  | 0.7480 | -0.04            | 0.06                                           | 2.99                                       | 3.07                                       | 0.06                                         | 4.13           | 3.94           | 0.09           | 0.07           |                |                |                | 1.91                |
| 31.000  | 25.500 | -8.6             | 1.5                                            | 77.0                                       | 79.0                                       | 1.5                                          | 106.0          | 101.0          | 0.60           | 3.60           | 105            | 50.4           | 0.0985         | 1.10                |
| 1.2205  | 1.0039 | -0.34            | 0.06                                           | 3.03                                       | 3.11                                       | 0.06                                         | 4.17           | 3.98           | 0.02           | 0.14           |                |                |                | 2.43                |
| 37.000  | 29.000 | -8.6             | 2.0                                            | 79.0                                       | 85.0                                       | 1.5                                          | 115.0          | 108.0          | 2.70           | 2.40           | 99.5           | 31.5           | 0.0809         | 1.68                |
| 1.4567  | 1.1417 | -0.34            | 0.08                                           | 3.11                                       | 3.35                                       | 0.06                                         | 4.53           | 4.25           | 0.11           | 0.09           |                |                |                | 3.71                |
| 24.000  | 21.000 | -0.5             | 2.0                                            | 77.0                                       | 80.0                                       | 1.5                                          | 118.0          | 115.0          | 1.80           | 3.80           | 63.7           | 24.7           | 0.0714         | 1.25                |
| 0.9449  | 0.8268 | -0.02            | 0.08                                           | 3.03                                       | 3.15                                       | 0.06                                         | 4.65           | 4.53           | 0.07           | 0.15           |                |                |                | 2.75                |
| 31.000  | 27.000 | -4.6             | 2.0                                            | 79.0                                       | 82.0                                       | 1.5                                          | 119.0          | 114.0          | 3.40           | 3.30           | 81.4           | 25.6           | 0.0779         | 1.64                |
| 1.2205  | 1.0630 | -0.18            | 0.08                                           | 3.11                                       | 3.23                                       | 0.06                                         | 4.69           | 4.49           | 0.13           | 0.13           |                |                |                | 3.61                |
| 35.000  | 25.000 | 9.1              | 3.0                                            | 85.0                                       | 101.0                                      | 2.5                                          | 141.5          | 129.0          | 5.70           | 5.60           | 75.8           | 29.5           | 0.0873         | 2.93                |
| 1.3780  | 0.9843 | 0.36             | 0.12                                           | 3.35                                       | 3.98                                       | 0.10                                         | 5.57           | 5.08           | 0.22           | 0.22           |                |                |                | 6.47                |
| 51.000  | 42.000 | -16.8            | 3.0                                            | 86.0                                       | 94.0                                       | 2.5                                          | 141.0          | 133.0          | 4.00           | 4.50           | 142            | 33.1           | 0.0828         | 4.41                |
| 2.0079  | 1.6535 | -0.66            | 0.12                                           | 3.39                                       | 3.70                                       | 0.10                                         | 5.55           | 5.24           | 0.16           | 0.18           |                |                |                | 9.72                |
| 25.000  | 19.000 | 0.5              | 1.5                                            | 82.0                                       | 84.0                                       | 1.5                                          | 110.0          | 105.0          | 2.50           | 1.80           | 81.8           | 49.9           | 0.1166         | 0.91                |
| 0.9843  | 0.7480 | 0.02             | 0.06                                           | 3.23                                       | 3.31                                       | 0.06                                         | 4.33           | 4.13           | 0.10           | 0.07           |                |                |                | 2.01                |
| 31.000  | 25.500 | -7.6             | 1.5                                            | 83.0                                       | 90.0                                       | 1.5                                          | 110.0          | 104.0          | 1.50           | 2.50           | 109            | 47.2           | 0.1122         | 1.15                |
| 1.2205  | 1.0039 | -0.30            | 0.06                                           | 3.27                                       | 3.54                                       | 0.06                                         | 4.33           | 4.09           | 0.06           | 0.10           |                |                |                | 2.54                |
| 37.000  | 29.000 | -7.4             | 2.0                                            | 83.0                                       | 88.0                                       | 1.5                                          | 120.0          | 112.0          | 2.80           | 2.40           | 111            | 26.3           | 0.0851         | 1.76                |
| 1.4567  | 1.1417 | -0.29            | 0.08                                           | 3.27                                       | 3.46                                       | 0.06                                         | 4.72           | 4.41           | 0.11           | 0.09           |                |                |                | 3.88                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

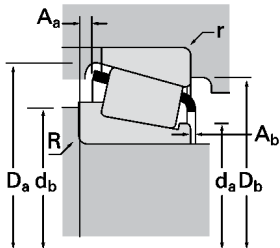
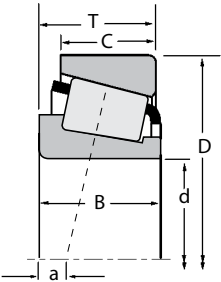
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                   |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number |          |
|-------------------------|-------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-------------|----------|
| d                       | D                 | T                | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static           | Inner       | Outer    |
|                         |                   |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |             |          |
| 75.000<br>2.9528        | 130.000<br>5.1181 | 27.250<br>1.0728 | 141000<br>31600        | 0.44 | 1.38 | 36500<br>8190          | 27100<br>6100    | 1.34 | 179000<br>40300  | 30215       | 30215    |
| 75.000<br>2.9528        | 130.000<br>5.1181 | 33.250<br>1.3091 | 170000<br>38300        | 0.44 | 1.38 | 44100<br>9920          | 32900<br>7390    | 1.34 | 227000<br>51100  | 32215       | 32215    |
| 75.000<br>2.9528        | 130.000<br>5.1181 | 41.000<br>1.6142 | 219000<br>49200        | 0.43 | 1.40 | 56700<br>12800         | 41500<br>9340    | 1.37 | 316000<br>71000  | 33215       | 33215    |
| 75.000<br>2.9528        | 160.000<br>6.2992 | 40.000<br>1.5748 | 273000<br>61400        | 0.35 | 1.74 | 70800<br>15900         | 41800<br>9390    | 1.69 | 333000<br>74800  | 30315       | 30315    |
| 75.000<br>2.9528        | 160.000<br>6.2992 | 40.000<br>1.5748 | 236000<br>53200        | 0.83 | 0.73 | 61300<br>13800         | 86600<br>19500   | 0.71 | 288000<br>64700  | 31315       | 31315    |
| 80.000<br>3.1496        | 125.000<br>4.9213 | 29.000<br>1.1417 | 154000<br>34600        | 0.42 | 1.42 | 39800<br>8960          | 28900<br>6490    | 1.38 | 238000<br>53600  | 32016X      | 32016X   |
| 80.000<br>3.1496        | 130.000<br>5.1181 | 37.000<br>1.4567 | 193000<br>43400        | 0.42 | 1.44 | 50100<br>11300         | 35700<br>8020    | 1.40 | 300000<br>67300  | 33116       | 33116    |
| 80.000<br>3.1496        | 130.000<br>5.1181 | 37.000<br>1.4567 | 172000<br>38700        | 0.42 | 1.44 | 44700<br>10000         | 31800<br>7120    | 1.40 | 300000<br>67300  | XA33116     | Y33116   |
| 80.000<br>3.1496        | 140.000<br>5.5118 | 28.250<br>1.1122 | 161000<br>36300        | 0.42 | 1.43 | 41800<br>9400          | 30100<br>6760    | 1.39 | 204000<br>45900  | 30216       | 30216    |
| 80.000<br>3.1496        | 140.000<br>5.5118 | 35.250<br>1.3878 | 190000<br>42800        | 0.42 | 1.43 | 49400<br>11100         | 35500<br>7980    | 1.39 | 249000<br>56000  | 32216       | 32216    |
| 80.000<br>3.1496        | 140.000<br>5.5118 | 46.000<br>1.8110 | 275000<br>61800        | 0.43 | 1.41 | 71300<br>16000         | 51900<br>11700   | 1.37 | 409000<br>91900  | 33216       | 33216    |
| 80.000<br>3.1496        | 141.000<br>5.5512 | 30.250<br>1.1909 | 151000<br>34000        | 0.42 | 1.43 | 39300<br>8830          | 28200<br>6350    | 1.39 | 187000<br>42000  | XUB-30216   | YFA30216 |
| 80.000<br>3.1496        | 170.000<br>6.6929 | 42.500<br>1.6732 | 309000<br>69400        | 0.35 | 1.74 | 80000<br>18000         | 47300<br>10600   | 1.69 | 379000<br>85200  | 30316       | 30316    |
| 80.000<br>3.1496        | 170.000<br>6.6929 | 61.500<br>2.4213 | 414000<br>93000        | 0.35 | 1.74 | 107000<br>24100        | 63200<br>14200   | 1.69 | 563000<br>127000 | 32316       | 32316    |
| 84.000<br>3.3071        | 140.000<br>5.5118 | 32.000<br>1.2598 | 170000<br>38200        | 0.42 | 1.42 | 44000<br>9890          | 31900<br>7160    | 1.38 | 264000<br>59400  | XUA32018X   | Y32018X  |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 29.000<br>1.1417 | 151000<br>33800        | 0.44 | 1.36 | 39000<br>8770          | 29500<br>6640    | 1.32 | 235000<br>52900  | 32017X      | 32017X   |
| 85.000<br>3.3465        | 130.000<br>5.1181 | 29.000<br>1.1417 | 151000<br>33800        | 0.44 | 1.36 | 39000<br>8770          | 29500<br>6640    | 1.32 | 235000<br>52900  | XAA32017X   | Y32017X  |
| 85.000<br>3.3465        | 131.000<br>5.1181 | 36.000<br>1.4173 | 204000<br>45800        | 0.29 | 2.06 | 52900<br>11900         | 26400<br>5930    | 2.00 | 343000<br>77100  | 33017       | 33017    |
| 85.000<br>3.3465        | 140.000<br>5.5118 | 41.000<br>1.6142 | 235000<br>52800        | 0.41 | 1.48 | 60900<br>13700         | 42400<br>9540    | 1.44 | 386000<br>86800  | 33117       | 33117    |
| 85.000<br>3.3465        | 150.000<br>5.9055 | 30.500<br>1.2008 | 185000<br>41500        | 0.42 | 1.43 | 47900<br>10800         | 34400<br>7740    | 1.39 | 236000<br>53000  | 30217       | 30217    |
| 85.000<br>3.3465        | 150.000<br>5.9055 | 38.500<br>1.5157 | 227000<br>51100        | 0.42 | 1.43 | 58900<br>13200         | 42300<br>9520    | 1.39 | 305000<br>68700  | 32217       | 32217    |
| 85.000<br>3.3465        | 150.000<br>5.9055 | 49.000<br>1.9291 | 325000<br>73100        | 0.42 | 1.43 | 84300<br>19000         | 60400<br>13600   | 1.40 | 483000<br>109000 | 33217       | 33217    |
| 85.000<br>3.3465        | 180.000<br>7.0866 | 44.500<br>1.7520 | 290000<br>65300        | 0.35 | 1.74 | 75300<br>16900         | 44400<br>9990    | 1.69 | 346000<br>77700  | 30317       | 30317    |
| 90.000<br>3.5433        | 140.000<br>5.5118 | 32.000<br>1.2598 | 170000<br>38200        | 0.42 | 1.42 | 44000<br>9890          | 31900<br>7160    | 1.38 | 264000<br>59400  | 32018X      | 32018X   |
| 90.000<br>3.5433        | 140.000<br>5.5118 | 32.000<br>1.2598 | 170000<br>38200        | 0.42 | 1.42 | 44000<br>9890          | 31900<br>7160    | 1.38 | 264000<br>59400  | XAA32018X   | Y32018X  |
| 90.000<br>3.5433        | 140.000<br>5.5118 | 39.000<br>1.5354 | 229000<br>51500        | 0.27 | 2.23 | 59400<br>13300         | 27300<br>6140    | 2.17 | 377000<br>84700  | 33018       | 33018    |
| 90.000<br>3.5433        | 150.000<br>5.9055 | 45.000<br>1.7717 | 284000<br>63800        | 0.40 | 1.51 | 73500<br>16500         | 50000<br>11200   | 1.47 | 447000<br>100000 | 33118       | 33118    |
| 90.000<br>3.5433        | 160.000<br>6.2992 | 32.500<br>1.2795 | 197000<br>44300        | 0.42 | 1.43 | 51100<br>11500         | 36700<br>8260    | 1.39 | 249000<br>56000  | 30218       | 30218    |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.



Tapered - IsoClass™ Metric 3000 Series

| Bearing |        |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|---------|--------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|         |        |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B       | C      | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 25.000  | 22.000 | 0.0              | 2.0                                            | 85.0                                       | 88.0                                       | 1.5                                          | 124.0          | 120.0          | 2.00           | 3.80           | 74.1           | 35.2           | 0.0760         | 1.35                |
| 0.9843  | 0.8661 | 0.00             | 0.08                                           | 3.35                                       | 3.46                                       | 0.06                                         | 4.88           | 4.72           | 0.08           | 0.15           |                |                |                | 2.97                |
| 31.000  | 27.000 | -3.6             | 2.0                                            | 84.0                                       | 88.0                                       | 1.5                                          | 125.0          | 117.0          | 3.50           | 3.40           | 87.5           | 37.8           | 0.0806         | 1.69                |
| 1.2205  | 1.0630 | -0.14            | 0.08                                           | 3.31                                       | 3.46                                       | 0.06                                         | 4.92           | 4.61           | 0.14           | 0.13           |                |                |                | 3.72                |
| 41.000  | 31.000 | -8.6             | 2.0                                            | 83.0                                       | 89.0                                       | 1.5                                          | 125.0          | 117.0          | 4.20           | 2.70           | 111            | 27             | 0.0874         | 2.16                |
| 1.6142  | 1.2205 | -0.34            | 0.08                                           | 3.27                                       | 3.50                                       | 0.06                                         | 4.92           | 4.61           | 0.17           | 0.11           |                |                |                | 4.77                |
| 37.000  | 31.000 | -7.9             | 3.0                                            | 90.0                                       | 94.0                                       | 2.5                                          | 149.0          | 145.0          | 2.40           | 5.40           | 125            | 36.2           | 0.0788         | 3.60                |
| 1.4567  | 1.2205 | -0.31            | 0.12                                           | 3.54                                       | 3.70                                       | 0.10                                         | 5.87           | 5.71           | 0.10           | 0.21           |                |                |                | 7.93                |
| 37.000  | 26.000 | 10.2             | 3.0                                            | 90.0                                       | 109.0                                      | 2.5                                          | 151.5          | 138.0          | 6.30           | 5.50           | 93.8           | 19             | 0.0938         | 3.43                |
| 1.4567  | 1.0236 | 0.40             | 0.12                                           | 3.54                                       | 4.29                                       | 0.10                                         | 5.96           | 5.43           | 0.25           | 0.22           |                |                |                | 7.56                |
| 29.000  | 22.000 | -1.8             | 1.5                                            | 87.0                                       | 91.0                                       | 1.5                                          | 120.0          | 114.0          | 2.80           | 2.40           | 104            | 32.7           | 0.1234         | 1.27                |
| 1.1417  | 0.8661 | -0.07            | 0.06                                           | 3.43                                       | 3.58                                       | 0.06                                         | 4.72           | 4.49           | 0.11           | 0.09           |                |                |                | 2.80                |
| 37.000  | 29.000 | -6.1             | 2.0                                            | 89.0                                       | 94.0                                       | 1.5                                          | 125.0          | 119.0          | 3.40           | 2.40           | 122            | 37.8           | 0.0891         | 1.86                |
| 1.4567  | 1.1417 | -0.24            | 0.08                                           | 3.50                                       | 3.70                                       | 0.06                                         | 4.92           | 4.69           | 0.13           | 0.10           |                |                |                | 4.11                |
| 37.000  | 29.000 | -6.1             | 2.0                                            | 89.0                                       | 94.0                                       | 1.5                                          | 125.0          | 119.0          | 3.40           | 2.40           | 122            | 37.8           | 0.0838         | 1.86                |
| 1.4567  | 1.1417 | -0.24            | 0.08                                           | 3.50                                       | 3.70                                       | 0.06                                         | 4.92           | 4.69           | 0.13           | 0.10           |                |                |                | 4.10                |
| 26.000  | 22.000 | -0.5             | 2.5                                            | 90.0                                       | 94.0                                       | 2.0                                          | 133.0          | 128.0          | 2.00           | 6.00           | 85.8           | 37.4           | 0.0742         | 1.66                |
| 1.0236  | 0.8661 | -0.02            | 0.10                                           | 3.54                                       | 3.70                                       | 0.08                                         | 5.24           | 5.04           | 0.08           | 0.23           |                |                |                | 3.66                |
| 33.000  | 28.000 | -4.6             | 2.5                                            | 89.0                                       | 94.0                                       | 2.0                                          | 133.0          | 126.0          | 3.90           | 4.00           | 98.4           | 28.7           | 0.0828         | 2.05                |
| 1.2992  | 1.1024 | -0.18            | 0.10                                           | 3.50                                       | 3.70                                       | 0.08                                         | 5.24           | 4.96           | 0.15           | 0.16           |                |                |                | 4.51                |
| 46.000  | 35.000 | -10.7            | 2.5                                            | 89.0                                       | 97.0                                       | 2.0                                          | 135.0          | 125.0          | 5.40           | 2.80           | 143            | 38             | 0.0948         | 2.94                |
| 1.8110  | 1.3780 | -0.42            | 0.10                                           | 3.50                                       | 3.82                                       | 0.08                                         | 5.31           | 4.92           | 0.21           | 0.11           |                |                |                | 6.49                |
| 28.000  | 22.000 | -2.0             | 0.5                                            | 90.0                                       | 90.0                                       | 2.0                                          | 133.0          | 128.0          | 3.80           | 3.50           | 80.7           | 25.6           | 0.0771         | 1.80                |
| 1.1024  | 0.8661 | -0.08            | 0.02                                           | 3.54                                       | 3.54                                       | 0.08                                         | 5.24           | 5.04           | 0.15           | 0.14           |                |                |                | 3.98                |
| 39.000  | 33.000 | -7.9             | 3.0                                            | 96.0                                       | 100.0                                      | 2.5                                          | 159.0          | 154.0          | 1.90           | 5.90           | 147            | 37.5           | 0.0830         | 4.33                |
| 1.5354  | 1.2992 | -0.31            | 0.12                                           | 3.78                                       | 3.94                                       | 0.10                                         | 6.26           | 6.06           | 0.08           | 0.23           |                |                |                | 9.54                |
| 58.000  | 48.000 | -19.0            | 3.0                                            | 100.0                                      | 105.0                                      | 2.5                                          | 159.0          | 151.0          | 6.00           | 4.50           | 196            | 38.8           | 0.0922         | 6.35                |
| 2.2835  | 1.8898 | -0.75            | 0.12                                           | 3.94                                       | 4.13                                       | 0.10                                         | 6.26           | 5.94           | 0.24           | 0.18           |                |                |                | 13.99               |
| 32.000  | 24.000 | -2.0             | 0.5                                            | 94.0                                       | 94.0                                       | 1.5                                          | 134.0          | 128.0          | 3.20           | 2.20           | 128            | 42.8           | 0.1317         | 1.96                |
| 1.2598  | 0.9449 | -0.08            | 0.02                                           | 3.70                                       | 3.70                                       | 0.06                                         | 5.28           | 5.04           | 0.13           | 0.09           |                |                |                | 4.32                |
| 29.000  | 22.000 | -0.5             | 1.5                                            | 92.0                                       | 95.0                                       | 1.5                                          | 125.0          | 119.0          | 2.10           | 2.70           | 109            | 36.3           | 0.1270         | 1.33                |
| 1.1417  | 0.8661 | -0.02            | 0.06                                           | 3.62                                       | 3.74                                       | 0.06                                         | 4.92           | 4.69           | 0.08           | 0.11           |                |                |                | 2.93                |
| 29.000  | 22.000 | -0.5             | 6.5                                            | 92.0                                       | 106.0                                      | 1.5                                          | 125.0          | 119.0          | 2.10           | 2.70           | 109            | 36.3           | 0.1270         | 1.31                |
| 1.1417  | 0.8661 | -0.02            | 0.26                                           | 3.62                                       | 4.17                                       | 0.06                                         | 4.92           | 4.69           | 0.08           | 0.11           |                |                |                | 2.89                |
| 36.000  | 29.500 | -9.4             | 1.5                                            | 93.0                                       | 96.0                                       | 1.5                                          | 125.0          | 120.0          | 1.50           | 2.80           | 158            | 55.4           | 0.0865         | 1.74                |
| 1.4173  | 1.1614 | -0.37            | 0.06                                           | 3.66                                       | 3.78                                       | 0.06                                         | 4.92           | 4.72           | 0.06           | 0.11           |                |                |                | 3.83                |
| 41.000  | 32.000 | -8.1             | 2.5                                            | 96.0                                       | 100.0                                      | 2.0                                          | 135.0          | 126.0          | 4.50           | 2.80           | 161            | 39.6           | 0.0972         | 2.46                |
| 1.6142  | 1.2598 | -0.32            | 0.10                                           | 3.78                                       | 3.94                                       | 0.08                                         | 5.31           | 4.96           | 0.18           | 0.11           |                |                |                | 5.42                |
| 28.000  | 24.000 | -0.3             | 2.5                                            | 93.0                                       | 97.0                                       | 2.0                                          | 142.0          | 137.0          | 2.00           | 4.10           | 101            | 40.6           | 0.0833         | 2.07                |
| 1.1024  | 0.9449 | -0.01            | 0.10                                           | 3.66                                       | 3.82                                       | 0.08                                         | 5.59           | 5.39           | 0.08           | 0.16           |                |                |                | 4.57                |
| 36.000  | 30.000 | -4.6             | 2.5                                            | 94.0                                       | 100.0                                      | 2.0                                          | 142.0          | 134.0          | 4.10           | 3.20           | 121            | 25.7           | 0.0888         | 2.62                |
| 1.4173  | 1.1811 | -0.18            | 0.10                                           | 3.70                                       | 3.94                                       | 0.08                                         | 5.59           | 5.28           | 0.16           | 0.12           |                |                |                | 5.78                |
| 49.000  | 37.000 | -11.7            | 2.5                                            | 94.0                                       | 103.0                                      | 2.0                                          | 144.0          | 134.0          | 5.60           | 3.20           | 168            | 34.4           | 0.0995         | 3.59                |
| 1.9291  | 1.4567 | -0.46            | 0.10                                           | 3.70                                       | 4.06                                       | 0.08                                         | 5.67           | 5.28           | 0.22           | 0.13           |                |                |                | 7.92                |
| 41.000  | 34.000 | -9.7             | 4.0                                            | 100.0                                      | 106.0                                      | 3.0                                          | 166.5          | 162.0          | 6.00           | 3.50           | 144            | 41.6           | 0.0823         | 4.78                |
| 1.6142  | 1.3386 | -0.38            | 0.16                                           | 3.94                                       | 4.17                                       | 0.12                                         | 6.56           | 6.38           | 0.24           | 0.14           |                |                |                | 10.54               |
| 32.000  | 24.000 | -2.0             | 2.0                                            | 98.0                                       | 102.0                                      | 1.5                                          | 134.0          | 128.0          | 3.20           | 2.20           | 128            | 41.1           | 0.1317         | 1.70                |
| 1.2598  | 0.9449 | -0.08            | 0.08                                           | 3.86                                       | 4.02                                       | 0.06                                         | 5.28           | 5.04           | 0.13           | 0.09           |                |                |                | 3.75                |
| 32.000  | 24.000 | -2.0             | 6.0                                            | 98.0                                       | 111.0                                      | 1.5                                          | 134.0          | 128.0          | 3.20           | 2.20           | 128            | 41.1           | 0.1317         | 1.70                |
| 1.2598  | 0.9449 | -0.08            | 0.24                                           | 3.86                                       | 4.37                                       | 0.06                                         | 5.28           | 5.04           | 0.13           | 0.09           |                |                |                | 3.75                |
| 39.000  | 32.500 | -10.9            | 2.0                                            | 98.0                                       | 101.0                                      | 1.5                                          | 135.0          | 131.0          | 1.80           | 2.30           | 183            | 55.8           | 0.0884         | 2.20                |
| 1.5354  | 1.2795 | -0.43            | 0.08                                           | 3.86                                       | 3.98                                       | 0.06                                         | 5.31           | 5.16           | 0.07           | 0.09           |                |                |                | 4.85                |
| 45.000  | 35.000 | -9.4             | 2.5                                            | 100.0                                      | 108.0                                      | 2.0                                          | 145.0          | 135.0          | 3.80           | 2.90           | 180            | 43.2           | 0.0942         | 3.15                |
| 1.7717  | 1.3780 | -0.37            | 0.10                                           | 3.94                                       | 4.25                                       | 0.08                                         | 5.71           | 5.31           | 0.15           | 0.12           |                |                |                | 6.94                |
| 30.000  | 26.000 | -0.8             | 2.5                                            | 98.0                                       | 103.0                                      | 2.0                                          | 151.0          | 146.0          | 2.40           | 4.80           | 112            | 47.7           | 0.0859         | 2.52                |
| 1.1811  | 1.0236 | -0.03            | 0.10                                           | 3.86                                       | 4.06                                       | 0.08                                         | 5.94           | 5.75           | 0.09           | 0.19           |                |                |                | 5.57                |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

Continued on next page.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

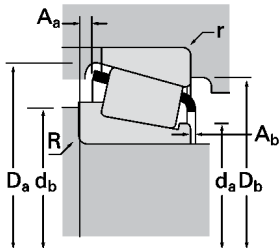
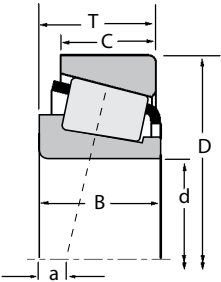
<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.



# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                    |                  | Load Ratings, N (lbf.) |      |      |                        |                  |      |                  | Part Number     |   |                |           |         |
|-------------------------|--------------------|------------------|------------------------|------|------|------------------------|------------------|------|------------------|-----------------|---|----------------|-----------|---------|
| d                       | D                  | T                | Dynamic <sup>(1)</sup> |      |      | Factors <sup>(5)</sup> |                  |      | C <sub>0</sub>   | C <sub>90</sub> | K | C <sub>0</sub> | Inner     | Outer   |
|                         |                    |                  | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                  |                 |   |                |           |         |
| 95.000<br>3.7402        | 145.000<br>5.7087  | 39.000<br>1.5354 | 228000<br>51300        | 0.28 | 2.16 | 59100<br>13300         | 28100<br>6320    | 2.10 | 378000<br>85100  |                 |   |                | XAA33019  | Y33019  |
| 95.000<br>3.7402        | 170.000<br>6.6929  | 34.500<br>1.3583 | 245000<br>55000        | 0.42 | 1.43 | 63400<br>14300         | 45600<br>10300   | 1.39 | 325000<br>73000  |                 |   |                | 30219     | 30219   |
| 95.000<br>3.7402        | 170.000<br>6.6929  | 45.500<br>1.7913 | 293000<br>65800        | 0.42 | 1.43 | 75900<br>17100         | 54600<br>12300   | 1.39 | 401000<br>90100  |                 |   |                | 32219     | 32219   |
| 100.000<br>3.9370       | 150.000<br>5.9055  | 39.000<br>1.5354 | 232000<br>52200        | 0.29 | 2.09 | 60200<br>13500         | 29600<br>6650    | 2.03 | 393000<br>88300  |                 |   |                | 33020     | 33020   |
| 100.000<br>3.9370       | 180.000<br>7.0866  | 37.000<br>1.4567 | 279000<br>62800        | 0.42 | 1.43 | 72400<br>16300         | 52100<br>11700   | 1.39 | 376000<br>84500  |                 |   |                | 30220     | 30220   |
| 100.000<br>3.9370       | 180.000<br>7.0866  | 49.000<br>1.9291 | 364000<br>81900        | 0.42 | 1.43 | 94400<br>21200         | 67900<br>15200   | 1.39 | 521000<br>117000 |                 |   |                | 32220     | 32220   |
| 105.000<br>4.1339       | 160.000<br>6.2992  | 35.000<br>1.3780 | 210000<br>47300        | 0.44 | 1.35 | 54500<br>12300         | 41500<br>9320    | 1.31 | 339000<br>76200  |                 |   |                | 32021X    | 32021X  |
| 105.000<br>4.1339       | 160.000<br>6.2992  | 43.000<br>1.6929 | 269000<br>60600        | 0.28 | 2.12 | 69800<br>15700         | 33800<br>7590    | 2.07 | 449000<br>101000 |                 |   |                | 33021     | 33021   |
| 105.000<br>4.1339       | 190.000<br>7.4803  | 53.000<br>2.0866 | 369000<br>82900        | 0.42 | 1.43 | 95600<br>21500         | 68800<br>15500   | 1.39 | 516000<br>116000 |                 |   |                | 32221     | 32221   |
| 106.000<br>4.1732       | 160.000<br>6.2992  | 35.000<br>1.3780 | 210000<br>47300        | 0.44 | 1.35 | 54500<br>12300         | 41500<br>9320    | 1.31 | 339000<br>76200  |                 |   |                | XGA32021X | Y32021X |
| 110.000<br>4.3307       | 170.000<br>6.6929  | 38.000<br>1.4961 | 261000<br>58600        | 0.43 | 1.39 | 67600<br>15200         | 49800<br>11200   | 1.36 | 433000<br>97300  |                 |   |                | 32022X    | 32022X  |
| 110.000<br>4.3307       | 200.000<br>7.8740  | 41.000<br>1.6142 | 345000<br>77500        | 0.42 | 1.43 | 89300<br>20100         | 64200<br>14500   | 1.39 | 472000<br>106000 |                 |   |                | 30222     | 30222   |
| 110.000<br>4.3307       | 200.000<br>7.8740  | 56.000<br>2.2047 | 426000<br>95800        | 0.42 | 1.43 | 111000<br>24800        | 79500<br>17900   | 1.39 | 612000<br>137000 |                 |   |                | 32222     | 32222   |
| 110.000<br>4.3307       | 215.000<br>8.4646  | 61.500<br>2.4213 | 502000<br>113000       | 0.44 | 1.38 | 130000<br>29300        | 97000<br>21800   | 1.34 | 753000<br>169000 |                 |   |                | XFA32224  | Y32224  |
| 120.000<br>4.7244       | 165.000<br>6.4961  | 29.000<br>1.1417 | 164000<br>36800        | 0.35 | 1.72 | 42500<br>9550          | 25400<br>5700    | 1.68 | 303000<br>68100  |                 |   |                | 32924     | 32924   |
| 120.000<br>4.7244       | 180.000<br>7.0866  | 38.000<br>1.4961 | 269000<br>60400        | 0.46 | 1.31 | 69700<br>15700         | 54700<br>12300   | 1.27 | 464000<br>104000 |                 |   |                | 32024X    | 32024X  |
| 120.000<br>4.7244       | 180.000<br>7.0866  | 38.000<br>1.4961 | 271000<br>60900        | 0.46 | 1.31 | 70200<br>15800         | 55100<br>12400   | 1.27 | 466000<br>105000 |                 |   |                | XAA32024X | Y32024X |
| 120.000<br>4.7244       | 215.000<br>8.4646  | 43.500<br>1.7126 | 367000<br>82500        | 0.44 | 1.38 | 95100<br>21400         | 70800<br>15900   | 1.34 | 508000<br>114000 |                 |   |                | 30224     | 30224   |
| 120.000<br>4.7244       | 215.000<br>8.4646  | 61.500<br>2.4213 | 543000<br>122000       | 0.44 | 1.38 | 141000<br>31600        | 105000<br>23500  | 1.34 | 832000<br>187000 |                 |   |                | 32224     | 32224   |
| 130.000<br>5.1181       | 200.000<br>7.8740  | 45.000<br>1.7717 | 359000<br>80700        | 0.43 | 1.38 | 93100<br>20900         | 69300<br>15600   | 1.34 | 620000<br>139000 |                 |   |                | 32026X    | 32026X  |
| 130.000<br>5.1181       | 230.000<br>9.0551  | 43.750<br>1.7224 | 399000<br>89700        | 0.44 | 1.38 | 103000<br>23300        | 76700<br>17400   | 1.34 | 550000<br>124000 |                 |   |                | 30226     | 30226   |
| 140.000<br>5.5118       | 190.000<br>7.4803  | 32.000<br>1.2598 | 207000<br>46600        | 0.36 | 1.67 | 53800<br>12100         | 33200<br>7460    | 1.62 | 398000<br>89500  |                 |   |                | 32928     | 32928   |
| 140.000<br>5.5118       | 210.000<br>8.2677  | 45.000<br>1.7717 | 365000<br>82100        | 0.46 | 1.31 | 94700<br>21300         | 74400<br>16700   | 1.27 | 646000<br>145000 |                 |   |                | XAA32028X | Y32028X |
| 140.000<br>5.5118       | 250.000<br>9.8425  | 45.750<br>1.8012 | 465000<br>104000       | 0.44 | 1.38 | 120000<br>27100        | 89400<br>20200   | 1.34 | 649000<br>146000 |                 |   |                | 30228     | 30228   |
| 150.000<br>5.9055       | 210.000<br>8.2677  | 38.000<br>1.4961 | 300000<br>67500        | 0.33 | 1.83 | 77800<br>17500         | 43700<br>9830    | 1.78 | 573000<br>129000 |                 |   |                | 32930     | 32930   |
| 150.000<br>5.9055       | 225.000<br>8.8583  | 48.000<br>1.8898 | 410000<br>92200        | 0.46 | 1.31 | 106000<br>23900        | 83200<br>18800   | 1.27 | 730000<br>164000 |                 |   |                | 32030X    | 32030X  |
| 150.000<br>5.9055       | 270.000<br>10.6299 | 49.000<br>1.9291 | 523000<br>118000       | 0.44 | 1.38 | 136000<br>30500        | 101000<br>22700  | 1.34 | 735000<br>165000 |                 |   |                | 30230     | 30230   |
| 160.000<br>6.2992       | 240.000<br>9.4488  | 51.000<br>2.0079 | 471000<br>106000       | 0.46 | 1.31 | 122000<br>27500        | 95800<br>21600   | 1.27 | 853000<br>192000 |                 |   |                | 32032X    | 32032X  |

(1) Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

(2) Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

(3) Negative value indicates effective center inside cone backface.

(4) These maximum fillet radii will be cleared by the bearing corners.

(5) These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

Tapered - IsoClass™ Metric 3000 Series

| Bearing          |                  |                  | Dimensions, mm (inches)                        |                                            |                                            |                                              |                |                | Cage           |                | Factors        |                |                | Weight<br>kg (lbs.) |
|------------------|------------------|------------------|------------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------|
|                  |                  |                  | Shaft                                          |                                            | Housing                                    |                                              |                |                |                |                |                |                |                |                     |
| B                | C                | a <sup>(3)</sup> | max shaft<br>fillet radius<br>R <sup>(4)</sup> | backing<br>shoulder dia.<br>d <sub>a</sub> | backing<br>shoulder dia.<br>d <sub>b</sub> | backing<br>shoulder dia.<br>r <sup>(4)</sup> | D <sub>a</sub> | D <sub>b</sub> | A <sub>a</sub> | A <sub>b</sub> | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                     |
| 39.000<br>1.5354 | 32.500<br>1.2795 | -10.2<br>-0.40   | 6.0<br>0.24                                    | 102.0<br>4.02                              | 114.0<br>4.49                              | 1.5<br>0.06                                  | 139.0<br>5.47  | 133.0<br>5.24  | 1.90<br>0.07   | 2.30<br>0.09   | 192            | 48.4           | 0.0907         | 2.23<br>4.93        |
| 32.000<br>1.2598 | 27.000<br>1.0630 | -1.0<br>-0.04    | 3.0<br>0.12                                    | 108.0<br>4.25                              | 113.0<br>4.45                              | 2.5<br>0.10                                  | 161.0<br>6.34  | 154.0<br>6.06  | 2.60<br>0.10   | 6.20<br>0.24   | 143            | 49.8           | 0.0880         | 3.14<br>6.92        |
| 43.000<br>1.6929 | 37.000<br>1.4567 | -6.4<br>-0.25    | 3.0<br>0.12                                    | 106.0<br>4.17                              | 111.0<br>4.37                              | 2.5<br>0.10                                  | 161.0<br>6.34  | 152.0<br>5.98  | 4.80<br>0.19   | 3.00<br>0.12   | 166            | 35.3           | 0.0984         | 4.06<br>8.94        |
| 39.000<br>1.5354 | 32.500<br>1.2795 | -9.4<br>-0.37    | 2.0<br>0.08                                    | 107.0<br>4.21                              | 111.0<br>4.37                              | 1.5<br>0.06                                  | 144.0<br>5.67  | 139.0<br>5.47  | 1.90<br>0.08   | 2.30<br>0.09   | 206            | 65.1           | 0.0938         | 2.37<br>5.22        |
| 34.000<br>1.3386 | 29.000<br>1.1417 | -0.8<br>-0.03    | 3.0<br>0.12                                    | 115.0<br>4.53                              | 119.0<br>4.69                              | 2.5<br>0.10                                  | 169.0<br>6.65  | 163.0<br>6.42  | 2.10<br>0.08   | 6.10<br>0.24   | 168            | 51.9           | 0.0928         | 3.77<br>8.3         |
| 46.000<br>1.8110 | 39.000<br>1.5354 | -7.4<br>-0.29    | 3.0<br>0.12                                    | 113.0<br>4.45                              | 122.0<br>4.80                              | 2.5<br>0.10                                  | 171.0<br>6.73  | 162.0<br>6.38  | 5.30<br>0.21   | 5.40<br>0.21   | 211            | 49.9           | 0.1006         | 5.00<br>11.02       |
| 35.000<br>1.3780 | 26.000<br>1.0236 | -0.3<br>-0.01    | 2.5<br>0.10                                    | 113.0<br>4.45                              | 119.0<br>4.69                              | 2.0<br>0.08                                  | 154.0<br>6.06  | 147.0<br>5.79  | 3.20<br>0.13   | 2.60<br>0.10   | 176            | 50.7           | 0.1024         | 2.40<br>5.29        |
| 43.000<br>1.6929 | 34.000<br>1.3386 | -12.2<br>-0.48   | 2.5<br>0.10                                    | 113.0<br>4.45                              | 118.0<br>4.65                              | 2.0<br>0.08                                  | 153.0<br>6.02  | 147.0<br>5.79  | 3.10<br>0.12   | 3.10<br>0.12   | 236            | 54.8           | 0.0975         | 2.95<br>6.50        |
| 50.000<br>1.9685 | 43.000<br>1.6929 | -7.9<br>-0.31    | 3.0<br>0.12                                    | 118.0<br>4.65                              | 123.0<br>4.84                              | 2.5<br>0.10                                  | 180.0<br>7.09  | 171.0<br>6.73  | 5.20<br>0.20   | 2.70<br>0.11   | 220            | 43.5           | 0.1082         | 5.98<br>13.18       |
| 35.000<br>1.3780 | 26.000<br>1.0236 | -0.3<br>-0.01    | 6.0<br>0.24                                    | 115.0<br>4.53                              | 128.0<br>5.04                              | 2.0<br>0.08                                  | 154.0<br>6.06  | 147.0<br>5.79  | 3.20<br>0.13   | 2.60<br>0.10   | 176            | 50.7           | 0.1024         | 2.36<br>5.19        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | -1.0<br>-0.04    | 2.5<br>0.10                                    | 119.0<br>4.69                              | 124.0<br>4.88                              | 2.0<br>0.08                                  | 164.0<br>6.46  | 156.0<br>6.14  | 3.30<br>0.13   | 3.00<br>0.12   | 222            | 46.3           | 0.1095         | 3.06<br>6.74        |
| 38.000<br>1.4961 | 32.000<br>1.2598 | -1.5<br>-0.06    | 3.0<br>0.12                                    | 126.0<br>4.96                              | 130.0<br>5.12                              | 2.5<br>0.10                                  | 187.0<br>7.36  | 181.0<br>7.13  | 3.20<br>0.12   | 7.20<br>0.28   | 219            | 59.9           | 0.1012         | 5.24<br>11.55       |
| 53.000<br>2.0866 | 46.000<br>1.8110 | -8.6<br>-0.34    | 3.0<br>0.12                                    | 124.0<br>4.88                              | 129.0<br>5.08                              | 2.5<br>0.10                                  | 190.0<br>7.48  | 179.0<br>7.05  | 6.40<br>0.25   | 3.00<br>0.12   | 261            | 55.9           | 0.1146         | 7.18<br>15.82       |
| 58.000<br>2.2835 | 50.000<br>1.9685 | -9.4<br>-0.37    | 3.0<br>0.12                                    | 133.0<br>5.24                              | 137.0<br>5.39                              | 2.5<br>0.10                                  | 204.0<br>8.03  | 192.0<br>7.56  | 7.80<br>0.31   | 3.00<br>0.12   | 329            | 52.3           | 0.1253         | 9.85<br>21.72       |
| 29.000<br>1.1417 | 23.000<br>0.9055 | 0.3<br>0.01      | 1.5<br>0.06                                    | 127.0<br>5.00                              | 129.0<br>5.08                              | 1.5<br>0.06                                  | 160.0<br>6.30  | 155.0<br>6.10  | 1.10<br>0.04   | 3.10<br>0.12   | 222            | 114            | 0.1332         | 1.79<br>3.95        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | 1.8<br>0.07      | 2.5<br>0.10                                    | 130.0<br>5.12                              | 136.0<br>5.35                              | 2.0<br>0.08                                  | 174.0<br>6.85  | 165.0<br>6.50  | 1.90<br>0.07   | 4.10<br>0.16   | 255            | 66.2           | 0.1100         | 3.27<br>7.22        |
| 38.000<br>1.4961 | 29.000<br>1.1417 | 1.5<br>0.06      | 5.0<br>0.20                                    | 130.0<br>5.12                              | 141.0<br>5.55                              | 2.0<br>0.08                                  | 174.0<br>6.85  | 165.0<br>6.50  | 3.50<br>0.14   | 3.00<br>0.12   | 255            | 58.3           | 0.1169         | 3.26<br>7.19        |
| 40.000<br>1.5748 | 34.000<br>1.3386 | 0.3<br>0.01      | 3.0<br>0.12                                    | 136.0<br>5.35                              | 140.0<br>5.51                              | 2.5<br>0.10                                  | 201.0<br>7.91  | 195.0<br>7.68  | 3.70<br>0.15   | 6.20<br>0.25   | 252            | 64.7           | 0.1072         | 6.24<br>13.75       |
| 58.000<br>2.2835 | 50.000<br>1.9685 | -10.2<br>-0.40   | 3.0<br>0.12                                    | 135.0<br>5.31                              | 147.0<br>5.79                              | 2.5<br>0.10                                  | 204.0<br>8.03  | 191.0<br>7.52  | 5.50<br>0.22   | 6.50<br>0.26   | 352            | 68.2           | 0.1208         | 9.26<br>20.42       |
| 45.000<br>1.7717 | 34.000<br>1.3386 | -1.0<br>-0.04    | 2.5<br>0.10                                    | 142.0<br>5.59                              | 148.0<br>5.83                              | 2.0<br>0.08                                  | 192.0<br>7.56  | 184.0<br>7.24  | 3.50<br>0.14   | 3.60<br>0.14   | 340            | 97.2           | 0.1190         | 4.95<br>10.92       |
| 40.000<br>1.5748 | 34.000<br>1.3386 | 2.0<br>0.08      | 4.0<br>0.16                                    | 146.0<br>5.75                              | 152.0<br>5.98                              | 3.0<br>0.12                                  | 217.0<br>8.54  | 210.0<br>8.27  | 2.80<br>0.11   | 7.10<br>0.28   | 287            | 76.9           | 0.1118         | 7.06<br>15.56       |
| 32.000<br>1.2598 | 25.000<br>0.9843 | 2.3<br>0.09      | 2.0<br>0.08                                    | 148.0<br>5.83                              | 151.0<br>5.94                              | 1.5<br>0.06                                  | 184.0<br>7.24  | 179.0<br>7.05  | 1.60<br>0.06   | 2.70<br>0.11   | 314            | 144            | 0.1509         | 2.51<br>5.53        |
| 45.000<br>1.7717 | 34.000<br>1.3386 | 1.5<br>0.06      | 6.5<br>0.26                                    | 151.0<br>5.94                              | 166.0<br>6.54                              | 2.0<br>0.08                                  | 203.0<br>7.99  | 193.0<br>7.60  | 3.10<br>0.12   | 3.60<br>0.14   | 375            | 108            | 0.1250         | 5.24<br>11.55       |
| 42.000<br>1.6535 | 36.000<br>1.4173 | 2.8<br>0.11      | 4.0<br>0.16                                    | 157.0<br>6.18                              | 164.0<br>6.46                              | 3.0<br>0.12                                  | 233.0<br>9.17  | 227.0<br>8.94  | 3.30<br>0.13   | 8.30<br>0.33   | 348            | 75.7           | 0.1191         | 8.23<br>18.14       |
| 38.000<br>1.4961 | 30.000<br>1.1811 | -1.5<br>-0.06    | 2.5<br>0.10                                    | 160.0<br>6.30                              | 163.0<br>6.42                              | 2.0<br>0.08                                  | 203.0<br>7.99  | 197.0<br>7.76  | 1.60<br>0.06   | 3.90<br>0.15   | 429            | 157            | 0.1167         | 4.00<br>8.82        |
| 48.001<br>1.8898 | 36.000<br>1.4173 | 1.0<br>0.04      | 3.0<br>0.12                                    | 163.0<br>6.42                              | 169.0<br>6.65                              | 2.5<br>0.10                                  | 217.0<br>8.54  | 206.0<br>8.11  | 4.80<br>0.19   | 4.30<br>0.17   | 437            | 115            | 0.1314         | 6.38<br>14.06       |
| 45.000<br>1.7717 | 38.000<br>1.4961 | 3.6<br>0.14      | 4.0<br>0.16                                    | 168.0<br>6.61                              | 174.0<br>6.85                              | 3.0<br>0.12                                  | 250.0<br>9.84  | 245.0<br>9.65  | 3.00<br>0.12   | 7.50<br>0.29   | 407            | 78.1           | 0.1254         | 11.08<br>24.43      |
| 51.000<br>2.0079 | 38.000<br>1.4961 | 1.8<br>0.07      | 3.0<br>0.12                                    | 174.0<br>6.85                              | 181.0<br>7.13                              | 2.5<br>0.10                                  | 234.0<br>9.21  | 221.0<br>8.70  | 3.50<br>0.14   | 4.00<br>0.16   | 522            | 134            | 0.1166         | 7.90<br>17.42       |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.

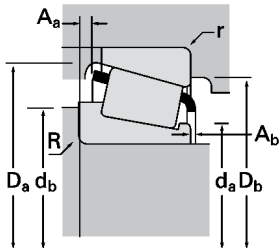
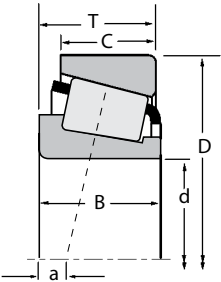
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# ROLLER BEARINGS

## IsoClass™ METRIC 30000

B



| Dimensions, mm (inches) |                    |                   | Load Ratings, N (lbf.) |      |      |                        |                  |      |                   | Part Number |        |
|-------------------------|--------------------|-------------------|------------------------|------|------|------------------------|------------------|------|-------------------|-------------|--------|
| d                       | D                  | T                 | Dynamic <sup>(1)</sup> |      |      | Dynamic <sup>(2)</sup> |                  |      | Static            | Inner       | Outer  |
|                         |                    |                   | C <sub>1</sub>         | e    | Y    | C <sub>90</sub>        | C <sub>a90</sub> | K    |                   |             |        |
| 170.000<br>6.6929       | 230.000<br>9.0551  | 38.000<br>1.4961  | 333000<br>74800        | 0.38 | 1.57 | 86200<br>19400         | 56600<br>12700   | 1.52 | 652000<br>146000  | 32934       | 32934  |
| 180.000<br>7.0866       | 250.000<br>9.8425  | 45.000<br>1.7717  | 376000<br>84600        | 0.48 | 1.25 | 97500<br>21900         | 80200<br>18000   | 1.22 | 739000<br>166000  | 32936       | 32936  |
| 180.000<br>7.0866       | 280.000<br>11.0236 | 64.000<br>2.5197  | 722000<br>162000       | 0.42 | 1.42 | 187000<br>42100        | 135000<br>30500  | 1.38 | 1280000<br>287000 | 32036X      | 32036X |
| 190.000<br>7.4803       | 290.000<br>11.4173 | 64.000<br>2.5197  | 734000<br>165000       | 0.44 | 1.36 | 190000<br>42800        | 144000<br>32400  | 1.32 | 1330000<br>298000 | 32038X      | 32038X |
| 200.000<br>7.8740       | 280.000<br>11.0236 | 51.000<br>2.0079  | 522000<br>117000       | 0.39 | 1.52 | 135000<br>30400        | 91300<br>20600   | 1.48 | 1050000<br>237000 | 32940       | 32940  |
| 220.000<br>8.6614       | 300.000<br>11.8110 | 51.000<br>2.0079  | 550000<br>124000       | 0.43 | 1.41 | 143000<br>32100        | 104000<br>23400  | 1.37 | 1090000<br>245000 | 32944       | 32944  |
| 220.000<br>8.6614       | 340.000<br>13.3858 | 76.000<br>2.9921  | 975000<br>219000       | 0.43 | 1.39 | 253000<br>56800        | 186000<br>41800  | 1.36 | 1800000<br>405000 | 32044X      | 32044X |
| 280.000<br>11.0236      | 380.000<br>14.9606 | 63.500<br>2.5000  | 833000<br>187000       | 0.43 | 1.39 | 216000<br>48600        | 160000<br>36000  | 1.35 | 1780000<br>401000 | 32956       | 32956  |
| 320.000<br>12.5984      | 480.000<br>18.8976 | 100.000<br>3.9370 | 1770000<br>398000      | 0.46 | 1.31 | 459000<br>103000       | 360000<br>80900  | 1.27 | 3420000<br>768000 | 32064X      | 32064X |
| 360.000<br>14.1732      | 480.000<br>18.8976 | 76.000<br>2.9921  | 1220000<br>275000      | 0.46 | 1.31 | 317000<br>71400        | 249000<br>56100  | 1.27 | 2780000<br>624000 | 32972       | 32972  |

<sup>(1)</sup> Based on 1 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for the ISO life calculation method.

<sup>(2)</sup> Based on 90 x 10<sup>6</sup> revolutions L<sub>10</sub> life, for The Timken Company life calculation method. C<sub>90</sub> and C<sub>a90</sub> are radial and thrust values.

<sup>(3)</sup> Negative value indicates effective center inside cone backface.

<sup>(4)</sup> These maximum fillet radii will be cleared by the bearing corners.

<sup>(5)</sup> These factors apply for both inch and metric calculations. Consult your Timken representative for instruction on use.

Tapered - IsoClass™ Metric 30000 Series

| Bearing                  |                         |                      | Dimensions, mm (inches)    |                                   |                          |                                     |                       |                       | Cage                 |                     | Factors        |                |                | Weight<br>kg (lbs.)    |
|--------------------------|-------------------------|----------------------|----------------------------|-----------------------------------|--------------------------|-------------------------------------|-----------------------|-----------------------|----------------------|---------------------|----------------|----------------|----------------|------------------------|
|                          |                         |                      | max shaft<br>fillet radius | Shaft<br>backing<br>shoulder dia. | backing<br>shoulder dia. | Housing<br>backing<br>shoulder dia. |                       |                       |                      |                     |                |                |                |                        |
| B                        | C                       | a <sup>(3)</sup>     | R <sup>(4)</sup>           | d <sub>a</sub>                    | d <sub>b</sub>           | r <sup>(4)</sup>                    | D <sub>a</sub>        | D <sub>b</sub>        | A <sub>a</sub>       | A <sub>b</sub>      | G <sub>1</sub> | G <sub>2</sub> | C <sub>g</sub> |                        |
| <b>38.000</b><br>1.4961  | <b>30.000</b><br>1.1811 | <b>3.8</b><br>0.15   | <b>2.5</b><br>0.10         | <b>179.0</b><br>7.05              | <b>183.0</b><br>7.20     | <b>2.0</b><br>0.08                  | <b>223.0</b><br>8.78  | <b>215.0</b><br>8.46  | <b>2.10</b><br>0.08  | <b>4.60</b><br>0.18 | <b>519</b>     | <b>180</b>     | <b>0.1305</b>  | <b>4.40</b><br>9.71    |
| <b>45.000</b><br>1.7717  | <b>34.000</b><br>1.3386 | <b>8.9</b><br>0.35   | <b>2.5</b><br>0.10         | <b>191.0</b><br>7.52              | <b>196.0</b><br>7.72     | <b>2.0</b><br>0.08                  | <b>241.0</b><br>9.49  | <b>232.0</b><br>9.13  | <b>3.60</b><br>0.14  | <b>3.40</b><br>0.13 | <b>569</b>     | <b>184</b>     | <b>0.1211</b>  | <b>6.51</b><br>14.34   |
| <b>64.000</b><br>2.5197  | <b>48.000</b><br>1.8898 | <b>-3.6</b><br>-0.14 | <b>3.0</b><br>0.12         | <b>197.0</b><br>7.76              | <b>203.0</b><br>7.99     | <b>2.5</b><br>0.10                  | <b>270.0</b><br>10.63 | <b>256.0</b><br>10.08 | <b>6.20</b><br>0.25  | <b>3.70</b><br>0.15 | <b>773</b>     | <b>147</b>     | <b>0.1298</b>  | <b>11.39</b><br>25.10  |
| <b>64.000</b><br>2.5197  | <b>48.000</b><br>1.8898 | <b>-0.5</b><br>-0.02 | <b>3.0</b><br>0.12         | <b>207.0</b><br>8.15              | <b>214.0</b><br>8.43     | <b>2.5</b><br>0.10                  | <b>282.0</b><br>11.10 | <b>267.0</b><br>10.51 | <b>6.40</b><br>0.25  | <b>3.90</b><br>0.15 | <b>842</b>     | <b>161</b>     | <b>0.1353</b>  | <b>14.81</b><br>32.65  |
| <b>51.000</b><br>2.0079  | <b>39.000</b><br>1.5354 | <b>3.3</b><br>0.13   | <b>3.0</b><br>0.12         | <b>213.0</b><br>8.39              | <b>217.0</b><br>8.54     | <b>2.5</b><br>0.10                  | <b>272.0</b><br>10.71 | <b>262.0</b><br>10.31 | <b>3.30</b><br>0.13  | <b>3.50</b><br>0.14 | <b>848</b>     | <b>220</b>     | <b>0.1300</b>  | <b>9.45</b><br>20.83   |
| <b>51.000</b><br>2.0079  | <b>39.000</b><br>1.5354 | <b>8.1</b><br>0.32   | <b>3.0</b><br>0.12         | <b>232.0</b><br>9.13              | <b>237.0</b><br>9.33     | <b>2.5</b><br>0.10                  | <b>290.0</b><br>11.42 | <b>281.0</b><br>11.06 | <b>4.80</b><br>0.19  | <b>3.10</b><br>0.12 | <b>909</b>     | <b>152</b>     | <b>0.1361</b>  | <b>9.90</b><br>21.83   |
| <b>76.000</b><br>2.9921  | <b>57.000</b><br>2.2441 | <b>-3.3</b><br>-0.13 | <b>4.0</b><br>0.16         | <b>241.0</b><br>9.49              | <b>248.0</b><br>9.76     | <b>3.0</b><br>0.12                  | <b>325.0</b><br>12.80 | <b>312.0</b><br>12.28 | <b>10.20</b><br>0.40 | <b>4.30</b><br>0.17 | <b>1210</b>    | <b>128</b>     | <b>0.1509</b>  | <b>24.04</b><br>53.01  |
| <b>63.500</b><br>2.5000  | <b>48.000</b><br>1.8898 | <b>11.4</b><br>0.45  | <b>3.0</b><br>0.12         | <b>296.0</b><br>11.65             | <b>300.0</b><br>11.81    | <b>2.5</b><br>0.10                  | <b>368.0</b><br>14.49 | <b>356.0</b><br>14.02 | <b>7.40</b><br>0.29  | <b>3.40</b><br>0.13 | <b>1700</b>    | <b>236</b>     | <b>0.1680</b>  | <b>19.87</b><br>43.81  |
| <b>100.000</b><br>3.9370 | <b>74.000</b><br>2.9134 | <b>4.3</b><br>0.17   | <b>5.0</b><br>0.20         | <b>343.0</b><br>13.50             | <b>357.0</b><br>14.06    | <b>4.0</b><br>0.16                  | <b>461.0</b><br>18.15 | <b>442.0</b><br>17.40 | <b>13.50</b><br>0.53 | <b>5.20</b><br>0.21 | <b>2670</b>    | <b>201</b>     | <b>0.1998</b>  | <b>59.73</b><br>131.68 |
| <b>76.000</b><br>2.9921  | <b>57.000</b><br>2.2441 | <b>20.6</b><br>0.81  | <b>4.0</b><br>0.16         | <b>378.0</b><br>14.88             | <b>385.0</b><br>15.16    | <b>3.0</b><br>0.12                  | <b>466.0</b><br>18.35 | <b>451.0</b><br>17.76 | <b>10.80</b><br>0.43 | <b>4.10</b><br>0.16 | <b>2980</b>    | <b>344</b>     | <b>0.2061</b>  | <b>36.43</b><br>80.31  |

<sup>(6)</sup> For standard class (4 or 2) only, the maximum metric value is a whole millimeter dimension.

<sup>(7)</sup> Compound radius on inner race. Details on drawing for bearing.

<sup>(8)</sup> Pin-type cage. Please consult The Timken Company.





## **ROLLER BEARINGS**



### **NOTES**

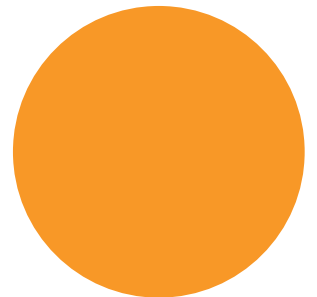
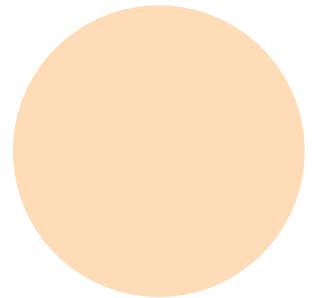
**B**



## RADIAL CYLINDRICAL ROLLER BEARINGS

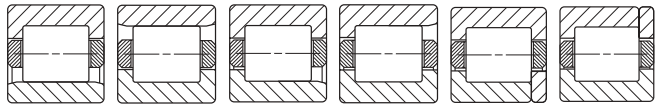
**Overview:** A radial cylindrical roller bearing consists of an inner and/or outer ring, a roller retaining cage and a complement of controlled contour cylindrical rollers. Depending on the style of bearing, either the inner or the outer ring will have two roller guiding ribs. The other ring, separable from the assembly, has one rib or none. The ring with two ribs axially locates the position of the roller assembly. The diameters of these ribs may be used to support the roller cage. One of the ribs may carry light thrust loads when an opposing rib is provided in the mating ring.

- **Sizes:** 15 mm - 65 mm (0.5906 in. to 2.5591 in.) and 100 mm - 600 mm (4 in. - 27.20 in.).
- **Markets:** Power generation, oil field, mining and aggregate processing, gear drives and rolling mills.
- **Features:** Extensive product range for integration into heavy-duty industrial applications.
- **Benefits:** Accommodate heavy radial loads through expertly designed critical dimensions, such as roller and raceway diameter and contact geometry.





## Radial Cylindrical Roller Bearings

|                                                                                                                                         |  |                                                                                                                     |  |                                                                                                                                                                                                                                               |  |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| <b>Bore</b><br><b>inch:</b><br><b>200</b> 20.0 in.<br><b>42</b> 4.25 in.<br><b>43</b> 4.375 in.<br>standard sizes<br>are 4 - 27.20 inch |  | <b>metric:</b><br><b>200</b> 200 mm<br><b>210</b> 210 mm<br><b>220</b> 220 mm<br>standard sizes<br>are 100 - 600 mm |  | <b>Standard Styles inch/metric</b><br><br><b>RIU, RU, NU</b> <b>RIN, RN, N</b> <b>RIJ, RJ, NJ</b> <b>RIF, RF, NF</b> <b>RIT, RT, NUP</b> <b>RIP, RP, NP</b> |  |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|

METRIC

**200**

**RU**

**02**

**OA107**

**R3**

**Series:**  
 two digits indicates metric  
 envelope dimensions  
 three digits indicates inch  
 envelope dimensions

**Modifications:**  
 (First two letters are assigned by Timken engineers)  
 letter other than "O" in first position indicates  
 modification to inner ring.  
 Letter other than "O" in second position indicates  
 modification to outer ring.

**Common Modifications:**  
**101** outer ring with special lubrication hole size  
**107** outer ring with standard lubrication holes and  
 machined lubrication groove in center of O.D.  
**127** steel cage  
**132** wide inner ring  
**229** rings and rollers made of carburized grade steel  
**305** inner ring with oversize bore outer ring with  
 standard lubrication holes and machined  
 lubrication groove in center of O.D.  
**334** centrifugally cast brass cage  
**771** mark bearings serially

**Radial Internal Clearance:**  
**R1 < R2**      **C2 < C0**  
**R2 < R3**      **C0 < C3**  
**R3 = Standard**   **C3 < C4**  
**R4 > R3**      **C4 < C5**  
**R5 > R4**      **C5**

## Cylindrical Roller Radial Bearings - Metric Nominal Dimensions

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Prefix</b><br><b>NJ</b> = cylindrical roller radial bearing (two ribs on outer ring,<br>one rib on inner ring)<br><b>NU</b> = cylindrical roller radial bearing (two ribs on outer ring,<br>cylindrical inner ring)<br><b>NUP</b> = cylindrical roller radial bearing (two ribs on outer ring,<br>one fixed rib and one loose rib/flat washer on inner ring)<br><b>RNU</b> = cylindrical roller radial bearing (two ribs on outer ring,<br>without an inner ring) | <b>Inner Ring Bore Diameter</b><br><b>02</b> = 15 mm<br><b>03</b> = 17 mm<br>(for inner ring bore > 20 mm):<br>bore code x 5 = bore diameter<br><b>04</b> = 4 x 5 = 20 mm |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**NJ**

**2**

**04**

**E.TVP**

**Series**  
**10** = width series 1; diameter series 0 (dimension series 10)  
**2** = width series 0; diameter series 2 (dimension series 02)  
**22** = width series 2; diameter series 2 (dimension series 22)  
**3** = width series 0; diameter series 3 (dimension series 03)  
**23** = width series 2; diameter series 3 (dimension series 23)

**Suffix**  
**E.TVP** = "E" design bearing,  
 molded reinforced polymer  
 window-type cage  
**M** = machined brass cage



# Radial Cylindrical Roller Bearings

*Page*

## **METRIC SERIES (SMALL BORE)**

|                                   |             |
|-----------------------------------|-------------|
| <b>Types</b> .....                | <b>B328</b> |
| <b>Construction</b> .....         | <b>B328</b> |
| <b>Dimensional Accuracy</b> ..... | <b>B329</b> |
| <b>Mounting</b> .....             | <b>B329</b> |
| <b>Load Ratings</b> .....         | <b>B331</b> |

## **CYLINDRICAL ROLLER RADIAL BEARINGS SINGLE-ROW**

|                                                      |             |
|------------------------------------------------------|-------------|
| <b>Bearing Types</b> .....                           | <b>B333</b> |
| <b>Metric Series</b> .....                           | <b>B335</b> |
| <b>Standard Series</b> .....                         | <b>B339</b> |
| <b>5200, A5200 Metric Series</b> .....               | <b>B346</b> |
| <b>5200, A5200 Metric Series</b>                     |             |
| <b>Shaft and Housing Fits and Tolerances</b> .....   | <b>B347</b> |
| <b>Type NCF/NU size range:</b>                       |             |
| <b>200 mm - 1300 mm (7.87 in. - 51.18 in.)</b> ..... | <b>B349</b> |





## ROLLER BEARINGS

### SINGLE-ROW RADIAL BEARINGS – METRIC SERIES

The Timken radial cylindrical roller bearing has integral end ribs on the outer ring for end guiding the cylindrical rollers. The inner ring is separable for simplified mounting and removal.

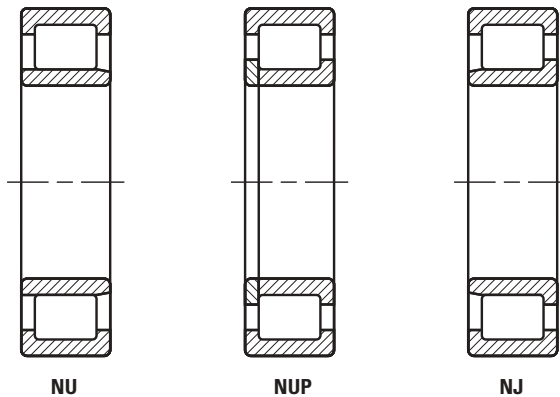
All NU design bearings are available on request without inner rings. For this requirement add letter R in the prefix.

The modified line contact between the cylindrical rollers and raceways reduces edge stressing.

#### REFERENCE STANDARDS ARE:

- DIN 5412 single-row cylindrical roller bearings.
- ISO 246 & DIN 5412 angle rings (thrust collar).

#### TYPES OF METRIC SERIES CYLINDRICAL ROLLER RADIAL BEARINGS



#### SUFFIXES

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| <b>E.TVP</b> | E-design bearing, molded window type cage of engineered polymer. |
| <b>M</b>     | Machined brass cages.                                            |

### CONSTRUCTION

Cylindrical roller radial bearings can be recognized by the arrangement of their end ribs. Bearings of NU design have two ribs on the outer ring, the inner ring being cylindrical, making them well-suited for use as floating bearings. They are separable, which simplifies mounting and removal. Radial cylindrical roller bearings of NJ design have two ribs on the outer ring and one rib on the inner ring. They can accept axial loading in one direction.

Bearings of NUP design have two ribs on the outer ring, and one fixed and one loose rib (a flat washer) on the inner ring. These radial cylindrical roller bearings are used for locating purposes and can accept reversing axial loading. A radial cylindrical roller bearing of NJ design with an HJ Type thrust collar forms a locating bearing similar to the NUP design.

Cylindrical roller bearings of RNU Type, available on request, are supplied without an inner ring so that the cylindrical rollers run directly on a hardened and ground shaft. For most general applications, the shaft may be machined to g6 and the housing bore to K6 tolerances.

#### CAGE DESIGNS

The majority of cylindrical roller bearings of series 2..E, 22..E, 3..E and 23..E use cages of glass-fiber reinforced nylon. This cage construction allows bearings to be designed with maximum load carrying capability. These cages can also be used at operating temperatures of up to 120° C over extended periods. When bearings are lubricated with an oil, presence of additives may reduce operating life if the temperature exceeds 100° C over extended periods. Furthermore, stagnant oil may affect the performance of the cage at these temperatures, requiring oil change intervals to be strictly observed.

Suffix M indicates that the bearings use machined brass cages.

## DIMENSIONAL ACCURACY

### TOLERANCES AND BEARING CLEARANCE

Metric series radial cylindrical roller bearings are available in various tolerance classes and clearance groups. Single-row cylindrical roller bearings are made to normal clearance group C0, although bearings with radial clearance groups C2, C3 and C4 may be obtained on request.

For tolerances of radial cylindrical roller bearings see the engineering section. For radial internal clearances of radial cylindrical roller bearings see the engineering section.

### ALIGNMENT

The modified line contact between the cylindrical rollers and raceways of cylindrical roller bearings reduces stress concentration at ends of the rollers and provides some aligning capability. The angular alignment of single-row cylindrical roller bearings must not exceed a maximum of four angular minutes at a .001% load of  $C/P\partial 5$  = equivalent dynamic load, kN. At higher applied loads, or with presence of greater misalignment, consultation with Timken engineering is strongly encouraged.

## MOUNTING DIMENSIONS

The bearing inner and outer rings should be mounted against the stepped portion on the shaft and the shoulder of the housing. Under no circumstances should they interfere with the shaft or housing fillets. For this reason, the maximum fillet radius  $r_{as\ max}$  of the mating component must be no greater than the minimum chamfer dimension of the corresponding cylindrical roller bearing ring corner  $r_{s\ min}$ .

The shoulder of the mating components must be such that, even with the maximum permissible single chamfer dimension of the corresponding bearing ring, there is an adequate contact surface area. Table 1 lists the maximum fillet radius  $r_{as\ max}$  and the minimum shoulder height. At high axial loads the ribs must be supported over half their height.

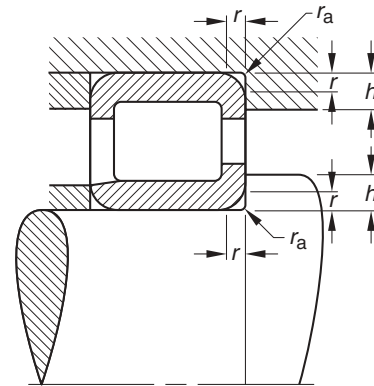
$$\left( \frac{H + E}{2} \text{ and } \frac{F + J}{2} \right)$$

where from bearing tables:

- F** raceway diameter of the inner ring
- E** raceway diameter of the outer ring
- J** rib diameter of the inner ring
- H** rib diameter of the outer ring

The shaft can be mounted and removed if the mounting dimensions shown in Table 2 on page B330 are observed.

TABLE 1 – ABUTMENT DIMENSIONS AS SPECIFIED IN DIN 5418 FOR METRIC SERIES BEARINGS



| $r_{s\ min}$<br>mm | $r_{as\ max}$ | $h_{min}$<br>BEARING SERIES |                                |
|--------------------|---------------|-----------------------------|--------------------------------|
|                    |               | 10                          | 2..E<br>3..E<br>22..E<br>23..E |
| 0.3                | 0.3           | 1                           | 1.2                            |
| 0.6                | 0.6           | 1.6                         | 2.1                            |
| 1                  | 1             | 2.3                         | 2.8                            |
| 1.1                | 1             | 3                           | 3.5                            |
| 1.5                | 1.5           | 3.5                         | 4.5                            |
| 2                  | 2             | 4.4                         | 5.5                            |
| 2.1                | 2.1           | 5.1                         | 6                              |
| 3                  | 2.5           | 6.2                         | 7                              |
| 4                  | 3             | 7.3                         | 8.5                            |
| 5                  | 4             | 9                           | 10                             |
| 6                  | 5             | 11.5                        | 13                             |

See the Needle section for cylindrical roller bearings with inner rings.



# ROLLER BEARINGS

B

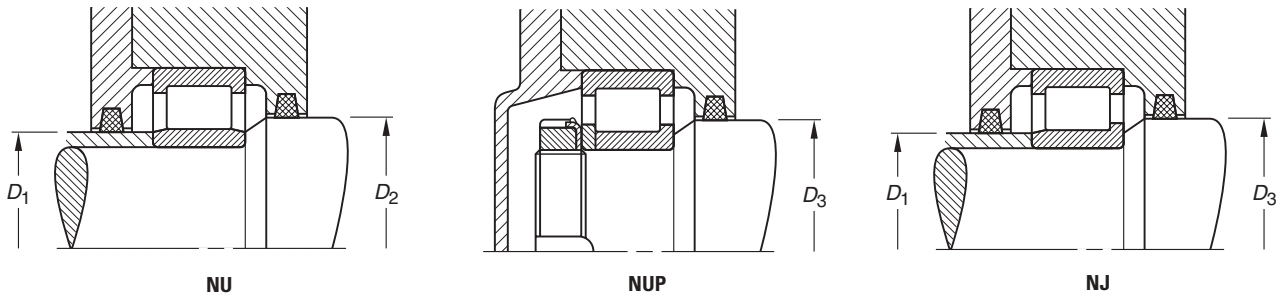


TABLE 2 – MOUNTING DIMENSIONS FOR METRIC SERIES SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

| Bore Reference Number | Shaft Dia.<br>mm | BEARING SERIES      |                     |                     |                     |                     |                     |                     |                     |
|-----------------------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                       |                  | 10                  | 22..E               | 2..E                | 23..E               | 3..E                |                     |                     |                     |
|                       |                  | D <sub>1</sub> max. | D <sub>2</sub> min. | D <sub>1</sub> max. | D <sub>2</sub> min. | D <sub>3</sub> min. | D <sub>1</sub> max. | D <sub>2</sub> min. | D <sub>3</sub> min. |
| 02                    | 15               |                     |                     | 20                  | 23                  | 26                  |                     |                     |                     |
| 03                    | 17               |                     |                     | 21                  | 25                  | 27                  | 24                  | 27                  | 30                  |
| 04                    | 20               | 25                  | 27                  | 26                  | 29                  | 32                  | 27                  | 30                  | 33                  |
| 05                    | 25               | 30                  | 32                  | 31                  | 34                  | 37                  | 33                  | 37                  | 40                  |
| 06                    | 30               | 35                  | 38                  | 37                  | 40                  | 44                  | 40                  | 44                  | 48                  |
| 07                    | 35               | 41                  | 44                  | 43                  | 46                  | 50                  | 45                  | 48                  | 53                  |
| 08                    | 40               | 46                  | 49                  | 49                  | 52                  | 56                  | 51                  | 55                  | 60                  |
| 09                    | 45               | 52                  | 54                  | 54                  | 57                  | 61                  | 57                  | 60                  | 66                  |
| 10                    | 50               | 57                  | 59                  | 58                  | 62                  | 67                  | 63                  | 67                  | 73                  |
| 11                    | 55               | 63                  | 66                  | 65                  | 68                  | 73                  | 69                  | 72                  | 80                  |
| 12                    | 60               | 68                  | 71                  | 71                  | 75                  | 80                  | 75                  | 79                  | 86                  |
| 13                    | 65               | 73                  | 76                  | 77                  | 81                  | 87                  | 81                  | 85                  | 93                  |
| 14                    | 70               | 78                  | 82                  | 82                  | 86                  | 92                  | 87                  | 92                  | 100                 |
| 15                    | 75               | 83                  | 87                  | 87                  | 90                  | 96                  | 93                  | 97                  | 106                 |
| 16                    | 80               | 90                  | 94                  | 94                  | 97                  | 104                 | 99                  | 105                 | 114                 |

## LOAD RATINGS

### CYLINDRICAL ROLLER BEARING MAXIMUM ALLOWABLE AXIAL LOAD

Metric series cylindrical roller bearings of NUP, NJ, as well as NU or NJ designs with a thrust collar can transmit axial loads if they are radially loaded at the same time. The allowable axial load ratio  $F_a/C$  of 0.1 maximum depends to a great extent on the magnitude of radial load, the operating speed, type of lubricant used, the operating temperature, and heat transfer conditions at the bearing location. The heat balance achieved at the bearing location is used as a basis for determination of the allowable axial load.

The nomogram on page B332 should be used to determine the allowable axial load  $F_{az}$  based on the following operating conditions:

- The axial load is of constant direction and magnitude.
- Radial load ratio  $F_r/C \leq 0.2$ .
- Ratio of axial load to radial load  $F_a/F_r < 0.4$ .
- The temperature of the bearing is 80° C at an ambient temperature of 20° C.
- Lubricating oil is ISO VG 100 using oil bath lubrication or circulating oil.
- As an alternative, the bearing may be lubricated with a grease using the above specified base oil and viscosity. Use of EP additives will be necessary, although considerably shorter relubrication intervals may be expected than with purely radially loaded radial cylindrical roller bearings.

### EXAMPLE OF USING THE NOMOGRAM

From the lower part of the nomogram, determine the intersection point of the inner ring bore diameter and the dimension series of the bearing. From the upper part, the allowable axial load ratio  $F_{az}/C$  can be found as a function of the operating speed,  $n$ .

For a cylindrical roller radial bearing **NU2207E.TVP**  
 $C = 63 \text{ kN}$ ;  $d = 35 \text{ mm}$   
 $n = 2000 \text{ RPM}$   
 $F_r = 10 \text{ kN}$

From the nomogram:

$F_{az}/C = 0.06$

Then  $F_{az} = 0.06 \cdot 63$

The calculated allowable axial load  $F_{az}$  is 3.78 kN

It should be noted that an axial load as high as that determined by means of the nomogram should not be applied if an oil of rated kinematic viscosity lower than ISO VG 100 is used. Suitable EP additives, which are known for fatigue life improving qualities, may allow for an increase in applied axial load subject to thorough testing.

### HIGHER APPLIED AXIAL LOADS

Axial loads greater than those determined by means of the nomogram may be considered, providing they are to be applied intermittently. Also, the bearing should be cooled using circulating oil lubrication. If the operating temperature, due to the internal friction and the higher axial load, exceeds 80° C, a more viscous oil must be used.

B

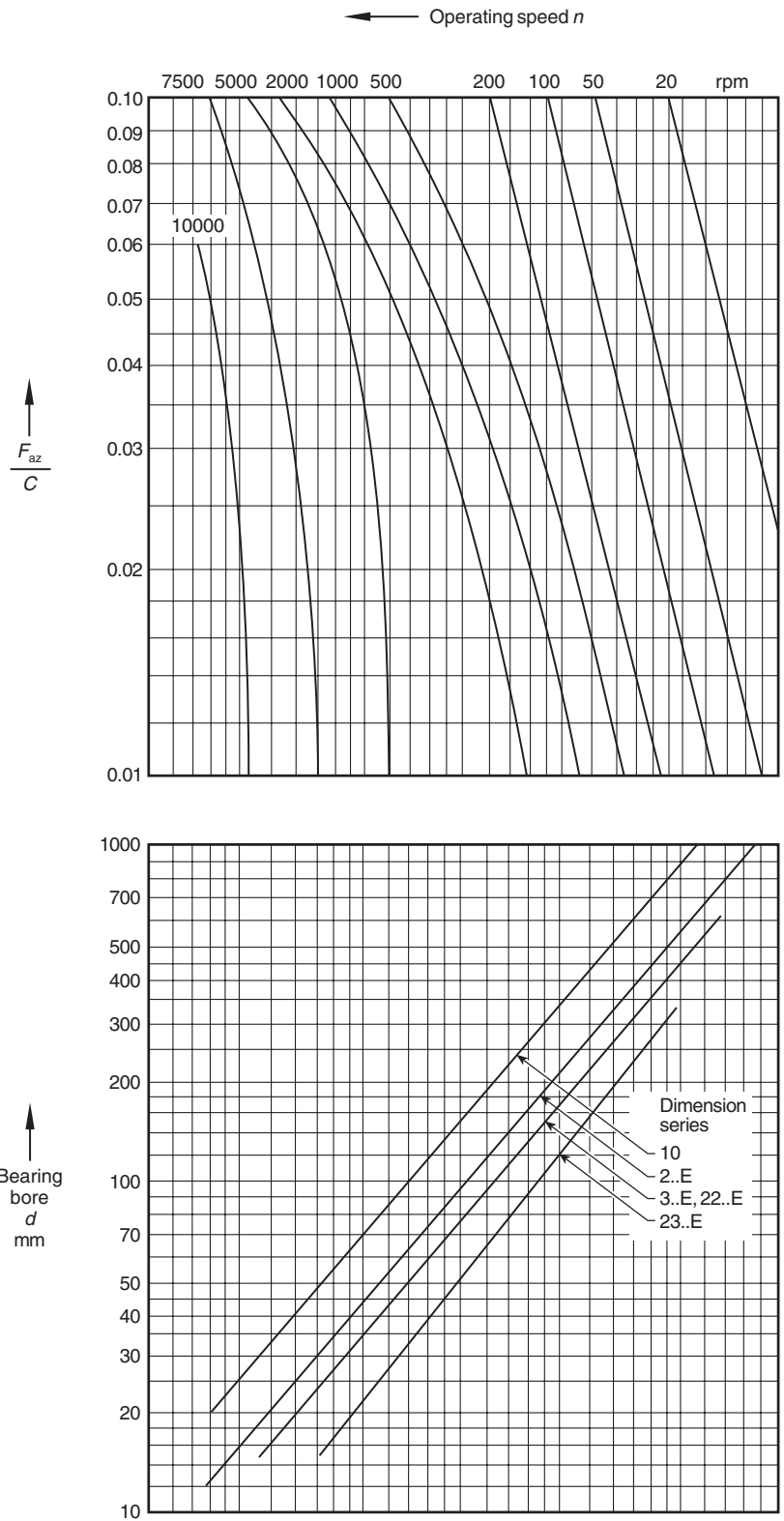




# ROLLER BEARINGS

## NOMOGRAM FOR DETERMINING THE ALLOWABLE AXIAL LOAD $F_{az}$

B





## INTRODUCTION

Timken heavy-duty radial cylindrical roller bearings are designed to provide the highest possible radial capacity for a given cross section, and to perform under heavy radial loads.

These bearings incorporate improved internal proportions developed through computer-assisted optimization studies to make maximum use of the total available cross-sectional area. Controlled contour rollers redistribute end-stress concentration and provide more uniform distribution of the applied load.

Cylindrical roller bearings with bore sizes from 100 mm (3.937 in.) up to 700 mm (27.5 in.) are shown in this catalog, and even larger

sizes can be provided on special order. Consult your Timken representative for complete information on your bearing size requirements.

The standard cylindrical roller bearing furnished consists of an outer ring, a complement of controlled contour rollers, a cage and an inner ring. The 5200 Series bearings include styles without an inner ring for applications where the shaft functions as the inner ring. Bearing rings and rollers are manufactured from bearing-quality steel.

B

## BEARING TYPES

### STANDARD SIZES

Six standard styles of cylindrical roller bearings are listed in this section of the catalog. All six styles have the same roller complement for a given cross section or envelope and, therefore, the same radial load capacity.

In all six styles, one ring (either the inner or the outer) has two integral roller-guiding ribs. The other ring is separable from the assembly and has either one integral rib or none. The two-rib ring locates the roller complement axially, and the ground diameter of the ribs may be used to support the cage.

Moderate thrust loads from one direction only are acceptable for those styles with three integral ribs (RJ, RF, RT and RP). The decision as to which ring should be double-ribbed is determined by conditions of assembly and mounting procedures in a specific

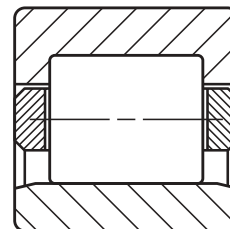
application. Standard cage material is fully machined brass with stamped steel also available.

For convenience, all six styles of bearings are listed in the dimension tables in order of ascending bore size, with both inch and metric sizes indicated for each bearing. ABMA designations are used for these bearings. Inch-sized bearings are identified by the letter "I" with the part number in bold type. RIU, for example, indicates an inch bearing, while RU indicates the equivalent style in metric dimensions.

All types can be mounted with interference fits on either inner or outer ring (or both). In the latter case, a bearing with increased internal clearance must be specified to provide proper running clearance.

### RIU, RU

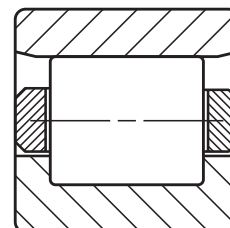
These bearings carry radial load only and can accommodate expansion or contraction. The relative axial displacement of one ring to the other occurs with minimum friction while the bearing is rotating. These bearings may be used in one or two positions for shaft support if other means of axial location are provided. The outer ring has two integral ribs while the inner ring has a cylindrical O.D. without ribs.



RIU, RU, NU

### RIN, RN

This series has the same characteristics as RIU and RU, bearings except that two ribs are incorporated in the inner ring, and the outer ring has a cylindrical bore without ribs.



RIN, RN, N

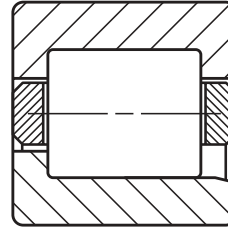


## ROLLER BEARINGS

### RIJ, RJ

Types RIJ and RJ have double-ribbed outer and single-ribbed inner rings and can support heavy radial loads, as well as light unidirectional thrust loads up to 10 percent of the radial load. The thrust load is transmitted between the diagonally opposed rib faces in a sliding rather than a rolling action. Thus, when limiting thrust conditions are approached, lubrication can become critical.

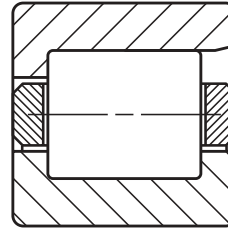
Your Timken representative should be consulted for such applications. When thrust loads are very light, these bearings may be used in an opposed mounting to locate the shaft. In these cases, shaft endplay should be adjusted at time of assembly.



RIJ, RJ, NJ

### RIF, RF

This type has the same characteristics as RIJ and RJ, except it incorporates a double-ribbed inner ring and a single-ribbed outer ring.

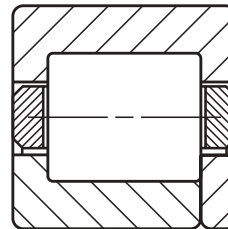


RIF, RF, NF

### RIT, RT

These types have a double-ribbed outer ring and a single-ribbed inner ring with an abutting loose rib, which allows the bearing to provide axial location and to carry light thrust loads in both directions. Factors governing radial and thrust capacities are the same as for RIJ and RJ.

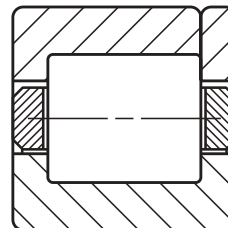
A type RIT or RT bearing may be used in conjunction with a type RN or RU bearing for applications where axial shaft expansion is anticipated. In these cases, the fixed bearing is usually placed nearest the drive end of the shaft to minimize alignment variations in the drive. Shaft endplay (or float) is determined by the axial clearance in the bearing.



RIT, RT, NUP

### RIP, RP

These types have the same characteristics as RIT and RT, except the inner ring is double-ribbed with a loose abutting rib.



RIP, RP, NP

B

**5200 METRIC SERIES**

The Timken 5200 metric cylindrical roller bearing offers an enhanced radial capacity in most applications due to its internal design proportions. The outer ring of a 5200 Series bearing is double-ribbed to create a recessed raceway for the complement of rollers. Style A-5200, which fits the widest variety of applications in industry, includes a full-width plain inner ring.

Because of the manufacturing tolerances established by Timken for the 5200 Series, components for any one cross section are interchangeable. This enables Timken to supply finished 5200 Series bearings to customers quickly from our complete inventory. 5200 Series bearings are available with bore sizes from 100 mm to 240 mm (3.9370 in. to 9.4488 in.).

The designer also is offered the option of specifying these bearings without the inner ring, for installations with limited radial cross sections. In these installations, the shaft serves as the inner ring and must therefore be hardened to Rc58 (minimum) and ground to a 14Ra or better surface finish.

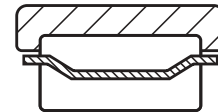
The 5200 Series bearings are supplied with a stamped steel cage that is land-riding on the outer ring ribs (indicated by the suffix "S" on the catalog number). The cage is designed to provide free-rolling separation and also to retain the rollers. If the bearing is to be used under special conditions, such as reversing or high-speed applications, a machined brass cage is available (suffix "M" on catalog number). Your Timken representative should be consulted for specific suggestions.

The outer rings and rollers of 5200 Series bearings are made from bearing-quality alloy steel. The inner rings are deep-case hardened to accommodate the hoop stresses resulting from heavy press fits.

When supplied with an inner ring, all 5200 Series bearings have an R6 radial internal clearance as standard (see page B348). Other radial internal clearances can be provided as required by using a different inner ring. Proper roller guidance is assured by integral ribs and roller end-clearance control.

**5200**

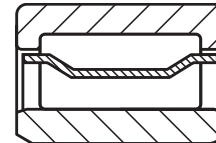
This type carries radial load only and has a double-ribbed outer ring. It has enhanced radial capacity due to internal design proportions. The bearings are useful for installations in which limited radial cross section is available where the shaft serves as the inner ring.



5200

**A-5200-WS**

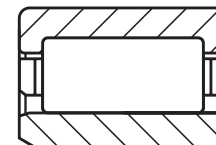
This type has the same characteristics as the 5200, except, includes a full-width cylindrical O.D. inner ring.



A-5200-WS

**A-5200-WM**

This type has the same characteristics as the WS except, with a machined brass cage.



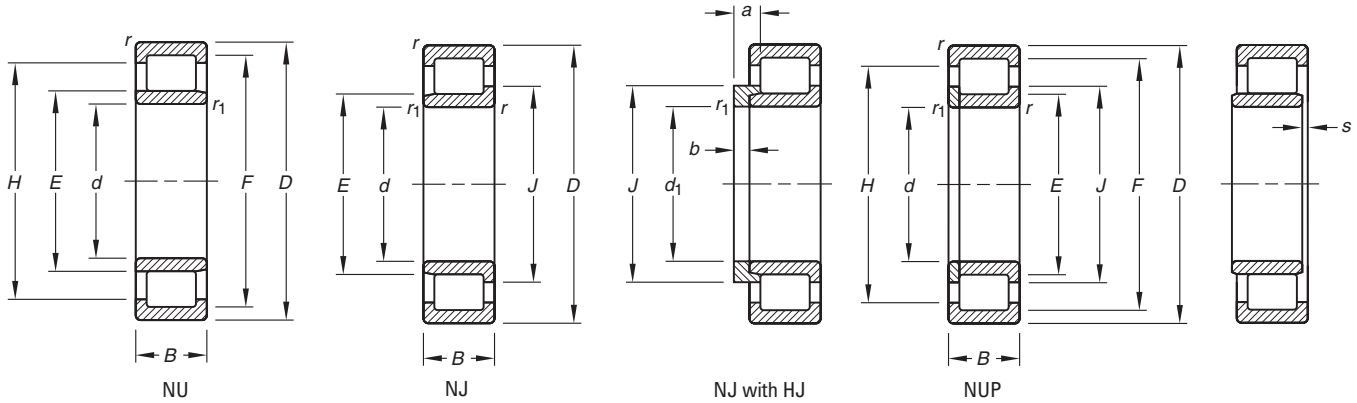
A-52XX-WM





# ROLLER BEARINGS

## CYLINDRICAL ROLLER RADIAL BEARINGS SINGLE-ROW METRIC SERIES



| Bearing Number | Bore<br>d or d <sub>i</sub> | O.D.<br>D    | Width<br>B   | Fillet Radius     |                         | Backing Dia. |              | Rib Dia.     |              | a           | b           | s           | Load Ratings             |              | Lubri-<br>cation<br>Factor<br>C <sub>0</sub> | Reference<br>Speed<br>Grease | Thermal<br>Ratings<br>Oil | Wt.            |                |
|----------------|-----------------------------|--------------|--------------|-------------------|-------------------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|--------------------------|--------------|----------------------------------------------|------------------------------|---------------------------|----------------|----------------|
|                |                             |              |              | Min<br>Outer<br>r | Inner<br>r <sub>1</sub> | Shaft<br>E   | Housing<br>F | Inner<br>J   | Outer<br>H   |             |             |             | Static<br>C <sub>0</sub> | Dynamic<br>C |                                              |                              |                           | RPM            | RPM            |
| NJ202E.TVP     | 15<br>0.5906                | 35<br>1.3780 | 11<br>0.4331 | 0.3<br>0.01       | 0.6<br>0.02             | 19.3<br>0.76 | 30.3<br>1.19 | 21.8<br>0.86 | 27.8<br>1.09 | 5.0<br>0.20 | 2.5<br>0.10 |             | 11.6<br>2610             | 13.9<br>3120 | 0.0327                                       | 14000                        | 17000                     | 0.047<br>0.104 | 0.015<br>0.007 |
| NU202E.TVP     | 15<br>0.5906                | 35<br>1.3780 | 11<br>0.4331 | 0.3<br>0.01       | 0.6<br>0.02             | 19.3<br>0.76 | 30.3<br>1.19 |              | 27.8<br>1.09 |             |             | 1.0<br>0.04 | 11.6<br>2610             | 13.9<br>3120 | 0.0327                                       | 14000                        | 17000                     | 0.047<br>0.104 |                |
| NJ203E.TVP     | 17<br>0.6693                | 40<br>1.5748 | 12<br>0.4724 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 | 24.7<br>0.97 | 32.0<br>1.26 | 5.5<br>0.22 | 3.0<br>0.12 |             | 16.0<br>3600             | 18.9<br>4250 | 0.0366                                       | 12000                        | 15000                     | 0.068<br>0.150 | 0.020<br>0.009 |
| NU203E.TVP     | 17<br>0.6693                | 40<br>1.5748 | 12<br>0.4724 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 |              | 32.0<br>1.26 |             |             | 1.2<br>0.05 | 16.0<br>3600             | 18.9<br>4250 | 0.0366                                       | 12000                        | 15000                     | 0.068<br>0.150 |                |
| NUP203E.TVP    | 17<br>0.6693                | 40<br>1.5748 | 12<br>0.4724 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 | 24.7<br>0.97 | 32.0<br>1.26 |             |             |             | 16.0<br>3600             | 18.9<br>4250 | 0.0366                                       | 12000                        | 15000                     | 0.068<br>0.150 |                |
| NJ2203E.TVP    | 17<br>0.6693                | 40<br>1.5748 | 16<br>0.6299 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 | 24.7<br>0.97 | 32.0<br>1.26 | 6.0<br>0.24 | 3.0<br>0.12 |             | 23.3<br>5240             | 25.3<br>5690 | 0.0402                                       | 11000                        | 13000                     | 0.091<br>0.201 | 0.022<br>0.010 |
| NU2203E.TVP    | 17<br>0.6693                | 40<br>1.5748 | 16<br>0.6299 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 |              | 32.0<br>1.26 |             |             | 1.0<br>0.04 | 23.3<br>5240             | 25.3<br>5690 | 0.0402                                       | 11000                        | 13000                     | 0.091<br>0.201 |                |
| NUP2203E.TVP   | 17<br>0.6693                | 40<br>1.5748 | 16<br>0.6299 | 0.3<br>0.01       | 0.6<br>0.02             | 22.1<br>0.87 | 35.1<br>1.38 | 24.7<br>0.97 | 32.0<br>1.26 |             |             |             | 23.3<br>5240             | 25.3<br>5690 | 0.0402                                       | 11000                        | 13000                     | 0.091<br>0.201 |                |
| NJ303E.TVP     | 17<br>0.6693                | 47<br>1.8504 | 14<br>0.5512 | 0.6<br>0.02       | 1.1<br>0.04             | 24.2<br>0.95 | 40.2<br>1.58 | 27.6<br>1.09 | 36.8<br>1.45 | 6.5<br>0.26 | 4.0<br>0.16 |             | 22.8<br>5130             | 26.7<br>6000 | 0.0392                                       | 11000                        | 13000                     | 0.121<br>0.267 | 0.012<br>0.026 |
| NU303E.TVP     | 17<br>0.6693                | 47<br>1.8504 | 14<br>0.5512 | 0.6<br>0.02       | 1.1<br>0.04             | 24.2<br>0.95 | 40.2<br>1.58 |              | 36.8<br>1.45 |             |             | 1.2<br>0.05 | 22.8<br>5130             | 26.7<br>6000 | 0.0392                                       | 11000                        | 13000                     | 0.121<br>0.267 |                |
| NJ204E.TVP     | 20<br>0.7874                | 47<br>1.8504 | 14<br>0.5512 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 | 29.9<br>1.18 | 38.4<br>1.51 | 5.5<br>0.22 | 3.0<br>0.12 |             | 26.5<br>5960             | 29.0<br>6520 | 0.0436                                       | 11000                        | 13000                     | 0.133<br>0.293 | 0.024<br>0.011 |
| NU204E.TVP     | 20<br>0.7874                | 47<br>1.8504 | 14<br>0.5512 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 |              | 38.4<br>1.51 |             |             | 1.0<br>0.04 | 26.5<br>5960             | 29.0<br>6520 | 0.0436                                       | 11000                        | 13000                     | 0.133<br>0.293 |                |
| NUP204E.TVP    | 20<br>0.7874                | 47<br>1.8504 | 14<br>0.5512 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 | 29.9<br>1.18 | 38.4<br>1.51 |             |             |             | 26.5<br>5960             | 29.0<br>6520 | 0.0433                                       | 11000                        | 13000                     | 0.133<br>0.293 |                |
| NJ2204E.TVP    | 20<br>0.7874                | 47<br>1.8504 | 18<br>0.7087 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 | 29.9<br>1.18 | 38.4<br>1.51 | 6.5<br>0.26 | 3.0<br>0.12 |             | 32.7<br>7350             | 34.1<br>7670 | 0.0459                                       | 9400                         | 11000                     | 0.142<br>0.313 | 0.012<br>0.026 |
| NU2204E.TVP    | 20<br>0.7874                | 47<br>1.8504 | 18<br>0.7087 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 |              | 38.4<br>1.51 |             |             | 1.8<br>0.07 | 32.7<br>7350             | 34.1<br>7670 | 0.0459                                       | 9400                         | 11000                     | 0.142<br>0.313 |                |
| NUP2204E.TVP   | 20<br>0.7874                | 47<br>1.8504 | 18<br>0.7087 | 0.6<br>0.02       | 1.0<br>0.04             | 26.5<br>1.04 | 41.5<br>1.63 | 29.9<br>1.18 | 38.4<br>1.51 |             |             |             | 32.7<br>7350             | 34.1<br>7670 | 0.0459                                       | 9400                         | 11000                     | 0.142<br>0.313 |                |
| NJ304E.TVP     | 20<br>0.7874                | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02       | 1.1<br>0.04             | 27.5<br>1.08 | 45.5<br>1.79 | 31.4<br>1.24 | 41.8<br>1.65 | 6.5<br>0.26 | 4.0<br>0.16 |             | 28.0<br>6290             | 32.6<br>7330 | 0.0435                                       | 10000                        | 12000                     | 0.152<br>0.335 | 0.017<br>0.037 |
| NU304E.TVP     | 20<br>0.7874                | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02       | 1.1<br>0.04             | 27.5<br>1.08 | 45.5<br>1.79 |              | 41.8<br>1.65 |             |             | 1.1<br>0.04 | 28.0<br>6290             | 32.6<br>7330 | 0.0435                                       | 10000                        | 12000                     | 0.152<br>0.335 |                |
| NUP304E.TVP    | 20<br>0.7874                | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02       | 1.1<br>0.04             | 27.5<br>1.08 | 45.5<br>1.79 | 31.4<br>1.24 | 41.8<br>1.65 |             |             |             | 28.0<br>6290             | 32.6<br>7330 | 0.0435                                       | 10000                        | 12000                     | 0.152<br>0.335 |                |
| NJ2304E.TVP    | 20<br>0.7874                | 52<br>2.0472 | 21<br>0.8268 | 0.6<br>0.02       | 1.1<br>0.04             | 27.5<br>1.08 | 45.5<br>1.79 | 31.4<br>1.24 | 41.8<br>1.65 | 7.5<br>0.30 | 4.0<br>0.16 |             | 40.0<br>8990             | 42.9<br>9640 | 0.0475                                       | 8200                         | 9800                      | 0.207<br>0.456 | 0.020<br>0.044 |

# Radial Cylindrical

| Bearing Number | Bore d or d <sub>1</sub> | O.D. D       | Width B      | Min Outer r | Fillet Radius Inner r <sub>1</sub> | Backing Dia. Shaft E Housing F |              | Rib Dia. Inner J Outer H |              | a           | b           | s           | Load Ratings Static C <sub>0</sub> Dynamic C |               | Lubrication Factor C <sub>g</sub> | Reference Speed Grease RPM Oil RPM | Thermal Ratings RPM | Wt. Brg. Thrust Collar |                |
|----------------|--------------------------|--------------|--------------|-------------|------------------------------------|--------------------------------|--------------|--------------------------|--------------|-------------|-------------|-------------|----------------------------------------------|---------------|-----------------------------------|------------------------------------|---------------------|------------------------|----------------|
|                |                          |              |              |             |                                    | mm in.                         | mm in.       | mm in.                   | mm in.       |             |             |             | mm in.                                       | mm in.        |                                   |                                    |                     | mm in.                 | mm in.         |
| NJ205E.TVP     | 25<br>0.9843             | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 | 34.9<br>1.37             | 43.3<br>1.70 | 6.0<br>0.24 | 3.0<br>0.12 |             | 29.8<br>6700                                 | 31.0<br>6970  | 0.0489                            | 9600                               | 12000               | 0.140<br>0.309         | 0.031<br>0.014 |
| NU205E.TVP     | 25<br>0.9843             | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 |                          | 43.3<br>1.70 |             |             | 1.3<br>0.05 | 29.8<br>6700                                 | 31.0<br>6970  | 0.0489                            | 9600                               | 12000               | 0.140<br>0.309         |                |
| NUP205E.TVP    | 25<br>0.9843             | 52<br>2.0472 | 15<br>0.5906 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 | 34.9<br>1.37             | 43.3<br>1.70 |             |             |             | 29.8<br>6700                                 | 31.0<br>6970  | 0.0486                            | 9600                               | 12000               | 0.140<br>0.309         |                |
| NJ2205E.TVP    | 25<br>0.9843             | 52<br>2.0472 | 18<br>0.7087 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 | 34.9<br>1.37             | 43.3<br>1.70 | 6.5<br>0.26 | 3.0<br>0.12 |             | 36.7<br>8250                                 | 36.5<br>8210  | 0.0515                            | 8100                               | 9700                | 0.160<br>0.353         | 0.014<br>0.031 |
| NU2205E.TVP    | 25<br>0.9843             | 52<br>2.0472 | 18<br>0.7087 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 |                          | 43.3<br>1.70 |             |             | 1.7<br>0.07 | 36.7<br>8250                                 | 36.5<br>8210  | 0.0515                            | 8100                               | 9700                | 0.160<br>0.353         |                |
| NUP2205E.TVP   | 25<br>0.9843             | 52<br>2.0472 | 18<br>0.7087 | 0.6<br>0.02 | 1.0<br>0.04                        | 31.5<br>1.24                   | 46.5<br>1.83 | 34.9<br>1.37             | 43.3<br>1.70 |             |             |             | 36.7<br>8250                                 | 36.5<br>8210  | 0.0515                            | 8100                               | 9700                | 0.160<br>0.353         |                |
| NJ305E.TVP     | 25<br>0.9843             | 62<br>2.4409 | 17<br>0.6693 | 1.1<br>0.04 | 1.1<br>0.04                        | 34.0<br>1.34                   | 54.0<br>2.13 | 38.3<br>1.51             | 50.1<br>1.97 | 7.0<br>0.28 | 4.0<br>0.16 |             | 38.9<br>8750                                 | 42.8<br>9620  | 0.0508                            | 8500                               | 10000               | 0.243<br>0.536         | 0.025<br>0.055 |
| NU305E.TVP     | 25<br>0.9843             | 62<br>2.4409 | 17<br>0.6693 | 1.1<br>0.04 | 1.1<br>0.04                        | 34.0<br>1.34                   | 54.0<br>2.13 |                          | 50.1<br>1.97 |             |             | 1.5<br>0.06 | 38.9<br>8750                                 | 42.8<br>9620  | 0.0508                            | 8500                               | 10000               | 0.243<br>0.536         |                |
| NUP305E.TVP    | 25<br>0.9843             | 62<br>2.4409 | 17<br>0.6693 | 1.1<br>0.04 | 1.1<br>0.04                        | 34.0<br>1.34                   | 54.0<br>2.13 | 38.3<br>1.51             | 50.1<br>1.97 |             |             |             | 38.9<br>8750                                 | 42.8<br>9620  | 0.0508                            | 8500                               | 10000               | 0.243<br>0.536         |                |
| NJ2305E.TVP    | 25<br>0.9843             | 62<br>2.4409 | 24<br>0.9449 | 1.1<br>0.04 | 1.1<br>0.04                        | 34.0<br>1.34                   | 54.0<br>2.13 | 38.3<br>1.51             | 50.1<br>1.97 | 8.0<br>0.31 | 4.0<br>0.16 |             | 57.6<br>12900                                | 58.1<br>13100 | 0.0561                            | 6900                               | 8300                | 0.348<br>0.767         | 0.026<br>0.057 |
| NU2305E.TVP    | 25<br>0.9843             | 62<br>2.4409 | 24<br>0.9449 | 1.1<br>0.04 | 1.1<br>0.04                        | 34.0<br>1.34                   | 54.0<br>2.13 |                          | 50.1<br>1.97 |             |             | 1.9<br>0.07 | 57.6<br>12900                                | 58.1<br>13100 | 0.0561                            | 6900                               | 8300                | 0.348<br>0.767         |                |
| NJ206E.TVP     | 30<br>1.1811             | 62<br>2.4409 | 16<br>0.6299 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 | 41.4<br>1.63             | 52.0<br>2.05 | 7.0<br>0.28 | 4.0<br>0.16 |             | 39.0<br>8770                                 | 40.4<br>9080  | 0.0552                            | 8000                               | 9700                | 0.206<br>0.454         | 0.055<br>0.025 |
| NU206E.TVP     | 30<br>1.1811             | 62<br>2.4409 | 16<br>0.6299 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 |                          | 52.0<br>2.05 |             |             | 1.4<br>0.06 | 39.0<br>8770                                 | 40.4<br>9080  | 0.0280                            | 8000                               | 9700                | 0.206<br>0.454         |                |
| NUP206E.TVP    | 30<br>1.1811             | 62<br>2.4409 | 16<br>0.6299 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 | 41.4<br>1.63             | 52.0<br>2.05 |             |             |             | 39.0<br>8770                                 | 40.4<br>9080  | 0.0552                            | 8000                               | 9700                | 0.206<br>0.454         |                |
| NJ2206E.TVP    | 30<br>1.1811             | 62<br>2.4409 | 20<br>0.7874 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 | 41.4<br>1.63             | 52.0<br>2.05 | 7.5<br>0.30 | 4.0<br>0.16 |             | 51.5<br>11600                                | 50.1<br>11300 | 0.0591                            | 6800                               | 8100                | 0.255<br>0.562         | 0.025<br>0.055 |
| NU2206E.TVP    | 30<br>1.1811             | 62<br>2.4409 | 20<br>0.7874 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 |                          | 52.0<br>2.05 |             |             | 1.6<br>0.06 | 51.5<br>11600                                | 50.1<br>11300 | 0.0591                            | 6800                               | 8100                | 0.255<br>0.562         |                |
| NUP2206E.TVP   | 30<br>1.1811             | 62<br>2.4409 | 20<br>0.7874 | 0.6<br>0.02 | 1.0<br>0.04                        | 37.5<br>1.48                   | 55.5<br>2.19 | 41.4<br>1.63             | 52.0<br>2.05 |             |             |             | 51.5<br>11600                                | 50.1<br>11300 | 0.0591                            | 6800                               | 8100                | 0.255<br>0.562         |                |
| NJ306E.TVP     | 30<br>1.1811             | 72<br>2.8346 | 19<br>0.7480 | 1.1<br>0.04 | 1.1<br>0.04                        | 40.5<br>1.59                   | 62.5<br>2.46 | 45.1<br>1.78             | 58.3<br>2.30 | 8.5<br>0.33 | 5.0<br>0.20 |             | 52.1<br>11700                                | 54.6<br>12300 | 0.0581                            | 7400                               | 8800                | 0.370<br>0.816         | 0.042<br>0.093 |
| NU306E.TVP     | 30<br>1.1811             | 72<br>2.8346 | 19<br>0.7480 | 1.1<br>0.04 | 1.1<br>0.04                        | 40.5<br>1.59                   | 62.5<br>2.46 |                          | 58.3<br>2.30 |             |             | 1.9<br>0.07 | 52.1<br>11700                                | 54.6<br>12300 | 0.0581                            | 7400                               | 8800                | 0.370<br>0.816         |                |
| NUP306E.TVP    | 30<br>1.1811             | 72<br>2.8346 | 19<br>0.7480 | 1.1<br>0.04 | 1.1<br>0.04                        | 40.5<br>1.59                   | 62.5<br>2.46 | 45.1<br>1.78             | 58.3<br>2.30 |             |             |             | 52.1<br>11700                                | 54.6<br>12300 | 0.0581                            | 7400                               | 8800                | 0.370<br>0.816         |                |
| NJ2306E.TVP    | 30<br>1.1811             | 72<br>2.8346 | 27<br>1.0630 | 1.1<br>0.04 | 1.1<br>0.04                        | 40.5<br>1.59                   | 62.5<br>2.46 | 45.1<br>1.78             | 58.3<br>2.30 | 9.5<br>0.37 | 5.0<br>0.20 |             | 79.5<br>17900                                | 75.9<br>17100 | 0.0645                            | 6000                               | 7200                | 0.530<br>1.169         | 0.095<br>0.043 |
| NUP2306E.TVP   | 30<br>1.1811             | 72<br>2.8346 | 27<br>1.0630 | 1.1<br>0.04 | 1.1<br>0.04                        | 40.5<br>1.59                   | 62.5<br>2.46 | 45.1<br>1.78             | 58.3<br>2.30 |             |             |             | 79.5<br>17900                                | 75.9<br>17100 | 0.0642                            | 6000                               | 7200                | 0.530<br>1.169         |                |
| NJ207E.TVP     | 35<br>1.3780             | 72<br>2.8346 | 17<br>0.6693 | 0.6<br>0.02 | 1.1<br>0.04                        | 44.0<br>1.73                   | 64.0<br>2.52 | 48.0<br>1.89             | 60.1<br>2.37 | 7.0<br>0.28 | 4.0<br>0.16 |             | 52.2<br>11700                                | 51.8<br>11600 | 0.0624                            | 6800                               | 8200                | 0.303<br>0.668         | 0.073<br>0.033 |
| NU2207E.TVP    | 35<br>1.3780             | 72<br>2.8346 | 23<br>0.9055 | 0.6<br>0.02 | 1.1<br>0.04                        | 44.0<br>1.73                   | 64.0<br>2.52 |                          | 60.1<br>2.37 |             |             | 2.9<br>0.11 | 67.3<br>15100                                | 63.0<br>14200 | 0.0664                            | 6100                               | 7300                | 0.395<br>0.871         |                |
| NUP2207E.TVP   | 35<br>1.3780             | 72<br>2.8346 | 23<br>0.9055 | 0.6<br>0.02 | 1.1<br>0.04                        | 44.0<br>1.73                   | 64.0<br>2.52 | 48.0<br>1.89             | 60.1<br>2.37 |             |             |             | 67.3<br>15100                                | 63.0<br>14200 | 0.0664                            | 6100                               | 7300                | 0.395<br>0.871         |                |
| NJ307E.TVP     | 35<br>1.3780             | 80<br>3.1496 | 21<br>0.8268 | 1.1<br>0.04 | 1.5<br>0.06                        | 46.2<br>1.82                   | 70.2<br>2.76 | 51.2<br>2.02             | 65.7<br>2.59 | 9.5<br>0.37 | 6.0<br>0.24 |             | 66.4<br>14900                                | 67.3<br>15100 | 0.0653                            | 6700                               | 7900                | 0.485<br>1.069         | 0.132<br>0.060 |
| NUP307E.TVP    | 35<br>1.3780             | 80<br>3.1496 | 21<br>0.8268 | 1.1<br>0.04 | 1.5<br>0.06                        | 46.2<br>1.82                   | 70.2<br>2.76 | 51.2<br>2.02             | 65.7<br>2.59 |             |             |             | 66.4<br>14900                                | 67.3<br>15100 | 0.0653                            | 6700                               | 7900                | 0.485<br>1.069         |                |
| NU2307E.TVP    | 35<br>1.3780             | 80<br>3.1496 | 31<br>1.2205 | 1.1<br>0.04 | 1.5<br>0.06                        | 46.2<br>1.82                   | 70.2<br>2.76 |                          | 65.7<br>2.59 |             |             | 3.0<br>0.12 | 102.0<br>22900                               | 93.7<br>21100 | 0.0724                            | 5600                               | 6600                | 0.720<br>1.588         |                |
| NUP208E.TVP    | 40<br>1.5748             | 80<br>3.1496 | 18<br>0.7087 | 1.1<br>0.04 | 1.1<br>0.04                        | 49.5<br>1.95                   | 71.5<br>2.81 | 54.1<br>2.13             | 67.3<br>2.65 |             |             |             | 57.7<br>13000                                | 57.3<br>12900 | 0.0668                            | 6200                               | 7500                | 0.380<br>0.838         |                |

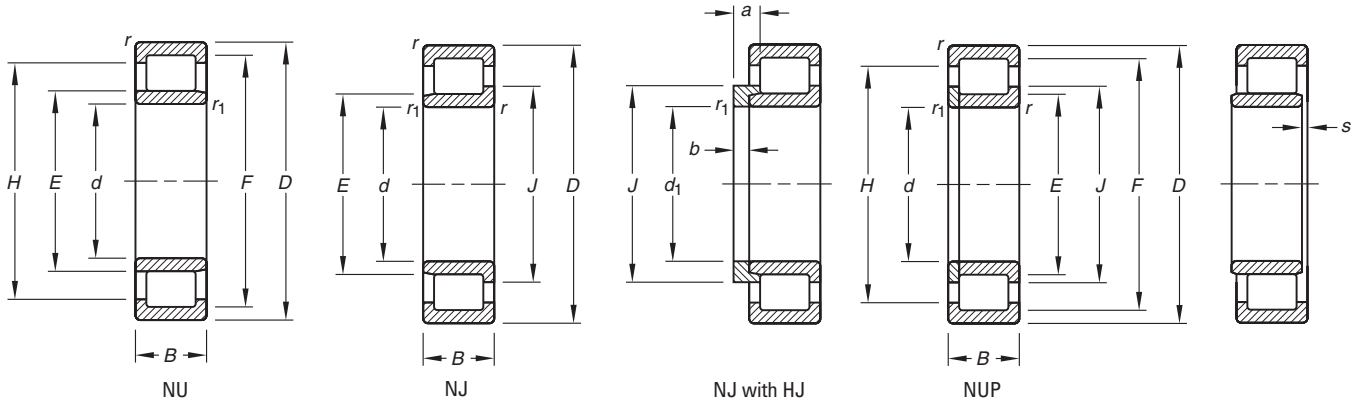
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# ROLLER BEARINGS

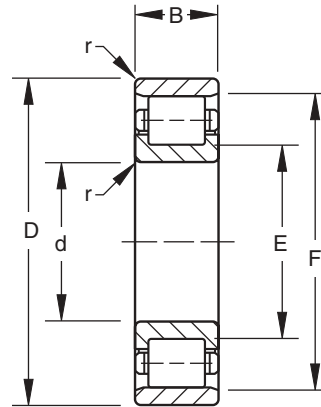
## CYLINDRICAL ROLLER RADIAL BEARINGS SINGLE-ROW METRIC SERIES - continued

B



| Bearing Number      | Bore<br>d or d <sub>i</sub><br>mm<br>in. | O.D.<br>D<br>mm<br>in. | Width<br>B<br>mm<br>in. | Fillet Radius               |                                      | Backing Dia. Shaft Housing |                | Rib Dia. Outer |                | a            | b           | s           | Load Ratings                 |                 | Lubrication Factor<br>C <sub>0</sub> | Reference Thermal Ratings |            | Wt. Thrust Collar |                |
|---------------------|------------------------------------------|------------------------|-------------------------|-----------------------------|--------------------------------------|----------------------------|----------------|----------------|----------------|--------------|-------------|-------------|------------------------------|-----------------|--------------------------------------|---------------------------|------------|-------------------|----------------|
|                     |                                          |                        |                         | Min Outer<br>r<br>mm<br>in. | Inner<br>r <sub>1</sub><br>mm<br>in. | E<br>mm<br>in.             | F<br>mm<br>in. | J<br>mm<br>in. | H<br>mm<br>in. |              |             |             | C <sub>0</sub><br>kN<br>lbs. | C<br>kN<br>lbs. |                                      | Grease<br>RPM             | Oil<br>RPM | kg<br>lbs.        | kg<br>lbs.     |
| <b>NU2208E.TVP</b>  | 40<br>1.5748                             | 80<br>3.1496           | 23<br>0.9055            | 1.1<br>0.04                 | 1.1<br>0.04                          | 49.5<br>1.95               | 71.5<br>2.81   | 67.3<br>2.65   |                |              |             | 2.3<br>0.09 | 79.8<br>17900                | 73.8<br>16600   | 0.0724                               | 5300                      | 6300       | 0.490<br>1.080    |                |
| <b>NUP308E.TVP</b>  | 40<br>1.5748                             | 90<br>3.5433           | 23<br>0.9055            | 1.5<br>0.06                 | 1.5<br>0.06                          | 52.0<br>2.05               | 80.0<br>3.15   | 57.7<br>2.27   | 74.9<br>2.95   |              |             |             | 82.7<br>18600                | 84.0<br>18900   | 0.0714                               | 6000                      | 7100       | 0.660<br>1.455    |                |
| <b>NJ2308E.TVP</b>  | 40<br>1.5748                             | 90<br>3.5433           | 33<br>1.2992            | 1.5<br>0.06                 | 1.5<br>0.06                          | 52.0<br>2.05               | 80.0<br>3.15   | 57.7<br>2.27   | 74.9<br>2.95   | 12.5<br>0.49 | 7.0<br>0.28 |             | 123.0<br>27700               | 115.0<br>25900  | 0.0788                               | 5000                      | 5900       | 0.950<br>2.095    | 0.091<br>0.201 |
| <b>NU2209E.TVP</b>  | 45<br>1.7717                             | 85<br>3.3465           | 23<br>0.9055            | 1.1<br>0.04                 | 1.1<br>0.04                          | 54.5<br>2.15               | 76.5<br>3.01   | 72.4<br>2.85   |                |              |             | 2.3<br>0.09 | 87.0<br>19600                | 77.7<br>17500   | 0.0775                               | 4800                      | 5700       | 0.530<br>1.169    |                |
| <b>NUP2209E.TVP</b> | 45<br>1.7717                             | 85<br>3.3465           | 23<br>0.9055            | 1.1<br>0.04                 | 1.1<br>0.04                          | 54.5<br>2.15               | 76.5<br>3.01   | 59.1<br>2.33   | 72.4<br>2.85   |              |             |             | 87.0<br>19600                | 77.7<br>17500   | 0.0775                               | 4800                      | 5700       | 0.530<br>1.169    |                |
| <b>NJ309E.TVP</b>   | 45<br>1.7717                             | 100<br>3.9370          | 25<br>0.9843            | 1.5<br>0.06                 | 1.5<br>0.06                          | 58.5<br>2.30               | 88.5<br>3.48   | 64.6<br>2.54   | 83.1<br>3.27   | 11.5<br>0.45 | 7.0<br>0.28 |             | 104.0<br>23400               | 101.0<br>22700  | 0.0785                               | 5500                      | 6400       | 0.895<br>1.973    | 0.110<br>0.243 |
| <b>NUP210E.TVP</b>  | 50<br>1.9685                             | 90<br>3.5433           | 20<br>0.7874            | 1.1<br>0.04                 | 1.1<br>0.04                          | 59.5<br>2.34               | 81.5<br>3.21   | 64.1<br>2.52   | 77.4<br>3.05   |              |             |             | 74.5<br>16700                | 67.7<br>15200   | 0.0778                               | 5500                      | 6600       | 0.490<br>1.080    |                |
| <b>NU2210E.TVP</b>  | 50<br>1.9685                             | 90<br>3.5433           | 23<br>0.9055            | 1.1<br>0.04                 | 1.1<br>0.04                          | 59.5<br>2.34               | 81.5<br>3.21   | 77.4<br>3.05   |                |              | 2.2<br>0.09 |             | 94.1<br>21200                | 81.2<br>18300   | 0.0824                               | 4400                      | 5200       | 0.575<br>1.268    |                |
| <b>NUP211E.TVP</b>  | 55<br>2.1654                             | 100<br>3.9370          | 21<br>0.8268            | 1.1<br>0.04                 | 1.5<br>0.06                          | 66.0<br>2.60               | 90.0<br>3.54   | 71.0<br>2.80   | 85.6<br>3.37   |              |             |             | 100.0<br>22500               | 87.2<br>19600   | 0.0862                               | 4800                      | 5700       | 0.665<br>1.466    |                |
| <b>NU311E.TVP</b>   | 55<br>2.1654                             | 120<br>4.7244          | 29<br>1.1417            | 2.0<br>0.08                 | 2.0<br>0.08                          | 70.5<br>2.78               | 106.5<br>4.19  | 100.3<br>3.95  |                |              | 3.0<br>0.12 |             | 149.0<br>33500               | 142.0<br>31900  | 0.0628                               | 4700                      | 5500       | 1.470<br>3.241    |                |
| <b>NUP212E.TVP</b>  | 60<br>2.3622                             | 110<br>4.3307          | 22<br>0.8661            | 1.5<br>0.06                 | 1.5<br>0.06                          | 72.0<br>2.83               | 100.0<br>3.94  | 77.7<br>3.06   | 95.1<br>3.74   |              |             |             | 109.0<br>24500               | 98.6<br>22200   | 0.0896                               | 4500                      | 5300       | 0.825<br>1.819    |                |
| <b>NUP2212E.TVP</b> | 60<br>2.3622                             | 110<br>4.3307          | 28<br>1.1024            | 1.5<br>0.06                 | 1.5<br>0.06                          | 72.0<br>2.83               | 100.0<br>3.94  | 77.7<br>3.06   | 95.1<br>3.74   |              |             |             | 158.0<br>35500               | 132.0<br>29700  | 0.0984                               | 3700                      | 4300       | 1.080<br>2.381    |                |
| <b>NUP2213E.TVP</b> | 65<br>2.5591                             | 120<br>4.7244          | 31<br>1.2205            | 1.5<br>0.06                 | 1.5<br>0.06                          | 78.5<br>3.09               | 108.5<br>4.27  | 84.6<br>3.33   | 103.2<br>4.06  |              |             |             | 188.0<br>42300               | 153.0<br>34400  | 0.0723                               | 3500                      | 4100       | 1.420<br>3.131    |                |

STANDARD STYLES



| Bearing Number and Style |           |           |           |           | d<br>Bore         | D<br>O.D.          | B<br>Width       | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings<br>Oil<br>RPM | Wt.          |
|--------------------------|-----------|-----------|-----------|-----------|-------------------|--------------------|------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|-------------------------------------|----------------------------------|--------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                   |                    |                  |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                                     |                                  |              |
| 100RU02                  | 100RN02   | 100RJ02   | 100RF02   | 100RT02   | 100.000<br>3.9370 | 180.000<br>7.0866  | 34.000<br>1.3386 | 2.0<br>0.08                                    | 114<br>4.5   | 165<br>6.5   | 245<br>55000                               | 216<br>49000                   | 0.088                                        | 2200                                | 2600                             | 3.8<br>8.5   |
| 100RU33                  | 100RN33   | 100RJ33   | 100RF33   | 100RT33   | 100.000<br>3.9370 | 215.000<br>8.4646  | 82.600<br>3.2500 | 2.5<br>0.10                                    | 122<br>4.8   | 193<br>7.6   | 865<br>196000                              | 670<br>150000                  | 0.119                                        | 2200                                | 2500                             | 15.5<br>34.2 |
| 40RIU130                 | 40RIN130  | 40RIJ130  | 40RIF130  | 40RIT130  | 101.600<br>4.0000 | 142.880<br>5.6250  | 22.230<br>0.8750 | 2.5<br>0.10                                    | 110<br>4.3   | 135<br>5.3   | 134<br>30000                               | 98<br>22000                    | 0.081                                        | 2100                                | 2500                             | 1.1<br>2.4   |
| 40RIU133                 | 40RIN133  | 40RIJ133  | 40RIF133  | 40RIT133  | 101.600<br>4.0000 | 215.900<br>8.5000  | 44.450<br>1.7500 | 4.0<br>0.16                                    | 121<br>4.8   | 197<br>7.8   | 325<br>73500                               | 320<br>72000                   | 0.095                                        | 2200                                | 2600                             | 8.3<br>18.3  |
| 105RU02                  | 105RN02   | 105RJ02   | 105RF02   | 105RT02   | 105.000<br>4.1339 | 190.000<br>7.4803  | 36.000<br>1.4173 | 2.0<br>0.08                                    | 121<br>4.8   | 175<br>6.9   | 250<br>57000                               | 224<br>50000                   | 0.090                                        | 2100                                | 2600                             | 4.6<br>10.2  |
| 105RU32                  | 105RN32   | 105RJ32   | 105RF32   | 105RT32   | 105.000<br>4.1339 | 190.000<br>7.4803  | 65.100<br>2.5625 | 2.0<br>0.08                                    | 121<br>4.8   | 175<br>6.9   | 655<br>146000                              | 480<br>108000                  | 0.113                                        | 2300                                | 2700                             | 8.3<br>18.3  |
| 105RU03                  | 105RN03   | 105RJ03   | 105RF03   | 105RT03   | 105.000<br>4.1339 | 225.000<br>8.8583  | 49.000<br>1.9291 | 2.5<br>0.10                                    | 127<br>5.0   | 203<br>8.0   | 450<br>100000                              | 400<br>90000                   | 0.104                                        | 2100                                | 2400                             | 10.1<br>22.2 |
| 42RIU194                 | 42RIN194  | 42RIJ194  | 42RIF194  | 42RIT194  | 107.950<br>4.2500 | 222.250<br>8.7500  | 69.850<br>2.7500 | 4.0<br>0.16                                    | 127<br>5.0   | 203<br>8.0   | 720<br>160000                              | 570<br>129000                  | 0.115                                        | 2100                                | 2400                             | 13.6<br>30.0 |
| 110RU02                  | 110RN02   | 110RJ02   | 110RF02   | 110RT02   | 110.000<br>4.3307 | 200.000<br>7.8740  | 38.000<br>1.4961 | 2.0<br>0.08                                    | 125<br>4.9   | 185<br>7.3   | 315<br>71000                               | 275<br>62000                   | 0.098                                        | 2000                                | 2400                             | 5.4<br>11.8  |
| 110RU03                  | 110RN03   | 110RJ03   | 110RF03   | 110RT03   | 110.000<br>4.3307 | 240.000<br>9.4488  | 50.000<br>1.9685 | 2.5<br>0.10                                    | 135<br>5.3   | 215<br>8.5   | 750<br>170000                              | 550<br>122000                  | 0.106                                        | 1600                                | 1900                             | 11.7<br>25.8 |
| 45RIU196                 | 45RIN196  | 45RIJ196  | 45RIF196  | 45RIT196  | 114.300<br>4.5000 | 203.200<br>8.0000  | 33.340<br>1.3125 | 3.0<br>0.12                                    | 130<br>5.1   | 187<br>7.4   | 245<br>55000                               | 224<br>50000                   | 0.090                                        | 1900                                | 2300                             | 4.8<br>10.5  |
| 120RU30                  | 120RN30   | 120RJ30   | 120RF30   | 120RT30   | 120.000<br>4.7244 | 180.000<br>7.0866  | 46.000<br>1.8110 | 2.0<br>0.08                                    | 130<br>5.1   | 170<br>6.7   | 390<br>88000                               | 255<br>57000                   | 0.108                                        | 2200                                | 2600                             | 4.2<br>9.3   |
| 120RU02                  | 120RN02   | 120RJ02   | 120RF02   | 120RT02   | 120.000<br>4.7244 | 215.000<br>8.4646  | 40.000<br>1.5748 | 2.0<br>0.08                                    | 137<br>5.4   | 198<br>7.8   | 320<br>72000                               | 285<br>64000                   | 0.098                                        | 1900                                | 2300                             | 6.5<br>14.4  |
| 120RU92                  | 120RN92   | 120RJ92   | 120RF92   | 120RT92   | 120.000<br>4.7244 | 215.000<br>8.4646  | 76.200<br>3.0000 | 2.0<br>0.08                                    | 137<br>5.4   | 198<br>7.8   | 865<br>196000                              | 620<br>140000                  | 0.125                                        | 2000                                | 2300                             | 12.4<br>27.3 |
| 120RU03                  | 120RN03   | 120RJ03   | 120RF03   | 120RT03   | 120.000<br>4.7244 | 260.000<br>10.2362 | 55.000<br>2.1654 | 2.5<br>0.10                                    | 145<br>5.7   | 235<br>9.2   | 540<br>120000                              | 490<br>112000                  | 0.114                                        | 1800                                | 2100                             | 15.2<br>33.4 |
| 130RU30                  | 130RN30   | 130RJ30   | 130RF30   | 130RT30   | 130.000<br>5.1181 | 200.000<br>7.8740  | 52.000<br>2.0472 | 2.0<br>0.08                                    | 143<br>5.6   | 187<br>7.4   | 540<br>122000                              | 355<br>80000                   | 0.119                                        | 2000                                | 2300                             | 6.1<br>13.5  |
| 130RU02                  | 130RN02   | 130RJ02   | 130RF02   | 130RT02   | 130.000<br>5.1181 | 230.000<br>9.0551  | 40.000<br>1.5748 | 2.5<br>0.10                                    | 148<br>5.8   | 212<br>8.3   | 355<br>80000                               | 305<br>69500                   | 0.105                                        | 1800                                | 2100                             | 7.4<br>16.3  |
| 130RU92                  | 130RN92   | 130RJ92   | 130RF92   | 130RT92   | 130.000<br>5.1181 | 230.000<br>9.0551  | 79.400<br>3.1250 | 2.5<br>0.10                                    | 148<br>5.8   | 213<br>8.4   | 980<br>224000                              | 680<br>153000                  | 0.133                                        | 1800                                | 2000                             | 14.7<br>32.4 |
| 130RU03                  | 130RN03   | 130RJ03   | 130RF03   | 130RT03   | 130.000<br>5.1181 | 280.000<br>11.0236 | 58.000<br>2.2835 | 3.0<br>0.12                                    | 158<br>6.2   | 252<br>9.9   | 600<br>134000                              | 550<br>125000                  | 0.100                                        | 1600                                | 1900                             | 18.5<br>40.8 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

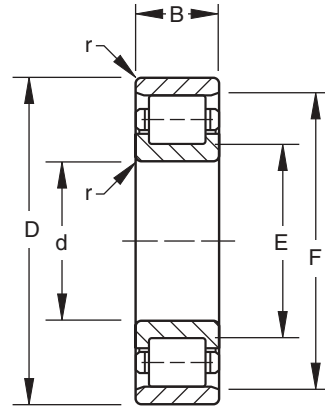
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# ROLLER BEARINGS

## STANDARD STYLES - *continued*



B

| Bearing Number and Style |           |           |           |           | d<br>Bore         | D<br>O.D.          | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|-------------------|--------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|---------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                   |                    |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                           |                   |
|                          |           |           |           |           | mm<br>in.         | mm<br>in.          | mm<br>in.         | mm<br>in.                                      | mm<br>in.    | mm<br>in.    | kN<br>lbs.                                 | kN<br>lbs.                     |                                              |                           |                           |                   |
| 140RU30                  | 140RN30   | 140RJ30   | 140RF30   | 140RT30   | 140.000<br>5.5118 | 210.000<br>8.2677  | 53.000<br>2.0866  | 2.0<br>0.08                                    | 152<br>6.0   | 198<br>7.8   | 540<br>122000                              | 355<br>80000                   | 0.120                                        | 1900                      | 2200                      | 6.6<br>14.6       |
| 140RU51                  | 140RN51   | 140RJ51   | 140RF51   | 140RT51   | 140.000<br>5.5118 | 220.000<br>8.6614  | 36.000<br>1.4173  | 2.0<br>0.08                                    | 155<br>6.1   | 206<br>8.1   | 300<br>68000                               | 240<br>54000                   | 0.104                                        | 1700                      | 2000                      | 5.3<br>11.6       |
| 140RU91                  | 140RN91   | 140RJ91   | 140RF91   | 140RT91   | 140.000<br>5.5118 | 220.000<br>8.6614  | 63.500<br>2.5000  | 2.0<br>0.08                                    | 154<br>6.1   | 206<br>8.1   | 800<br>180000                              | 520<br>116000                  | 0.132                                        | 1800                      | 2000                      | 9.3<br>20.5       |
| 140RU02                  | 140RN02   | 140RJ02   | 140RF02   | 140RT02   | 140.000<br>5.5118 | 250.000<br>9.8425  | 42.000<br>1.6535  | 2.5<br>0.10                                    | 159<br>6.2   | 231<br>9.1   | 465<br>104000                              | 400<br>88000                   | 0.114                                        | 1600                      | 1900                      | 9.2<br>20.2       |
| 140RU92                  | 140RN92   | 140RJ92   | 140RF92   | 140RT92   | 140.000<br>5.5118 | 250.000<br>9.8425  | 82.600<br>3.2500  | 2.5<br>0.10                                    | 159<br>6.2   | 231<br>9.1   | 1200<br>270000                             | 830<br>186000                  | 0.143                                        | 1600                      | 1800                      | 18.2<br>40.0      |
| 140RU03                  | 140RN03   | 140RJ03   | 140RF03   | 140RT03   | 140.000<br>5.5118 | 300.000<br>11.8110 | 62.000<br>2.4409  | 3.0<br>0.12                                    | 168<br>6.6   | 271<br>10.7  | 670<br>150000                              | 610<br>137000                  | 0.106                                        | 1500                      | 1800                      | 22.8<br>50.2      |
| 140RU93                  | 140RN93   | 140RJ93   | 140RF93   | 140RT93   | 140.000<br>5.5118 | 300.000<br>11.8110 | 114.300<br>4.5000 | 3.0<br>0.12                                    | 168<br>6.6   | 271<br>10.7  | 1760<br>400000                             | 1290<br>290000                 | 0.109                                        | 1400                      | 1500                      | 42.0<br>92.5      |
| 150RU51                  | 150RN51   | 150RJ51   | 150RF51   | 150RT51   | 150.000<br>5.9055 | 235.000<br>9.2520  | 38.000<br>1.4961  | 2.0<br>0.08                                    | 165<br>6.5   | 220<br>8.7   | 400<br>90000                               | 310<br>69500                   | 0.114                                        | 1500                      | 1900                      | 6.3<br>13.9       |
| 150RU91                  | 150RN91   | 150RJ91   | 150RF91   | 150RT91   | 150.000<br>5.9055 | 235.000<br>9.2520  | 66.700<br>2.6250  | 2.0<br>0.08                                    | 165<br>6.5   | 220<br>8.7   | 900<br>204000                              | 585<br>132000                  | 0.139                                        | 1600                      | 1800                      | 11.1<br>24.5      |
| 150RU02                  | 150RN02   | 150RJ02   | 150RF02   | 150RT02   | 150.000<br>5.9055 | 270.000<br>10.6299 | 45.000<br>1.7717  | 2.5<br>0.10                                    | 171<br>6.8   | 248<br>9.8   | 520<br>118000                              | 440<br>100000                  | 0.099                                        | 1400                      | 1700                      | 11.7<br>25.7      |
| 150RU92                  | 150RN92   | 150RJ92   | 150RF92   | 150RT92   | 150.000<br>5.9055 | 270.000<br>10.6299 | 88.900<br>3.5000  | 2.5<br>0.10                                    | 170<br>6.7   | 250<br>9.8   | 1400<br>315000                             | 950<br>216000                  | 0.126                                        | 1400                      | 1600                      | 23.1<br>50.9      |
| 150RU03                  | 150RN03   | 150RJ03   | 150RF03   | 150RT03   | 150.000<br>5.9055 | 320.000<br>12.5984 | 65.000<br>2.5591  | 3.0<br>0.12                                    | 182<br>7.2   | 288<br>11.3  | 815<br>183000                              | 720<br>163000                  | 0.111                                        | 1300                      | 1600                      | 27.3<br>60.1      |
| 150RU93                  | 150RN93   | 150RJ93   | 150RF93   | 150RT93   | 150.000<br>5.9055 | 320.000<br>12.5984 | 123.900<br>4.8750 | 3.0<br>0.12                                    | 182<br>7.2   | 288<br>11.3  | 2040<br>455000                             | 1460<br>325000                 | 0.137                                        | 1300                      | 1400                      | 51.8<br>114.1     |
| 60RIU247                 | 60RIN247  | 60RIJ247  | 60RIF247  | 60RIT247  | 152.400<br>6.0000 | 203.200<br>8.0000  | 25.400<br>1.0000  | 2.5<br>0.10                                    | 161<br>6.3   | 194<br>7.7   | 270<br>61000                               | 173<br>39000                   | 0.110                                        | 1400                      | 1700                      | 2.2<br>4.9        |
| 60RIU248                 | 60RIN248  | 60RIJ248  | 60RIF248  | 60RIT248  | 152.400<br>6.0000 | 266.700<br>10.5000 | 39.690<br>1.5625  | 4.0<br>0.16                                    | 173<br>6.8   | 246<br>9.7   | 450<br>100000                              | 380<br>86500                   | 0.097                                        | 1400                      | 1700                      | 9.7<br>21.4       |
| 60RIU249                 | 60RIN249  | 60RIJ249  | 60RIF249  | 60RIT249  | 152.400<br>6.0000 | 266.700<br>10.5000 | 61.910<br>2.4375  | 4.0<br>0.16                                    | 174<br>6.8   | 245<br>9.7   | 865<br>196000                              | 640<br>146000                  | 0.114                                        | 1400                      | 1700                      | 15.2<br>33.5      |
| 60RIU250                 | 60RIN250  | 60RIJ250  | 60RIF250  | 60RIT250  | 152.400<br>6.0000 | 304.800<br>12.0000 | 57.150<br>2.2500  | 5.0<br>0.20                                    | 182<br>7.2   | 275<br>10.8  | 735<br>166000                              | 640<br>143000                  | 0.109                                        | 1300                      | 1600                      | 20.7<br>45.6      |
| 60RIU251                 | 60RIN251  | 60RIJ251  | 60RIF251  | 60RIT251  | 152.400<br>6.0000 | 304.800<br>12.0000 | 88.900<br>3.5000  | 5.0<br>0.20                                    | 181<br>7.1   | 276<br>10.9  | 1340<br>305000                             | 1020<br>228000                 | 0.125                                        | 1300                      | 1500                      | 32.3<br>71.3      |
| 160RU30                  | 160RN30   | 160RJ30   | 160RF30   | 160RT30   | 160.000<br>6.2992 | 240.000<br>9.4488  | 60.000<br>2.3622  | 2.0<br>0.08                                    | 175<br>6.9   | 225<br>8.9   | 765<br>170000                              | 475<br>108000                  | 0.138                                        | 1600                      | 1800                      | 9.8<br>21.7       |
| 160RU51                  | 160RN51   | 160RJ51   | 160RF51   | 160RT51   | 160.000<br>6.2992 | 250.000<br>9.8425  | 40.000<br>1.5748  | 2.0<br>0.08                                    | 173<br>6.8   | 237<br>9.3   | 455<br>102000                              | 345<br>78000                   | 0.100                                        | 1500                      | 1700                      | 7.5<br>16.5       |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

| Bearing Number and Style |           |           |           |           | d<br>Bore         | D<br>O.D.          | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|-------------------|--------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|---------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                   |                    |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                           |                   |
| 160RU91                  | 160RN91   | 160RJ91   | 160RF91   | 160RT91   | 160.000<br>6.2992 | 250.000<br>9.8425  | 73.000<br>2.8750  | 2.0<br>0.08                                    | 173<br>6.8   | 237<br>9.3   | 1060<br>240000                             | 670<br>150000                  | 0.124                                        | 1500                      | 1700                      | 13.7<br>30.3      |
| 160RU02                  | 160RN02   | 160RJ02   | 160RF02   | 160RT02   | 160.000<br>6.2992 | 290.000<br>11.4173 | 48.000<br>1.8898  | 2.5<br>0.10                                    | 183<br>7.2   | 267<br>10.5  | 670<br>150000                              | 550<br>122000                  | 0.106                                        | 1300                      | 1500                      | 14.4<br>31.8      |
| 160RU92                  | 160RN92   | 160RJ92   | 160RF92   | 160RT92   | 160.000<br>6.2992 | 290.000<br>11.4173 | 98.000<br>3.8750  | 2.5<br>0.10                                    | 183<br>7.2   | 267<br>10.5  | 1560<br>345000                             | 1060<br>236000                 | 0.134                                        | 1300                      | 1500                      | 29.8<br>65.6      |
| 160RU03                  | 160RN03   | 160RJ03   | 160RF03   | 160RT03   | 160.000<br>6.2992 | 340.000<br>13.3858 | 68.000<br>2.6772  | 3.0<br>0.12                                    | 194<br>7.6   | 306<br>12.1  | 900<br>204000                              | 780<br>176000                  | 0.115                                        | 1200                      | 1400                      | 32.2<br>71.0      |
| 160RU93                  | 160RN93   | 160RJ93   | 160RF93   | 160RT93   | 160.000<br>6.2992 | 340.000<br>13.3858 | 133.000<br>5.2500 | 3.0<br>0.12                                    | 194<br>7.6   | 306<br>12.1  | 2320<br>520000                             | 1660<br>375000                 | 0.147                                        | 1200                      | 1300                      | 62.8<br>138.6     |
| 170RU30                  | 170RN30   | 170RJ30   | 170RF30   | 170RT30   | 170.000<br>6.6929 | 260.000<br>10.2362 | 67.000<br>2.6378  | 2.0<br>0.08                                    | 186<br>7.3   | 243<br>9.6   | 1020<br>228000                             | 640<br>143000                  | 0.125                                        | 1400                      | 1600                      | 13.2<br>29.1      |
| 170RU51                  | 170RN51   | 170RJ51   | 170RF51   | 170RT51   | 170.000<br>6.6929 | 265.000<br>10.4331 | 42.000<br>1.6535  | 2.5<br>0.10                                    | 187<br>7.4   | 248<br>9.8   | 510<br>114000                              | 380<br>86500                   | 0.104                                        | 1400                      | 1600                      | 8.8<br>19.4       |
| 170RU91                  | 170RN91   | 170RJ91   | 170RF91   | 170RT91   | 170.000<br>6.6929 | 265.000<br>10.4331 | 76.200<br>3.0000  | 2.5<br>0.10                                    | 187<br>7.4   | 248<br>9.8   | 1160<br>260000                             | 735<br>166000                  | 0.130                                        | 1400                      | 1600                      | 16.1<br>35.5      |
| 170RU02                  | 170RN02   | 170RJ02   | 170RF02   | 170RT02   | 170.000<br>6.6929 | 310.000<br>12.2047 | 52.000<br>2.0472  | 3.0<br>0.12                                    | 195<br>7.7   | 285<br>11.2  | 695<br>156000                              | 585<br>132000                  | 0.112                                        | 1200                      | 1500                      | 18.2<br>40.0      |
| 170RU92                  | 170RN92   | 170RJ92   | 170RF92   | 170RT92   | 170.000<br>6.6929 | 310.000<br>12.2047 | 104.800<br>4.1250 | 3.0<br>0.12                                    | 196<br>7.7   | 284<br>11.2  | 1930<br>430000                             | 1270<br>290000                 | 0.141                                        | 1200                      | 1300                      | 36.5<br>80.6      |
| 170RU03                  | 170RN03   | 170RJ03   | 170RF03   | 170RT03   | 170.000<br>6.6929 | 360.000<br>14.1732 | 72.000<br>2.8346  | 3.0<br>0.12                                    | 205<br>8.1   | 325<br>12.8  | 1020<br>228000                             | 880<br>200000                  | 0.123                                        | 1200                      | 1300                      | 38.2<br>84.1      |
| 170RU93                  | 170RN93   | 170RJ93   | 170RF93   | 170RT93   | 170.000<br>6.6929 | 360.000<br>14.1732 | 139.700<br>5.5000 | 3.0<br>0.12                                    | 205<br>8.1   | 325<br>12.8  | 2600<br>585000                             | 1830<br>415000                 | 0.153                                        | 1100                      | 1200                      | 73.6<br>162.4     |
| 180RU51                  | 180RN51   | 180RJ51   | 180RF51   | 180RT51   | 180.000<br>7.0866 | 280.000<br>11.0236 | 44.000<br>1.7323  | 2.5<br>0.10                                    | 196<br>7.7   | 263<br>10.3  | 600<br>134000                              | 440<br>100000                  | 0.111                                        | 1200                      | 1500                      | 10.3<br>22.7      |
| 180RU30                  | 180RN30   | 180RJ30   | 180RF30   | 180RT30   | 180.000<br>7.0866 | 280.000<br>11.0236 | 74.000<br>2.9134  | 2.0<br>0.08                                    | 197<br>7.8   | 264<br>10.4  | 1250<br>280000                             | 780<br>176000                  | 0.132                                        | 1200                      | 1400                      | 17.4<br>38.4      |
| 180RU91                  | 180RN91   | 180RJ91   | 180RF91   | 180RT91   | 180.000<br>7.0866 | 280.000<br>11.0236 | 82.600<br>3.2500  | 2.5<br>0.10                                    | 197<br>7.8   | 262<br>10.3  | 1430<br>325000                             | 880<br>196000                  | 0.138                                        | 1200                      | 1400                      | 19.4<br>42.9      |
| 180RU02                  | 180RN02   | 180RJ02   | 180RF02   | 180RT02   | 180.000<br>7.0866 | 320.000<br>12.5984 | 52.000<br>2.0472  | 3.0<br>0.12                                    | 205<br>8.1   | 295<br>11.6  | 710<br>160000                              | 585<br>129000                  | 0.114                                        | 1200                      | 1400                      | 18.9<br>41.6      |
| 180RU92                  | 180RN92   | 180RJ92   | 180RF92   | 180RT92   | 180.000<br>7.0866 | 320.000<br>12.5984 | 108.000<br>4.2500 | 3.0<br>0.12                                    | 206<br>8.1   | 294<br>11.6  | 1930<br>440000                             | 1270<br>285000                 | 0.144                                        | 1100                      | 1300                      | 39.3<br>86.6      |
| 180RU03                  | 180RN03   | 180RJ03   | 180RF03   | 180RT03   | 180.000<br>7.0866 | 380.000<br>14.9606 | 75.000<br>2.9528  | 3.0<br>0.12                                    | 216<br>8.5   | 344<br>13.6  | 1200<br>270000                             | 1020<br>232000                 | 0.127                                        | 1000                      | 1200                      | 44.0<br>97.0      |
| 190RU30                  | 190RN30   | 190RJ30   | 190RF30   | 190RT30   | 190.000<br>7.4803 | 290.000<br>11.4173 | 75.000<br>2.9528  | 2.0<br>0.08                                    | 207<br>8.2   | 272<br>10.7  | 1270<br>285000                             | 780<br>176000                  | 0.138                                        | 1200                      | 1400                      | 18.4<br>40.6      |
| 190RU51                  | 190RN51   | 190RJ51   | 190RF51   | 190RT51   | 190.000<br>7.4803 | 300.000<br>11.8110 | 46.000<br>1.8110  | 2.5<br>0.10                                    | 210<br>8.2   | 280<br>11.0  | 695<br>156000                              | 510<br>114000                  | 0.117                                        | 1100                      | 1300                      | 12.7<br>28.0      |
| 190RU91                  | 190RN91   | 190RJ91   | 190RF91   | 190RT91   | 190.000<br>7.4803 | 300.000<br>11.8110 | 85.700<br>3.3750  | 2.5<br>0.10                                    | 210<br>8.2   | 281<br>11.1  | 1630<br>365000                             | 980<br>220000                  | 0.144                                        | 1100                      | 1300                      | 23.8<br>52.5      |
| 190RU02                  | 190RN02   | 190RJ02   | 190RF02   | 190RT02   | 190.000<br>7.4803 | 340.000<br>13.3858 | 55.000<br>2.1654  | 3.0<br>0.12                                    | 216<br>8.5   | 314<br>12.4  | 930<br>208000                              | 735<br>166000                  | 0.124                                        | 1000                      | 1200                      | 22.7<br>50.0      |
| 190RU92                  | 190RN92   | 190RJ92   | 190RF92   | 190RT92   | 190.000<br>7.4803 | 340.000<br>13.3858 | 114.300<br>4.5000 | 3.0<br>0.12                                    | 217<br>8.6   | 312<br>12.3  | 2240<br>500000                             | 1460<br>325000                 | 0.154                                        | 1000                      | 1100                      | 47.3<br>104.2     |
| 190RU03                  | 190RN03   | 190RJ03   | 190RF03   | 190RT03   | 190.000<br>7.4803 | 400.000<br>15.7480 | 78.000<br>3.0709  | 4.0<br>0.16                                    | 233<br>9.2   | 357<br>14.1  | 1320<br>290000                             | 1060<br>240000                 | 0.136                                        | 980                       | 1100                      | 51.5<br>113.5     |
| 200RU30                  | 200RN30   | 200RJ30   | 200RF30   | 200RT30   | 200.000<br>7.8740 | 310.000<br>12.2047 | 82.000<br>3.2283  | 2.0<br>0.08                                    | 220<br>8.7   | 290<br>11.4  | 1560<br>355000                             | 930<br>212000                  | 0.146                                        | 1100                      | 1200                      | 23.8<br>52.5      |
| 200RU51                  | 200RN51   | 200RJ51   | 200RF51   | 200RT51   | 200.000<br>7.8740 | 320.000<br>12.5984 | 48.000<br>1.8898  | 2.5<br>0.10                                    | 221<br>8.7   | 299<br>11.8  | 735<br>166000                              | 550<br>122000                  | 0.120                                        | 1100                      | 1300                      | 15.5<br>34.1      |
| 200RU91                  | 200RN91   | 200RJ91   | 200RF91   | 200RT91   | 200.000<br>7.8740 | 320.000<br>12.5984 | 88.900<br>3.5000  | 3.0<br>0.12                                    | 221<br>8.7   | 299<br>11.8  | 1630<br>365000                             | 1020<br>228000                 | 0.150                                        | 1100                      | 1200                      | 28.8<br>63.4      |
| 200RU02                  | 200RN02   | 200RJ02   | 200RF02   | 200RT02   | 200.000<br>7.8740 | 360.000<br>14.1732 | 58.000<br>2.2835  | 3.0<br>0.12                                    | 230<br>9.1   | 330<br>13.0  | 930<br>208000                              | 735<br>163000                  | 0.127                                        | 1000                      | 1200                      | 27.3<br>60.2      |

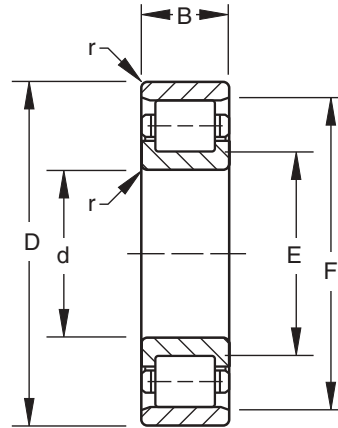
<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

Continued on next page.



# ROLLER BEARINGS

## STANDARD STYLES - continued



B

| Bearing Number and Style |           |           |           |           | d<br>Bore         | D<br>O.D.          | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|-------------------|--------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|---------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                   |                    |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                           |                   |
| 200RU92                  | 200RN92   | 200RJ92   | 200RF92   | 200RT92   | 200.000<br>7.8740 | 360.000<br>14.1732 | 120.700<br>4.7500 | 3.0<br>0.12                                    | 230<br>9.1   | 330<br>13.0  | 2600<br>585000                             | 1630<br>365000                 | 0.164                                        | 940                       | 1000                      | 56.8<br>125.2     |
| 200RU03                  | 200RN03   | 200RJ03   | 200RF03   | 200RT03   | 200.000<br>7.8740 | 420.000<br>16.5354 | 80.000<br>3.1496  | 4.0<br>0.16                                    | 241<br>9.5   | 379<br>14.9  | 1290<br>290000                             | 1120<br>250000                 | 0.135                                        | 950                       | 1100                      | 57.6<br>127.0     |
| 210RU51                  | 210RN51   | 210RJ51   | 210RF51   | 210RT51   | 210.000<br>8.2677 | 340.000<br>13.3858 | 50.000<br>1.9685  | 2.5<br>0.10                                    | 234<br>9.2   | 316<br>12.4  | 780<br>176000                              | 600<br>134000                  | 0.124                                        | 1000                      | 1200                      | 18.3<br>40.3      |
| 210RU91                  | 210RN91   | 210RJ91   | 210RF91   | 210RT91   | 210.000<br>8.2677 | 340.000<br>13.3858 | 95.300<br>3.7500  | 2.5<br>0.10                                    | 233<br>9.2   | 318<br>12.5  | 1960<br>440000                             | 1220<br>275000                 | 0.156                                        | 980                       | 1100                      | 35.3<br>77.7      |
| 210RU02                  | 210RN02   | 210RJ02   | 210RF02   | 210RT02   | 210.000<br>8.2677 | 380.000<br>14.9606 | 62.000<br>2.4409  | 3.0<br>0.12                                    | 242<br>9.5   | 348<br>13.7  | 1060<br>236000                             | 850<br>190000                  | 0.132                                        | 940                       | 1100                      | 32.4<br>71.5      |
| 210RU92                  | 210RN92   | 210RJ92   | 210RF92   | 210RT92   | 210.000<br>8.2677 | 380.000<br>14.9606 | 127.000<br>5.0000 | 3.0<br>0.12                                    | 240<br>9.4   | 350<br>13.8  | 2700<br>600000                             | 1760<br>400000                 | 0.165                                        | 900                       | 1000                      | 66.1<br>145.8     |
| 210RU03                  | 210RN03   | 210RJ03   | 210RF03   | 210RT03   | 210.000<br>8.2677 | 440.000<br>17.3228 | 84.000<br>3.3071  | 4.0<br>0.16                                    | 252<br>9.9   | 398<br>15.7  | 1430<br>325000                             | 1220<br>275000                 | 0.142                                        | 890                       | 1000                      | 66.3<br>146.2     |
| 220RU30                  | 220RN30   | 220RJ30   | 220RF30   | 220RT30   | 220.000<br>8.6614 | 340.000<br>13.3858 | 90.000<br>3.5433  | 2.5<br>0.10                                    | 241<br>9.5   | 318<br>12.5  | 1960<br>440000                             | 1160<br>260000                 | 0.159                                        | 930                       | 1000                      | 31.2<br>68.9      |
| 220RU51                  | 220RN51   | 220RJ51   | 220RF51   | 220RT51   | 220.000<br>8.6614 | 350.000<br>13.7796 | 51.000<br>2.0079  | 2.5<br>0.10                                    | 244<br>9.6   | 326<br>12.8  | 865<br>193000                              | 630<br>143000                  | 0.128                                        | 950                       | 1100                      | 19.6<br>43.2      |
| 220RU91                  | 220RN91   | 220RJ91   | 220RF91   | 220RT91   | 220.000<br>8.6614 | 350.000<br>13.7796 | 98.400<br>3.8750  | 2.5<br>0.10                                    | 241<br>9.5   | 329<br>12.9  | 2080<br>475000                             | 1290<br>290000                 | 0.160                                        | 930                       | 1000                      | 37.6<br>82.9      |
| 220RU02                  | 220RN02   | 220RJ02   | 220RF02   | 220RT02   | 220.000<br>8.6614 | 400.000<br>15.7480 | 65.000<br>2.5591  | 3.0<br>0.12                                    | 256<br>10.1  | 365<br>14.4  | 1180<br>260000                             | 915<br>208000                  | 0.138                                        | 880                       | 1000                      | 38.3<br>84.4      |
| 220RU92                  | 220RN92   | 220RJ92   | 220RF92   | 220RT92   | 220.000<br>8.6614 | 400.000<br>15.7480 | 133.400<br>5.2500 | 3.0<br>0.12                                    | 252<br>9.9   | 368<br>14.5  | 3250<br>735000                             | 2000<br>455000                 | 0.178                                        | 800                       | 880                       | 78.4<br>172.9     |
| 220RU03                  | 220RN03   | 220RJ03   | 220RF03   | 220RT03   | 220.000<br>8.6614 | 460.000<br>18.1102 | 88.000<br>3.4646  | 4.0<br>0.16                                    | 261<br>10.3  | 419<br>16.5  | 1600<br>360000                             | 1340<br>305000                 | 0.149                                        | 840                       | 970                       | 75.9<br>167.2     |
| 90RIU395                 | 90RIN395  | 90RIJ395  | 90RIF395  | 90RIT395  | 228.600<br>9.0000 | 304.800<br>12.0000 | 38.100<br>1.5000  | 4.0<br>0.16                                    | 241<br>9.5   | 292<br>11.5  | 585<br>132000                              | 355<br>80000                   | 0.124                                        | 990                       | 1200                      | 7.8<br>17.3       |
| 90RIU396                 | 90RIN396  | 90RIJ396  | 90RIF396  | 90RIT396  | 228.600<br>9.0000 | 368.300<br>14.5000 | 50.800<br>2.0000  | 5.0<br>0.20                                    | 255<br>10.0  | 342<br>13.5  | 930<br>208000                              | 680<br>153000                  | 0.133                                        | 880                       | 1000                      | 21.9<br>48.4      |
| 90RIU399                 | 90RIN399  | 90RIJ399  | 90RIF399  | 90RIT399  | 228.600<br>9.0000 | 431.800<br>17.0000 | 117.480<br>4.6250 | 5.0<br>0.20                                    | 265<br>10.4  | 395<br>15.6  | 2600<br>600000                             | 1860<br>415000                 | 0.168                                        | 810                       | 900                       | 82.7<br>182.4     |
| 230RU51                  | 230RN51   | 230RJ51   | 230RF51   | 230RT51   | 230.000<br>9.0551 | 370.000<br>14.5669 | 53.000<br>2.0866  | 3.0<br>0.12                                    | 256<br>10.1  | 344<br>13.6  | 1000<br>224000                             | 720<br>163000                  | 0.134                                        | 880                       | 1000                      | 23.1<br>50.8      |
| 230RU91                  | 230RN91   | 230RJ91   | 230RF91   | 230RT91   | 230.000<br>9.0551 | 370.000<br>14.5669 | 101.600<br>4.0000 | 3.0<br>0.12                                    | 256<br>10.1  | 344<br>13.6  | 2450<br>550000                             | 1460<br>325000                 | 0.167                                        | 830                       | 920                       | 44.3<br>97.7      |
| 230RU02                  | 230RN02   | 230RJ02   | 230RF02   | 230RT02   | 230.000<br>9.0551 | 420.000<br>16.5354 | 69.000<br>2.7165  | 3.0<br>0.12                                    | 263<br>10.4  | 387<br>15.2  | 1370<br>305000                             | 1080<br>240000                 | 0.144                                        | 820                       | 950                       | 44.5<br>98.1      |
| 230RU92                  | 230RN92   | 230RJ92   | 230RF92   | 230RT92   | 230.000<br>9.0551 | 420.000<br>16.5354 | 139.000<br>5.5000 | 3.0<br>0.12                                    | 263<br>10.4  | 387<br>15.2  | 3400<br>765000                             | 2200<br>490000                 | 0.178                                        | 770                       | 840                       | 90.4<br>199.2     |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

| Bearing Number and Style |           |           |           |           | d<br>Bore          | D<br>O.D.          | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|--------------------|--------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|---------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                    |                    |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                           |                   |
| 230RU03                  | 230RN03   | 230RJ03   | 230RF03   | 230RT03   | 230.000<br>9.0551  | 480.000<br>18.8976 | 91.000<br>3.5827  | 4.0<br>0.16                                    | 279<br>11.0  | 431<br>17.0  | 1700<br>380000                             | 1400<br>315000                 | 0.151                                        | 800                       | 920                       | 85.6<br>188.8     |
| 240RU30                  | 240RN30   | 240RJ30   | 240RF30   | 240RT30   | 240.000<br>9.4488  | 360.000<br>14.1732 | 92.000<br>3.6220  | 2.5<br>0.10                                    | 262<br>10.3  | 338<br>13.3  | 2200<br>490000                             | 1220<br>275000                 | 0.169                                        | 840                       | 930                       | 34.4<br>75.8      |
| 240RU51                  | 240RN51   | 240RJ51   | 240RF51   | 240RT51   | 240.000<br>9.4488  | 390.000<br>15.3543 | 55.000<br>2.1654  | 3.0<br>0.12                                    | 265<br>10.4  | 365<br>14.4  | 1060<br>236000                             | 765<br>173000                  | 0.140                                        | 830                       | 970                       | 27.2<br>59.8      |
| 240RU91                  | 240RN91   | 240RJ91   | 240RF91   | 240RT91   | 240.000<br>9.4488  | 390.000<br>15.3543 | 108.000<br>4.2500 | 3.0<br>0.12                                    | 265<br>10.4  | 365<br>14.4  | 2700<br>600000                             | 1600<br>355000                 | 0.176                                        | 790                       | 870                       | 53.4<br>117.7     |
| 240RU02                  | 240RN02   | 240RJ02   | 240RF02   | 240RT02   | 240.000<br>9.4488  | 440.000<br>17.3228 | 72.000<br>2.8346  | 3.0<br>0.12                                    | 277<br>10.9  | 402<br>15.8  | 1400<br>315000                             | 1100<br>250000                 | 0.146                                        | 800                       | 920                       | 51.6<br>113.7     |
| 240RU92                  | 240RN92   | 240RJ92   | 240RF92   | 240RT92   | 240.000<br>9.4488  | 440.000<br>17.3228 | 146.000<br>5.7500 | 3.0<br>0.12                                    | 277<br>10.9  | 402<br>15.8  | 3750<br>850000                             | 2400<br>540000                 | 0.185                                        | 720                       | 790                       | 104.3<br>230.0    |
| 240RU03                  | 240RN03   | 240RJ03   | 240RF03   | 240RT03   | 240.000<br>9.4488  | 500.000<br>19.6850 | 95.000<br>3.7402  | 4.0<br>0.16                                    | 289<br>11.4  | 451<br>17.8  | 2000<br>450000                             | 1600<br>360000                 | 0.159                                        | 730                       | 840                       | 97.5<br>215.0     |
| 95RIU430                 | 95RIN430  | 95RIJ430  | 95RIF430  | 95RIT430  | 241.300<br>9.5000  | 323.850<br>12.7500 | 41.270<br>1.6250  | 4.0<br>0.16                                    | 255<br>10.0  | 310<br>12.2  | 695<br>156000                              | 425<br>95000                   | 0.133                                        | 920                       | 1100                      | 9.8<br>21.5       |
| 250RU51                  | 250RN51   | 250RJ51   | 250RF51   | 250RT51   | 250.000<br>9.8425  | 410.000<br>16.1417 | 57.000<br>2.2441  | 3.0<br>0.12                                    | 278<br>10.9  | 383<br>15.1  | 1140<br>255000                             | 850<br>190000                  | 0.144                                        | 790                       | 920                       | 31.3<br>69.0      |
| 250RU91                  | 250RN91   | 250RJ91   | 250RF91   | 250RT91   | 250.000<br>9.8425  | 410.000<br>16.1417 | 111.100<br>4.3750 | 3.0<br>0.12                                    | 278<br>10.9  | 383<br>15.1  | 2750<br>610000                             | 1700<br>380000                 | 0.177                                        | 760                       | 840                       | 60.9<br>134.3     |
| 250RU02                  | 250RN02   | 250RJ02   | 250RF02   | 250RT02   | 250.000<br>9.8425  | 460.000<br>18.1102 | 76.000<br>2.9921  | 4.0<br>0.16                                    | 291<br>11.5  | 418<br>16.5  | 1600<br>360000                             | 1220<br>275000                 | 0.154                                        | 750                       | 860                       | 59.8<br>131.8     |
| 250RU92                  | 250RN92   | 250RJ92   | 250RF92   | 250RT92   | 250.000<br>9.8425  | 460.000<br>18.1102 | 152.400<br>6.0000 | 4.0<br>0.16                                    | 291<br>11.5  | 418<br>16.5  | 4050<br>915000                             | 2550<br>570000                 | 0.192                                        | 680                       | 740                       | 119.7<br>263.9    |
| 250RU03                  | 250RN03   | 250RJ03   | 250RF03   | 250RT03   | 250.000<br>9.8425  | 520.000<br>20.4724 | 98.000<br>3.8583  | 5.0<br>0.20                                    | 300<br>11.8  | 470<br>18.5  | 2120<br>475000                             | 1660<br>375000                 | 0.165                                        | 700                       | 800                       | 109.0<br>240.3    |
| 100RIU433                | 100RIN433 | 100RIJ433 | 100RIF433 | 100RIT433 | 254.000<br>10.0000 | 336.550<br>13.2500 | 41.270<br>1.6250  | 4.0<br>0.16                                    | 269<br>10.6  | 322<br>12.7  | 735<br>163000                              | 430<br>96500                   | 0.136                                        | 870                       | 1000                      | 10.2<br>22.4      |
| 260RU30                  | 260RN30   | 260RJ30   | 260RF30   | 260RT30   | 260.000<br>10.2362 | 400.000<br>15.7480 | 104.000<br>4.0945 | 3.0<br>0.12                                    | 285<br>11.2  | 375<br>14.8  | 2600<br>600000                             | 1530<br>345000                 | 0.180                                        | 760                       | 840                       | 49.8<br>109.8     |
| 260RU51                  | 260RN51   | 260RJ51   | 260RF51   | 260RT51   | 260.000<br>10.2362 | 430.000<br>16.9291 | 59.000<br>2.3228  | 3.0<br>0.12                                    | 291<br>11.4  | 399<br>15.7  | 1200<br>270000                             | 900<br>204000                  | 0.147                                        | 750                       | 880                       | 36.1<br>79.6      |
| 260RU91                  | 260RN91   | 260RJ91   | 260RF91   | 260RT91   | 260.000<br>10.2362 | 430.000<br>16.9291 | 114.300<br>4.5000 | 3.0<br>0.12                                    | 291<br>11.4  | 399<br>15.7  | 3100<br>695000                             | 1900<br>425000                 | 0.182                                        | 700                       | 770                       | 70.0<br>154.3     |
| 260RU02                  | 260RN02   | 260RJ02   | 260RF02   | 260RT02   | 260.000<br>10.2362 | 480.000<br>18.8976 | 80.000<br>3.1496  | 4.0<br>0.16                                    | 300<br>11.8  | 440<br>17.3  | 1760<br>400000                             | 1370<br>305000                 | 0.160                                        | 710                       | 820                       | 68.2<br>150.4     |
| 260RU92                  | 260RN92   | 260RJ92   | 260RF92   | 260RT92   | 260.000<br>10.2362 | 480.000<br>18.8976 | 158.800<br>6.2500 | 4.0<br>0.16                                    | 300<br>11.8  | 440<br>17.3  | 4400<br>1000000                            | 2800<br>630000                 | 0.200                                        | 640                       | 700                       | 136.3<br>300.4    |
| 260RU03                  | 260RN03   | 260RJ03   | 260RF03   | 260RT03   | 260.000<br>10.2362 | 540.000<br>21.2598 | 102.000<br>4.0157 | 5.0<br>0.20                                    | 314<br>12.4  | 486<br>19.1  | 2320<br>520000                             | 1860<br>415000                 | 0.171                                        | 660                       | 760                       | 122.0<br>268.9    |
| 110RIU473                | 110RIN473 | 110RIJ473 | 110RIF473 | 110RIT473 | 279.400<br>11.0000 | 368.300<br>14.5000 | 44.450<br>1.7500  | 4.0<br>0.16                                    | 295<br>11.6  | 352<br>13.9  | 930<br>208000                              | 530<br>118000                  | 0.150                                        | 760                       | 890                       | 13.0<br>28.7      |
| 280RU30                  | 280RN30   | 280RJ30   | 280RF30   | 280RT30   | 280.000<br>11.0236 | 420.000<br>16.5354 | 106.000<br>4.1732 | 3.0<br>0.12                                    | 303<br>11.9  | 397<br>15.6  | 3050<br>680000                             | 1700<br>380000                 | 0.192                                        | 670                       | 740                       | 53.9<br>118.8     |
| 280RU51                  | 280RN51   | 280RJ51   | 280RF51   | 280RT51   | 280.000<br>11.0236 | 460.000<br>18.1102 | 63.000<br>2.4803  | 3.0<br>0.12                                    | 311<br>12.2  | 429<br>16.9  | 1430<br>325000                             | 1000<br>228000                 | 0.156                                        | 680                       | 790                       | 44.5<br>98.1      |
| 280RU91                  | 280RN91   | 280RJ91   | 280RF91   | 280RT91   | 280.000<br>11.0236 | 460.000<br>18.1102 | 123.800<br>4.8750 | 3.0<br>0.12                                    | 311<br>12.2  | 429<br>16.9  | 3750<br>830000                             | 2120<br>475000                 | 0.201                                        | 620                       | 680                       | 87.4<br>192.8     |
| 280RU02                  | 280RN02   | 280RJ02   | 280RF02   | 280RT02   | 280.000<br>11.0236 | 500.000<br>19.6850 | 80.000<br>3.1496  | 4.0<br>0.16                                    | 319<br>12.6  | 461<br>18.2  | 2000<br>450000                             | 1500<br>335000                 | 0.169                                        | 640                       | 730                       | 72.1<br>159.0     |
| 280RU92                  | 280RN92   | 280RJ92   | 280RF92   | 280RT92   | 280.000<br>11.0236 | 500.000<br>19.6850 | 165.100<br>6.5000 | 4.0<br>0.16                                    | 319<br>12.6  | 461<br>18.2  | 5200<br>1180000                            | 3150<br>710000                 | 0.213                                        | 570                       | 610                       | 148.7<br>327.9    |
| 280RU03                  | 280RN03   | 280RJ03   | 280RF03   | 280RT03   | 280.000<br>11.0236 | 580.000<br>22.8346 | 108.000<br>4.2520 | 5.0<br>0.20                                    | 341<br>13.4  | 519<br>20.4  | 2750<br>620000                             | 2160<br>480000                 | 0.182                                        | 590                       | 670                       | 148.6<br>327.6    |
| 300RU30                  | 300RN30   | 300RJ30   | 300RF30   | 300RT30   | 300.000<br>11.8110 | 460.000<br>18.1102 | 118.000<br>4.6457 | 3.0<br>0.12                                    | 330<br>13.0  | 429<br>16.9  | 3750<br>830000                             | 2040<br>455000                 | 0.205                                        | 590                       | 640                       | 75.3<br>166.0     |

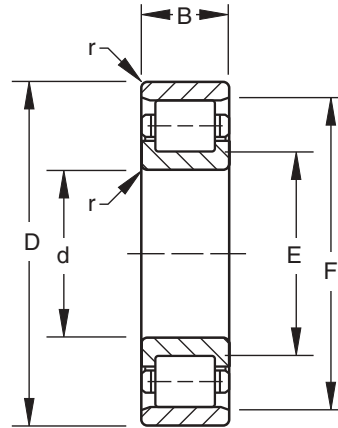
<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

Continued on next page.



# ROLLER BEARINGS

## STANDARD STYLES - continued



B

| Bearing Number and Style |           |           |           |           | d<br>Bore          | D<br>O.D.          | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|--------------------|--------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|---------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                    |                    |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                           |                   |
| 300RU51                  | 300RN51   | 300RJ51   | 300RF51   | 300RT51   | 300.000<br>11.8110 | 480.000<br>18.8976 | 67.000<br>2.6378  | 3.0<br>0.12                                    | 329<br>12.9  | 452<br>17.8  | 1660<br>375000                             | 1160<br>260000                 | 0.166                                        | 630                       | 730                       | 49.1<br>108.2     |
| 300RU91                  | 300RN91   | 300RJ91   | 300RF91   | 300RT91   | 300.000<br>11.8110 | 480.000<br>18.8976 | 127.000<br>5.0000 | 3.0<br>0.12                                    | 329<br>12.9  | 452<br>17.8  | 4000<br>900000                             | 2320<br>520000                 | 0.204                                        | 580                       | 630                       | 93.0<br>205.1     |
| 300RU02                  | 300RN02   | 300RJ02   | 300RF02   | 300RT02   | 300.000<br>11.8110 | 540.000<br>21.2598 | 85.000<br>3.3465  | 4.0<br>0.16                                    | 343<br>13.5  | 497<br>19.6  | 2280<br>510000                             | 1660<br>375000                 | 0.178                                        | 580                       | 660                       | 90.5<br>199.6     |
| 300RU92                  | 300RN92   | 300RJ92   | 300RF92   | 300RT92   | 300.000<br>11.8110 | 540.000<br>21.2598 | 177.800<br>7.0000 | 4.0<br>0.16                                    | 343<br>13.5  | 497<br>19.6  | 6200<br>1400000                            | 3750<br>830000                 | 0.226                                        | 500                       | 540                       | 188.5<br>415.6    |
| 125RIU550                | 125RIN550 | 125RIJ550 | 125RIF550 | 125RIT550 | 317.500<br>12.5000 | 419.100<br>16.5000 | 50.800<br>2.0000  | 5.0<br>0.20                                    | 337<br>13.2  | 400<br>15.8  | 1290<br>290000                             | 710<br>160000                  | 0.167                                        | 640                       | 740                       | 19.4<br>42.8      |
| 125RIU551                | 125RIN551 | 125RIJ551 | 125RIF551 | 125RIT551 | 317.500<br>12.5000 | 482.600<br>19.0000 | 66.670<br>2.6250  | 5.0<br>0.20                                    | 337<br>13.8  | 451<br>17.8  | 1800<br>405000                             | 1180<br>260000                 | 0.174                                        | 590                       | 680                       | 46.0<br>101.3     |
| 320RU30                  | 320RN30   | 320RJ30   | 320RF30   | 320RT30   | 320.000<br>12.5984 | 480.000<br>18.8976 | 121.000<br>4.7638 | 3.0<br>0.12                                    | 347<br>13.7  | 453<br>17.8  | 4050<br>900000                             | 2120<br>480000                 | 0.215                                        | 550                       | 600                       | 81.3<br>179.1     |
| 320RU51                  | 320RN51   | 320RJ51   | 320RF51   | 320RT51   | 320.000<br>12.5984 | 500.000<br>19.6850 | 71.000<br>2.7953  | 3.0<br>0.12                                    | 352<br>13.9  | 468<br>18.4  | 1900<br>425000                             | 1270<br>285000                 | 0.176                                        | 590                       | 670                       | 54.7<br>120.7     |
| 320RU91                  | 320RN91   | 320RJ91   | 320RF91   | 320RT91   | 320.000<br>12.5984 | 500.000<br>19.6850 | 130.200<br>5.1250 | 3.0<br>0.12                                    | 352<br>13.9  | 468<br>18.4  | 4300<br>980000                             | 2450<br>550000                 | 0.214                                        | 540                       | 590                       | 100.3<br>221.2    |
| 320RU02                  | 320RN02   | 320RJ02   | 320RF02   | 320RT02   | 320.000<br>12.5984 | 580.000<br>22.8346 | 92.000<br>3.6220  | 4.0<br>0.16                                    | 368<br>14.5  | 532<br>20.9  | 2450<br>550000                             | 1800<br>405000                 | 0.186                                        | 550                       | 630                       | 114.9<br>253.4    |
| 320RU92                  | 320RN92   | 320RJ92   | 320RF92   | 320RT92   | 320.000<br>12.5984 | 580.000<br>22.8346 | 190.500<br>7.5000 | 4.0<br>0.16                                    | 370<br>14.6  | 530<br>20.9  | 6700<br>1530000                            | 4000<br>900000                 | 0.238                                        | 470                       | 510                       | 236.4<br>521.1    |
| 340RU30                  | 340RN30   | 340RJ30   | 340RF30   | 340RT30   | 340.000<br>13.3858 | 520.000<br>20.4724 | 133.000<br>5.2362 | 4.0<br>0.16                                    | 372<br>14.7  | 488<br>19.2  | 4650<br>1040000                            | 2550<br>570000                 | 0.224                                        | 500                       | 550                       | 107.6<br>237.2    |
| 135RIU580                | 135RIN580 | 135RIJ580 | 135RIF580 | 135RIT580 | 342.900<br>13.5000 | 457.200<br>18.0000 | 57.150<br>2.2500  | 5.0<br>0.20                                    | 365<br>14.4  | 435<br>17.1  | 1530<br>345000                             | 815<br>183000                  | 0.181                                        | 580                       | 680                       | 27.2<br>60.0      |
| 135RIU582                | 135RIN582 | 135RIJ582 | 135RIF582 | 135RIT582 | 342.900<br>13.5000 | 527.100<br>20.7500 | 104.770<br>4.1250 | 5.0<br>0.20                                    | 376<br>14.8  | 494<br>19.4  | 3450<br>765000                             | 2040<br>455000                 | 0.208                                        | 520                       | 580                       | 88.0<br>193.9     |
| 360RU30                  | 360RN30   | 360RJ30   | 360RF30   | 360RT30   | 360.000<br>14.1732 | 540.000<br>21.2598 | 134.000<br>5.2765 | 4.0<br>0.16                                    | 392<br>15.4  | 508<br>20.0  | 4900<br>1100000                            | 2600<br>585000                 | 0.232                                        | 470                       | 520                       | 113.6<br>250.4    |
| 145RIU610                | 145RIN610 | 145RIJ610 | 145RIF610 | 145RIT610 | 368.300<br>14.5000 | 495.300<br>19.5000 | 63.500<br>2.5000  | 5.0<br>0.20                                    | 391<br>15.4  | 473<br>18.6  | 2040<br>455000                             | 1100<br>245000                 | 0.194                                        | 510                       | 590                       | 35.8<br>79.0      |
| 380RU30                  | 380RN30   | 380RJ30   | 380RF30   | 380RT30   | 380.000<br>14.9606 | 560.000<br>22.0472 | 135.000<br>5.3150 | 4.0<br>0.16                                    | 412<br>16.2  | 528<br>20.8  | 5200<br>1180000                            | 2750<br>610000                 | 0.241                                        | 440                       | 480                       | 119.5<br>263.4    |
| 150RIU613                | 150RIN613 | 150RIJ613 | 150RIF613 | 150RIT613 | 381.000<br>15.0000 | 508.000<br>20.0000 | 63.500<br>2.5000  | 5.0<br>0.20                                    | 404<br>15.9  | 485<br>19.1  | 2040<br>455000                             | 1100<br>245000                 | 0.196                                        | 500                       | 570                       | 36.9<br>81.3      |
| 155RIU640                | 155RIN640 | 155RIJ640 | 155RIF640 | 155RIT640 | 393.700<br>15.5000 | 520.700<br>20.5000 | 63.500<br>2.5000  | 5.0<br>0.20                                    | 416<br>16.4  | 498<br>19.6  | 2040<br>455000                             | 1080<br>245000                 | 0.200                                        | 480                       | 560                       | 38.0<br>83.8      |
| 400RU30                  | 400RN30   | 400RJ30   | 400RF30   | 400RT30   | 400.000<br>15.7480 | 600.000<br>23.6220 | 148.000<br>5.8268 | 4.0<br>0.16                                    | 438<br>17.2  | 562<br>22.1  | 6000<br>1340000                            | 3100<br>695000                 | 0.252                                        | 410                       | 440                       | 155.7<br>343.2    |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

| Bearing Number and Style |           |           |           |           | d<br>Bore          | D<br>O.D.           | B<br>Width        | r <sup>(1)</sup><br>Fillet<br>Radius<br>(max.) | Backing Dia. |              | Load Ratings                               |                                | Lubri-<br>cation<br>Factor<br>C <sub>g</sub> | Reference<br>Speed<br>RPM | Thermal<br>Ratings<br>Oil<br>RPM | Wt.<br>kg<br>lbs. |
|--------------------------|-----------|-----------|-----------|-----------|--------------------|---------------------|-------------------|------------------------------------------------|--------------|--------------|--------------------------------------------|--------------------------------|----------------------------------------------|---------------------------|----------------------------------|-------------------|
| RU<br>RIU                | RN<br>RIN | RJ<br>RIJ | RF<br>RIF | RT<br>RIT |                    |                     |                   |                                                | Shaft<br>E   | Housing<br>F | Static<br>Load<br>Rating<br>C <sub>0</sub> | Dynamic<br>Load<br>Rating<br>C |                                              |                           |                                  |                   |
| 160RIU643                | 160RIN643 | 160RIJ643 | 160RIF643 | 160RIT643 | 406.400<br>16.0000 | 546.100<br>21.5000  | 69.850<br>2.7500  | 5.0<br>0.20                                    | 432<br>17.0  | 521<br>20.5  | 2500<br>560000                             | 1320<br>300000                 | 0.212                                        | 450                       | 510                              | 48.2<br>106.2     |
| 160RIU644                | 160RIN644 | 160RIJ644 | 160RIF644 | 160RIT644 | 406.400<br>16.0000 | 603.250<br>23.7500  | 82.550<br>3.2500  | 5.0<br>0.20                                    | 444<br>17.5  | 565<br>22.2  | 2800<br>630000                             | 1700<br>380000                 | 0.211                                        | 440                       | 500                              | 86.4<br>190.4     |
| 160RIU645                | 160RIN645 | 160RIJ645 | 160RIF645 | 160RIT645 | 406.400<br>16.0000 | 603.250<br>23.7500  | 123.820<br>4.8750 | 5.0<br>0.20                                    | 442<br>17.4  | 568<br>22.3  | 5000<br>1120000                            | 2600<br>600000                 | 0.243                                        | 410                       | 450                              | 129.4<br>285.4    |
| 165RIU662                | 165RIN662 | 165RIJ662 | 165RIF662 | 165RIT662 | 419.100<br>16.5000 | 622.300<br>24.5000  | 127.000<br>5.0000 | 5.0<br>0.20                                    | 456<br>18.0  | 585<br>23.0  | 5400<br>1200000                            | 2900<br>655000                 | 0.247                                        | 390                       | 420                              | 141.0<br>310.9    |
| 170RIU663                | 170RIN663 | 170RIJ663 | 170RIF663 | 170RIT663 | 431.800<br>17.0000 | 584.200<br>23.0000  | 76.200<br>3.0000  | 6.0<br>0.24                                    | 460<br>18.1  | 556<br>21.9  | 3000<br>670000                             | 1560<br>355000                 | 0.223                                        | 410                       | 460                              | 61.4<br>135.4     |
| 170RIU664                | 170RIN664 | 170RIJ664 | 170RIF664 | 170RIT664 | 431.800<br>17.0000 | 635.000<br>25.0000  | 88.900<br>3.5000  | 6.0<br>0.24                                    | 470<br>18.5  | 597<br>23.5  | 3450<br>780000                             | 2040<br>455000                 | 0.226                                        | 400                       | 450                              | 101.2<br>223.2    |
| 440RU30                  | 440RN30   | 440RJ30   | 440RF30   | 440RT30   | 440.000<br>17.3228 | 650.000<br>25.5906  | 157.000<br>6.1811 | 5.0<br>0.20                                    | 476<br>18.8  | 613<br>24.1  | 7350<br>1660000                            | 3650<br>830000                 | 0.274                                        | 350                       | 370                              | 189.4<br>417.5    |
| 180RIU683                | 180RIN683 | 180RIJ683 | 180RIF683 | 180RIT683 | 457.200<br>18.0000 | 685.800<br>27.0000  | 88.900<br>3.5000  | 6.0<br>0.24                                    | 500<br>19.7  | 643<br>25.3  | 3450<br>780000                             | 2160<br>480000                 | 0.229                                        | 370                       | 420                              | 122.5<br>270.1    |
| 180RIU684                | 180RIN684 | 180RIJ684 | 180RIF684 | 180RIT684 | 457.200<br>18.0000 | 685.800<br>27.0000  | 139.700<br>5.5000 | 6.0<br>0.24                                    | 500<br>19.7  | 643<br>25.3  | 6300<br>1430000                            | 3400<br>765000                 | 0.265                                        | 350                       | 380                              | 192.2<br>423.8    |
| 460RU30                  | 460RN30   | 460RJ30   | 460RF30   | 460RT30   | 460.000<br>18.1102 | 680.000<br>26.7717  | 163.000<br>6.4173 | 5.0<br>0.20                                    | 498<br>19.6  | 641<br>25.2  | 8000<br>1800000                            | 4000<br>900000                 | 0.283                                        | 330                       | 350                              | 215.6<br>475.2    |
| 185RIU696                | 185RIN696 | 185RIJ696 | 185RIF696 | 185RIT696 | 469.900<br>18.5000 | 698.500<br>27.5000  | 88.900<br>5.5000  | 6.0<br>0.24                                    | 513<br>20.2  | 656<br>25.8  | 6550<br>1500000                            | 3550<br>800000                 | 0.266                                        | 260                       | 280                              | 125.5<br>434.6    |
| 480RU30                  | 480RN30   | 480RJ30   | 480RF30   | 480RT30   | 480.000<br>18.8976 | 700.000<br>27.5591  | 165.000<br>6.4961 | 5.0<br>0.20                                    | 518<br>20.4  | 660<br>26.0  | 8150<br>1830000                            | 4000<br>900000                 | 0.294                                        | 320                       | 340                              | 225.6<br>497.4    |
| 500RU30                  | 500RN30   | 500RJ30   | 500RF30   | 500RT30   | 500.000<br>19.6850 | 720.000<br>28.3465  | 167.000<br>6.5748 | 5.0<br>0.20                                    | 540<br>21.2  | 680<br>26.8  | 8300<br>1900000                            | 4150<br>930000                 | 0.296                                        | 310                       | 330                              | 235.3<br>518.7    |
| 530RU30                  | 530RN30   | 530RJ30   | 530RF30   | 530RT30   | 530.000<br>20.8661 | 780.000<br>30.7087  | 185.000<br>7.2835 | 5.0<br>0.20                                    | 578<br>22.8  | 730<br>28.8  | 10600<br>2360000                           | 5100<br>1140000                | 0.320                                        | 260                       | 280                              | 321.7<br>709.2    |
| 210RIU728                | 210RIN728 | 210RIJ728 | 210RIF728 | 210RIT728 | 533.400<br>21.0000 | 787.400<br>31.0000  | 161.920<br>6.3750 | 6.0<br>0.24                                    | 579<br>22.8  | 742<br>29.2  | 8500<br>1900000                            | 4300<br>965000                 | 0.302                                        | 280                       | 300                              | 288.5<br>636.0    |
| 220RIU744                | 220RIN744 | 220RIJ744 | 220RIF744 | 220RIT744 | 558.800<br>22.0000 | 711.200<br>28.0000  | 111.120<br>4.3750 | 5.0<br>0.20                                    | 587<br>23.1  | 683<br>26.9  | 5700<br>1290000                            | 2450<br>550000                 | 0.292                                        | 300                       | 330                              | 112.2<br>247.3    |
| 560RU30                  | 560RN30   | 560RJ30   | 560RF30   | 560RT30   | 560.000<br>22.0472 | 820.000<br>32.2835  | 195.000<br>7.6772 | 5.0<br>0.20                                    | 607<br>23.9  | 773<br>30.4  | 11400<br>2550000                           | 5500<br>1250000                | 0.324                                        | 250                       | 270                              | 369.7<br>815.0    |
| 600RU30                  | 600RN30   | 600RJ30   | 600RF30   | 600RT30   | 600.000<br>23.6220 | 870.000<br>34.2520  | 200.000<br>7.8740 | 5.0<br>0.20                                    | 650<br>25.6  | 820<br>32.3  | 12500<br>2800000                           | 6000<br>1340000                | 0.341                                        | 230                       | 240                              | 420.3<br>926.7    |
| 260RIU802                | 260RIN802 | 260RIJ802 | 260RIF802 | 260RIT802 | 660.400<br>26.0000 | 958.850<br>37.7500  | 127.000<br>5.0000 | 6.0<br>0.24                                    | 716<br>28.2  | 903<br>35.6  | 7200<br>1630000                            | 4000<br>900000                 |                                              | 230                       | 260                              | 326.6<br>720.1    |
| 275RIU808                | 275RIN808 | 275RIJ808 | 275RIF808 | 275RIT808 | 698.500<br>27.5000 | 1016.000<br>40.0000 | 133.350<br>5.2500 | 6.0<br>0.24                                    | 757<br>29.8  | 957<br>37.7  | 8300<br>1860000                            | 4550<br>1040000                | 0.325                                        | 210                       | 230                              | 385.7<br>850.3    |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

B

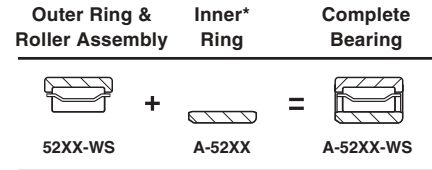
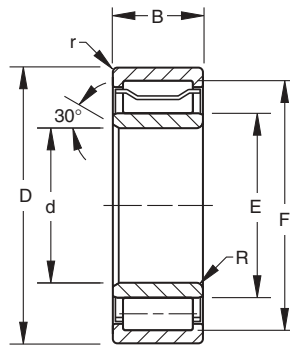




# ROLLER BEARINGS

## 5200, A5200 METRIC SERIES

- Ring tolerances are found on page B348.
- Life and load calculations are found in the engineering section of this catalog.
- Shaft and housing fits, tolerances and shaft diameters are found on pages B347 and B348.



\* Inner ring can be ordered separately

### IN THE BEARING NUMBER

**W** = double ribbed outer ring.

**S** = stamped steel land-riding cage.

**M** = machined brass land-riding cage.

| Bearing Number | d             |                | B Width           | Max. Fillet Radius |             | Backing Diameter |             | Load Ratings                      |                        | Lubrication Factor<br>C <sub>g</sub> | Reference Speed<br>Grease<br>RPM | Thermal Rating<br>Oil<br>RPM | Weight<br>kg<br>lbs. |
|----------------|---------------|----------------|-------------------|--------------------|-------------|------------------|-------------|-----------------------------------|------------------------|--------------------------------------|----------------------------------|------------------------------|----------------------|
|                | Bore          | O.D.           |                   | R Shaft            | r Housing   | Shaft E          | Housing F   | Static Load Rating C <sub>0</sub> | Dynamic Load Ratings C |                                      |                                  |                              |                      |
|                | mm in.        | mm in.         |                   | mm in.             | mm in.      | mm in.           | mm in.      | kN lbs.                           | kN lbs.                |                                      |                                  |                              |                      |
| A-5220-WS      | 100<br>3.9370 | 180<br>7.0866  | 60.325<br>2.3750  | 4.0<br>0.16        | 2.0<br>0.08 | 118<br>4.6       | 167<br>6.6  | 489<br>110000                     | 387<br>87000           | 0.112                                | 2600                             | 3100                         | 7.2<br>15.9          |
| A-5222-WS      | 110<br>4.3307 | 200<br>7.8740  | 69.850<br>2.7500  | 4.0<br>0.16        | 2.0<br>0.08 | 130<br>5.1       | 186<br>7.3  | 645<br>145000                     | 498<br>112000          | 0.124                                | 2300                             | 2700                         | 10.4<br>22.9         |
| A-5224-WS      | 120<br>4.7244 | 215<br>8.4646  | 76.200<br>3.0000  | 4.8<br>0.19        | 2.0<br>0.08 | 144<br>5.7       | 197<br>7.8  | 774<br>174000                     | 574<br>129000          | 0.134                                | 2100                             | 2400                         | 13.0<br>28.6         |
| A-5226-WS      | 130<br>5.1181 | 230<br>9.0551  | 79.375<br>3.1250  | 4.8<br>0.19        | 2.5<br>0.10 | 148<br>5.8       | 213<br>8.4  | 867<br>195000                     | 645<br>145000          | 0.140                                | 1900                             | 2200                         | 15.2<br>33.6         |
| A-5228-WS      | 140<br>5.5118 | 250<br>9.8425  | 82.550<br>3.2500  | 4.8<br>0.19        | 2.5<br>0.10 | 165<br>6.5       | 232<br>9.1  | 992<br>223000                     | 730<br>164000          | 0.148                                | 1700                             | 1900                         | 18.9<br>41.7         |
| A-5230-WS      | 150<br>5.9055 | 270<br>10.6299 | 88.900<br>3.5000  | 6.4<br>0.25        | 2.5<br>0.10 | 179<br>7.0       | 252<br>9.9  | 1190<br>268000                    | 872<br>196000          | 0.132                                | 1500                             | 1700                         | 23.9<br>52.8         |
| A-5232-WS      | 160<br>6.2992 | 290<br>11.4173 | 98.425<br>3.8750  | 6.4<br>0.25        | 2.5<br>0.10 | 190<br>7.5       | 268<br>10.6 | 1410<br>318000                    | 1020<br>229000         | 0.141                                | 1400                             | 1600                         | 30.8<br>67.8         |
| A-5234-WS      | 170<br>6.6929 | 310<br>12.2047 | 104.775<br>4.1250 | 6.4<br>0.25        | 3.0<br>0.12 | 202<br>7.9       | 286<br>11.2 | 1610<br>361000                    | 1130<br>255000         | 0.148                                | 1300                             | 1400                         | 37.6<br>82.9         |
| A-5236-WS      | 180<br>7.0866 | 320<br>12.5984 | 107.950<br>4.2500 | 6.4<br>0.25        | 3.0<br>0.12 | 211<br>8.3       | 298<br>11.7 | 1740<br>392000                    | 1220<br>274000         | 0.153                                | 1200                             | 1300                         | 40.4<br>89.0         |
| A-5238-WS      | 190<br>7.4803 | 340<br>13.3858 | 114.300<br>4.5000 | 7.9<br>0.31        | 3.0<br>0.12 | 224<br>8.8       | 313<br>12.3 | 1940<br>437000                    | 1350<br>304000         | 0.160                                | 1100                             | 1200                         | 48.5<br>107.0        |
| A-5240-WS      | 200<br>7.8740 | 360<br>14.1732 | 120.650<br>4.7500 | 7.9<br>0.31        | 3.0<br>0.12 | 235<br>9.2       | 325<br>12.8 | 1810<br>406000                    | 1230<br>277000         | 0.165                                | 1100                             | 1300                         | 57.6<br>127.0        |
| A-5244-WM      | 220<br>8.6614 | 400<br>15.7480 | 133.350<br>5.2500 | 9.5<br>0.38        | 3.0<br>0.12 | 260<br>10.2      | 367<br>14.4 | 2740<br>615000                    | 1850<br>416000         | 0.182                                | 880                              | 980                          | 76.4<br>175.0        |
| A-5248-WM      | 240<br>9.4488 | 440<br>17.3228 | 146.050<br>5.7500 | 9.5<br>0.38        | 3.0<br>0.12 | 285<br>11.2      | 402<br>15.8 | 3270<br>736000                    | 2210<br>497000         | 0.195                                | 780                              | 860                          | 106.1<br>234.0       |



## 5200, A5200 METRIC SERIES SHAFT AND HOUSING FITS AND TOLERANCES

### SHAFT FITS<sup>(1)</sup>

All tolerances shown in ten thousandth (.0001") and micrometers (µm).

| Bearing O.D.  |               | Bore Tolerance | Press fit Rotating Inner Ring |            |            |             | Slip Fit Stationary Inner Ring |         |            |            |
|---------------|---------------|----------------|-------------------------------|------------|------------|-------------|--------------------------------|---------|------------|------------|
| Over          | Incl.         |                | Shaft Diameter                |            | Fit        |             | Shaft Diameter                 |         | Fit        |            |
| mm in.        | mm in.        | +0             | min.                          | max.       | mm in.     | mm in.      | min.                           | max.    | mm in.     | mm in.     |
| 80<br>3.1496  | 120<br>4.7236 | -20<br>-8      | +25<br>+10                    | +48<br>+19 | 25T<br>10T | 69T<br>27T  | -23<br>-9                      | 0<br>0  | 23L<br>9L  | 20T<br>8T  |
| 120<br>4.7236 | 140<br>5.5108 | -25<br>-10     | +30<br>+12                    | +56<br>+22 | 30T<br>12T | 81T<br>32T  | -25<br>-10                     | 0<br>0  | 25L<br>10L | 25T<br>10T |
| 140<br>5.5108 | 180<br>7.0856 | -25<br>-10     | +46<br>+18                    | +71<br>+28 | 46T<br>18T | 97T<br>38T  | -25<br>-10                     | 10<br>0 | 25L<br>10L | 25T<br>10T |
| 180<br>7.0856 | 240<br>9.4476 | -30<br>-12     | +51<br>+20                    | +81<br>+32 | 51T<br>20T | 112T<br>44T | -30<br>-12                     | 0<br>0  | 30L<br>12L | 30T<br>12T |

<sup>(1)</sup> When shaft is used as race surface, hardness to be Rc58 minimum and surface finish to be 15 RMS.

### HOUSING FITS

All tolerances shown in ten thousandth (.0001") and micrometers (µm).

| Bearing O.D.   |                | O.D. Tolerance Inner Ring | Press fit Rotating Inner Ring |            |           |            | Slip Fit Stationary Inner Ring |            |            |           |
|----------------|----------------|---------------------------|-------------------------------|------------|-----------|------------|--------------------------------|------------|------------|-----------|
| Over           | Incl.          |                           | Housing Diameter              |            | Fit       |            | Housing Diameter               |            | Fit        |           |
| mm in.         | mm in.         | +0                        | min.                          | max.       | mm in.    | mm in.     | min.                           | max.       | mm in.     | mm in.    |
| -              | 180<br>7.0866  | -25<br>-10                | -15<br>-6                     | +22<br>+8  | 15T<br>6T | 46L<br>18L | -56<br>-22                     | -25<br>-10 | 56T<br>22T | 0L<br>0L  |
| 180<br>7.0866  | 200<br>7.8740  | -30<br>-12                | -18<br>-7                     | +18<br>+7  | 18T<br>7T | 48L<br>19L | -66<br>-26                     | -30<br>-12 | 66T<br>26T | 0L<br>0L  |
| 200<br>7.874   | 230<br>9.0551  | -30<br>-12                | -18<br>-7                     | +23<br>+9  | 18T<br>7T | 53L<br>21L | -66<br>-26                     | -30<br>-12 | 66T<br>26T | 0L<br>0L  |
| 230<br>9.0551  | 250<br>9.8425  | -30<br>-12                | -18<br>-7                     | +28<br>+11 | 18T<br>7T | 58L<br>23L | -66<br>-12                     | -30<br>-12 | 66T<br>26T | 0L<br>0L  |
| 250<br>9.8425  | 270<br>10.6299 | -36<br>-14                | -18<br>-7                     | +28<br>+11 | 18T<br>7T | 64L<br>25L | -71<br>-28                     | -30<br>-12 | 71T<br>28T | 5L<br>2L  |
| 270<br>10.6299 | 310<br>12.2047 | -36<br>-14                | -18<br>-7                     | +33<br>+13 | 18T<br>7T | 69L<br>27L | -71<br>-28                     | -36<br>-14 | 71T<br>28T | 5L<br>2L  |
| 310<br>12.2047 | 400<br>15.7480 | -41<br>-16                | -18<br>-7                     | +38<br>+15 | 18T<br>7T | 79L<br>31L | -76<br>-30                     | -36<br>-14 | 79T<br>30T | 5L<br>2L  |
| 400<br>15.748  | 440<br>17.3228 | -46<br>-18                | -23<br>-9                     | +41<br>+16 | 23T<br>9T | 86L<br>34L | -86<br>-14                     | -36<br>-34 | 86T<br>34T | 10L<br>4L |



# ROLLER BEARINGS

## 5200, A5200 METRIC SERIES SHAFT AND HOUSING FITS AND TOLERANCES - continued

### RADIAL INTERNAL CLEARANCE (R6)

| Bearing Bore |        | Radial Internal Clearance |        |
|--------------|--------|---------------------------|--------|
| Over         | Incl.  | min.                      | max.   |
| mm in.       | mm in. | mm in.                    | mm in. |
| -            | 100    | 0.127                     | 0.183  |
| -            | 3.937  | 0.005                     | 0.0072 |
| 100          | 120    | 0.127                     | 0.188  |
| 3.937        | 4.7244 | 0.005                     | 0.0074 |
| 120          | 140    | 0.142                     | 0.208  |
| 4.7244       | 5.5118 | 0.0056                    | 0.0082 |
| 140          | 170    | 0.152                     | 0.224  |
| 5.5118       | 6.6929 | 0.006                     | 0.0088 |
| 170          | 180    | 0.152                     | 0.229  |
| 6.6929       | 7.0866 | 0.006                     | 0.009  |
| 180          | 220    | 0.173                     | 0.254  |
| 7.0866       | 8.6614 | 0.0068                    | 0.01   |
| 220          | 240    | 0.183                     | 0.269  |
| 8.6614       | 9.4488 | 0.0072                    | 0.0106 |

### INNER RING TOLERANCES

All tolerances shown in ten thousandth (.0001") and micrometers (µm).

| Bearing Bore |        | Bore & Inner O.D. | Width  |
|--------------|--------|-------------------|--------|
| Over         | Incl.  | +0                | +0     |
| mm in.       | mm in. | mm in.            | mm in. |
| 80           | 120    | -20               | -203   |
| 3.1496       | 4.7244 | -8                | -80    |
| 120          | 180    | -25               | -254   |
| 4.7244       | 7.0866 | -10               | -100   |
| 180          | 250    | -30               | -305   |
| 7.0866       | 9.8425 | -12               | -120   |

### OUTER RING TOLERANCES

All tolerances shown in ten thousandth (.0001") and micrometers (µm).

| Bearing O.D. |         | O.D.   | Diameter Under Rollers |
|--------------|---------|--------|------------------------|
| Over         | Incl.   | +0     | -0                     |
| mm in.       | mm in.  | mm in. | mm in.                 |
| 150          | 180     | -25    | +36                    |
| 5.9055       | 7.0866  | -10    | +14                    |
| 180          | 250     | -30    | +41                    |
| 7.0866       | 9.8425  | -12    | +16                    |
| 250          | 315     | -36    | +46                    |
| 9.8425       | 12.4016 | -14    | +18                    |
| 315          | 400     | -41    | +51                    |
| 12.4016      | 15.748  | -16    | +20                    |
| 400          | 500     | -46    | +56                    |
| 15.748       | 19.685  | -18    | +22                    |

### SHAFT DIMENSIONS - 5200 BEARINGS WITHOUT INNER RING

| Bearing Number | Slip Fit Housing*  |                    | Press Fit Housing* |                   |
|----------------|--------------------|--------------------|--------------------|-------------------|
|                | max.               | min.               | max.               | min.              |
|                | mm in.             | mm in.             | mm in.             | mm in.            |
| 5220 WS        | 121.064<br>4.7663  | 121.044<br>4.7655  | 121.036<br>4.7652  | 121.016<br>4.7644 |
| 5222 WS        | 133.007<br>5.2365  | 132.987<br>5.2357  | 132.969<br>5.235   | 132.949<br>5.2343 |
| 5224 WS        | 145.194<br>5.7163  | 145.174<br>5.7155  | 145.156<br>5.7148  | 145.136<br>5.714  |
| 5226 WS        | 155.042<br>6.104   | 155.016<br>6.103   | 155.004<br>6.1025  | 154.978<br>6.1015 |
| 5228 WS        | 168.529<br>6.635   | 168.504<br>6.634   | 168.491<br>6.6335  | 168.466<br>6.6325 |
| 5230 WS        | 181.623<br>7.1505  | 181.597<br>7.1495  | 181.587<br>7.149   | 181.559<br>7.148  |
| 5232 WS        | 193.713<br>7.6265  | 193.688<br>7.6255  | 193.675<br>7.625   | 193.65<br>7.624   |
| 5234 WS        | 205.562<br>8.093   | 205.537<br>8.092   | 205.524<br>8.0915  | 205.499<br>8.0905 |
| 5236 WS        | 216.37<br>8.5185   | 216.344<br>8.5175  | 216.319<br>8.5165  | 216.294<br>8.5155 |
| 5238 WS        | 229.032<br>9.017   | 229.001<br>9.0158  | 228.994<br>9.0155  | 228.963<br>9.0143 |
| 5240 WS        | 242.296<br>9.5392  | 242.265<br>9.538   | 242.245<br>9.5372  | 242.214<br>9.536  |
| 5244 WM        | 266.02<br>10.4725  | 265.971<br>10.4713 | 265.951<br>10.4705 | 265.92<br>10.4693 |
| 5248WM         | 291.292<br>11.4682 | 291.262<br>11.467  | 291.241<br>11.4662 | 291.211<br>11.465 |

\*All shaft diameters are based on a housing bore to housing O.D. ratio of 0.7.

**NCF/NU**

- Single-row, full-complement cylindrical roller bearings.
- Features include integral flanges on the inner and outer rings.
- Can manage axial loads in one direction and permit small axial displacements.



| Bearing Number | d Bore | D O.D. | B Width | r Fillet Rad. (max.) | Backing Diameter |        | Load Ratings                              |                                | Lubrication Factor | Reference Speed | Thermal Ratings | Weight  |
|----------------|--------|--------|---------|----------------------|------------------|--------|-------------------------------------------|--------------------------------|--------------------|-----------------|-----------------|---------|
|                | mm in. | mm in. | mm in.  | mm in.               | mm in.           | mm in. | Static Load Rating C <sub>0</sub> kN lbs. | Dynamic Load Ratings C kN lbs. | C <sub>g</sub>     | Grease RPM      | Oil RPM         | kg lbs. |

**NCF**

|            |                |                |              |             |             |             |                |                |       |     |     |               |
|------------|----------------|----------------|--------------|-------------|-------------|-------------|----------------|----------------|-------|-----|-----|---------------|
| NCF1840V   | 200<br>7.8740  | 250<br>9.8425  | 24<br>0.9449 | 1.5<br>0.06 | 207<br>8.1  | 243<br>9.6  | 343<br>77200   | 193<br>43300   | 0.112 | 610 | 740 | 2.5<br>5.5    |
| NCF1844V   | 220<br>8.6614  | 270<br>10.6299 | 24<br>0.9449 | 1.5<br>0.06 | 227<br>8.9  | 263<br>10.4 | 377<br>84800   | 202<br>45400   | 0.119 | 550 | 670 | 2.9<br>6.4    |
| NCF2944V   | 220<br>8.6614  | 300<br>11.8110 | 48<br>1.8898 | 2.1<br>0.08 | 230<br>9.1  | 290<br>11.4 | 1010<br>226000 | 575<br>129000  | 0.144 | 560 | 660 | 10.9<br>24.0  |
| NCF1852V   | 260<br>10.2362 | 320<br>12.5984 | 28<br>1.1024 | 2.0<br>0.08 | 269<br>10.6 | 311<br>12.3 | 561<br>126000  | 297<br>66700   | 0.138 | 480 | 580 | 4.8<br>10.6   |
| NCF1864V   | 320<br>12.5984 | 400<br>15.7480 | 38<br>1.4961 | 2.1<br>0.08 | 330<br>13.0 | 390<br>15.3 | 912<br>205000  | 479<br>108000  | 0.164 | 380 | 460 | 10.6<br>23.4  |
| NCF2964V   | 320<br>12.5984 | 440<br>17.3228 | 72<br>2.8346 | 2.5<br>0.10 | 332<br>13.1 | 428<br>16.8 | 2380<br>536000 | 1300<br>293000 | 0.197 | 340 | 400 | 32.9<br>72.5  |
| NCF1876V   | 380<br>14.9606 | 480<br>18.8976 | 46<br>1.8110 | 2.1<br>0.08 | 390<br>15.4 | 470<br>18.5 | 1360<br>307000 | 708<br>159000  | 0.190 | 310 | 370 | 19.1<br>42.1  |
| NCF2976V   | 380<br>14.9606 | 520<br>20.4724 | 82<br>3.2283 | 3.0<br>0.12 | 395<br>15.5 | 505<br>19.9 | 3380<br>759000 | 1800<br>405000 | 0.226 | 270 | 310 | 52.9<br>116.6 |
| NCF1880V   | 400<br>15.7480 | 500<br>19.6850 | 46<br>1.8110 | 2.1<br>0.08 | 410<br>16.1 | 490<br>19.3 | 1420<br>319000 | 722<br>162000  | 0.195 | 290 | 350 | 20.6<br>45.4  |
| NCF1888V   | 440<br>17.3228 | 540<br>21.2598 | 46<br>1.8110 | 2.1<br>0.08 | 450<br>17.7 | 530<br>20.9 | 1560<br>351000 | 756<br>170000  | 0.208 | 260 | 310 | 22.3<br>49.2  |
| NCF1892V   | 460<br>18.1102 | 580<br>22.8346 | 56<br>2.2047 | 2.5<br>0.10 | 472<br>18.6 | 568<br>22.3 | 2020<br>455000 | 1030<br>232000 | 0.220 | 250 | 290 | 34.2<br>75.4  |
| NCF18/530V | 530<br>20.8661 | 650<br>25.5906 | 56<br>2.2047 | 2.5<br>0.10 | 542<br>21.4 | 638<br>25.1 | 2320<br>521000 | 1100<br>248000 | 0.242 | 210 | 240 | 37.8<br>83.3  |
| NCF18/600V | 600<br>23.6220 | 730<br>28.7402 | 60<br>2.3622 | 2.5<br>0.10 | 612<br>24.1 | 718<br>28.3 | 2610<br>587000 | 1170<br>263000 | 0.264 | 180 | 210 | 50.2<br>110.7 |
| NCF18/630V | 630<br>24.8031 | 780<br>30.7087 | 69<br>2.7165 | 3.0<br>0.12 | 645<br>25.4 | 765<br>30.1 | 3080<br>692000 | 1410<br>316000 | 0.276 | 170 | 200 | 72.2<br>159.2 |
| NCF18/710V | 710<br>27.9528 | 870<br>34.2520 | 74<br>2.9134 | 3.0<br>0.12 | 725<br>28.5 | 855<br>33.7 | 3900<br>876000 | 1740<br>390000 | 0.304 | 150 | 170 | 91.6<br>201.9 |

**NU**

|          |                |                |               |             |             |             |                 |                |       |      |      |                |
|----------|----------------|----------------|---------------|-------------|-------------|-------------|-----------------|----------------|-------|------|------|----------------|
| NU1036MA | 180<br>7.0866  | 280<br>11.0236 | 46<br>1.8110  | 2.1<br>0.08 | 190<br>7.5  | 270<br>10.6 | 505<br>113000   | 391<br>88000   | 0.111 | 2100 | 2600 | 10.7<br>23.6   |
| NU1040MA | 200<br>7.8740  | 310<br>12.2047 | 51<br>2.0079  | 2.1<br>0.08 | 210<br>8.3  | 300<br>11.8 | 602<br>135000   | 445<br>100000  | 0.120 | 1900 | 2300 | 14.6<br>32.2   |
| NU1052MA | 260<br>10.2362 | 400<br>15.7480 | 65<br>2.5591  | 3.0<br>0.12 | 275<br>10.8 | 385<br>15.2 | 1030<br>232000  | 737<br>166000  | 0.148 | 1400 | 1700 | 30.0<br>66.1   |
| NU1056MA | 280<br>11.0236 | 420<br>16.5354 | 65<br>2.5591  | 3.0<br>0.12 | 295<br>11.6 | 405<br>16.0 | 1080<br>243000  | 754<br>169000  | 0.154 | 1300 | 1600 | 31.9<br>70.3   |
| NU1060MA | 300<br>11.8110 | 460<br>18.1102 | 74<br>2.9134  | 3.0<br>0.12 | 315<br>12.4 | 445<br>17.5 | 1420<br>319000  | 1000<br>225000 | 0.167 | 1200 | 1400 | 45.7<br>100.8  |
| NU1064MA | 320<br>12.5984 | 480<br>18.8976 | 74<br>2.9134  | 3.0<br>0.12 | 335<br>13.2 | 465<br>18.3 | 1490<br>335000  | 1020<br>230000 | 0.173 | 1100 | 1300 | 48.1<br>106.0  |
| NU1068MA | 340<br>13.3858 | 520<br>20.4724 | 82<br>3.2283  | 4.0<br>0.16 | 358<br>14.1 | 502<br>19.8 | 1800<br>404000  | 1240<br>279000 | 0.184 | 1000 | 1200 | 64.2<br>141.5  |
| NU1080MA | 400<br>15.7480 | 600<br>23.6220 | 90<br>3.5433  | 4.0<br>0.16 | 418<br>16.5 | 582<br>22.9 | 2340<br>525000  | 1560<br>350000 | 0.206 | 830  | 970  | 91.9<br>202.6  |
| NU10/600 | 600<br>23.6220 | 870<br>34.2520 | 118<br>4.6457 | 5.0<br>0.20 | 651<br>25.6 | 807<br>31.8 | 5030<br>1130000 | 3080<br>692000 | 0.283 | 490  | 560  | 239.6<br>528.2 |



## **ROLLER BEARINGS**



### **NOTES**

**B**





## SPHERICAL ROLLER BEARINGS

**Overview:** Timken spherical roller bearings feature all of the characteristics that have made Timken renowned – superior design, reliable performance and comprehensive technical support. Spherical roller bearings are designed to manage high radial loads and perform consistently, even when misalignment, marginal lubrication, contamination, extreme speeds and critical application stresses are present.

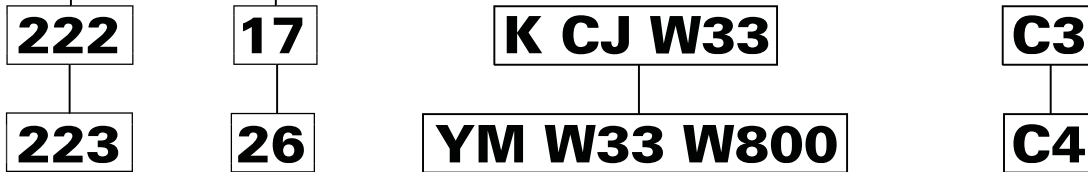
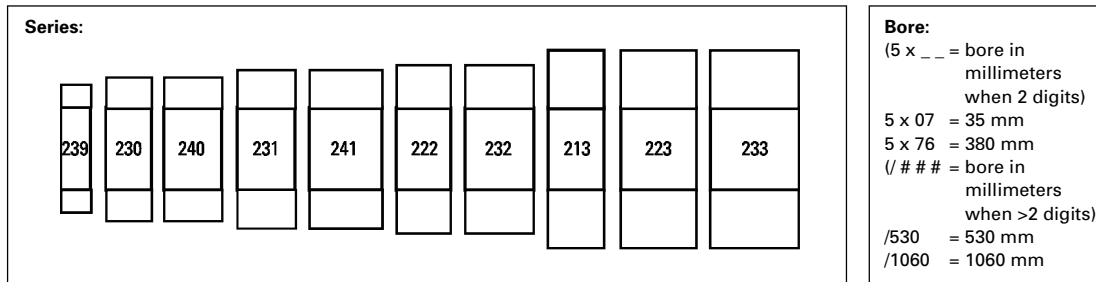
- **Sizes:** Bore sizes of 25 mm and larger.
- **Markets:** Pulp and paper, power generation, oil field, mining and aggregate processing, wind turbines, gear drives and rolling mills.
- **Features:** Large bores for integration into heavy-duty industrial applications.
- **Benefits:** High load capacity under misalignment conditions from shaft deflections or housing misalignment.



B



## Spherical Roller Bearings



**Modification and style codes:**

- K** = tapered bore
- CJ** = 2 piece steel cage - window type
- VJ** = 2 piece steel cage - finger type
- YM** = 1 piece brass cage - finger type
- YMB** = 1 piece brass, finger type, land piloted
- YMD** = 2 piece brass, finger type, land piloted
- W33** = 3 holes and groove in O.D.
- W800** = shaker screen modification:
  - tighter bore diameter and O.D. tolerances
  - brass cage
  - RIC in upper 2/3 of clearance specified
- W47** = inner ring with oversize bore

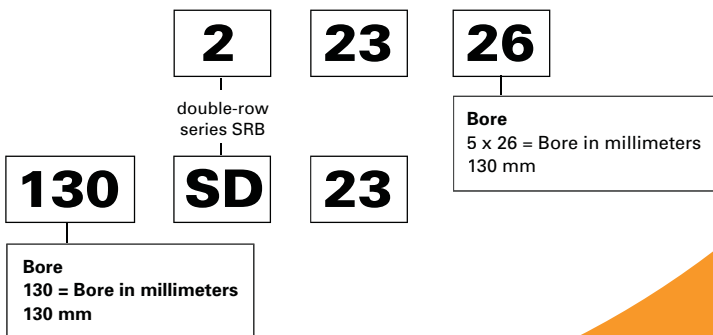
**Internal Clearance:**

- C2** less than C0
- C0** normal
- C3** greater than C0
- C4** greater than C3
- C5** greater than C4
- C6** special clearance



**Current Industry Standard:**  
22326

**Old ABMA Part Number:**  
130SD23



# ***Spherical Roller Bearings***

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| <b>Bearing Types . . . . .</b>                                     | <b>B354</b> |
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## ROLLER BEARINGS

### INTRODUCTION

The Timken self-aligning spherical roller bearing is a combination radial and thrust bearing, designed to operate even if shaft and housing are, or become, misaligned under load. This high-capacity bearing is the favored choice when conditions include heavy loads, plus difficulties in establishing or maintaining housing alignment, or when shaft deflection can be expected.

Shaft deflections and housing distortions caused by shock or heavy loads, which lead to misalignment, are compensated for by the internal self-alignment of the bearing elements during operation. Edge loading of rollers, a condition that limits service life on other types of bearings, does not develop in spherical roller bearings. Optimum bearing capacity can often be realized with up to  $\pm 1\frac{1}{2}$  degrees of misalignment, depending on the size and series of bearing selected.

The inherent compensation for misalignment provided by the spherical roller bearing offers the designer the opportunity to use weldments for housing frames instead of complex castings, eliminating high-cost machining operations. Even when castings may be preferred, bore alignment is less critical if spherical roller bearings are specified. Unit design and construction also make the spherical roller bearing convenient to handle during installation or maintenance.

Several types of radial spherical roller bearings include CJ, YM, YMB, YMD, and VCSJ types.

Bearings are made to RBEC-1 tolerances. Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.

### BEARING TYPES



CJ



YM



Tapered Bore with Adapter Sleeve

#### YM

- Higher load ratings for longer life.
- Incorporates advanced features and precision-machined roller-riding one piece brass cage.
- Suited for severe conditions of use.

#### YMB

- Higher load ratings for longer life.
- Incorporates advanced features and precision-machined, land-riding one piece brass cage.
- Suited for use in severe conditions.

#### YMD

- Incorporates advanced features and offers higher load ratings for longer life.
- Precision-machined, land-riding and two-pieced brass cages.
- Suited for use in severe conditions.

#### CJ

- High load ratings for longer life.
- Incorporates stamped steel window type cage for a broad range of applications.
- Utilize advanced features.

#### VCSJ

- Compact design for general use.
- Stamped steel finger type cage.

### TAPERED BORE BEARINGS WITH ADAPTER SLEEVES

- SNW adapter assemblies consist of a sleeve and locknut. Lockwashers are available for shaft mounting of tapered bore "K" bearings.
- Description of shaft mounting techniques for tapered bore bearings with adapter sleeves are found on page B380.

### SHAKER SCREEN EQUIPMENT

- Vibrating equipment commonly found in the aggregate industry is one of the most demanding applications for spherical roller bearings.
- Timken manufactures spherical roller bearings suited for high rotational speeds, high radial and impact loads, fluctuating and unbalanced loads, misalignment and extreme centrifugal forces in tough environmental conditions.
- The design allows for static and dynamic misalignment in the application while maintaining the bearing's full dynamic capacity. This achieves maximum expected service life.
- Standards and special modification codes are available for shaft (s4 or m6) and housing (P6 or H7) fits as in the engineering section.

TIMKEN SPHERICAL ROLLER BEARING MODIFICATIONS

| TKN                                                                                           | SKF                    | FAG           | TIMKEN GENERAL DEFINITION                                                                                       |
|-----------------------------------------------------------------------------------------------|------------------------|---------------|-----------------------------------------------------------------------------------------------------------------|
| Other modifications available, contact your local Timken representative for more information. |                        |               |                                                                                                                 |
| CJ                                                                                            | CJ, CC                 | J             | Spherical with stamped steel cage                                                                               |
| YM                                                                                            | M2                     | M             | One-piece roller riding machined brass cage                                                                     |
| YMB                                                                                           | MC                     | MB            | One-piece inner ring piloted machined brass cage                                                                |
| C02                                                                                           | C02                    | T52BE         | Inner ring with P5 running accuracy, W4 (SKF does not include W4)                                               |
| C02 C3                                                                                        | C023                   | C3, T52BE     | Inner ring with P5 running accuracy, C3 RIC                                                                     |
| C02 C4                                                                                        | C024                   | C4, T52BE     | Inner ring with P5 running accuracy, C4 RIC                                                                     |
| C04                                                                                           | C04                    | T52BN         | Outer ring with P5 running accuracy, W4 (SKF does not include W4)                                               |
| C04 C3                                                                                        | C043                   | C3, T52BN     | Outer ring with P5 running accuracy, C3 RIC                                                                     |
| C04 C4                                                                                        | C044                   | C4, T52BN     | Outer ring with P5 running accuracy, C4 RIC                                                                     |
| C08                                                                                           | C08                    | T52BW C02     | P5 running accuracy (C02 and C04)                                                                               |
| C08 C3                                                                                        | C083                   | C3, T52BW     | P5 running accuracy (C02 and C04), C3 RIC                                                                       |
| C08 C4                                                                                        | C084                   | C4, T52BW     | PS running accuracy (C02 and C04), C4 RIC                                                                       |
| C6                                                                                            | C6                     | —             | Special RIC non-specific                                                                                        |
| K                                                                                             | K                      | K             | Tapered bore (1: 12 on diameter 22, 23, 30, 31, 32, 33, 39 series)                                              |
| K                                                                                             | K30                    | K30           | Tapered bore (1: 30 on diameter 40,41,42 series)                                                                |
| W4                                                                                            | W4                     | J26A          | Mark high and low points of eccentricity on face of rings                                                       |
| W6R                                                                                           | —                      | —             | Engineered coating on rollers to combat low lube or abrasive contamination                                      |
| W8                                                                                            | —                      | —             | Rings and rollers TDC® coated                                                                                   |
| W20                                                                                           | W20                    | SY            | Outer ring with standard lubrication holes                                                                      |
| W22                                                                                           | W22                    | 700855        | Special reduced O.D. tolerance on outer rings                                                                   |
| W25                                                                                           | W73                    | —             | Outer ring with counter drilled lubrication hole                                                                |
| W31                                                                                           | W31                    | —             | Bearing inspected to certain quality control requirements                                                       |
| W33                                                                                           | W33                    | S             | Standard lubrication holes and groove in outer ring (FAG drops S from number for sizes larger than 315 mm O.D.) |
| W33 W4                                                                                        | W503                   | S + J26A      | Timken and FAG drop W33 W4 in conjunction with C08, W507                                                        |
| W33 W22 W31                                                                                   | W512 (W22 + W31 + W33) | S + 700855    | Timken and FAG drop W31 in conjunction with C02, C04, and C08                                                   |
| W33 W94                                                                                       | W513 (W26 + W33)       | S + H40A      | See other component description                                                                                 |
| W37                                                                                           | —                      | —             | Special finish                                                                                                  |
| W40I                                                                                          | ECB (Prefix)           | W209B         | Inner ring only made of carburizing grade steel                                                                 |
| W40R                                                                                          | —                      | —             | Rollers only made of carburizing grade steel                                                                    |
| W45A                                                                                          | W61                    | —             | Tapped lifting holes in face of outer ring to facilitate lifting and handling                                   |
| W84                                                                                           | W77                    | H44S (H40)*   | Outer ring with standard lubrication holes plugged                                                              |
| W88                                                                                           | —                      | —             | Special reduced bore tolerance on inner ring                                                                    |
| W93                                                                                           | —                      | —             | Inner ring with keyway in bore                                                                                  |
| W94                                                                                           | W26                    | H40A          | Inner ring lubrication holes and retainer face grooves SKF and FAG - no retainer face grooves                   |
| W502                                                                                          | W502 (W22 + W33)       | S + 700855    | W22, W33 and W45A (where feasible)                                                                              |
| W507                                                                                          | W507 (W4 + W31 + W33)  | S +           | W31, W33 and W45A (where feasible)                                                                              |
| W509                                                                                          | W509 (W26 + W31 + W33) | S.H40A + ...  | W31, W33, W94 and W45A (where feasible)                                                                         |
| W525                                                                                          | W525 (W31 + W77)       | S.H44S (H40)* | W31, W33, W84 and W45A (where feasible)                                                                         |
| W534                                                                                          | W534 (C08 + W507)      | —             | W507 and C08                                                                                                    |
| W800                                                                                          | VA405                  | T41A          | W22 + W88 + radial internal clearance in upper two-thirds of range specified range (shaker screen modification) |
| W906A                                                                                         | —                      | —             | C02 + C04 + W31 + W33 + W401 + W40R (offered on tapered bore product, supercedes W507A, W534A)                  |

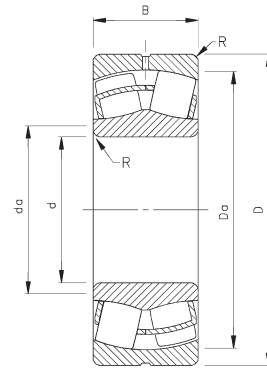
Data in this chart has been compiled to make the information as complete as possible, Timken cannot assume any responsibility for errors, omissions or accuracy of the published data.



# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore       | D O.D.        | B Width        | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                                         |                                        | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|--------------|---------------|----------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |              |               |                |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                                         | Static                                 |                                                                  |                            |                                        |                |                                 |
|                |              |               |                |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.               | e                                             | $\frac{T}{R} \leq \frac{e}{e}$<br>X = 1 | $\frac{T}{R} > \frac{e}{e}$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 22205CJ        | 25<br>0.9843 | 52<br>2.0472  | 18.0<br>0.7087 | 1.0<br>0.04                    | 30<br>1.2            | 47<br>1.9              | 43.0<br>9700                      | 44.0<br>9800          | 0.34                                          | 2.00                                    | 2.98                                   | 1.96                                                             | 0.0384                     | 7700                                   | 9600           | 0.2<br>0.4                      |
| 21305VCSJ      | 25<br>0.9843 | 62<br>2.4409  | 17.0<br>0.6693 | 1.0<br>0.04                    | 33<br>1.3            | 54<br>2.1              | 38.0<br>8400                      | 41.0<br>9200          | 0.29                                          | 2.33                                    | 3.47                                   | 2.28                                                             | 0.0403                     | 7000                                   | 8700           | 0.30<br>0.6                     |
| 22206CJ        | 30<br>1.1811 | 62<br>2.4409  | 20.0<br>0.7874 | 1.0<br>0.04                    | 38<br>1.5            | 56<br>2.2              | 61.0<br>13700                     | 58.0<br>13100         | 0.31                                          | 2.15                                    | 3.20                                   | 2.10                                                             | 0.0435                     | 6600                                   | 8100           | 0.3<br>0.6                      |
| 21306VCSJ      | 30<br>1.1811 | 72<br>2.8346  | 19.0<br>0.7480 | 1.0<br>0.04                    | 39<br>1.5            | 63<br>2.5              | 51.0<br>11300                     | 53.0<br>12000         | 0.28                                          | 2.45                                    | 3.64                                   | 2.39                                                             | 0.0444                     | 6200                                   | 7600           | 0.40<br>0.8                     |
| 22207CJ        | 35<br>1.3780 | 72<br>2.8346  | 23.0<br>0.9055 | 1.0<br>0.04                    | 45<br>1.8            | 65<br>2.6              | 88.0<br>19700                     | 78.0<br>17500         | 0.31                                          | 2.21                                    | 3.29                                   | 2.16                                                             | 0.0484                     | 5900                                   | 7200           | 0.5<br>1.0                      |
| 21307VCSJ      | 35<br>1.3779 | 80<br>3.1496  | 21.0<br>0.8268 | 1.5<br>0.06                    | 44<br>1.7            | 71<br>2.8              | 66.0<br>14800                     | 67.0<br>15000         | 0.27                                          | 2.48                                    | 3.69                                   | 2.42                                                             | 0.0484                     | 5600                                   | 6900           | 0.50<br>1.1                     |
| 22208CJ        | 40<br>1.5748 | 80<br>3.1496  | 23.0<br>0.9055 | 1.0<br>0.04                    | 50<br>2.0            | 72<br>2.9              | 100<br>22400                      | 90.0<br>20100         | 0.27                                          | 2.47                                    | 3.67                                   | 2.41                                                             | 0.0494                     | 5100                                   | 6300           | 0.6<br>1.2                      |
| 22208YM        | 40<br>1.5748 | 80<br>3.1496  | 23.0<br>0.9055 | 1.0<br>0.04                    | 50<br>2.0            | 72<br>2.9              | 93.5<br>21000                     | 85.5<br>19200         | 0.27                                          | 2.47                                    | 3.67                                   | 2.41                                                             | 0.0514                     | 5200                                   | 6400           | 0.6<br>1.2                      |
| 21308VCSJ      | 40<br>1.5748 | 90<br>3.5433  | 23.0<br>0.9055 | 1.5<br>0.06                    | 51<br>2.0            | 81<br>3.2              | 85.0<br>19100                     | 81.0<br>18200         | 0.26                                          | 2.55                                    | 3.80                                   | 2.50                                                             | 0.0529                     | 5100                                   | 6200           | 0.70<br>1.5                     |
| 22308CJ        | 40<br>1.5748 | 90<br>3.5433  | 33.0<br>1.2992 | 1.5<br>0.06                    | 53<br>2.1            | 81<br>3.2              | 148<br>33100                      | 133<br>29800          | 0.36                                          | 1.87                                    | 2.79                                   | 1.83                                                             | 0.0541                     | 4900                                   | 5800           | 1.1<br>2.3                      |
| 22308YM        | 40<br>1.5748 | 90<br>3.5433  | 33.0<br>1.2992 | 1.5<br>0.06                    | 53<br>2.1            | 81<br>3.2              | 148<br>33100                      | 133<br>29800          | 0.36                                          | 1.87                                    | 2.79                                   | 1.83                                                             | 0.0541                     | 4900                                   | 5800           | 1.1<br>2.3                      |
| 22209CJ        | 45<br>1.7717 | 85<br>3.3465  | 23.0<br>0.9055 | 1.0<br>0.04                    | 55<br>2.2            | 77<br>3.0              | 108<br>24200                      | 94.0<br>21100         | 0.26                                          | 2.64                                    | 3.93                                   | 2.58                                                             | 0.0547                     | 4700                                   | 5700           | 0.6<br>1.3                      |
| 22209YM        | 45<br>1.7717 | 85<br>3.3465  | 23.0<br>0.9055 | 1.0<br>0.04                    | 55<br>2.2            | 77<br>3.0              | 101<br>22800                      | 90.0<br>20100         | 0.26                                          | 2.64                                    | 3.93                                   | 2.58                                                             | 0.0547                     | 4700                                   | 5800           | 0.6<br>1.3                      |
| 21309VCSJ      | 45<br>1.7717 | 100<br>3.9370 | 25.0<br>0.9843 | 1.5<br>0.06                    | 57<br>2.2            | 91<br>3.6              | 106<br>23900                      | 100<br>22500          | 0.26                                          | 2.64                                    | 3.93                                   | 2.58                                                             | 0.0567                     | 4600                                   | 5700           | 0.90<br>2                       |
| 22309CJ        | 45<br>1.7717 | 100<br>3.9370 | 36.0<br>1.4173 | 1.5<br>0.06                    | 58<br>2.3            | 90<br>3.5              | 182<br>40800                      | 162<br>36400          | 0.36                                          | 1.90                                    | 2.83                                   | 1.86                                                             | 0.0565                     | 4500                                   | 5300           | 1.4<br>3.1                      |
| 22309YM        | 45<br>1.7717 | 100<br>3.9370 | 36.0<br>1.4173 | 1.5<br>0.06                    | 58<br>2.3            | 90<br>3.5              | 182<br>40800                      | 162<br>36400          | 0.36                                          | 1.90                                    | 2.83                                   | 1.86                                                             | 0.0579                     | 4500                                   | 5300           | 1.4<br>3.1                      |
| 22210CJ        | 50<br>1.9685 | 90<br>3.5433  | 23.0<br>0.9055 | 1.0<br>0.04                    | 59<br>2.3            | 82<br>3.2              | 118<br>26000                      | 101<br>22600          | 0.24                                          | 2.84                                    | 4.23                                   | 2.78                                                             | 0.0575                     | 4300                                   | 5200           | 0.6<br>1.4                      |
| 22210YM        | 50<br>1.9685 | 90<br>3.5433  | 23.0<br>0.9055 | 1.0<br>0.04                    | 59<br>2.3            | 82<br>3.2              | 112<br>25100                      | 96.5<br>21700         | 0.24                                          | 2.84                                    | 4.23                                   | 2.78                                                             | 0.0575                     | 4300                                   | 5300           | 0.6<br>1.4                      |
| 22310CJ        | 50<br>1.9685 | 110<br>4.3307 | 40.0<br>1.5748 | 2.0<br>0.08                    | 64<br>2.5            | 98<br>3.9              | 226<br>51000                      | 197<br>44200          | 0.36                                          | 1.87                                    | 2.79                                   | 1.83                                                             | 0.0422                     | 4200                                   | 4900           | 1.9<br>4.2                      |
| 22310YM        | 50<br>1.9685 | 110<br>4.3307 | 40.0<br>1.5748 | 2.0<br>0.08                    | 64<br>2.5            | 98<br>3.9              | 226<br>51000                      | 197<br>44200          | 0.36                                          | 1.87                                    | 2.79                                   | 1.83                                                             | 0.0422                     | 4200                                   | 4900           | 1.9<br>4.2                      |
| 22211CJ        | 55<br>2.1654 | 100<br>3.9370 | 25.0<br>0.9843 | 1.5<br>0.06                    | 66<br>2.6            | 91<br>3.6              | 142<br>32000                      | 120<br>27000          | 0.23                                          | 2.95                                    | 4.40                                   | 2.89                                                             | 0.0604                     | 4000                                   | 4800           | 0.9<br>1.9                      |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

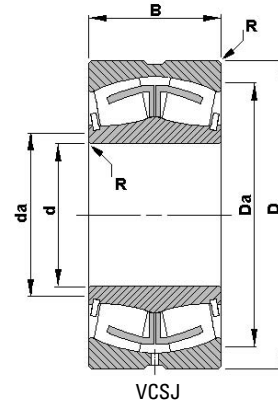
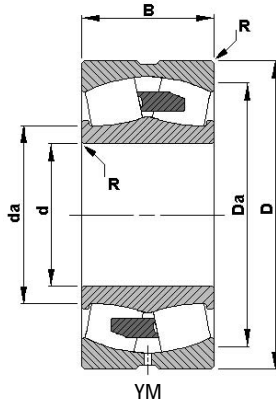
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



| Bearing Number | d<br>Bore    | D<br>O.D.     | B<br>Width     | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                                   |                                                                   | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |             |
|----------------|--------------|---------------|----------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|-----------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|-------------|
|                |              |               |                |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                                   | Static<br>In All<br>Cases<br>X <sub>0</sub> = 1<br>Y <sub>0</sub> |                                                                              |                                     |                                                 |                      |             |
|                |              |               |                |                                      |                         |                           |                                         |                             | $\frac{T}{R} \leq e$<br>X = 1<br>Y            | $\frac{T}{R} > e$<br>X = .67<br>Y |                                                                   |                                                                              |                                     |                                                 |                      |             |
| 22311CJ        | 55<br>2.1654 | 120<br>4.7244 | 43.0<br>1.6929 | 2.0<br>0.08                          | 69<br>2.7               | 107<br>4.2                | 248<br>55800                            | 221<br>49600                | 0.36                                          | 1.87                              | 2.79                                                              | 1.83                                                                         | 0.0446                              | 3900                                            | 4700                 | 2.4<br>5.3  |
| 22311YM        | 55<br>2.1654 | 120<br>4.7244 | 43.0<br>1.6929 | 2.0<br>0.08                          | 69<br>2.7               | 107<br>4.2                | 248<br>55800                            | 221<br>49600                | 0.36                                          | 1.87                              | 2.79                                                              | 1.83                                                                         | 0.0446                              | 3900                                            | 4700                 | 2.4<br>5.3  |
| 21311VCSJ      | 55<br>2.1654 | 120<br>4.7244 | 29.0<br>1.1417 | 2.0<br>0.08                          | 70<br>2.8               | 109<br>4.3                | 158<br>35500                            | 141<br>31700                | 0.24                                          | 2.82                              | 4.20                                                              | 2.76                                                                         | 0.0446                              | 4000                                            | 4800                 | 1.50<br>3.3 |
| 22212CJ        | 60<br>2.3622 | 110<br>4.3307 | 28.0<br>1.1024 | 1.5<br>0.06                          | 72<br>2.8               | 100<br>4.0                | 174<br>39100                            | 146<br>32800                | 0.24                                          | 2.84                              | 4.23                                                              | 2.78                                                                         | 0.0652                              | 3800                                            | 4600                 | 1.2<br>2.6  |
| 22212YM        | 60<br>2.3622 | 110<br>4.3307 | 28.0<br>1.1024 | 1.5<br>0.06                          | 72<br>2.8               | 100<br>4.0                | 164<br>36900                            | 140<br>31400                | 0.24                                          | 2.84                              | 4.23                                                              | 2.78                                                                         | 0.0645                              | 3800                                            | 4700                 | 1.2<br>2.6  |
| 22312CJ        | 60<br>2.3622 | 130<br>5.1181 | 46.0<br>1.8110 | 2.0<br>0.08                          | 75<br>3.0               | 117<br>4.6                | 312<br>70100                            | 269<br>60400                | 0.35                                          | 1.95                              | 2.90                                                              | 1.91                                                                         | 0.0463                              | 3600                                            | 4300                 | 3.0<br>6.6  |
| 22312YM        | 60<br>2.3622 | 130<br>5.1181 | 46.0<br>1.8110 | 2.0<br>0.08                          | 75<br>3.0               | 117<br>4.6                | 312<br>70100                            | 269<br>60400                | 0.35                                          | 1.95                              | 2.90                                                              | 1.91                                                                         | 0.0471                              | 3600                                            | 4300                 | 3.0<br>6.6  |
| 21312VCSJ      | 60<br>2.3622 | 130<br>5.1181 | 31.0<br>1.2205 | 2.0<br>0.08                          | 76<br>3.0               | 118<br>4.7                | 179<br>40200                            | 158<br>35500                | 0.24                                          | 2.81                              | 4.19                                                              | 2.75                                                                         | 0.0467                              | 3700                                            | 4600                 | 1.90<br>4.2 |
| 22213CJ        | 65<br>2.5591 | 120<br>4.7244 | 31.0<br>1.2205 | 1.5<br>0.06                          | 78<br>3.1               | 109<br>4.3                | 217<br>49000                            | 177<br>39800                | 0.24                                          | 2.79                              | 4.15                                                              | 2.73                                                                         | 0.0473                              | 3600                                            | 4400                 | 1.6<br>3.4  |
| 22213YM        | 65<br>2.5591 | 120<br>4.7244 | 31.0<br>1.2205 | 1.5<br>0.06                          | 78<br>3.1               | 109<br>4.3                | 204<br>46000                            | 170<br>38200                | 0.24                                          | 2.79                              | 4.15                                                              | 2.73                                                                         | 0.0468                              | 3600                                            | 4400                 | 1.6<br>3.4  |
| 21313VCSJ      | 65<br>2.5591 | 140<br>5.5118 | 33.0<br>1.2992 | 2.0<br>0.08                          | 82<br>3.2               | 128<br>5.0                | 215<br>48300                            | 189<br>42500                | 0.23                                          | 2.91                              | 4.33                                                              | 2.84                                                                         | 0.0463                              | 3500                                            | 4300                 | 2.40<br>5.3 |
| 22313CJ        | 65<br>2.5591 | 140<br>5.5118 | 48.0<br>1.8898 | 2.0<br>0.08                          | 82<br>3.2               | 126<br>5.0                | 333<br>74900                            | 290<br>65200                | 0.33                                          | 2.06                              | 3.06                                                              | 2.01                                                                         | 0.0455                              | 3400                                            | 4100                 | 3.6<br>8.0  |
| 22313YM        | 65<br>2.5591 | 140<br>5.5118 | 48.0<br>1.8898 | 2.0<br>0.08                          | 82<br>3.2               | 126<br>5.0                | 333<br>74900                            | 290<br>65200                | 0.33                                          | 2.06                              | 3.06                                                              | 2.01                                                                         | 0.0464                              | 3400                                            | 4100                 | 3.6<br>8.0  |
| 22214CJ        | 70<br>2.7559 | 125<br>4.9213 | 31.0<br>1.2205 | 1.5<br>0.06                          | 84<br>3.3               | 115<br>4.5                | 231<br>52000                            | 184<br>41400                | 0.22                                          | 3.01                              | 4.48                                                              | 2.94                                                                         | 0.0464                              | 3400                                            | 4100                 | 1.6<br>3.6  |
| 22314CJ        | 70<br>2.7559 | 150<br>5.9055 | 51.0<br>2.0079 | 2.0<br>0.08                          | 87<br>3.4               | 131<br>5.2                | 385<br>86500                            | 331<br>74300                | 0.34                                          | 2.00                              | 2.98                                                              | 1.96                                                                         | 0.0482                              | 3200                                            | 3800                 | 4.4<br>9.7  |
| 21314VCSJ      | 70<br>2.7559 | 150<br>5.9055 | 35.0<br>1.3780 | 2.0<br>0.08                          | 88<br>3.5               | 138<br>5.4                | 240<br>54000                            | 208<br>46700                | 0.23                                          | 2.90                              | 4.31                                                              | 2.83                                                                         | 0.0480                              | 3300                                            | 4100                 | 2.90<br>6.4 |
| 22314YM        | 70<br>2.7559 | 150<br>5.9055 | 51.0<br>2.0079 | 2.0<br>0.08                          | 87<br>3.4               | 131<br>5.2                | 385<br>86500                            | 331<br>74300                | 0.34                                          | 2.00                              | 2.98                                                              | 1.96                                                                         | 0.0482                              | 3200                                            | 3800                 | 4.4<br>9.7  |
| 22215CJ        | 75<br>2.9528 | 130<br>5.1181 | 31.0<br>1.2205 | 1.5<br>0.06                          | 88<br>3.5               | 120<br>4.7                | 241<br>54100                            | 191<br>42900                | 0.22                                          | 3.14                              | 4.67                                                              | 3.07                                                                         | 0.0477                              | 3200                                            | 3900                 | 1.7<br>3.8  |
| 22315CJ        | 75<br>2.9528 | 160<br>6.2992 | 55.0<br>2.1654 | 2.0<br>0.08                          | 93<br>3.7               | 140<br>5.5                | 456<br>102000                           | 387<br>87100                | 0.34                                          | 2.00                              | 2.98                                                              | 1.96                                                                         | 0.0505                              | 3100                                            | 3600                 | 5.4<br>11.9 |
| 21315VCSJ      | 75<br>2.9528 | 160<br>6.2992 | 37.0<br>1.4567 | 2.0<br>0.08                          | 94<br>3.7               | 148<br>5.8                | 274<br>61600                            | 237<br>53200                | 0.23                                          | 2.94                              | 4.37                                                              | 2.87                                                                         | 0.0502                              | 3200                                            | 3800                 | 3.50<br>7.7 |
| 22315YM        | 75<br>2.9528 | 160<br>6.2992 | 55.0<br>2.1654 | 2.0<br>0.08                          | 93<br>3.7               | 140<br>5.5                | 456<br>102000                           | 387<br>87100                | 0.34                                          | 2.00                              | 2.98                                                              | 1.96                                                                         | 0.0505                              | 3100                                            | 3600                 | 5.4<br>11.9 |

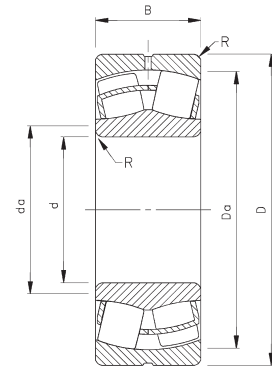
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# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore       | D O.D.        | B Width        | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                              | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|--------------|---------------|----------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-------------------------------|------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |              |               |                |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                               | Static                       |                                                                  |                            |                                        |                |                                 |
|                |              |               |                |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.               | e                                             | $\frac{T}{R} \leq e$<br>X = 1 | $\frac{T}{R} > e$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 22216CJ        | 80<br>3.1496 | 140<br>5.5118 | 33.0<br>1.2992 | 2.0<br>0.08                    | 95<br>3.7            | 129<br>5.1             | 278<br>62500                      | 218<br>49100          | 0.22                                          | 3.14                          | 4.67                         | 3.07                                                             | 0.0499                     | 3000                                   | 3700           | 2.2<br>4.7                      |
| 22216YM        | 80<br>3.1496 | 140<br>5.5118 | 33.0<br>1.2992 | 2.0<br>0.08                    | 95<br>3.7            | 129<br>5.1             | 263<br>59200                      | 210<br>47100          | 0.22                                          | 3.14                          | 4.67                         | 3.07                                                             | 0.0495                     | 3000                                   | 3700           | 2.2<br>4.7                      |
| 21316VCSJ      | 80<br>3.1496 | 170<br>6.6929 | 39.0<br>1.5354 | 2.0<br>0.08                    | 100<br>3.9           | 158<br>6.2             | 305<br>68500                      | 260<br>58400          | 0.23                                          | 2.95                          | 4.40                         | 2.89                                                             | 0.0522                     | 3000                                   | 3700           | 4.10<br>9                       |
| 22316CJ        | 80<br>3.1496 | 170<br>6.6929 | 58.0<br>2.2835 | 2.0<br>0.08                    | 97<br>3.8            | 148<br>5.8             | 510<br>115000                     | 427<br>96100          | 0.34                                          | 2.00                          | 2.98                         | 1.96                                                             | 0.0526                     | 2900                                   | 3500           | 6.4<br>14.2                     |
| 22316YM        | 80<br>3.1496 | 170<br>6.6929 | 58.0<br>2.2835 | 2.0<br>0.08                    | 97<br>3.8            | 148<br>5.8             | 510<br>115000                     | 427<br>96100          | 0.34                                          | 2.00                          | 2.98                         | 1.96                                                             | 0.0526                     | 2900                                   | 3500           | 6.4<br>14.2                     |
| 22217CJ        | 85<br>3.3465 | 150<br>5.9055 | 36.0<br>1.4173 | 2.0<br>0.08                    | 101<br>4.0           | 139<br>5.5             | 320<br>72000                      | 255<br>57200          | 0.22                                          | 3.07                          | 4.57                         | 3.00                                                             | 0.0518                     | 2900                                   | 3500           | 2.7<br>6.0                      |
| 22217YM        | 85<br>3.3465 | 150<br>5.9055 | 36.0<br>1.4173 | 2.0<br>0.08                    | 101<br>4.0           | 139<br>5.5             | 302<br>67900                      | 244<br>54800          | 0.22                                          | 3.07                          | 4.57                         | 3.00                                                             | 0.0513                     | 2900                                   | 3600           | 2.7<br>6.0                      |
| 21317VCSM      | 85<br>3.3465 | 180<br>7.0866 | 41.0<br>1.6142 | 3.0<br>0.12                    | 107<br>4.2           | 166<br>6.5             | 365<br>82000                      | 301<br>67800          | 0.23                                          | 2.99                          | 4.46                         | 2.93                                                             | 0.0547                     | 2900                                   | 3500           | 5.20<br>11.5                    |
| 22317CJ        | 85<br>3.3465 | 180<br>7.0866 | 60.0<br>2.3622 | 2.5<br>0.10                    | 106<br>4.2           | 158<br>6.2             | 591<br>133000                     | 474<br>107000         | 0.32                                          | 2.09                          | 3.11                         | 2.04                                                             | 0.0554                     | 2700                                   | 3200           | 7.5<br>16.4                     |
| 22317YM        | 85<br>3.3465 | 180<br>7.0866 | 60.0<br>2.3622 | 2.5<br>0.10                    | 106<br>4.2           | 158<br>6.2             | 591<br>133000                     | 474<br>107000         | 0.32                                          | 2.09                          | 3.11                         | 2.04                                                             | 0.0554                     | 2700                                   | 3200           | 7.5<br>16.4                     |
| 22218CJ        | 90<br>3.5433 | 160<br>6.2992 | 40.0<br>1.5748 | 2.0<br>0.08                    | 105<br>4.2           | 146<br>5.8             | 388<br>87200                      | 303<br>68100          | 0.23                                          | 2.90                          | 4.31                         | 2.83                                                             | 0.0536                     | 2800                                   | 3400           | 3.5<br>7.6                      |
| 22218YM        | 90<br>3.5433 | 160<br>6.2992 | 40.0<br>1.5748 | 2.0<br>0.08                    | 105<br>4.2           | 146<br>5.8             | 388<br>87200                      | 303<br>68100          | 0.23                                          | 2.90                          | 4.31                         | 2.83                                                             | 0.0536                     | 2800                                   | 3400           | 3.5<br>7.6                      |
| 23218CJ        | 90<br>3.5433 | 160<br>6.2992 | 52.0<br>2.0630 | 2.0<br>0.08                    | 104<br>4.1           | 146<br>5.8             | 504<br>113000                     | 369<br>83000          | 0.30                                          | 2.25                          | 3.34                         | 2.20                                                             | 0.0536                     | 2300                                   | 2700           | 4.5<br>10.0                     |
| 23218YM        | 90<br>3.5433 | 160<br>6.2992 | 52.0<br>2.0630 | 2.0<br>0.08                    | 104<br>4.1           | 146<br>5.8             | 504<br>113000                     | 369<br>83000          | 0.30                                          | 2.25                          | 3.34                         | 2.20                                                             | 0.0536                     | 2300                                   | 2700           | 4.5<br>10.0                     |
| 22318CJ        | 90<br>3.5433 | 190<br>7.4803 | 64.0<br>2.5197 | 2.5<br>0.10                    | 110<br>4.3           | 167<br>6.6             | 642<br>144000                     | 529<br>119000         | 0.35                                          | 1.92                          | 2.86                         | 1.88                                                             | 0.0565                     | 2600                                   | 3000           | 8.8<br>19.4                     |
| 22318YM        | 90<br>3.5433 | 190<br>7.4803 | 64.0<br>2.5197 | 2.5<br>0.10                    | 110<br>4.3           | 167<br>6.6             | 642<br>144000                     | 529<br>119000         | 0.33                                          | 2.06                          | 3.06                         | 2.01                                                             | 0.0565                     | 2600                                   | 3000           | 8.8<br>19.4                     |
| 21318VCSM      | 90<br>3.5433 | 190<br>7.4803 | 43.0<br>1.6929 | 3.0<br>0.12                    | 113<br>4.5           | 176<br>6.9             | 398<br>89500                      | 327<br>73400          | 0.23                                          | 3.00                          | 4.47                         | 2.93                                                             | 0.0567                     | 2800                                   | 3300           | 6.00<br>13.5                    |
| 22319CJ        | 90<br>3.5433 | 190<br>7.4803 | 64.0<br>2.5197 | 2.5<br>0.10                    | 110<br>4.3           | 167<br>6.6             | 642<br>144000                     | 529<br>119000         | 0.33                                          | 2.06                          | 3.06                         | 2.01                                                             | 0.0593                     | 2600                                   | 3000           | 8.8<br>19.4                     |
| 23318YM        | 90<br>3.5433 | 190<br>7.4803 | 73.0<br>2.8740 | 2.5<br>0.10                    | 110<br>4.3           | 167<br>6.6             | 664<br>149000                     | 516<br>116000         | 0.40                                          | 1.70                          | 2.52                         | 1.66                                                             | 0.0555                     | 1900                                   | 2200           | 10.1<br>22.2                    |
| 22219CJ        | 95<br>3.7402 | 170<br>6.6929 | 43.0<br>1.6929 | 2.0<br>0.08                    | 112<br>4.4           | 152<br>6.0             | 383<br>86200                      | 289<br>65000          | 0.25                                          | 2.68                          | 3.99                         | 2.62                                                             | 0.0556                     | 2800                                   | 3400           | 4.2<br>9.3                      |
| 22219YM        | 95<br>3.7402 | 170<br>6.6929 | 43.0<br>1.6929 | 2.0<br>0.08                    | 112<br>4.4           | 152<br>6.0             | 383<br>86200                      | 289<br>65000          | 0.25                                          | 2.68                          | 3.99                         | 2.62                                                             | 0.0558                     | 2800                                   | 3400           | 4.2<br>9.3                      |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

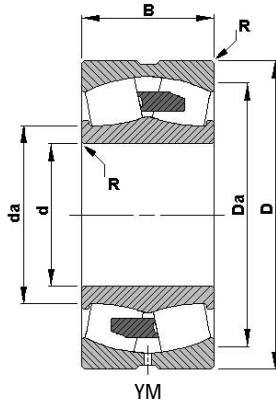
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



B

| Bearing Number | d<br>Bore     | D<br>O.D.     | B<br>Width     | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                                    |        |                                   | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |
|----------------|---------------|---------------|----------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------------|--------|-----------------------------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|
|                |               |               |                |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                                    | Static |                                   |                                                                              |                                     |                                                 |                      |
|                |               |               |                |                                      |                         |                           |                                         |                             | e                                             | $\frac{T}{R} \leq e$<br>X = 1<br>Y |        | $\frac{T}{R} > e$<br>X = .67<br>Y |                                                                              |                                     |                                                 |                      |
| 22319YM        | 95<br>3.7402  | 200<br>7.8740 | 67.0<br>2.6378 | 2.5<br>0.10                          | 119<br>4.7              | 175<br>6.9                | 735<br>165000                           | 580<br>130000               | 0.32                                          | 2.09                               | 3.11   | 2.04                              | 0.0593                                                                       | 2400                                | 2800                                            | 10.2<br>22.5         |
| 23120YM        | 100<br>3.9370 | 165<br>6.4961 | 52.0<br>2.0472 | 2.0<br>0.08                          | 112<br>4.5              | 151<br>6.0                | 575<br>129000                           | 379<br>85200                | 0.28                                          | 2.39                               | 3.56   | 2.34                              | 0.0567                                                                       | 2400                                | 2800                                            | 4.4<br>9.7           |
| 22220CJ        | 100<br>3.9370 | 180<br>7.0866 | 46.0<br>1.8110 | 2.0<br>0.08                          | 119<br>4.7              | 160<br>6.3                | 484<br>109000                           | 373<br>83800                | 0.24                                          | 2.84                               | 4.23   | 2.78                              | 0.0577                                                                       | 2700                                | 3200                                            | 5.1<br>11.2          |
| 22220YM        | 100<br>3.9370 | 180<br>7.0866 | 46.0<br>1.8110 | 2.0<br>0.08                          | 119<br>4.7              | 160<br>6.3                | 484<br>109000                           | 373<br>83800                | 0.24                                          | 2.84                               | 4.23   | 2.78                              | 0.0577                                                                       | 2700                                | 3200                                            | 5.1<br>11.2          |
| 23220CJ        | 100<br>3.9370 | 180<br>7.0866 | 60.3<br>2.3740 | 2.0<br>0.08                          | 118<br>4.7              | 165<br>6.5                | 646<br>145000                           | 463<br>104000               | 0.31                                          | 2.18                               | 3.24   | 2.13                              | 0.0579                                                                       | 2100                                | 2500                                            | 6.6<br>15.0          |
| 23220YM        | 100<br>3.9370 | 180<br>7.0866 | 60.3<br>2.3740 | 2.0<br>0.08                          | 118<br>4.7              | 165<br>6.5                | 646<br>145000                           | 463<br>104000               | 0.31                                          | 2.18                               | 3.24   | 2.13                              | 0.0579                                                                       | 2100                                | 2500                                            | 6.6<br>15.0          |
| 22320CJ        | 100<br>3.9370 | 215<br>8.4646 | 73.0<br>2.8740 | 2.5<br>0.10                          | 125<br>4.9              | 187<br>7.4                | 756<br>170000                           | 586<br>132000               | 0.36                                          | 1.90                               | 2.82   | 1.85                              | 0.0618                                                                       | 2300                                | 2700                                            | 13.0<br>28.7         |
| 22320YM        | 100<br>3.9370 | 215<br>8.4646 | 73.0<br>2.8740 | 2.5<br>0.10                          | 125<br>4.9              | 187<br>7.4                | 756<br>170000                           | 586<br>132000               | 0.36                                          | 1.90                               | 2.82   | 1.85                              | 0.0618                                                                       | 2300                                | 2700                                            | 13.0<br>28.7         |
| 23122CJ        | 110<br>4.3307 | 180<br>7.0866 | 56.0<br>2.2047 | 2.0<br>0.08                          | 127<br>5.0              | 169<br>6.7                | 615<br>138000                           | 377<br>84800                | 0.28                                          | 2.37                               | 3.53   | 2.32                              | 0.0596                                                                       | 2200                                | 2600                                            | 5.6<br>12.3          |
| 23122YM        | 110<br>4.3307 | 180<br>7.0866 | 56.0<br>2.2047 | 2.0<br>0.08                          | 127<br>5.0              | 169<br>6.7                | 615<br>138000                           | 377<br>84800                | 0.28                                          | 2.37                               | 3.53   | 2.32                              | 0.0596                                                                       | 2200                                | 2600                                            | 5.6<br>12.3          |
| 24122CJ        | 110<br>4.3307 | 180<br>7.0866 | 69.0<br>2.7165 | 2.0<br>0.08                          | 124<br>4.9              | 164<br>6.5                | 676<br>152000                           | 448<br>101000               | 0.36                                          | 1.85                               | 2.76   | 1.81                              | 0.0588                                                                       | 1800                                | 2100                                            | 6.9<br>15.2          |
| 22222CJ        | 110<br>4.3307 | 200<br>7.8740 | 53.0<br>2.0866 | 2.0<br>0.08                          | 132<br>5.2              | 179<br>7.0                | 627<br>141000                           | 475<br>107000               | 0.25                                          | 2.69                               | 4.00   | 2.63                              | 0.0616                                                                       | 2500                                | 3000                                            | 7.3<br>16.1          |
| 22222YM        | 110<br>4.3307 | 200<br>7.8740 | 53.0<br>2.0866 | 2.0<br>0.08                          | 132<br>5.2              | 179<br>7.0                | 627<br>141000                           | 475<br>107000               | 0.25                                          | 2.69                               | 4.00   | 2.63                              | 0.0616                                                                       | 2500                                | 3000                                            | 7.3<br>16.1          |
| 23222CJ        | 110<br>4.3307 | 200<br>7.8740 | 69.8<br>2.7480 | 2.0<br>0.08                          | 130<br>5.1              | 183<br>7.2                | 853<br>192000                           | 596<br>134000               | 0.32                                          | 2.12                               | 3.15   | 2.07                              | 0.0618                                                                       | 1900                                | 2200                                            | 9.6<br>21.1          |
| 23222YM        | 110<br>4.3307 | 200<br>7.8740 | 69.8<br>2.7480 | 2.0<br>0.08                          | 130<br>5.1              | 183<br>7.2                | 853<br>192000                           | 596<br>134000               | 0.32                                          | 2.12                               | 3.15   | 2.07                              | 0.0618                                                                       | 1900                                | 2200                                            | 9.6<br>21.1          |
| 22322CJ        | 110<br>4.3307 | 240<br>9.4488 | 80.0<br>3.1496 | 2.5<br>0.10                          | 139<br>5.5              | 208<br>8.2                | 962<br>216000                           | 733<br>165000               | 0.35                                          | 1.92                               | 2.86   | 1.88                              | 0.0654                                                                       | 2000                                | 2300                                            | 18.0<br>39.5         |
| 22322YM        | 110<br>4.3307 | 240<br>9.4488 | 80.0<br>3.1496 | 2.5<br>0.10                          | 139<br>5.5              | 208<br>8.2                | 962<br>216000                           | 733<br>165000               | 0.35                                          | 1.92                               | 2.86   | 1.88                              | 0.0654                                                                       | 2000                                | 2300                                            | 18.0<br>39.5         |
| 23322YM        | 110<br>4.3307 | 240<br>9.4488 | 92.1<br>3.6260 | 2.5<br>0.10                          | 137<br>5.4              | 210<br>8.3                | 1070<br>240000                          | 808<br>182000               | 0.40                                          | 1.67                               | 2.49   | 1.63                              | 0.0641                                                                       | 1500                                | 1700                                            | 20.7<br>45.5         |
| 23024CJ        | 120<br>4.7244 | 180<br>7.0866 | 46.0<br>1.8110 | 2.0<br>0.08                          | 134<br>5.3              | 169<br>6.6                | 564<br>127000                           | 352<br>79200                | 0.22                                          | 3.14                               | 4.67   | 3.07                              | 0.0616                                                                       | 2300                                | 2900                                            | 4.1<br>9.0           |
| 24024CJ        | 120<br>4.7244 | 180<br>7.0866 | 60.0<br>2.3622 | 2.0<br>0.08                          | 131<br>5.2              | 164<br>6.5                | 642<br>144000                           | 393<br>88400                | 0.30                                          | 2.25                               | 3.34   | 2.20                              | 0.0610                                                                       | 2000                                | 2400                                            | 5.3<br>11.7          |
| 23124CJ        | 120<br>4.7244 | 200<br>7.8740 | 62.0<br>2.4409 | 2.0<br>0.08                          | 142<br>5.6              | 189<br>7.4                | 803<br>180000                           | 524<br>118000               | 0.30                                          | 2.28                               | 3.39   | 2.23                              | 0.0636                                                                       | 2000                                | 2300                                            | 7.8<br>17.2          |

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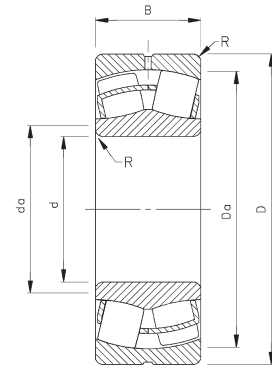




# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore        | D O.D.         | B Width         | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                              | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|---------------|----------------|-----------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-------------------------------|------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |               |                |                 |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                               | Static                       |                                                                  |                            |                                        |                |                                 |
|                |               |                |                 |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.               | e                                             | $\frac{T}{R} \leq e$<br>X = 1 | $\frac{T}{R} > e$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 23124YM        | 120<br>4.7244 | 200<br>7.8740  | 62.0<br>2.4409  | 2.0<br>0.08                    | 142<br>5.6           | 189<br>7.4             | 803<br>180000                     | 524<br>118000         | 0.30                                          | 2.28                          | 3.39                         | 2.23                                                             | 0.0636                     | 2000                                   | 2300           | 7.8<br>17.2                     |
| 24124CJ        | 120<br>4.7244 | 200<br>7.8740  | 80.0<br>3.1496  | 2.0<br>0.08                    | 136<br>5.4           | 181<br>7.1             | 923<br>207000                     | 590<br>133000         | 0.39                                          | 1.74                          | 2.59                         | 1.70                                                             | 0.0625                     | 1600                                   | 1800           | 10.1<br>22.2                    |
| 22224CJ        | 120<br>4.7244 | 215<br>8.4646  | 58.0<br>2.2835  | 2.0<br>0.08                    | 142<br>5.6           | 192<br>7.6             | 667<br>150000                     | 475<br>107000         | 0.27                                          | 2.51                          | 3.74                         | 2.46                                                             | 0.0648                     | 2400                                   | 2900           | 9.1<br>20.0                     |
| 22224YM        | 120<br>4.7244 | 215<br>8.4646  | 58.0<br>2.2835  | 2.0<br>0.08                    | 142<br>5.6           | 192<br>7.6             | 667<br>150000                     | 475<br>107000         | 0.27                                          | 2.51                          | 3.74                         | 2.46                                                             | 0.0648                     | 2400                                   | 2900           | 9.1<br>20.0                     |
| 23224YM        | 120<br>4.7244 | 215<br>8.4646  | 76.0<br>2.9921  | 2.0<br>0.08                    | 140<br>5.5           | 197<br>7.8             | 977<br>220000                     | 678<br>152000         | 0.32                                          | 2.09                          | 3.11                         | 2.04                                                             | 0.0647                     | 1700                                   | 2000           | 12.0<br>26.0                    |
| 22324CJ        | 120<br>4.7244 | 260<br>10.2362 | 86.0<br>3.3858  | 2.5<br>0.10                    | 151<br>5.9           | 225<br>8.9             | 1090<br>245000                    | 825<br>185000         | 0.35                                          | 1.92                          | 2.85                         | 1.87                                                             | 0.0680                     | 1800                                   | 2100           | 22.6<br>49.6                    |
| 22324YM        | 120<br>4.7244 | 260<br>10.2362 | 86.0<br>3.3858  | 2.5<br>0.10                    | 151<br>5.9           | 225<br>8.9             | 1090<br>245000                    | 825<br>185000         | 0.35                                          | 1.92                          | 2.85                         | 1.87                                                             | 0.0704                     | 1800                                   | 2100           | 22.6<br>49.6                    |
| 23324YM        | 120<br>4.7244 | 260<br>10.2362 | 106.0<br>4.1732 | 2.5<br>0.10                    | 147<br>5.8           | 226<br>8.9             | 1420<br>320000                    | 1030<br>232000        | 0.43                                          | 1.57                          | 2.34                         | 1.54                                                             | 0.0681                     | 1300                                   | 1400           | 27.8<br>61.2                    |
| 23926YM        | 130<br>5.1181 | 180<br>7.0866  | 37.0<br>1.4567  | 1.5<br>0.06                    | 142<br>5.6           | 169<br>6.7             | 427<br>95900                      | 245<br>55000          | 0.18                                          | 3.76                          | 5.60                         | 3.68                                                             | 0.0880                     | 2000                                   | 2500           | 2.8<br>6.2                      |
| 23026CJ        | 130<br>5.1181 | 200<br>7.8740  | 52.0<br>2.0472  | 2.0<br>0.08                    | 146<br>5.8           | 187<br>7.4             | 703<br>158000                     | 446<br>100000         | 0.22                                          | 3.01                          | 4.48                         | 2.94                                                             | 0.0654                     | 2200                                   | 2700           | 5.9<br>13.0                     |
| 24026CJ        | 130<br>5.1181 | 200<br>7.8740  | 69.0<br>2.7165  | 2.0<br>0.08                    | 144<br>5.7           | 182<br>7.2             | 795<br>179000                     | 501<br>113000         | 0.32                                          | 2.09                          | 3.11                         | 2.04                                                             | 0.0642                     | 1900                                   | 2200           | 7.9<br>17.3                     |
| 23126CJ        | 130<br>5.1181 | 210<br>8.2677  | 64.0<br>2.5197  | 2.0<br>0.08                    | 149<br>5.9           | 195<br>7.7             | 888<br>200000                     | 562<br>126000         | 0.29                                          | 2.34                          | 3.49                         | 2.29                                                             | 0.0663                     | 1800                                   | 2100           | 8.6<br>19.0                     |
| 23126YM        | 130<br>5.1181 | 210<br>8.2677  | 64.0<br>2.5197  | 2.0<br>0.08                    | 149<br>5.9           | 195<br>7.7             | 888<br>200000                     | 562<br>126000         | 0.29                                          | 2.34                          | 3.49                         | 2.29                                                             | 0.0663                     | 1800                                   | 2100           | 8.6<br>19.0                     |
| 24126CJ        | 130<br>5.1181 | 210<br>8.2677  | 80.0<br>3.1496  | 2.0<br>0.08                    | 147<br>5.8           | 190<br>7.5             | 967<br>217000                     | 608<br>137000         | 0.36                                          | 1.85                          | 2.76                         | 1.81                                                             | 0.0655                     | 1500                                   | 1700           | 10.7<br>23.6                    |
| 22226CJ        | 130<br>5.1181 | 230<br>9.0551  | 64.0<br>2.5197  | 2.5<br>0.10                    | 152<br>6.0           | 206<br>8.1             | 805<br>181000                     | 562<br>126000         | 0.27                                          | 2.47                          | 3.68                         | 2.42                                                             | 0.0676                     | 2200                                   | 2600           | 11.4<br>25.0                    |
| 22226YM        | 130<br>5.1181 | 230<br>9.0551  | 64.0<br>2.5197  | 2.5<br>0.10                    | 152<br>6.0           | 206<br>8.1             | 805<br>181000                     | 562<br>126000         | 0.27                                          | 2.47                          | 3.68                         | 2.42                                                             | 0.0676                     | 2200                                   | 2600           | 11.4<br>25.0                    |
| 23226YM        | 130<br>5.1181 | 230<br>9.0551  | 80.0<br>3.1496  | 2.5<br>0.10                    | 151<br>5.9           | 211<br>8.3             | 1110<br>249000                    | 759<br>171000         | 0.32                                          | 2.12                          | 3.15                         | 2.07                                                             | 0.0676                     | 1600                                   | 1800           | 14.0<br>31.0                    |
| 22326CJ        | 130<br>5.1181 | 280<br>11.0236 | 93.0<br>3.6614  | 3.0<br>0.12                    | 161<br>6.4           | 242<br>9.5             | 1270<br>286000                    | 952<br>214000         | 0.35                                          | 1.92                          | 2.85                         | 1.87                                                             | 0.0610                     | 1700                                   | 1900           | 28.2<br>62.1                    |
| 22326YM        | 130<br>5.1181 | 280<br>11.0236 | 93.0<br>3.6614  | 3.0<br>0.12                    | 161<br>6.4           | 242<br>9.5             | 1270<br>286000                    | 952<br>214000         | 0.35                                          | 1.92                          | 2.85                         | 1.87                                                             | 0.0610                     | 1700                                   | 1900           | 28.2<br>62.1                    |
| 23326YM        | 130<br>5.1181 | 280<br>11.0236 | 112.0<br>4.4094 | 3.0<br>0.12                    | 164<br>6.5           | 244<br>9.6             | 1550<br>348000                    | 1090<br>245000        | 0.42                                          | 1.62                          | 2.42                         | 1.59                                                             | 0.0600                     | 1200                                   | 1300           | 34.0<br>74.7                    |
| 23928YM        | 140<br>5.5118 | 190<br>7.4803  | 37.0<br>1.4567  | 1.5<br>0.06                    | 152<br>6.0           | 179<br>7.1             | 456<br>102000                     | 253<br>56900          | 0.17                                          | 4.01                          | 5.97                         | 3.92                                                             | 0.0920                     | 1900                                   | 2300           | 3.0<br>6.6                      |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

(2) Maximum shaft or housing fillet radius that bearing corners will clear.

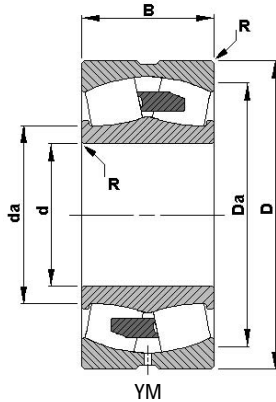
\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."



# Spherical Roller Bearings



B

| Bearing Number | d<br>Bore     | D<br>O.D.      | B<br>Width      | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                              |        |                | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed |                                       | Thermal<br>Ratings <sup>(3)</sup> |     | Weight |
|----------------|---------------|----------------|-----------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------|--------|----------------|------------------------------------------------------------------------------|--------------------|---------------------------------------|-----------------------------------|-----|--------|
|                |               |                |                 |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                              | Static | Grease         |                                                                              | Oil                |                                       |                                   |     |        |
|                |               |                |                 |                                      |                         |                           |                                         |                             | $\frac{T}{R} \leq e$<br>X = 1                 | $\frac{T}{R} > e$<br>X = .67 |        |                |                                                                              |                    | In All<br>Cases<br>X <sub>0</sub> = 1 | RPM                               | RPM |        |
|                | mm<br>in.     | mm<br>in.      | mm<br>in.       | mm<br>in.                            | mm<br>in.               | mm<br>in.                 | kN<br>lbs.                              | kN<br>lbs.                  | e                                             | Y                            | Y      | Y <sub>0</sub> |                                                                              | RPM                | RPM                                   | kg<br>lbs.                        |     |        |
| 23028CJ        | 140<br>5.5118 | 210<br>8.2677  | 53.0<br>2.0866  | 2.0<br>0.08                          | 156<br>6.1              | 197<br>7.8                | 764<br>173000                           | 471<br>106000               | 0.22                                          | 3.14                         | 4.67   | 3.07           | 0.0680                                                                       | 2000               | 2500                                  | 6.4<br>14.0                       |     |        |
| 24028CJ        | 140<br>5.5118 | 210<br>8.2677  | 69.0<br>2.7165  | 2.0<br>0.08                          | 154<br>6.1              | 192<br>7.6                | 899<br>202000                           | 527<br>118000               | 0.31                                          | 2.21                         | 3.29   | 2.16           | 0.0676                                                                       | 1700               | 2000                                  | 8.3<br>18.3                       |     |        |
| 23128YM        | 140<br>5.5118 | 225<br>8.8583  | 68.0<br>2.6772  | 2.0<br>0.08                          | 159<br>6.3              | 209<br>8.2                | 1010<br>228000                          | 636<br>143000               | 0.29                                          | 2.37                         | 3.52   | 2.31           | 0.0670                                                                       | 1700               | 2000                                  | 10.0<br>23.0                      |     |        |
| 24128CJ        | 140<br>5.5118 | 225<br>8.8583  | 85.0<br>3.3465  | 2.0<br>0.08                          | 156<br>6.2              | 203<br>8.0                | 1120<br>252000                          | 701<br>158000               | 0.36                                          | 1.90                         | 2.83   | 1.86           | 0.0684                                                                       | 1300               | 1500                                  | 13.0<br>28.6                      |     |        |
| 26228YM        | 140<br>5.5118 | 240<br>9.4488  | 80.0<br>3.1496  | 2.5<br>0.10                          | 161<br>6.3              | 217<br>8.6                | 1120<br>251000                          | 726<br>163000               | 0.32                                          | 2.08                         | 3.10   | 2.04           | 0.0693                                                                       | 1200               | 1400                                  | 14.7<br>32.4                      |     |        |
| 22228CJ        | 140<br>5.5118 | 250<br>9.8425  | 68.0<br>2.6772  | 2.5<br>0.10                          | 166<br>6.5              | 225<br>8.9                | 930<br>209000                           | 646<br>145000               | 0.27                                          | 2.51                         | 3.73   | 2.45           | 0.0713                                                                       | 2000               | 2400                                  | 14.4<br>31.7                      |     |        |
| 22228YM        | 140<br>5.5118 | 250<br>9.8425  | 68.0<br>2.6772  | 2.5<br>0.10                          | 166<br>6.5              | 225<br>8.9                | 930<br>209000                           | 646<br>145000               | 0.27                                          | 2.51                         | 3.73   | 2.45           | 0.0713                                                                       | 2000               | 2400                                  | 14.4<br>31.7                      |     |        |
| 22328CJ        | 140<br>5.5118 | 300<br>11.8110 | 102.0<br>4.0157 | 3.0<br>0.12                          | 174<br>6.9              | 262<br>10.3               | 1520<br>341000                          | 1120<br>252000              | 0.36                                          | 1.88                         | 2.81   | 1.84           | 0.0648                                                                       | 1500               | 1700                                  | 35.4<br>77.9                      |     |        |
| 22328YM        | 140<br>5.5118 | 300<br>11.8110 | 102.0<br>4.0157 | 3.0<br>0.12                          | 174<br>6.9              | 262<br>10.3               | 1520<br>341000                          | 1120<br>252000              | 0.36                                          | 1.88                         | 2.81   | 1.84           | 0.0648                                                                       | 1500               | 1700                                  | 35.4<br>77.9                      |     |        |
| 23328YM        | 140<br>5.5118 | 300<br>11.8110 | 118.0<br>4.6457 | 3.0<br>0.12                          | 175<br>6.9              | 261<br>10.3               | 1920<br>432000                          | 1310<br>295000              | 0.41                                          | 1.64                         | 2.45   | 1.61           | 0.0632                                                                       | 1000               | 1100                                  | 41.0<br>90.1                      |     |        |
| 23030YM        | 150<br>5.9055 | 225<br>8.8583  | 56.0<br>2.2047  | 2.0<br>0.08                          | 169<br>6.6              | 211<br>8.3                | 872<br>196000                           | 521<br>117000               | 0.21                                          | 3.20                         | 4.77   | 3.13           | 0.0714                                                                       | 1900               | 2300                                  | 7.8<br>17.0                       |     |        |
| 24030CJ        | 150<br>5.9055 | 225<br>8.8583  | 75.0<br>2.9528  | 2.0<br>0.08                          | 166<br>6.5              | 206<br>8.1                | 1000<br>226000                          | 603<br>136000               | 0.31                                          | 2.18                         | 3.24   | 2.13           | 0.0699                                                                       | 1600               | 1900                                  | 10.4<br>22.9                      |     |        |
| 23130YM        | 150<br>5.9055 | 250<br>9.8425  | 80.0<br>3.1496  | 2.0<br>0.08                          | 172<br>6.8              | 230<br>9.1                | 1320<br>298000                          | 837<br>188000               | 0.31                                          | 2.20                         | 3.27   | 2.15           | 0.0614                                                                       | 1500               | 1700                                  | 16.0<br>35.0                      |     |        |
| 24130CJ        | 150<br>5.9055 | 250<br>9.8425  | 100.0<br>3.9370 | 2.0<br>0.08                          | 169<br>6.7              | 225<br>8.9                | 1400<br>315000                          | 901<br>203000               | 0.38                                          | 1.78                         | 2.65   | 1.74           | 0.0603                                                                       | 1200               | 1300                                  | 19.7<br>43.4                      |     |        |
| 22230CJ        | 150<br>5.9055 | 270<br>10.6299 | 73.0<br>2.8740  | 2.5<br>0.10                          | 179<br>7.0              | 242<br>9.5                | 1100<br>247000                          | 752<br>169000               | 0.27                                          | 2.52                         | 3.75   | 2.46           | 0.0626                                                                       | 1800               | 2200                                  | 18.2<br>39.9                      |     |        |
| 22230YM        | 150<br>5.9055 | 270<br>10.6299 | 73.0<br>2.8740  | 3.0<br>0.10                          | 177<br>7.0              | 248<br>9.8                | 1200<br>269000                          | 853<br>192000               | 0.25                                          | 2.74                         | 4.08   | 2.68           | 0.0626                                                                       | 1800               | 2100                                  | 18.0<br>40.0                      |     |        |
| 23230YM        | 150<br>5.9055 | 270<br>10.6299 | 96.0<br>3.7795  | 2.5<br>0.10                          | 175<br>6.9              | 247<br>9.7                | 1590<br>357000                          | 1060<br>239000              | 0.33                                          | 2.03                         | 3.02   | 1.98           | 0.0625                                                                       | 1300               | 1500                                  | 24.0<br>53.0                      |     |        |
| 22330CJ        | 150<br>5.9055 | 320<br>12.5984 | 108.0<br>4.2520 | 3.0<br>0.12                          | 186<br>7.3              | 280<br>11.0               | 1720<br>386000                          | 1260<br>283000              | 0.35                                          | 1.91                         | 2.84   | 1.87           | 0.0667                                                                       | 1400               | 1600                                  | 42.6<br>93.6                      |     |        |
| 22330YM        | 150<br>5.9055 | 320<br>12.5984 | 108.0<br>4.2520 | 3.0<br>0.12                          | 186<br>7.3              | 280<br>11.0               | 1720<br>386000                          | 1260<br>283000              | 0.35                                          | 1.91                         | 2.84   | 1.87           | 0.0667                                                                       | 1400               | 1600                                  | 42.6<br>93.6                      |     |        |
| 23330YM        | 150<br>5.9055 | 320<br>12.5984 | 128.0<br>5.0394 | 3.0<br>0.12                          | 185<br>7.3              | 280<br>11.0               | 2130<br>478000                          | 1480<br>332000              | 0.41                                          | 1.64                         | 2.44   | 1.60           | 0.0654                                                                       | 960                | 1100                                  | 50.4<br>111                       |     |        |
| 23932YM        | 160<br>6.2992 | 220<br>8.6614  | 45.0<br>1.7717  | 2.0<br>0.08                          | 175<br>6.9              | 206<br>8.1                | 655<br>147000                           | 348<br>78200                | 0.19                                          | 3.60                         | 5.35   | 3.52           | 0.0724                                                                       | 1800               | 2100                                  | 5.1<br>11.1                       |     |        |

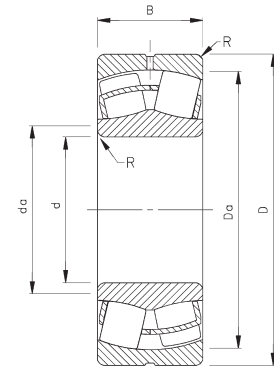
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- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore        | D O.D.         | B Width         | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                              | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|---------------|----------------|-----------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-------------------------------|------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |               |                |                 |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                               | Static                       |                                                                  |                            |                                        |                |                                 |
|                |               |                |                 |                                |                      |                        |                                   |                       | e                                             | $\frac{T}{R} \leq e$<br>X = 1 | $\frac{T}{R} > e$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 23032YM        | 160<br>6.2992 | 240<br>9.4488  | 60.0<br>2.3622  | 2.0<br>0.08                    | 179<br>7.0           | 225<br>8.9             | 979<br>220000                     | 591<br>133000         | 0.21                                          | 3.20                          | 4.77                         | 3.13                                                             | 0.0620                     | 1700                                   | 2100           | 9.4<br>21.0                     |
| 24032CJ        | 160<br>6.2992 | 240<br>9.4488  | 80.0<br>3.1496  | 2.0<br>0.08                    | 173<br>6.8           | 224<br>8.8             | 1100<br>246000                    | 665<br>150000         | 0.30                                          | 2.28                          | 3.39                         | 2.23                                                             | 0.0611                     | 1500                                   | 1800           | 12.6<br>27.8                    |
| 23132YM        | 160<br>6.2992 | 270<br>10.6299 | 86.0<br>3.3858  | 2.0<br>0.08                    | 189<br>7.4           | 244<br>9.6             | 1560<br>350000                    | 968<br>218000         | 0.30                                          | 2.23                          | 3.32                         | 2.18                                                             | 0.0633                     | 1400                                   | 1600           | 20.1<br>44.1                    |
| 22232CJ        | 160<br>6.2992 | 290<br>11.4173 | 80.0<br>3.1496  | 2.5<br>0.10                    | 192<br>7.6           | 260<br>10.2            | 1280<br>288000                    | 864<br>194000         | 0.27                                          | 2.47                          | 3.67                         | 2.41                                                             | 0.0655                     | 1700                                   | 2000           | 23.1<br>50.8                    |
| 23232YM        | 160<br>6.2992 | 290<br>11.4173 | 104.0<br>4.0945 | 2.5<br>0.10                    | 187<br>7.4           | 260<br>10.2            | 1680<br>377000                    | 1090<br>246000        | 0.34                                          | 1.96                          | 2.91                         | 1.91                                                             | 0.0645                     | 1200                                   | 1400           | 30.0<br>66.0                    |
| 22332CJ        | 160<br>6.2992 | 340<br>13.3858 | 114.0<br>4.4882 | 3.0<br>0.12                    | 198<br>7.8           | 298<br>11.7            | 1920<br>432000                    | 1400<br>314000        | 0.35                                          | 1.92                          | 2.86                         | 1.88                                                             | 0.0702                     | 1300                                   | 1500           | 50.6<br>111                     |
| 22332YMB       | 160<br>6.2992 | 340<br>13.3858 | 114.0<br>4.4882 | 3.0<br>0.12                    | 198<br>7.8           | 298<br>11.7            | 1920<br>432000                    | 1400<br>314000        | 0.35                                          | 1.92                          | 2.86                         | 1.88                                                             | 0.0702                     | 1300                                   | 1500           | 50.6<br>111                     |
| 23332YM        | 160<br>6.2992 | 340<br>13.3858 | 136.0<br>5.3543 | 3.0<br>0.12                    | 202<br>8.0           | 297<br>11.7            | 2540<br>572000                    | 1670<br>375000        | 0.42                                          | 1.62                          | 2.41                         | 1.58                                                             | 0.0686                     | 850                                    | 940            | 60.4<br>133                     |
| 23934YM        | 170<br>6.6929 | 230<br>9.0551  | 45.0<br>1.7717  | 2.0<br>0.08                    | 184<br>7.3           | 217<br>8.6             | 692<br>156000                     | 371<br>83400          | 0.18                                          | 3.79                          | 5.65                         | 3.71                                                             | 0.0627                     | 1600                                   | 2000           | 5.3<br>11.7                     |
| 23034YM        | 170<br>6.6929 | 260<br>10.2362 | 67.0<br>2.6378  | 2.0<br>0.08                    | 192<br>7.6           | 243<br>9.6             | 1220<br>274000                    | 724<br>163000         | 0.22                                          | 3.07                          | 4.57                         | 3.00                                                             | 0.0649                     | 1600                                   | 1900           | 12.8<br>28.1                    |
| 24034CJ        | 170<br>6.6929 | 260<br>10.2362 | 90.0<br>3.5433  | 2.0<br>0.08                    | 185<br>7.3           | 242<br>9.5             | 1430<br>322000                    | 851<br>191000         | 0.32                                          | 2.12                          | 3.15                         | 2.07                                                             | 0.0641                     | 1300                                   | 1600           | 17.2<br>38.0                    |
| 23134YM        | 170<br>6.6929 | 280<br>11.0236 | 88.0<br>3.4646  | 2.0<br>0.08                    | 194<br>7.7           | 255<br>10.2            | 1670<br>375000                    | 1010<br>226000        | 0.30                                          | 2.28                          | 3.40                         | 2.23                                                             | 0.0654                     | 1300                                   | 1500           | 21.5<br>47.3                    |
| 24134CJ        | 170<br>6.6929 | 280<br>11.0236 | 109.0<br>4.2913 | 2.0<br>0.08                    | 191<br>7.5           | 252<br>10.1            | 1840<br>413000                    | 1110<br>248000        | 0.37                                          | 1.83                          | 2.72                         | 1.79                                                             | 0.0657                     | 980                                    | 1100           | 26.6<br>58.5                    |
| 22234CJ        | 170<br>6.6929 | 310<br>12.2047 | 86.0<br>3.3858  | 3.0<br>0.12                    | 201<br>7.9           | 278<br>10.9            | 1450<br>326000                    | 999<br>225000         | 0.28                                          | 2.44                          | 3.63                         | 2.38                                                             | 0.0672                     | 1600                                   | 1900           | 28.5<br>62.7                    |
| 23234YM        | 170<br>6.6929 | 310<br>12.2047 | 110.0<br>4.3307 | 3.0<br>0.12                    | 200<br>7.9           | 276<br>10.9            | 1960<br>441000                    | 1240<br>279000        | 0.34                                          | 1.97                          | 2.94                         | 1.93                                                             | 0.0676                     | 1100                                   | 1200           | 36.5<br>80.2                    |
| 23036YM        | 180<br>7.0866 | 280<br>11.0236 | 74.0<br>2.9134  | 2.0<br>0.08                    | 204<br>8.0           | 261<br>10.3            | 1420<br>321000                    | 851<br>192000         | 0.23                                          | 2.95                          | 4.40                         | 2.89                                                             | 0.0677                     | 1500                                   | 1800           | 17.0<br>37.0                    |
| 24036CJ        | 180<br>7.0866 | 280<br>11.0236 | 100.0<br>3.9370 | 2.0<br>0.08                    | 198<br>7.8           | 260<br>10.2            | 1700<br>385000                    | 992<br>223000         | 0.33                                          | 2.03                          | 3.02                         | 1.98                                                             | 0.0671                     | 1200                                   | 1500           | 23.0<br>50.0                    |
| 23136YM        | 180<br>7.0866 | 300<br>11.8110 | 96.0<br>3.7795  | 2.5<br>0.10                    | 205<br>8.1           | 273<br>10.8            | 1810<br>406000                    | 1100<br>247000        | 0.31                                          | 2.20                          | 3.28                         | 2.15                                                             | 0.0677                     | 1200                                   | 1400           | 27.0<br>60.0                    |
| 24136CJ        | 180<br>7.0866 | 300<br>11.8110 | 118.0<br>4.6457 | 2.5<br>0.10                    | 201<br>7.9           | 275<br>10.8            | 2050<br>464000                    | 1250<br>280000        | 0.38                                          | 1.78                          | 2.65                         | 1.74                                                             | 0.0680                     | 920                                    | 1000           | 33.0<br>74.0                    |
| 22236CJ        | 180<br>7.0866 | 320<br>12.5984 | 86.0<br>3.3858  | 3.0<br>0.12                    | 213<br>8.4           | 288<br>11.3            | 1540<br>346000                    | 1030<br>231000        | 0.27                                          | 2.54                          | 3.78                         | 2.48                                                             | 0.0698                     | 1500                                   | 1700           | 30.0<br>65.0                    |
| 23236YM        | 180<br>7.0866 | 320<br>12.5984 | 112.0<br>4.4094 | 3.0<br>0.12                    | 209<br>8.2           | 288<br>11.3            | 2110<br>473000                    | 1330<br>298000        | 0.34                                          | 2.00                          | 2.97                         | 1.95                                                             | 0.0694                     | 1000                                   | 1200           | 39.0<br>85.0                    |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

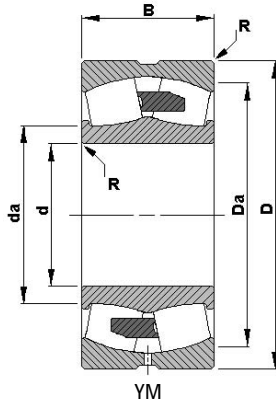
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



B

| Bearing Number | d<br>Bore     | D<br>O.D.      | B<br>Width      | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                              |                                                                   | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |              |
|----------------|---------------|----------------|-----------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|--------------|
|                |               |                |                 |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                              | Static<br>In All<br>Cases<br>X <sub>0</sub> = 1<br>Y <sub>0</sub> |                                                                              |                                     |                                                 |                      |              |
|                |               |                |                 |                                      |                         |                           |                                         |                             | $\frac{T}{R} \leq e$<br>X = 1                 | $\frac{T}{R} > e$<br>X = .67 |                                                                   |                                                                              |                                     |                                                 |                      | e            |
| 22336YMB       | 180<br>7.0866 | 380<br>14.9606 | 126.0<br>4.9606 | 3.0<br>0.12                          | 222<br>8.8              | 334<br>13.1               | 2460<br>554000                          | 1760<br>395000              | 0.34                                          | 1.98                         | 2.94                                                              | 1.93                                                                         | 0.0730                              | 1100                                            | 1200                 | 69.0<br>153  |
| 23938YM        | 190<br>7.4803 | 260<br>10.2362 | 52.0<br>2.0472  | 2.0<br>0.08                          | 207<br>8.2              | 245<br>9.6                | 910<br>205000                           | 480<br>108000               | 0.18                                          | 3.84                         | 5.72                                                              | 3.75                                                                         | 0.0677                              | 1400                                            | 1700                 | 8.1<br>18.0  |
| 23038YM        | 190<br>7.4803 | 290<br>11.4173 | 75.0<br>2.9528  | 2.0<br>0.08                          | 213<br>8.4              | 271<br>10.7               | 1540<br>349000                          | 901<br>203000               | 0.22                                          | 3.01                         | 4.48                                                              | 2.94                                                                         | 0.0698                              | 1400                                            | 1700                 | 18.0<br>39.0 |
| 24038CJ        | 190<br>7.4803 | 290<br>11.4173 | 100.0<br>3.9370 | 2.0<br>0.08                          | 211<br>8.3              | 264<br>10.4               | 1810<br>407000                          | 957<br>215000               | 0.31                                          | 2.16                         | 3.22                                                              | 2.12                                                                         | 0.0682                              | 1200                                            | 1400                 | 24.0<br>52.0 |
| 23138YM        | 190<br>7.4803 | 320<br>12.5984 | 104.0<br>4.0945 | 2.5<br>0.10                          | 218<br>8.6              | 290<br>11.4               | 2090<br>470000                          | 1250<br>282000              | 0.31                                          | 2.15                         | 3.21                                                              | 2.11                                                                         | 0.0716                              | 1100                                            | 1300                 | 34.0<br>75.0 |
| 24138CJ        | 190<br>7.4803 | 320<br>12.5984 | 128.0<br>5.0394 | 2.5<br>0.10                          | 211<br>8.3              | 286<br>11.3               | 2310<br>520000                          | 1350<br>305000              | 0.40                                          | 1.68                         | 2.50                                                              | 1.64                                                                         | 0.0710                              | 860                                             | 950                  | 42.0<br>92.0 |
| 22238YM        | 190<br>7.4803 | 340<br>13.3858 | 92.0<br>3.6220  | 3.0<br>0.12                          | 224<br>8.8              | 306<br>12.0               | 1810<br>407000                          | 1200<br>270000              | 0.27                                          | 2.53                         | 3.77                                                              | 2.48                                                                         | 0.0725                              | 1400                                            | 1600                 | 36.0<br>79.0 |
| 23238YM        | 190<br>7.4803 | 340<br>13.3858 | 120.0<br>4.7244 | 3.0<br>0.12                          | 221<br>8.7              | 306<br>12.0               | 2390<br>536000                          | 1490<br>335000              | 0.34                                          | 1.99                         | 2.96                                                              | 1.95                                                                         | 0.0714                              | 960                                             | 1100                 | 47.0<br>104  |
| 22338YMB       | 190<br>7.4803 | 400<br>15.7480 | 132.0<br>5.1969 | 4.0<br>0.16                          | 236<br>9.3              | 350<br>13.8               | 2730<br>614000                          | 1900<br>428000              | 0.34                                          | 1.97                         | 2.94                                                              | 1.93                                                                         | 0.0761                              | 1000                                            | 1200                 | 80.0<br>177  |
| 23940YM        | 200<br>7.8740 | 280<br>11.0236 | 60.0<br>2.3622  | 2.0<br>0.08                          | 219<br>8.6              | 263<br>10.3               | 1140<br>256000                          | 608<br>137000               | 0.19                                          | 3.65                         | 5.43                                                              | 3.57                                                                         | 0.0704                              | 1400                                            | 1600                 | 11.0<br>25.0 |
| 23040YM        | 200<br>7.8740 | 310<br>12.2047 | 82.0<br>3.2283  | 2.0<br>0.08                          | 225<br>8.9              | 289<br>11.4               | 1760<br>398000                          | 1040<br>234000              | 0.23                                          | 2.95                         | 4.40                                                              | 2.89                                                                         | 0.0723                              | 1300                                            | 1600                 | 23.0<br>50.0 |
| 24040CJ        | 200<br>7.8740 | 310<br>12.2047 | 109.0<br>4.2913 | 2.0<br>0.08                          | 223<br>8.8              | 284<br>11.2               | 2080<br>468000                          | 1120<br>251000              | 0.32                                          | 2.09                         | 3.11                                                              | 2.04                                                                         | 0.0710                              | 1100                                            | 1300                 | 30.0<br>66.0 |
| 23140YM        | 200<br>7.8740 | 340<br>13.3858 | 112.0<br>4.4094 | 2.5<br>0.10                          | 230<br>9.0              | 308<br>12.1               | 2300<br>518000                          | 1390<br>313000              | 0.31                                          | 2.15                         | 3.20                                                              | 2.10                                                                         | 0.0730                              | 1100                                            | 1200                 | 42.0<br>92.0 |
| 23140YMB       | 200<br>7.8740 | 340<br>13.3858 | 112.0<br>4.4094 | 2.5<br>0.10                          | 230<br>9.0              | 308<br>12.1               | 2300<br>518000                          | 1390<br>313000              | 0.31                                          | 2.15                         | 3.20                                                              | 2.10                                                                         | 0.0730                              | 1100                                            | 1200                 | 42.0<br>92.0 |
| 24140YMB       | 200<br>7.8740 | 340<br>13.3858 | 140.0<br>5.5118 | 2.5<br>0.10                          | 226<br>8.9              | 308<br>12.1               | 2950<br>663000                          | 1690<br>380000              | 0.39                                          | 1.74                         | 2.59                                                              | 1.70                                                                         | 0.0730                              | 750                                             | 830                  | 52.0<br>115  |
| 22240YMB       | 200<br>7.8740 | 360<br>14.1732 | 98.0<br>3.8583  | 3.0<br>0.12                          | 236<br>9.3              | 323<br>12.7               | 2030<br>456000                          | 1330<br>300000              | 0.27                                          | 2.50                         | 3.72                                                              | 2.44                                                                         | 0.0751                              | 1300                                            | 1500                 | 43.0<br>95.0 |
| 23240YM        | 200<br>7.8740 | 360<br>14.1732 | 128.0<br>5.0394 | 3.0<br>0.12                          | 233<br>9.2              | 323<br>12.7               | 2720<br>611000                          | 1670<br>376000              | 0.35                                          | 1.95                         | 2.90                                                              | 1.91                                                                         | 0.0746                              | 890                                             | 1000                 | 56.0<br>124  |
| 26340YM        | 200<br>7.8740 | 380<br>14.9606 | 126.0<br>4.9606 | 4.0<br>0.16                          | 240<br>9.4              | 337<br>13.3               | 2710<br>610000                          | 1740<br>391000              | 0.33                                          | 2.02                         | 3.01                                                              | 1.98                                                                         | 0.0759                              | 700                                             | 780                  | 65.8<br>145  |
| 22340YMB       | 200<br>7.8740 | 420<br>16.5354 | 138.0<br>5.4331 | 4.0<br>0.16                          | 247<br>9.7              | 369<br>14.5               | 2950<br>663000                          | 2070<br>465000              | 0.33                                          | 2.02                         | 3.01                                                              | 1.98                                                                         | 0.0778                              | 970                                             | 1100                 | 93.0<br>204  |
| 23340YM        | 200<br>7.8740 | 420<br>16.5354 | 165.0<br>6.4961 | 4.0<br>0.16                          | 246<br>9.7              | 366<br>14.4               | 3750<br>844000                          | 2450<br>550000              | 0.41                                          | 1.66                         | 2.47                                                              | 1.62                                                                         | 0.0784                              | 640                                             | 700                  | 111<br>244   |
| 23944YM        | 220<br>8.6614 | 300<br>11.8110 | 60.0<br>2.3622  | 2.0<br>0.08                          | 239<br>9.4              | 283<br>11.2               | 1220<br>275000                          | 632<br>142000               | 0.17                                          | 3.94                         | 5.87                                                              | 3.85                                                                         | 0.0743                              | 1200                                            | 1500                 | 12.0<br>27.0 |

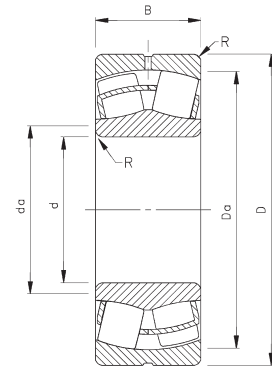
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# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d<br>Bore     | D<br>O.D.      | B<br>Width      | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                         |                          | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                              | Lubrication Life Adjustment Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference Speed<br>Grease<br>RPM | Thermal Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg lbs. |                                    |
|----------------|---------------|----------------|-----------------|--------------------------------------|-------------------------|---------------------------|--------------------------------------|--------------------------|-----------------------------------------------|-------------------------------|------------------------------|---------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------|------------------------------------|
|                |               |                |                 |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static Load Rating<br>C <sub>0</sub> | Dynamic Load Rating<br>C | Dynamic                                       |                               | Static                       |                                                                     |                                  |                                              |                   |                                    |
|                |               |                |                 |                                      | mm in.                  | mm in.                    | kN lbs.                              | kN lbs.                  | e                                             | $\frac{T}{R} \leq e$<br>X = 1 | $\frac{T}{R} > e$<br>X = .67 |                                                                     |                                  |                                              |                   | In All Cases<br>X <sub>0</sub> = 1 |
| 23044YM        | 220<br>8.6614 | 340<br>13.3858 | 90.0<br>3.5433  | 2.5<br>0.10                          | 247<br>9.7              | 313<br>12.3               | 1990<br>447000                       | 1130<br>254000           | 0.24                                          | 2.77                          | 4.13                         | 2.71                                                                | 0.0767                           | 1200                                         | 1400              | 30.0<br>66.0                       |
| 24044YM        | 220<br>8.6614 | 340<br>13.3858 | 118.0<br>4.6457 | 2.5<br>0.10                          | 245<br>9.6              | 313<br>12.3               | 2740<br>616000                       | 1450<br>326000           | 0.32                                          | 2.14                          | 3.18                         | 2.09                                                                | 0.0762                           | 930                                          | 1100              | 39.0<br>86.0                       |
| 23144YM        | 220<br>8.6614 | 370<br>14.5669 | 120.0<br>4.7244 | 3.0<br>0.12                          | 252<br>9.9              | 336<br>13.2               | 2760<br>621000                       | 1630<br>366000           | 0.31                                          | 2.17                          | 3.24                         | 2.12                                                                | 0.0777                           | 940                                          | 1100              | 52.0<br>115                        |
| 23144YMB       | 220<br>8.6614 | 370<br>14.5669 | 120.0<br>4.7244 | 3.0<br>0.12                          | 252<br>9.9              | 336<br>13.2               | 2760<br>621000                       | 1630<br>366000           | 0.31                                          | 2.17                          | 3.24                         | 2.12                                                                | 0.0777                           | 940                                          | 1100              | 52.0<br>115                        |
| 24144YMB       | 220<br>8.6614 | 370<br>14.5669 | 150.0<br>5.9055 | 3.0<br>0.12                          | 248<br>9.8              | 337<br>13.3               | 3250<br>730000                       | 1870<br>421000           | 0.36                                          | 1.86                          | 2.77                         | 1.82                                                                | 0.0773                           | 690                                          | 760               | 65.0<br>144                        |
| 22244YMB       | 220<br>8.6614 | 400<br>15.7480 | 108.0<br>4.2520 | 3.0<br>0.12                          | 261<br>10.3             | 359<br>14.1               | 2330<br>524000                       | 1550<br>349000           | 0.27                                          | 2.51                          | 3.73                         | 2.45                                                                | 0.0810                           | 1200                                         | 1400              | 59.0<br>131                        |
| 23244YM        | 220<br>8.6614 | 400<br>15.7480 | 144.0<br>5.6693 | 3.0<br>0.12                          | 257<br>10.1             | 359<br>14.1               | 3380<br>760000                       | 2080<br>467000           | 0.35                                          | 1.95                          | 2.90                         | 1.90                                                                | 0.0790                           | 780                                          | 870               | 79.0<br>174                        |
| 26344YM        | 220<br>8.6614 | 420<br>16.5354 | 138.0<br>5.4331 | 4.0<br>0.16                          | 265<br>10.4             | 372<br>14.6               | 3280<br>738000                       | 2080<br>468000           | 0.33                                          | 2.04                          | 3.03                         | 1.99                                                                | 0.0808                           | 610                                          | 680               | 88.2<br>194                        |
| 22344YMB       | 220<br>8.6614 | 460<br>18.1102 | 145.0<br>5.7087 | 4.0<br>0.16                          | 273<br>10.7             | 404<br>15.9               | 3490<br>784000                       | 2400<br>540000           | 0.32                                          | 2.08                          | 3.10                         | 2.04                                                                | 0.0834                           | 840                                          | 950               | 116<br>257                         |
| 23344YM        | 220<br>8.6614 | 460<br>18.1102 | 180.0<br>7.0866 | 4.0<br>0.16                          | 269<br>10.6             | 402<br>15.8               | 4500<br>1010000                      | 2900<br>652000           | 0.40                                          | 1.67                          | 2.48                         | 1.63                                                                | 0.0832                           | 560                                          | 610               | 145<br>319                         |
| 23948YM        | 240<br>9.4488 | 320<br>12.5984 | 60.0<br>2.3622  | 2.0<br>0.08                          | 260<br>10.2             | 303<br>11.9               | 1360<br>306000                       | 666<br>150000            | 0.16                                          | 4.19                          | 6.24                         | 4.09                                                                | 0.0782                           | 1100                                         | 1300              | 13.0<br>29.0                       |
| 23048YM        | 240<br>9.4488 | 360<br>14.1732 | 92.0<br>3.6220  | 2.5<br>0.10                          | 267<br>10.5             | 334<br>13.1               | 2150<br>484000                       | 1180<br>266000           | 0.23                                          | 2.91                          | 4.34                         | 2.85                                                                | 0.0797                           | 1100                                         | 1300              | 33.0<br>72.0                       |
| 24048YM        | 240<br>9.4488 | 360<br>14.1732 | 118.0<br>4.6457 | 2.5<br>0.10                          | 265<br>10.4             | 334<br>13.1               | 2920<br>657000                       | 1500<br>338000           | 0.29                                          | 2.31                          | 3.44                         | 2.26                                                                | 0.0797                           | 850                                          | 980               | 42.0<br>92.0                       |
| 23148YMB       | 240<br>9.4488 | 400<br>15.7480 | 128.0<br>5.0394 | 3.0<br>0.12                          | 276<br>10.9             | 364<br>14.3               | 3200<br>719000                       | 1850<br>415000           | 0.30                                          | 2.28                          | 3.40                         | 2.23                                                                | 0.0817                           | 850                                          | 970               | 65.0<br>142                        |
| 24148YMB       | 240<br>9.4488 | 400<br>15.7480 | 160.0<br>6.2992 | 3.0<br>0.12                          | 271<br>10.7             | 364<br>14.3               | 4090<br>919000                       | 2250<br>505000           | 0.37                                          | 1.80                          | 2.68                         | 1.76                                                                | 0.0817                           | 580                                          | 640               | 81.0<br>178                        |
| 22248YMB       | 240<br>9.4488 | 440<br>17.3228 | 120.0<br>4.7244 | 3.0<br>0.12                          | 284<br>11.2             | 395<br>15.6               | 2970<br>668000                       | 1960<br>441000           | 0.27                                          | 2.46                          | 3.67                         | 2.41                                                                | 0.0840                           | 1000                                         | 1200              | 80.0<br>177                        |
| 23248YM        | 240<br>9.4488 | 440<br>17.3228 | 160.0<br>6.2992 | 3.0<br>0.12                          | 281<br>11.1             | 394<br>15.5               | 4190<br>942000                       | 2540<br>571000           | 0.35                                          | 1.92                          | 2.86                         | 1.88                                                                | 0.0839                           | 680                                          | 760               | 107<br>236                         |
| 26348YM        | 240<br>9.4488 | 460<br>18.1102 | 147.0<br>5.7874 | 4.0<br>0.16                          | 286<br>11.3             | 410<br>16.2               | 3720<br>836000                       | 2430<br>547000           | 0.32                                          | 2.08                          | 3.10                         | 2.04                                                                | 0.0852                           | 550                                          | 610               | 113<br>248                         |
| 22348YMB       | 240<br>9.4488 | 500<br>19.6850 | 155.0<br>6.1024 | 4.0<br>0.16                          | 297<br>11.7             | 439<br>17.3               | 3990<br>897000                       | 2740<br>616000           | 0.32                                          | 2.10                          | 3.13                         | 2.05                                                                | 0.0880                           | 760                                          | 850               | 147<br>324                         |
| 23348YM        | 240<br>9.4488 | 500<br>19.6850 | 195.0<br>7.6772 | 4.0<br>0.16                          | 293<br>11.5             | 437<br>17.2               | 5320<br>1200000                      | 3380<br>761000           | 0.40                                          | 1.67                          | 2.49                         | 1.64                                                                | 0.0878                           | 500                                          | 540               | 185<br>407                         |
| 26250YM        | 250<br>9.8425 | 410<br>16.1417 | 128.0<br>5.0394 | 3.0<br>0.12                          | 284<br>11.2             | 374<br>14.7               | 3180<br>714000                       | 1830<br>412000           | 0.30                                          | 2.28                          | 3.39                         | 2.23                                                                | 0.0831                           | 580                                          | 650               | 64.0<br>141                        |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

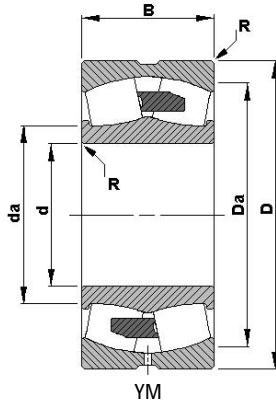
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



B

| Bearing Number | d<br>Bore      | D<br>O.D.      | B<br>Width      | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                              |                                                                   |      | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |
|----------------|----------------|----------------|-----------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------|-------------------------------------------------------------------|------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|
|                |                |                |                 |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                              | Static<br>In All<br>Cases<br>X <sub>0</sub> = 1<br>Y <sub>0</sub> |      |                                                                              |                                     |                                                 |                      |
|                |                |                |                 |                                      |                         |                           |                                         |                             | $\frac{T}{R} \leq e$<br>X = 1                 | $\frac{T}{R} > e$<br>X = .67 |                                                                   | e    |                                                                              |                                     |                                                 |                      |
| 23952YM        | 260<br>10.2362 | 360<br>14.1732 | 75.0<br>2.9528  | 2.0<br>0.08                          | 284<br>11.2             | 339<br>13.3               | 1880<br>422000                          | 951<br>214000               | 0.18                                          | 3.74                         | 5.56                                                              | 3.65 | 0.0830                                                                       | 1000                                | 1200                                            | 23.0<br>50.0         |
| 23052YM        | 260<br>10.2362 | 400<br>15.7480 | 104.0<br>4.0945 | 3.0<br>0.12                          | 291<br>11.5             | 369<br>14.5               | 2770<br>622000                          | 1540<br>345000              | 0.24                                          | 2.85                         | 4.24                                                              | 2.78 | 0.0847                                                                       | 990                                 | 1200                                            | 47.0<br>104          |
| 23052YMB       | 260<br>10.2362 | 400<br>15.7480 | 104.0<br>4.0945 | 3.0<br>0.12                          | 291<br>11.5             | 369<br>14.5               | 2770<br>622000                          | 1540<br>345000              | 0.24                                          | 2.85                         | 4.24                                                              | 2.78 | 0.0847                                                                       | 990                                 | 1200                                            | 47.0<br>104          |
| 24052YM        | 260<br>10.2362 | 400<br>15.7480 | 140.0<br>5.5118 | 3.0<br>0.12                          | 288<br>11.3             | 369<br>14.5               | 3870<br>871000                          | 1990<br>448000              | 0.32                                          | 2.12                         | 3.15                                                              | 2.07 | 0.0846                                                                       | 750                                 | 860                                             | 64.0<br>140          |
| 23152YMB       | 260<br>10.2362 | 440<br>17.3228 | 144.0<br>5.6693 | 3.0<br>0.12                          | 302<br>11.9             | 400<br>15.7               | 3970<br>891000                          | 2240<br>504000              | 0.30                                          | 2.23                         | 3.31                                                              | 2.18 | 0.0867                                                                       | 760                                 | 860                                             | 89.0<br>197          |
| 24152YMB       | 260<br>10.2362 | 440<br>17.3228 | 180.0<br>7.0866 | 3.0<br>0.12                          | 296<br>11.7             | 398<br>15.7               | 4840<br>1090000                         | 2630<br>592000              | 0.37                                          | 1.82                         | 2.70                                                              | 1.78 | 0.0865                                                                       | 530                                 | 570                                             | 112<br>246           |
| 22252YMB       | 260<br>10.2362 | 480<br>18.8976 | 130.0<br>5.1181 | 4.0<br>0.16                          | 309<br>12.2             | 430<br>16.9               | 3530<br>793000                          | 2300<br>518000              | 0.27                                          | 2.46                         | 3.66                                                              | 2.41 | 0.0887                                                                       | 910                                 | 1100                                            | 104<br>230           |
| 23252YM        | 260<br>10.2362 | 480<br>18.8976 | 174.0<br>6.8504 | 4.0<br>0.16                          | 308<br>12.1             | 430<br>16.9               | 4880<br>1100000                         | 2930<br>658000              | 0.34                                          | 1.98                         | 2.95                                                              | 1.94 | 0.0893                                                                       | 610                                 | 680                                             | 139<br>307           |
| 22352YMB       | 260<br>10.2362 | 540<br>21.2598 | 165.0<br>6.4961 | 5.0<br>0.20                          | 321<br>12.6             | 475<br>18.7               | 4590<br>1030000                         | 3130<br>703000              | 0.32                                          | 2.13                         | 3.17                                                              | 2.08 | 0.0924                                                                       | 680                                 | 770                                             | 182<br>401           |
| 23352YM        | 260<br>10.2362 | 540<br>21.2598 | 206.0<br>8.1102 | 5.0<br>0.20                          | 318<br>12.5             | 473<br>18.6               | 6040<br>1360000                         | 3830<br>861000              | 0.39                                          | 1.71                         | 2.54                                                              | 1.67 | 0.0923                                                                       | 450                                 | 480                                             | 227<br>501           |
| 23956YMB       | 280<br>11.0236 | 380<br>14.9606 | 75.0<br>2.9528  | 2.0<br>0.08                          | 304<br>12.0             | 360<br>14.2               | 2000<br>450000                          | 1000<br>225000              | 0.17                                          | 3.95                         | 5.88                                                              | 3.86 | 0.0865                                                                       | 920                                 | 1100                                            | 24.0<br>54.0         |
| 23056YMB       | 280<br>11.0236 | 420<br>16.5354 | 106.0<br>4.1732 | 3.0<br>0.12                          | 312<br>12.3             | 389<br>15.3               | 2830<br>636000                          | 1540<br>346000              | 0.23                                          | 2.92                         | 4.35                                                              | 2.86 | 0.0879                                                                       | 930                                 | 1100                                            | 51.0<br>113          |
| 24056YMB       | 280<br>11.0236 | 420<br>16.5354 | 140.0<br>5.5118 | 3.0<br>0.12                          | 310<br>12.2             | 388<br>15.3               | 4130<br>927000                          | 2030<br>456000              | 0.30                                          | 2.25                         | 3.35                                                              | 2.20 | 0.0883                                                                       | 690                                 | 790                                             | 68.0<br>149          |
| 23156YMB       | 280<br>11.0236 | 460<br>18.1102 | 146.0<br>5.7480 | 4.0<br>0.16                          | 320<br>12.6             | 419<br>16.5               | 4200<br>944000                          | 2330<br>524000              | 0.30                                          | 2.26                         | 3.36                                                              | 2.21 | 0.0900                                                                       | 710                                 | 800                                             | 96.0<br>211          |
| 24156YMB       | 280<br>11.0236 | 460<br>18.1102 | 180.0<br>7.0866 | 4.0<br>0.16                          | 319<br>12.6             | 419<br>16.5               | 5100<br>1150000                         | 2670<br>601000              | 0.36                                          | 1.86                         | 2.77                                                              | 1.82 | 0.0899                                                                       | 490                                 | 530                                             | 118<br>260           |
| 22256YMB       | 280<br>11.0236 | 500<br>19.6850 | 130.0<br>5.1181 | 4.0<br>0.16                          | 331<br>13.0             | 449<br>17.7               | 3780<br>850000                          | 2360<br>530000              | 0.26                                          | 2.62                         | 3.91                                                              | 2.57 | 0.0927                                                                       | 850                                 | 990                                             | 110<br>242           |
| 23256YMB       | 280<br>11.0236 | 500<br>19.6850 | 176.0<br>6.9291 | 4.0<br>0.16                          | 329<br>13.0             | 450<br>17.7               | 5290<br>1190000                         | 3070<br>689000              | 0.33                                          | 2.07                         | 3.08                                                              | 2.02 | 0.0921                                                                       | 560                                 | 620                                             | 149<br>328           |
| 22356YMB       | 280<br>11.0236 | 580<br>22.8346 | 175.0<br>6.8898 | 5.0<br>0.20                          | 345<br>13.6             | 511<br>20.1               | 5320<br>1200000                         | 3590<br>806000              | 0.32                                          | 2.13                         | 3.17                                                              | 2.08 | 0.0968                                                                       | 620                                 | 690                                             | 222<br>490           |
| 23356YM        | 280<br>11.0236 | 580<br>22.8346 | 224.0<br>8.8189 | 5.0<br>0.20                          | 341<br>13.4             | 508<br>20.0               | 7100<br>1600000                         | 4430<br>997000              | 0.40                                          | 1.69                         | 2.52                                                              | 1.65 | 0.0966                                                                       | 400                                 | 430                                             | 284<br>627           |
| 23960YMB       | 300<br>11.8110 | 420<br>16.5354 | 90.0<br>3.5433  | 2.5<br>0.10                          | 328<br>12.9             | 394<br>15.5               | 2650<br>596000                          | 1330<br>300000              | 0.19                                          | 3.59                         | 5.34                                                              | 3.51 | 0.0911                                                                       | 840                                 | 1000                                            | 38.0<br>84.0         |
| 23060YMB       | 300<br>11.8110 | 460<br>18.1102 | 118.0<br>4.6457 | 3.0<br>0.12                          | 336<br>13.2             | 425<br>16.8               | 3600<br>809000                          | 1970<br>442000              | 0.24                                          | 2.87                         | 4.27                                                              | 2.80 | 0.0926                                                                       | 830                                 | 980                                             | 71.0<br>156          |

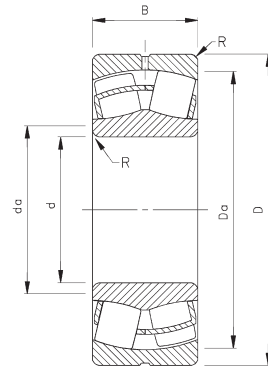
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# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore         | D O.D.         | B Width         | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                                         |                                        | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|----------------|----------------|-----------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |                |                |                 |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                                         | Static                                 |                                                                  |                            |                                        |                |                                 |
|                |                |                |                 |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.               | e                                             | $\frac{T}{R} \leq \frac{e}{e}$<br>X = 1 | $\frac{T}{R} > \frac{e}{e}$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 24060YMB       | 300<br>11.8110 | 460<br>18.1102 | 160.0<br>6.2992 | 3.0<br>0.12                    | 334<br>13.1          | 423<br>16.7            | 5230<br>1180000                   | 2560<br>576000        | 0.32                                          | 2.11                                    | 3.13                                   | 2.06                                                             | 0.0928                     | 620                                    | 700            | 96.0<br>211                     |
| 23160YMB       | 300<br>11.8110 | 500<br>19.6850 | 160.0<br>6.2992 | 4.0<br>0.16                    | 345<br>13.6          | 453<br>17.8            | 5160<br>1160000                   | 2810<br>632000        | 0.30                                          | 2.25                                    | 3.35                                   | 2.20                                                             | 0.0946                     | 630                                    | 710            | 126<br>278                      |
| 24160YMB       | 300<br>11.8110 | 500<br>19.6850 | 200.0<br>7.8740 | 4.0<br>0.16                    | 338<br>13.3          | 455<br>17.9            | 6320<br>1420000                   | 3380<br>759000        | 0.37                                          | 1.82                                    | 2.71                                   | 1.78                                                             | 0.0942                     | 430                                    | 460            | 158<br>347                      |
| 22260YMB       | 300<br>11.8110 | 540<br>21.2598 | 140.0<br>5.5118 | 4.0<br>0.16                    | 355<br>14.0          | 484<br>19.1            | 4430<br>997000                    | 2760<br>621000        | 0.26                                          | 2.59                                    | 3.86                                   | 2.53                                                             | 0.0965                     | 770                                    | 890            | 139<br>306                      |
| 23260YMB       | 300<br>11.8110 | 540<br>21.2598 | 192.0<br>7.5591 | 4.0<br>0.16                    | 353<br>13.9          | 482<br>19.0            | 6210<br>1400000                   | 3510<br>788000        | 0.34                                          | 2.00                                    | 2.98                                   | 1.96                                                             | 0.0967                     | 510                                    | 560            | 191<br>420                      |
| 23964YMB       | 320<br>12.5984 | 440<br>17.3228 | 90.0<br>3.5433  | 2.5<br>0.10                    | 349<br>13.8          | 414<br>16.3            | 2800<br>629000                    | 1360<br>305000        | 0.18                                          | 3.79                                    | 5.65                                   | 3.71                                                             | 0.0946                     | 780                                    | 930            | 40.0<br>89.0                    |
| 23064YMB       | 320<br>12.5984 | 480<br>18.8976 | 121.0<br>4.7638 | 3.0<br>0.12                    | 357<br>14.1          | 444<br>17.5            | 3910<br>880000                    | 2040<br>458000        | 0.23                                          | 2.93                                    | 4.36                                   | 2.86                                                             | 0.0962                     | 780                                    | 910            | 76.0<br>168                     |
| 24064YMB       | 320<br>12.5984 | 480<br>18.8976 | 160.0<br>6.2992 | 3.0<br>0.12                    | 354<br>13.9          | 444<br>17.5            | 5420<br>1220000                   | 2620<br>588000        | 0.30                                          | 2.24                                    | 3.34                                   | 2.19                                                             | 0.0961                     | 580                                    | 660            | 101<br>222                      |
| 23164YMB       | 320<br>12.5984 | 540<br>21.2598 | 176.0<br>6.9291 | 4.0<br>0.16                    | 367<br>14.4          | 490<br>19.3            | 6000<br>1350000                   | 3330<br>749000        | 0.31                                          | 2.14                                    | 3.19                                   | 2.10                                                             | 0.0988                     | 580                                    | 650            | 164<br>361                      |
| 24164YMB       | 320<br>12.5984 | 540<br>21.2598 | 218.0<br>8.5827 | 4.0<br>0.16                    | 362<br>14.3          | 489<br>19.3            | 7580<br>1710000                   | 3980<br>894000        | 0.38                                          | 1.77                                    | 2.63                                   | 1.73                                                             | 0.0986                     | 380                                    | 410            | 203<br>448                      |
| 22264YMB       | 320<br>12.5984 | 580<br>22.8346 | 150.0<br>5.9055 | 4.0<br>0.16                    | 380<br>15.0          | 519<br>20.4            | 5040<br>1130000                   | 3110<br>700000        | 0.26                                          | 2.58                                    | 3.84                                   | 2.52                                                             | 0.1009                     | 710                                    | 820            | 173<br>381                      |
| 23264YMB       | 320<br>12.5984 | 580<br>22.8346 | 208.0<br>8.1890 | 4.0<br>0.16                    | 379<br>14.9          | 516<br>20.3            | 7140<br>1610000                   | 3960<br>891000        | 0.34                                          | 1.98                                    | 2.94                                   | 1.93                                                             | 0.1013                     | 460                                    | 510            | 240<br>528                      |
| 23968YMB       | 340<br>13.3858 | 460<br>18.1102 | 90.0<br>3.5433  | 2.5<br>0.10                    | 369<br>14.5          | 435<br>17.1            | 3020<br>678000                    | 1420<br>320000        | 0.17                                          | 3.98                                    | 5.93                                   | 3.89                                                             | 0.0983                     | 730                                    | 860            | 43.0<br>94.0                    |
| 23068YMB       | 340<br>13.3858 | 520<br>20.4724 | 133.0<br>5.2362 | 4.0<br>0.16                    | 384<br>15.1          | 481<br>18.9            | 4670<br>1050000                   | 2430<br>546000        | 0.23                                          | 2.96                                    | 4.40                                   | 2.89                                                             | 0.1005                     | 710                                    | 830            | 101<br>223                      |
| 24068YMB       | 340<br>13.3858 | 520<br>20.4724 | 180.0<br>7.0866 | 4.0<br>0.16                    | 377<br>14.9          | 479<br>18.9            | 6590<br>1480000                   | 3190<br>717000        | 0.32                                          | 2.14                                    | 3.18                                   | 2.09                                                             | 0.1004                     | 530                                    | 600            | 137<br>302                      |
| 23168YMB       | 340<br>13.3858 | 580<br>22.8346 | 190.0<br>7.4803 | 4.0<br>0.16                    | 397<br>15.6          | 526<br>20.7            | 6900<br>1550000                   | 3750<br>843000        | 0.30                                          | 2.22                                    | 3.30                                   | 2.17                                                             | 0.1033                     | 530                                    | 590            | 206<br>455                      |
| 24168YMB       | 340<br>13.3858 | 580<br>22.8346 | 243.0<br>9.5669 | 4.0<br>0.16                    | 385<br>15.2          | 525<br>20.7            | 8970<br>2020000                   | 4720<br>1060000       | 0.39                                          | 1.75                                    | 2.61                                   | 1.71                                                             | 0.1033                     | 340                                    | 370            | 264<br>582                      |
| 23268YMB       | 340<br>13.3858 | 620<br>24.4094 | 224.0<br>8.8189 | 5.0<br>0.20                    | 399<br>15.7          | 554<br>21.8            | 8290<br>1860000                   | 4700<br>1060000       | 0.35                                          | 1.91                                    | 2.84                                   | 1.86                                                             | 0.1051                     | 420                                    | 460            | 296<br>653                      |
| 23972YMB       | 360<br>14.1732 | 480<br>18.8976 | 90.0<br>3.5433  | 2.5<br>0.10                    | 389<br>15.3          | 455<br>17.9            | 3170<br>712000                    | 1460<br>328000        | 0.16                                          | 4.12                                    | 6.13                                   | 4.03                                                             | 0.1013                     | 680                                    | 810            | 45.0<br>98.0                    |
| 23072YMB       | 360<br>14.1732 | 540<br>21.2598 | 134.0<br>5.2756 | 4.0<br>0.16                    | 403<br>15.9          | 499<br>19.7            | 4640<br>1040000                   | 2390<br>538000        | 0.23                                          | 2.94                                    | 4.38                                   | 2.88                                                             | 0.1035                     | 680                                    | 800            | 107<br>236                      |
| 24072YMB       | 360<br>14.1732 | 540<br>21.2598 | 180.0<br>7.0866 | 4.0<br>0.16                    | 398<br>15.7          | 500<br>19.7            | 6900<br>1550000                   | 3270<br>736000        | 0.30                                          | 2.24                                    | 3.33                                   | 2.19                                                             | 0.1036                     | 500                                    | 560            | 144<br>316                      |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

(2) Maximum shaft or housing fillet radius that bearing corners will clear.

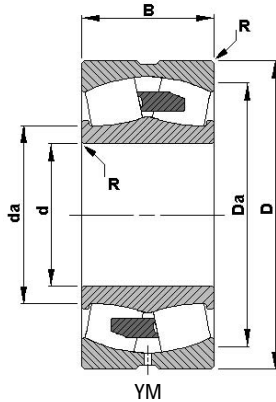
\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."



# Spherical Roller Bearings



B

| Bearing Number  | d<br>Bore  | D<br>O.D.  | B<br>Width   | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                              |                                                                   |             | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |
|-----------------|------------|------------|--------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------|-------------------------------------------------------------------|-------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|
|                 |            |            |              |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                              | Static<br>In All<br>Cases<br>X <sub>0</sub> = 1<br>Y <sub>0</sub> |             |                                                                              |                                     |                                                 |                      |
|                 |            |            |              |                                      |                         |                           |                                         |                             | $\frac{T}{R} \leq e$<br>X = 1                 | $\frac{T}{R} > e$<br>X = .67 |                                                                   | e           |                                                                              |                                     |                                                 |                      |
| <b>23172YMB</b> | <b>360</b> | <b>600</b> | <b>192.0</b> | <b>4.0</b>                           | <b>419</b>              | <b>546</b>                | <b>7360</b>                             | <b>3880</b>                 | <b>0.29</b>                                   | <b>2.29</b>                  | <b>3.42</b>                                                       | <b>2.24</b> | <b>0.1065</b>                                                                | <b>500</b>                          | <b>560</b>                                      | <b>218</b>           |
|                 | 14.1732    | 23.6220    | 7.5591       | 0.16                                 | 16.5                    | 21.5                      | 1650000                                 | 872000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 480                  |
| <b>24172YMB</b> | <b>360</b> | <b>600</b> | <b>243.0</b> | <b>4.0</b>                           | <b>406</b>              | <b>545</b>                | <b>9620</b>                             | <b>4890</b>                 | <b>0.38</b>                                   | <b>1.79</b>                  | <b>2.67</b>                                                       | <b>1.75</b> | <b>0.1064</b>                                                                | <b>320</b>                          | <b>340</b>                                      | <b>276</b>           |
|                 | 14.1732    | 23.6220    | 9.5669       | 0.16                                 | 16.0                    | 21.4                      | 2160000                                 | 1100000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 608                  |
| <b>23272YMB</b> | <b>360</b> | <b>650</b> | <b>232.0</b> | <b>5.0</b>                           | <b>420</b>              | <b>583</b>                | <b>8900</b>                             | <b>5040</b>                 | <b>0.35</b>                                   | <b>1.95</b>                  | <b>2.91</b>                                                       | <b>1.91</b> | <b>0.1086</b>                                                                | <b>400</b>                          | <b>430</b>                                      | <b>334</b>           |
|                 | 14.1732    | 25.5906    | 9.1339       | 0.20                                 | 16.5                    | 22.9                      | 2000000                                 | 1130000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 737                  |
| <b>23976YMB</b> | <b>380</b> | <b>520</b> | <b>106.0</b> | <b>3.0</b>                           | <b>416</b>              | <b>488</b>                | <b>3970</b>                             | <b>1810</b>                 | <b>0.18</b>                                   | <b>3.80</b>                  | <b>5.66</b>                                                       | <b>3.72</b> | <b>0.1057</b>                                                                | <b>640</b>                          | <b>750</b>                                      | <b>66.0</b>          |
|                 | 14.9606    | 20.4724    | 4.1732       | 0.12                                 | 16.4                    | 19.2                      | 893000                                  | 407000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 145                  |
| <b>23076YMB</b> | <b>380</b> | <b>560</b> | <b>135.0</b> | <b>4.0</b>                           | <b>422</b>              | <b>520</b>                | <b>5150</b>                             | <b>2590</b>                 | <b>0.22</b>                                   | <b>3.08</b>                  | <b>4.58</b>                                                       | <b>3.01</b> | <b>0.1068</b>                                                                | <b>630</b>                          | <b>740</b>                                      | <b>112</b>           |
|                 | 14.9606    | 22.0472    | 5.3150       | 0.16                                 | 16.6                    | 20.5                      | 1160000                                 | 581000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 248                  |
| <b>24076YMB</b> | <b>380</b> | <b>560</b> | <b>180.0</b> | <b>4.0</b>                           | <b>418</b>              | <b>520</b>                | <b>7150</b>                             | <b>3360</b>                 | <b>0.29</b>                                   | <b>2.32</b>                  | <b>3.45</b>                                                       | <b>2.27</b> | <b>0.1062</b>                                                                | <b>470</b>                          | <b>530</b>                                      | <b>150</b>           |
|                 | 14.9606    | 22.0472    | 7.0866       | 0.16                                 | 16.4                    | 20.5                      | 1610000                                 | 755000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 330                  |
| <b>23176YMB</b> | <b>380</b> | <b>620</b> | <b>194.0</b> | <b>4.0</b>                           | <b>431</b>              | <b>566</b>                | <b>7670</b>                             | <b>4100</b>                 | <b>0.30</b>                                   | <b>2.28</b>                  | <b>3.39</b>                                                       | <b>2.23</b> | <b>0.1090</b>                                                                | <b>470</b>                          | <b>530</b>                                      | <b>229</b>           |
|                 | 14.9606    | 24.4094    | 7.6378       | 0.16                                 | 17.0                    | 22.3                      | 1720000                                 | 922000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 505                  |
| <b>24176YMB</b> | <b>380</b> | <b>620</b> | <b>243.0</b> | <b>4.0</b>                           | <b>427</b>              | <b>565</b>                | <b>10200</b>                            | <b>5080</b>                 | <b>0.36</b>                                   | <b>1.87</b>                  | <b>2.79</b>                                                       | <b>1.83</b> | <b>0.1097</b>                                                                | <b>300</b>                          | <b>320</b>                                      | <b>287</b>           |
|                 | 14.9606    | 24.4094    | 9.5669       | 0.16                                 | 16.8                    | 22.3                      | 2290000                                 | 1140000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 633                  |
| <b>23276YMB</b> | <b>380</b> | <b>680</b> | <b>240.0</b> | <b>5.0</b>                           | <b>442</b>              | <b>611</b>                | <b>9630</b>                             | <b>5430</b>                 | <b>0.34</b>                                   | <b>1.98</b>                  | <b>2.95</b>                                                       | <b>1.94</b> | <b>0.1119</b>                                                                | <b>370</b>                          | <b>400</b>                                      | <b>376</b>           |
|                 | 14.9606    | 26.7717    | 9.4488       | 0.20                                 | 17.4                    | 24.1                      | 2170000                                 | 1220000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 828                  |
| <b>23980YMB</b> | <b>400</b> | <b>540</b> | <b>106.0</b> | <b>3.0</b>                           | <b>436</b>              | <b>511</b>                | <b>4050</b>                             | <b>1850</b>                 | <b>0.17</b>                                   | <b>3.99</b>                  | <b>5.94</b>                                                       | <b>3.90</b> | <b>0.1086</b>                                                                | <b>600</b>                          | <b>720</b>                                      | <b>69.0</b>          |
|                 | 15.7480    | 21.2598    | 4.1732       | 0.12                                 | 17.2                    | 20.1                      | 910000                                  | 415000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 151                  |
| <b>23080YMB</b> | <b>400</b> | <b>600</b> | <b>148.0</b> | <b>4.0</b>                           | <b>447</b>              | <b>555</b>                | <b>6020</b>                             | <b>3050</b>                 | <b>0.23</b>                                   | <b>2.98</b>                  | <b>4.44</b>                                                       | <b>2.92</b> | <b>0.1109</b>                                                                | <b>590</b>                          | <b>690</b>                                      | <b>146</b>           |
|                 | 15.7480    | 23.6220    | 5.8268       | 0.16                                 | 17.6                    | 21.9                      | 1350000                                 | 685000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 321                  |
| <b>24080YMB</b> | <b>400</b> | <b>600</b> | <b>200.0</b> | <b>4.0</b>                           | <b>442</b>              | <b>555</b>                | <b>8550</b>                             | <b>3990</b>                 | <b>0.30</b>                                   | <b>2.24</b>                  | <b>3.33</b>                                                       | <b>2.19</b> | <b>0.1108</b>                                                                | <b>430</b>                          | <b>480</b>                                      | <b>197</b>           |
|                 | 15.7480    | 23.6220    | 7.8740       | 0.16                                 | 17.4                    | 21.9                      | 1920000                                 | 898000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 434                  |
| <b>23180YMB</b> | <b>400</b> | <b>650</b> | <b>200.0</b> | <b>5.0</b>                           | <b>454</b>              | <b>594</b>                | <b>8210</b>                             | <b>4350</b>                 | <b>0.29</b>                                   | <b>2.32</b>                  | <b>3.46</b>                                                       | <b>2.27</b> | <b>0.1123</b>                                                                | <b>440</b>                          | <b>500</b>                                      | <b>258</b>           |
|                 | 15.7480    | 25.5906    | 7.8740       | 0.20                                 | 17.9                    | 23.4                      | 1850000                                 | 979000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 570                  |
| <b>24180YMB</b> | <b>400</b> | <b>650</b> | <b>250.0</b> | <b>5.0</b>                           | <b>449</b>              | <b>594</b>                | <b>10500</b>                            | <b>5280</b>                 | <b>0.35</b>                                   | <b>1.91</b>                  | <b>2.84</b>                                                       | <b>1.87</b> | <b>0.1123</b>                                                                | <b>290</b>                          | <b>310</b>                                      | <b>323</b>           |
|                 | 15.7480    | 25.5906    | 9.8425       | 0.20                                 | 17.7                    | 23.4                      | 2350000                                 | 1190000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 712                  |
| <b>23280YMB</b> | <b>400</b> | <b>720</b> | <b>256.0</b> | <b>5.0</b>                           | <b>466</b>              | <b>646</b>                | <b>11000</b>                            | <b>6110</b>                 | <b>0.34</b>                                   | <b>1.96</b>                  | <b>2.93</b>                                                       | <b>1.92</b> | <b>0.1159</b>                                                                | <b>340</b>                          | <b>370</b>                                      | <b>452</b>           |
|                 | 15.7480    | 28.3465    | 10.0787      | 0.20                                 | 18.4                    | 25.4                      | 2460000                                 | 1370000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 996                  |
| <b>22380YMB</b> | <b>400</b> | <b>820</b> | <b>243.0</b> | <b>6.0</b>                           | <b>496</b>              | <b>729</b>                | <b>10200</b>                            | <b>6570</b>                 | <b>0.30</b>                                   | <b>2.28</b>                  | <b>3.40</b>                                                       | <b>2.23</b> | <b>0.1213</b>                                                                | <b>390</b>                          | <b>430</b>                                      | <b>613</b>           |
|                 | 15.7480    | 32.2835    | 9.5669       | 0.24                                 | 19.5                    | 28.7                      | 2290000                                 | 1480000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 1350                 |
| <b>23984YMB</b> | <b>420</b> | <b>560</b> | <b>106.0</b> | <b>3.0</b>                           | <b>454</b>              | <b>531</b>                | <b>4270</b>                             | <b>1930</b>                 | <b>0.16</b>                                   | <b>4.14</b>                  | <b>6.17</b>                                                       | <b>4.05</b> | <b>0.1117</b>                                                                | <b>570</b>                          | <b>670</b>                                      | <b>72.0</b>          |
|                 | 16.5354    | 22.0472    | 4.1732       | 0.12                                 | 17.9                    | 20.9                      | 961000                                  | 434000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 158                  |
| <b>23084YMB</b> | <b>420</b> | <b>620</b> | <b>150.0</b> | <b>4.0</b>                           | <b>467</b>              | <b>576</b>                | <b>6430</b>                             | <b>3170</b>                 | <b>0.22</b>                                   | <b>3.05</b>                  | <b>4.54</b>                                                       | <b>2.98</b> | <b>0.1139</b>                                                                | <b>560</b>                          | <b>650</b>                                      | <b>154</b>           |
|                 | 16.5354    | 24.4094    | 5.9055       | 0.16                                 | 18.4                    | 22.7                      | 1450000                                 | 713000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 339                  |
| <b>24084YMB</b> | <b>420</b> | <b>620</b> | <b>200.0</b> | <b>4.0</b>                           | <b>463</b>              | <b>575</b>                | <b>8710</b>                             | <b>4010</b>                 | <b>0.29</b>                                   | <b>2.37</b>                  | <b>3.52</b>                                                       | <b>2.31</b> | <b>0.1138</b>                                                                | <b>410</b>                          | <b>460</b>                                      | <b>205</b>           |
|                 | 16.5354    | 24.4094    | 7.8740       | 0.16                                 | 18.2                    | 22.7                      | 1960000                                 | 901000                      |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 451                  |
| <b>23184YMB</b> | <b>420</b> | <b>700</b> | <b>224.0</b> | <b>5.0</b>                           | <b>480</b>              | <b>637</b>                | <b>9760</b>                             | <b>5210</b>                 | <b>0.31</b>                                   | <b>2.21</b>                  | <b>3.28</b>                                                       | <b>2.16</b> | <b>0.1166</b>                                                                | <b>410</b>                          | <b>450</b>                                      | <b>346</b>           |
|                 | 16.5354    | 27.5591    | 8.8189       | 0.20                                 | 18.9                    | 25.1                      | 2190000                                 | 1170000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 762                  |
| <b>24184YMB</b> | <b>420</b> | <b>700</b> | <b>280.0</b> | <b>5.0</b>                           | <b>473</b>              | <b>637</b>                | <b>12500</b>                            | <b>6330</b>                 | <b>0.37</b>                                   | <b>1.81</b>                  | <b>2.70</b>                                                       | <b>1.77</b> | <b>0.1166</b>                                                                | <b>260</b>                          | <b>280</b>                                      | <b>432</b>           |
|                 | 16.5354    | 27.5591    | 11.0236      | 0.20                                 | 18.6                    | 25.1                      | 2810000                                 | 1420000                     |                                               |                              |                                                                   |             |                                                                              |                                     |                                                 | 953                  |

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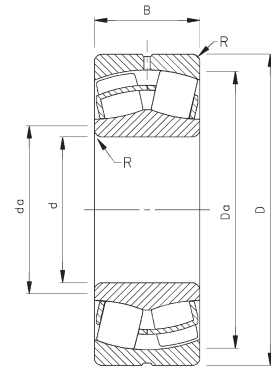




# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number | d Bore         | D O.D.         | B Width          | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                             |                               | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|----------------|----------------|----------------|------------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-----------------------------|-------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                |                |                |                  |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                             | Static                        |                                                                  |                            |                                        |                |                                 |
|                |                |                |                  |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.               | e                                             | T <sub>R</sub> ≤ e<br>X = 1 | T <sub>R</sub> > e<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| 23284YMB       | 420<br>16.5354 | 760<br>29.9213 | 272.0<br>10.7087 | 6.0<br>0.24                    | 490<br>19.3          | 681<br>26.8            | 12000<br>2690000                  | 6670<br>1500000       | 0.35                                          | 1.90                        | 2.83                          | 1.86                                                             | 0.1187                     | 320                                    | 350            | 537<br>1180                     |
| 23988YMB       | 440<br>17.3228 | 600<br>23.6220 | 118.0<br>4.6457  | 3.0<br>0.12                    | 479<br>18.9          | 566<br>22.3            | 5080<br>1140000                   | 2340<br>525000        | 0.17                                          | 3.93                        | 5.85                          | 3.84                                                             | 0.1157                     | 530                                    | 630            | 97.0<br>213                     |
| 23088YMB       | 440<br>17.3228 | 650<br>25.5906 | 157.0<br>6.1811  | 5.0<br>0.20                    | 489<br>19.3          | 603<br>23.8            | 7050<br>1590000                   | 3460<br>777000        | 0.22                                          | 3.04                        | 4.53                          | 2.97                                                             | 0.1173                     | 520                                    | 610            | 177<br>390                      |
| 24088YMB       | 440<br>17.3228 | 650<br>25.5906 | 212.0<br>8.3465  | 5.0<br>0.20                    | 485<br>19.1          | 603<br>23.7            | 9870<br>2220000                   | 4480<br>1010000       | 0.29                                          | 2.31                        | 3.44                          | 2.26                                                             | 0.1173                     | 380                                    | 430            | 239<br>527                      |
| 23188YMB       | 440<br>17.3228 | 720<br>28.3465 | 226.0<br>8.8976  | 5.0<br>0.20                    | 500<br>19.7          | 657<br>25.9            | 10400<br>2340000                  | 5440<br>1220000       | 0.30                                          | 2.26                        | 3.37                          | 2.21                                                             | 0.1198                     | 380                                    | 430            | 361<br>797                      |
| 24188YMB       | 440<br>17.3228 | 720<br>28.3465 | 280.0<br>11.0236 | 5.0<br>0.20                    | 495<br>19.5          | 656<br>25.8            | 13100<br>2930000                  | 6450<br>1450000       | 0.36                                          | 1.88                        | 2.79                          | 1.84                                                             | 0.1197                     | 250                                    | 260            | 448<br>987                      |
| 23288YMB       | 440<br>17.3228 | 790<br>31.1024 | 280.0<br>11.0236 | 6.0<br>0.24                    | 512<br>20.1          | 710<br>27.9            | 13400<br>3010000                  | 7350<br>1650000       | 0.35                                          | 1.95                        | 2.91                          | 1.91                                                             | 0.1231                     | 300                                    | 320            | 593<br>1310                     |
| 23992YMB       | 460<br>18.1102 | 620<br>24.4094 | 118.0<br>4.6457  | 3.0<br>0.12                    | 504<br>19.9          | 582<br>22.9            | 4700<br>1060000                   | 2050<br>460000        | 0.16                                          | 4.13                        | 6.15                          | 4.04                                                             | 0.1187                     | 520                                    | 620            | 101<br>221                      |
| 23092YMB       | 460<br>18.1102 | 680<br>26.7717 | 163.0<br>6.4173  | 5.0<br>0.20                    | 512<br>20.1          | 631<br>24.8            | 7660<br>1720000                   | 3740<br>840000        | 0.22                                          | 3.06                        | 4.56                          | 2.99                                                             | 0.1207                     | 500                                    | 570            | 202<br>444                      |
| 24092YMB       | 460<br>18.1102 | 680<br>26.7717 | 218.0<br>8.5827  | 5.0<br>0.20                    | 507<br>20.0          | 630<br>24.8            | 10400<br>2350000                  | 4750<br>1070000       | 0.28                                          | 2.37                        | 3.53                          | 2.32                                                             | 0.1207                     | 360                                    | 410            | 270<br>593                      |
| 23192YMB       | 460<br>18.1102 | 760<br>29.9213 | 240.0<br>9.4488  | 6.0<br>0.24                    | 524<br>20.6          | 692<br>27.2            | 11200<br>2530000                  | 5920<br>1330000       | 0.30                                          | 2.24                        | 3.33                          | 2.19                                                             | 0.1230                     | 370                                    | 410            | 433<br>953                      |
| 24192YMB       | 460<br>18.1102 | 760<br>29.9213 | 300.0<br>11.8110 | 6.0<br>0.24                    | 517<br>20.4          | 692<br>27.2            | 15000<br>3360000                  | 7420<br>1670000       | 0.37                                          | 1.82                        | 2.71                          | 1.78                                                             | 0.1239                     | 220                                    | 240            | 542<br>1190                     |
| 23292YMB       | 460<br>18.1102 | 830<br>32.6772 | 296.0<br>11.6535 | 6.0<br>0.24                    | 535<br>21.1          | 746<br>29.4            | 14200<br>3190000                  | 7870<br>1770000       | 0.34                                          | 1.96                        | 2.93                          | 1.92                                                             | 0.1259                     | 280                                    | 310            | 697<br>1530                     |
| 23996YMB       | 480<br>18.8976 | 650<br>25.5906 | 128.0<br>5.0394  | 4.0<br>0.16                    | 522<br>20.6          | 614<br>24.2            | 5430<br>1220000                   | 2490<br>559000        | 0.17                                          | 3.86                        | 5.75                          | 3.78                                                             | 0.1224                     | 500                                    | 590            | 121<br>267                      |
| 23096YMB       | 480<br>18.8976 | 700<br>27.5591 | 165.0<br>6.4961  | 5.0<br>0.20                    | 532<br>21.0          | 650<br>25.6            | 8070<br>1810000                   | 3840<br>863000        | 0.22                                          | 3.14                        | 4.67                          | 3.07                                                             | 0.1236                     | 470                                    | 550            | 211<br>465                      |
| 24096YMB       | 480<br>18.8976 | 700<br>27.5591 | 218.0<br>8.5827  | 5.0<br>0.20                    | 527<br>20.7          | 652<br>25.7            | 11000<br>2470000                  | 4970<br>1120000       | 0.28                                          | 2.45                        | 3.64                          | 2.39                                                             | 0.1233                     | 340                                    | 380            | 279<br>614                      |
| 23196YMB       | 480<br>18.8976 | 790<br>31.1024 | 248.0<br>9.7638  | 6.0<br>0.24                    | 547<br>21.5          | 719<br>28.3            | 12600<br>2830000                  | 6480<br>1460000       | 0.30                                          | 2.26                        | 3.36                          | 2.21                                                             | 0.1269                     | 340                                    | 370            | 482<br>1060                     |
| 24196YMB       | 480<br>18.8976 | 790<br>31.1024 | 308.0<br>12.1260 | 6.0<br>0.24                    | 542<br>21.3          | 717<br>28.2            | 16300<br>3660000                  | 7840<br>1760000       | 0.37                                          | 1.85                        | 2.75                          | 1.80                                                             | 0.1266                     | 210                                    | 220            | 598<br>1320                     |
| 23296YMB       | 480<br>18.8976 | 870<br>34.2520 | 310.0<br>12.2047 | 6.0<br>0.24                    | 561<br>22.1          | 779<br>30.7            | 16600<br>3740000                  | 8940<br>2010000       | 0.35                                          | 1.92                        | 2.85                          | 1.87                                                             | 0.1305                     | 250                                    | 270            | 805<br>1770                     |
| 239/500YMB     | 500<br>19.6850 | 670<br>26.3780 | 128.0<br>5.0394  | 4.0<br>0.16                    | 544<br>21.4          | 634<br>25.0            | 5730<br>1290000                   | 2540<br>571000        | 0.17                                          | 4.02                        | 5.98                          | 3.93                                                             | 0.1251                     | 470                                    | 560            | 126<br>276                      |
| 230/500YMB     | 500<br>19.6850 | 720<br>28.3465 | 167.0<br>6.5748  | 5.0<br>0.20                    | 551<br>21.7          | 673<br>26.5            | 8260<br>1860000                   | 3950<br>889000        | 0.21                                          | 3.26                        | 4.85                          | 3.18                                                             | 0.1263                     | 460                                    | 530            | 221<br>486                      |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

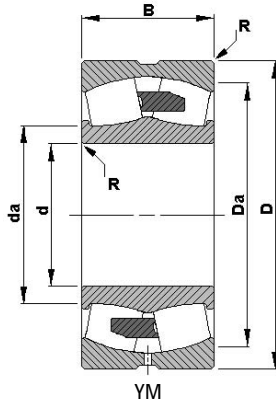
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



B

| Bearing Number    | d<br>Bore  | D<br>O.D.   | B<br>Width   | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                            |                             | Equivalent Radial load Factors <sup>(1)</sup> |                                    |                                                                   | Lubrication<br>Life<br>Adjustment<br>Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference<br>Speed<br>Grease<br>RPM | Thermal<br>Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg<br>lbs. |                                   |
|-------------------|------------|-------------|--------------|--------------------------------------|-------------------------|---------------------------|-----------------------------------------|-----------------------------|-----------------------------------------------|------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------|----------------------|-----------------------------------|
|                   |            |             |              |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static<br>Load Rating<br>C <sub>0</sub> | Dynamic<br>Load Rating<br>C | Dynamic                                       |                                    | Static<br>In All<br>Cases<br>X <sub>0</sub> = 1<br>Y <sub>0</sub> |                                                                              |                                     |                                                 |                      |                                   |
|                   |            |             |              |                                      |                         |                           |                                         |                             | e                                             | $\frac{T}{R} \leq e$<br>X = 1<br>Y |                                                                   |                                                                              |                                     |                                                 |                      | $\frac{T}{R} > e$<br>X = .67<br>Y |
| <b>240/500YMB</b> | <b>500</b> | <b>720</b>  | <b>218.0</b> | <b>5.0</b>                           | <b>547</b>              | <b>672</b>                | <b>11300</b>                            | <b>5040</b>                 | <b>0.27</b>                                   | <b>2.51</b>                        | <b>3.74</b>                                                       | <b>2.45</b>                                                                  | <b>0.1263</b>                       | <b>330</b>                                      | <b>370</b>           | <b>289</b><br>635                 |
|                   | 19.6850    | 28.3465     | 8.5827       | 0.20                                 | 21.5                    | 26.5                      | 2540000                                 | 1130000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>231/500YMB</b> | <b>500</b> | <b>830</b>  | <b>264.0</b> | <b>6.0</b>                           | <b>573</b>              | <b>753</b>                | <b>14100</b>                            | <b>7180</b>                 | <b>0.30</b>                                   | <b>2.22</b>                        | <b>3.30</b>                                                       | <b>2.17</b>                                                                  | <b>0.1307</b>                       | <b>320</b>                                      | <b>350</b>           | <b>572</b><br>1260                |
|                   | 19.6850    | 32.6772     | 10.3937      | 0.24                                 | 22.5                    | 29.6                      | 3170000                                 | 1610000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>241/500YMB</b> | <b>500</b> | <b>830</b>  | <b>325.0</b> | <b>6.0</b>                           | <b>563</b>              | <b>755</b>                | <b>17700</b>                            | <b>8720</b>                 | <b>0.37</b>                                   | <b>1.81</b>                        | <b>2.69</b>                                                       | <b>1.77</b>                                                                  | <b>0.1300</b>                       | <b>200</b>                                      | <b>210</b>           | <b>704</b><br>1550                |
|                   | 19.6850    | 32.6772     | 12.7953      | 0.24                                 | 22.2                    | 29.7                      | 3990000                                 | 1960000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>232/500YMB</b> | <b>500</b> | <b>920</b>  | <b>336.0</b> | <b>6.0</b>                           | <b>585</b>              | <b>823</b>                | <b>18100</b>                            | <b>9910</b>                 | <b>0.36</b>                                   | <b>1.90</b>                        | <b>2.83</b>                                                       | <b>1.86</b>                                                                  | <b>0.1340</b>                       | <b>240</b>                                      | <b>260</b>           | <b>988</b><br>2170                |
|                   | 19.6850    | 36.2205     | 13.2283      | 0.24                                 | 23.0                    | 32.4                      | 4070000                                 | 2230000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>239/530YMB</b> | <b>530</b> | <b>710</b>  | <b>136.0</b> | <b>4.0</b>                           | <b>575</b>              | <b>672</b>                | <b>6950</b>                             | <b>3030</b>                 | <b>0.16</b>                                   | <b>4.11</b>                        | <b>6.12</b>                                                       | <b>4.02</b>                                                                  | <b>0.1298</b>                       | <b>430</b>                                      | <b>500</b>           | <b>149</b><br>329                 |
|                   | 20.8661    | 27.9528     | 5.3543       | 0.16                                 | 22.6                    | 26.4                      | 1560000                                 | 682000                      |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>230/530YMB</b> | <b>530</b> | <b>780</b>  | <b>185.0</b> | <b>5.0</b>                           | <b>588</b>              | <b>725</b>                | <b>9840</b>                             | <b>4740</b>                 | <b>0.21</b>                                   | <b>3.14</b>                        | <b>4.68</b>                                                       | <b>3.07</b>                                                                  | <b>0.1319</b>                       | <b>420</b>                                      | <b>480</b>           | <b>299</b><br>657                 |
|                   | 20.8661    | 30.7087     | 7.2835       | 0.20                                 | 23.2                    | 28.5                      | 2210000                                 | 1070000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>240/530YMB</b> | <b>530</b> | <b>780</b>  | <b>250.0</b> | <b>5.0</b>                           | <b>583</b>              | <b>725</b>                | <b>13900</b>                            | <b>6170</b>                 | <b>0.28</b>                                   | <b>2.37</b>                        | <b>3.53</b>                                                       | <b>2.32</b>                                                                  | <b>0.1318</b>                       | <b>300</b>                                      | <b>330</b>           | <b>403</b><br>888                 |
|                   | 20.8661    | 30.7087     | 9.8425       | 0.20                                 | 23.0                    | 28.5                      | 3110000                                 | 1390000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>231/530YMB</b> | <b>530</b> | <b>870</b>  | <b>272.0</b> | <b>6.0</b>                           | <b>603</b>              | <b>793</b>                | <b>15300</b>                            | <b>7770</b>                 | <b>0.30</b>                                   | <b>2.27</b>                        | <b>3.38</b>                                                       | <b>2.22</b>                                                                  | <b>0.1350</b>                       | <b>300</b>                                      | <b>320</b>           | <b>637</b><br>1400                |
|                   | 20.8661    | 34.2520     | 10.7087      | 0.24                                 | 23.7                    | 31.2                      | 3440000                                 | 1750000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>241/530YMB</b> | <b>530</b> | <b>870</b>  | <b>335.0</b> | <b>6.0</b>                           | <b>596</b>              | <b>792</b>                | <b>19800</b>                            | <b>9430</b>                 | <b>0.37</b>                                   | <b>1.84</b>                        | <b>2.74</b>                                                       | <b>1.80</b>                                                                  | <b>0.1352</b>                       | <b>180</b>                                      | <b>190</b>           | <b>785</b><br>1730                |
|                   | 20.8661    | 34.2520     | 13.1890      | 0.24                                 | 23.5                    | 31.2                      | 4440000                                 | 2120000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>232/530YMB</b> | <b>530</b> | <b>980</b>  | <b>355.0</b> | <b>7.0</b>                           | <b>621</b>              | <b>878</b>                | <b>20500</b>                            | <b>11200</b>                | <b>0.35</b>                                   | <b>1.91</b>                        | <b>2.85</b>                                                       | <b>1.87</b>                                                                  | <b>0.1395</b>                       | <b>220</b>                                      | <b>240</b>           | <b>1190</b><br>2620               |
|                   | 20.8661    | 38.5827     | 13.9764      | 0.28                                 | 24.4                    | 34.6                      | 4610000                                 | 2520000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>239/560YMB</b> | <b>560</b> | <b>750</b>  | <b>140.0</b> | <b>4.0</b>                           | <b>607</b>              | <b>710</b>                | <b>7370</b>                             | <b>3240</b>                 | <b>0.16</b>                                   | <b>4.21</b>                        | <b>6.27</b>                                                       | <b>4.12</b>                                                                  | <b>0.1339</b>                       | <b>400</b>                                      | <b>470</b>           | <b>172</b><br>378                 |
|                   | 22.0472    | 29.5276     | 5.5118       | 0.16                                 | 23.9                    | 28.0                      | 1660000                                 | 729000                      |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>230/560YMB</b> | <b>560</b> | <b>820</b>  | <b>195.0</b> | <b>5.0</b>                           | <b>620</b>              | <b>764</b>                | <b>10900</b>                            | <b>5230</b>                 | <b>0.22</b>                                   | <b>3.14</b>                        | <b>4.67</b>                                                       | <b>3.07</b>                                                                  | <b>0.1364</b>                       | <b>390</b>                                      | <b>450</b>           | <b>344</b><br>759                 |
|                   | 22.0472    | 32.2835     | 7.6772       | 0.20                                 | 24.4                    | 30.1                      | 2460000                                 | 1180000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>240/560YMB</b> | <b>560</b> | <b>820</b>  | <b>258.0</b> | <b>5.0</b>                           | <b>617</b>              | <b>761</b>                | <b>15000</b>                            | <b>6500</b>                 | <b>0.28</b>                                   | <b>2.42</b>                        | <b>3.60</b>                                                       | <b>2.37</b>                                                                  | <b>0.1365</b>                       | <b>280</b>                                      | <b>310</b>           | <b>456</b><br>1000                |
|                   | 22.0472    | 32.2835     | 10.1575      | 0.20                                 | 24.3                    | 30.0                      | 3360000                                 | 1460000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>231/560YMB</b> | <b>560</b> | <b>920</b>  | <b>280.0</b> | <b>6.0</b>                           | <b>638</b>              | <b>838</b>                | <b>16600</b>                            | <b>8410</b>                 | <b>0.29</b>                                   | <b>2.33</b>                        | <b>3.47</b>                                                       | <b>2.28</b>                                                                  | <b>0.1399</b>                       | <b>270</b>                                      | <b>300</b>           | <b>734</b><br>1620                |
|                   | 22.0472    | 36.2205     | 11.0236      | 0.24                                 | 25.1                    | 33.0                      | 3730000                                 | 1890000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>241/560YMB</b> | <b>560</b> | <b>920</b>  | <b>355.0</b> | <b>6.0</b>                           | <b>629</b>              | <b>839</b>                | <b>22100</b>                            | <b>10600</b>                | <b>0.36</b>                                   | <b>1.87</b>                        | <b>2.78</b>                                                       | <b>1.83</b>                                                                  | <b>0.1400</b>                       | <b>160</b>                                      | <b>170</b>           | <b>931</b><br>2050                |
|                   | 22.0472    | 36.2205     | 13.9764      | 0.24                                 | 24.8                    | 33.0                      | 4960000                                 | 2370000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>232/560YMB</b> | <b>560</b> | <b>1030</b> | <b>365.0</b> | <b>7.0</b>                           | <b>661</b>              | <b>918</b>                | <b>22600</b>                            | <b>11900</b>                | <b>0.34</b>                                   | <b>1.96</b>                        | <b>2.91</b>                                                       | <b>1.91</b>                                                                  | <b>0.1449</b>                       | <b>200</b>                                      | <b>220</b>           | <b>1340</b><br>2960               |
|                   | 22.0472    | 40.5512     | 14.3701      | 0.28                                 | 26.0                    | 36.1                      | 5090000                                 | 2690000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>239/600YMB</b> | <b>600</b> | <b>800</b>  | <b>150.0</b> | <b>4.0</b>                           | <b>650</b>              | <b>757</b>                | <b>8690</b>                             | <b>3680</b>                 | <b>0.16</b>                                   | <b>4.20</b>                        | <b>6.25</b>                                                       | <b>4.11</b>                                                                  | <b>0.1404</b>                       | <b>370</b>                                      | <b>430</b>           | <b>207</b><br>456                 |
|                   | 23.6220    | 31.4961     | 5.9055       | 0.16                                 | 25.6                    | 29.8                      | 1950000                                 | 827000                      |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>230/600YMB</b> | <b>600</b> | <b>870</b>  | <b>200.0</b> | <b>5.0</b>                           | <b>664</b>              | <b>811</b>                | <b>11900</b>                            | <b>5530</b>                 | <b>0.21</b>                                   | <b>3.27</b>                        | <b>4.87</b>                                                       | <b>3.20</b>                                                                  | <b>0.1413</b>                       | <b>360</b>                                      | <b>410</b>           | <b>391</b><br>861                 |
|                   | 23.6220    | 34.2520     | 7.8740       | 0.20                                 | 26.1                    | 31.9                      | 2670000                                 | 1240000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>240/600YMB</b> | <b>600</b> | <b>870</b>  | <b>272.0</b> | <b>5.0</b>                           | <b>658</b>              | <b>811</b>                | <b>17000</b>                            | <b>7320</b>                 | <b>0.28</b>                                   | <b>2.44</b>                        | <b>3.64</b>                                                       | <b>2.39</b>                                                                  | <b>0.1421</b>                       | <b>260</b>                                      | <b>280</b>           | <b>531</b><br>1170                |
|                   | 23.6220    | 34.2520     | 10.7087      | 0.20                                 | 25.9                    | 31.9                      | 3820000                                 | 1650000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>231/600YMB</b> | <b>600</b> | <b>980</b>  | <b>300.0</b> | <b>6.0</b>                           | <b>681</b>              | <b>895</b>                | <b>19100</b>                            | <b>9560</b>                 | <b>0.29</b>                                   | <b>2.32</b>                        | <b>3.46</b>                                                       | <b>2.27</b>                                                                  | <b>0.1458</b>                       | <b>250</b>                                      | <b>270</b>           | <b>887</b><br>1950                |
|                   | 23.6220    | 38.5827     | 11.8110      | 0.24                                 | 26.8                    | 35.2                      | 4290000                                 | 2150000                     |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |
| <b>239/630YMB</b> | <b>630</b> | <b>850</b>  | <b>165.0</b> | <b>5.0</b>                           | <b>684</b>              | <b>804</b>                | <b>10200</b>                            | <b>4390</b>                 | <b>0.17</b>                                   | <b>4.02</b>                        | <b>5.99</b>                                                       | <b>3.93</b>                                                                  | <b>0.1451</b>                       | <b>340</b>                                      | <b>400</b>           | <b>264</b><br>583                 |
|                   | 24.8031    | 33.4646     | 6.4961       | 0.20                                 | 26.9                    | 31.6                      | 2290000                                 | 986000                      |                                               |                                    |                                                                   |                                                                              |                                     |                                                 |                      |                                   |

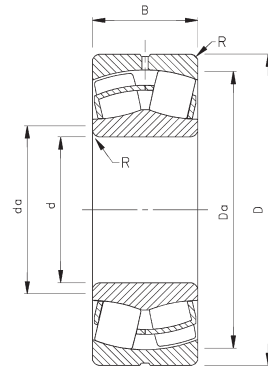
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# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting. To order, add the suffix "K" to bearing number (e.g., 23120K).



CJ

| Bearing Number    | d Bore                | D O.D.                 | B Width                 | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                         | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                              | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                                 |
|-------------------|-----------------------|------------------------|-------------------------|--------------------------------|----------------------|------------------------|-----------------------------------|-------------------------|-----------------------------------------------|-------------------------------|------------------------------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|---------------------------------|
|                   |                       |                        |                         |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C   | Dynamic                                       |                               | Static                       |                                                                  |                            |                                        |                |                                 |
|                   |                       |                        |                         |                                | mm in.               | mm in.                 | kN lbs.                           | kN lbs.                 | e                                             | $\frac{T}{R} \leq e$<br>X = 1 | $\frac{T}{R} > e$<br>X = .67 |                                                                  |                            |                                        |                | In All Cases X <sub>0</sub> = 1 |
| <b>230/630YMB</b> | <b>630</b><br>24.8031 | <b>920</b><br>36.2205  | <b>212.0</b><br>8.3465  | <b>6.0</b><br>0.24             | <b>696</b><br>27.4   | <b>858</b><br>33.8     | <b>13600</b><br>3050000           | <b>6370</b><br>1430000  | <b>0.21</b>                                   | <b>3.18</b>                   | <b>4.74</b>                  | <b>3.11</b>                                                      | <b>0.1466</b>              | <b>330</b>                             | <b>380</b>     | <b>469</b><br>1030              |
| <b>240/630YMB</b> | <b>630</b><br>24.8031 | <b>920</b><br>36.2205  | <b>290.0</b><br>11.4173 | <b>6.0</b><br>0.24             | <b>691</b><br>27.2   | <b>856</b><br>33.7     | <b>18900</b><br>4240000           | <b>8180</b><br>1840000  | <b>0.28</b>                                   | <b>2.41</b>                   | <b>3.59</b>                  | <b>2.36</b>                                                      | <b>0.1465</b>              | <b>240</b>                             | <b>260</b>     | <b>642</b><br>1410              |
| <b>231/630YMB</b> | <b>630</b><br>24.8031 | <b>1030</b><br>40.5512 | <b>315.0</b><br>12.4016 | <b>6.0</b><br>0.24             | <b>716</b><br>28.2   | <b>940</b><br>37.0     | <b>21500</b><br>4820000           | <b>10600</b><br>2390000 | <b>0.29</b>                                   | <b>2.30</b>                   | <b>3.42</b>                  | <b>2.25</b>                                                      | <b>0.1505</b>              | <b>230</b>                             | <b>250</b>     | <b>1030</b><br>2270             |
| <b>241/630YMB</b> | <b>630</b><br>24.8031 | <b>1030</b><br>40.5512 | <b>400.0</b><br>15.7480 | <b>6.0</b><br>0.24             | <b>707</b><br>27.8   | <b>939</b><br>37.0     | <b>27900</b><br>6270000           | <b>13000</b><br>2920000 | <b>0.37</b>                                   | <b>1.84</b>                   | <b>2.74</b>                  | <b>1.80</b>                                                      | <b>0.1504</b>              | <b>140</b>                             | <b>140</b>     | <b>1310</b><br>2880             |
| <b>239/670YMB</b> | <b>670</b><br>26.3780 | <b>900</b><br>35.4331  | <b>170.0</b><br>6.6929  | <b>5.0</b><br>0.20             | <b>727</b><br>28.6   | <b>851</b><br>33.5     | <b>11200</b><br>2510000           | <b>4720</b><br>1060000  | <b>0.16</b>                                   | <b>4.15</b>                   | <b>6.18</b>                  | <b>4.06</b>                                                      | <b>0.1509</b>              | <b>320</b>                             | <b>370</b>     | <b>302</b><br>666               |
| <b>230/670YMB</b> | <b>670</b><br>26.3780 | <b>980</b><br>38.5827  | <b>230.0</b><br>9.0551  | <b>6.0</b><br>0.24             | <b>744</b><br>29.3   | <b>911</b><br>35.9     | <b>16000</b><br>3590000           | <b>7230</b><br>1630000  | <b>0.22</b>                                   | <b>3.12</b>                   | <b>4.65</b>                  | <b>3.05</b>                                                      | <b>0.1531</b>              | <b>310</b>                             | <b>350</b>     | <b>579</b><br>1280              |
| <b>240/670YMB</b> | <b>670</b><br>26.3780 | <b>980</b><br>38.5827  | <b>308.0</b><br>12.1260 | <b>6.0</b><br>0.24             | <b>738</b><br>29.0   | <b>910</b><br>35.8     | <b>22100</b><br>4960000           | <b>9280</b><br>2090000  | <b>0.28</b>                                   | <b>2.39</b>                   | <b>3.55</b>                  | <b>2.33</b>                                                      | <b>0.1530</b>              | <b>220</b>                             | <b>240</b>     | <b>775</b><br>1710              |
| <b>231/670YMB</b> | <b>670</b><br>26.3780 | <b>1090</b><br>42.9134 | <b>336.0</b><br>13.2283 | <b>6.0</b><br>0.24             | <b>760</b><br>29.9   | <b>995</b><br>39.2     | <b>23700</b><br>5340000           | <b>11600</b><br>2610000 | <b>0.29</b>                                   | <b>2.31</b>                   | <b>3.44</b>                  | <b>2.26</b>                                                      | <b>0.1560</b>              | <b>210</b>                             | <b>230</b>     | <b>1220</b><br>2700             |
| <b>241/670YMD</b> | <b>670</b><br>26.3780 | <b>1090</b><br>42.9134 | <b>412.0</b><br>16.2205 | <b>6.0</b><br>0.24             | <b>751</b><br>29.6   | <b>996</b><br>39.2     | <b>30400</b><br>6830000           | <b>14100</b><br>3180000 | <b>0.36</b>                                   | <b>1.90</b>                   | <b>2.82</b>                  | <b>1.85</b>                                                      | <b>0.1560</b>              | <b>130</b>                             | <b>130</b>     | <b>1500</b><br>3300             |
| <b>232/670YMD</b> | <b>670</b><br>26.3780 | <b>1220</b><br>48.0315 | <b>438.0</b><br>17.2441 | <b>9.0</b><br>0.35             | <b>779</b><br>30.7   | <b>1097</b><br>43.2    | <b>32100</b><br>7220000           | <b>16900</b><br>3800000 | <b>0.35</b>                                   | <b>1.95</b>                   | <b>2.91</b>                  | <b>1.91</b>                                                      | <b>0.1608</b>              | <b>160</b>                             | <b>170</b>     | <b>2240</b><br>4940             |
| <b>239/710YMB</b> | <b>710</b><br>27.9528 | <b>950</b><br>37.4016  | <b>180.0</b><br>7.0866  | <b>5.0</b><br>0.20             | <b>771</b><br>30.4   | <b>898</b><br>35.3     | <b>12500</b><br>2820000           | <b>5150</b><br>1160000  | <b>0.16</b>                                   | <b>4.13</b>                   | <b>6.15</b>                  | <b>4.04</b>                                                      | <b>0.1565</b>              | <b>300</b>                             | <b>340</b>     | <b>353</b><br>778               |
| <b>230/710YMB</b> | <b>710</b><br>27.9528 | <b>1030</b><br>40.5512 | <b>236.0</b><br>9.2913  | <b>6.0</b><br>0.24             | <b>785</b><br>30.9   | <b>960</b><br>37.8     | <b>16900</b><br>3800000           | <b>7680</b><br>1730000  | <b>0.21</b>                                   | <b>3.26</b>                   | <b>4.86</b>                  | <b>3.19</b>                                                      | <b>0.1583</b>              | <b>290</b>                             | <b>330</b>     | <b>647</b><br>1430              |
| <b>240/710YMD</b> | <b>710</b><br>27.9528 | <b>1030</b><br>40.5512 | <b>315.0</b><br>12.4016 | <b>6.0</b><br>0.24             | <b>779</b><br>30.7   | <b>960</b><br>37.8     | <b>23400</b><br>5260000           | <b>9880</b><br>2220000  | <b>0.27</b>                                   | <b>2.49</b>                   | <b>3.71</b>                  | <b>2.44</b>                                                      | <b>0.1582</b>              | <b>200</b>                             | <b>220</b>     | <b>863</b><br>1900              |
| <b>231/710YMB</b> | <b>710</b><br>27.9528 | <b>1150</b><br>45.2756 | <b>345.0</b><br>13.5827 | <b>7.0</b><br>0.28             | <b>809</b><br>31.8   | <b>1048</b><br>41.3    | <b>26200</b><br>5880000           | <b>12500</b><br>2800000 | <b>0.28</b>                                   | <b>2.38</b>                   | <b>3.54</b>                  | <b>2.32</b>                                                      | <b>0.1622</b>              | <b>200</b>                             | <b>210</b>     | <b>1390</b><br>3060             |
| <b>241/710YMD</b> | <b>710</b><br>27.9528 | <b>1150</b><br>45.2756 | <b>438.0</b><br>17.2441 | <b>7.0</b><br>0.28             | <b>795</b><br>31.3   | <b>1050</b><br>41.4    | <b>34300</b><br>7720000           | <b>15700</b><br>3520000 | <b>0.36</b>                                   | <b>1.87</b>                   | <b>2.78</b>                  | <b>1.83</b>                                                      | <b>0.1613</b>              | <b>120</b>                             | <b>120</b>     | <b>1760</b><br>3890             |
| <b>239/750YMB</b> | <b>750</b><br>29.5276 | <b>1000</b><br>39.3701 | <b>185.0</b><br>7.2835  | <b>5.0</b><br>0.20             | <b>813</b><br>32.0   | <b>946</b><br>37.3     | <b>13500</b><br>3040000           | <b>5550</b><br>1250000  | <b>0.16</b>                                   | <b>4.23</b>                   | <b>6.30</b>                  | <b>4.14</b>                                                      | <b>0.1619</b>              | <b>280</b>                             | <b>320</b>     | <b>398</b><br>878               |
| <b>230/750YMB</b> | <b>750</b><br>29.5276 | <b>1090</b><br>42.9134 | <b>250.0</b><br>9.8425  | <b>6.0</b><br>0.24             | <b>830</b><br>32.7   | <b>1015</b><br>40.0    | <b>19000</b><br>4270000           | <b>8550</b><br>1920000  | <b>0.21</b>                                   | <b>3.26</b>                   | <b>4.85</b>                  | <b>3.18</b>                                                      | <b>0.1641</b>              | <b>270</b>                             | <b>300</b>     | <b>770</b><br>1700              |
| <b>240/750YMD</b> | <b>750</b><br>29.5276 | <b>1090</b><br>42.9134 | <b>335.0</b><br>13.1890 | <b>6.0</b><br>0.24             | <b>824</b><br>32.4   | <b>1014</b><br>39.9    | <b>26400</b><br>5940000           | <b>11000</b><br>2480000 | <b>0.27</b>                                   | <b>2.48</b>                   | <b>3.69</b>                  | <b>2.42</b>                                                      | <b>0.1640</b>              | <b>190</b>                             | <b>200</b>     | <b>1030</b><br>2270             |
| <b>241/750YMD</b> | <b>750</b><br>29.5276 | <b>1220</b><br>48.0315 | <b>475.0</b><br>18.7008 | <b>7.0</b><br>0.28             | <b>840</b><br>33.1   | <b>1114</b><br>43.9    | <b>39200</b><br>8800000           | <b>17800</b><br>4000000 | <b>0.36</b>                                   | <b>1.86</b>                   | <b>2.77</b>                  | <b>1.82</b>                                                      | <b>0.1676</b>              | <b>110</b>                             | <b>110</b>     | <b>2170</b><br>4770             |
| <b>239/800YMB</b> | <b>800</b><br>31.4961 | <b>1060</b><br>41.7323 | <b>195.0</b><br>7.6772  | <b>5.0</b><br>0.20             | <b>868</b><br>34.2   | <b>1007</b><br>39.6    | <b>13800</b><br>3100000           | <b>5700</b><br>1280000  | <b>0.16</b>                                   | <b>4.20</b>                   | <b>6.25</b>                  | <b>4.10</b>                                                      | <b>0.1685</b>              | <b>270</b>                             | <b>310</b>     | <b>465</b><br>1020              |
| <b>230/800YMB</b> | <b>800</b><br>31.4961 | <b>1150</b><br>45.2756 | <b>258.0</b><br>10.1575 | <b>6.0</b><br>0.24             | <b>888</b><br>35.0   | <b>1074</b><br>42.3    | <b>20300</b><br>4570000           | <b>8940</b><br>2010000  | <b>0.19</b>                                   | <b>3.50</b>                   | <b>5.22</b>                  | <b>3.43</b>                                                      | <b>0.1696</b>              | <b>250</b>                             | <b>280</b>     | <b>868</b><br>1910              |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

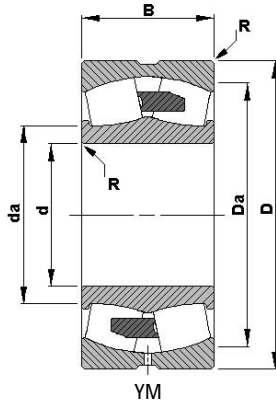
(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a3l. See "Bearing Load Ratings and Life Calculations."

# Spherical Roller Bearings



B

| Bearing Number    | d<br>Bore  | D<br>O.D.   | B<br>Width   | R<br>Fillet <sup>(2)</sup><br>(max.) | Backing Diameter        |                           | Load Ratings                         |                          | Equivalent Radial Load Factors <sup>(1)</sup> |                               |                                              | Lubrication Life Adjustment Factor <sup>(4)</sup><br>C <sub>g</sub> | Reference Speed<br>Grease<br>RPM | Thermal Ratings <sup>(3)</sup><br>Oil<br>RPM | Weight<br>kg lbs. |                              |
|-------------------|------------|-------------|--------------|--------------------------------------|-------------------------|---------------------------|--------------------------------------|--------------------------|-----------------------------------------------|-------------------------------|----------------------------------------------|---------------------------------------------------------------------|----------------------------------|----------------------------------------------|-------------------|------------------------------|
|                   |            |             |              |                                      | d <sub>a</sub><br>Shaft | D <sub>a</sub><br>Housing | Static Load Rating<br>C <sub>0</sub> | Dynamic Load Rating<br>C | Dynamic                                       |                               | Static<br>In All Cases<br>X <sub>0</sub> = 1 |                                                                     |                                  |                                              |                   |                              |
|                   |            |             |              |                                      |                         |                           |                                      |                          | e                                             | $\frac{T}{R} \leq e$<br>X = 1 |                                              |                                                                     |                                  |                                              |                   | $\frac{T}{R} > e$<br>X = .67 |
| <b>240/800YMD</b> | <b>800</b> | <b>1150</b> | <b>345.0</b> | <b>6.0</b>                           | <b>877</b>              | <b>1072</b>               | <b>28900</b>                         | <b>11800</b>             | <b>0.26</b>                                   | <b>2.55</b>                   | <b>3.80</b>                                  | <b>2.50</b>                                                         | <b>0.1790</b>                    | <b>170</b>                                   | <b>190</b>        | <b>1160</b><br>2560          |
| <b>231/800YMB</b> | <b>800</b> | <b>1280</b> | <b>365.0</b> | <b>7.0</b>                           | <b>906</b>              | <b>1171</b>               | <b>31900</b>                         | <b>15000</b>             | <b>0.28</b>                                   | <b>2.45</b>                   | <b>3.65</b>                                  | <b>2.40</b>                                                         | <b>0.1741</b>                    | <b>160</b>                                   | <b>180</b>        | <b>1800</b><br>3950          |
| <b>241/800YMD</b> | <b>800</b> | <b>1280</b> | <b>475.0</b> | <b>7.0</b>                           | <b>896</b>              | <b>1170</b>               | <b>41900</b>                         | <b>18500</b>             | <b>0.35</b>                                   | <b>1.95</b>                   | <b>2.90</b>                                  | <b>1.90</b>                                                         | <b>0.1740</b>                    | <b>97</b>                                    | <b>100</b>        | <b>2340</b><br>5150          |
| <b>232/800YMD</b> | <b>800</b> | <b>1420</b> | <b>488.0</b> | <b>11.0</b>                          | <b>935</b>              | <b>1272</b>               | <b>44000</b>                         | <b>21500</b>             | <b>0.33</b>                                   | <b>2.04</b>                   | <b>3.03</b>                                  | <b>1.99</b>                                                         | <b>0.1798</b>                    | <b>120</b>                                   | <b>130</b>        | <b>3310</b><br>7290          |
| <b>238/850YMB</b> | <b>850</b> | <b>1030</b> | <b>136.0</b> | <b>4.0</b>                           | <b>900</b>              | <b>993</b>                | <b>10500</b>                         | <b>3650</b>              | <b>0.11</b>                                   | <b>6.23</b>                   | <b>9.27</b>                                  | <b>6.09</b>                                                         | <b>0.1718</b>                    | <b>130</b>                                   | <b>150</b>        | <b>233</b><br>513            |
| <b>239/850YMB</b> | <b>850</b> | <b>1120</b> | <b>200.0</b> | <b>5.0</b>                           | <b>919</b>              | <b>1050</b>               | <b>14700</b>                         | <b>5720</b>              | <b>0.15</b>                                   | <b>4.54</b>                   | <b>6.76</b>                                  | <b>4.44</b>                                                         | <b>0.1747</b>                    | <b>250</b>                                   | <b>290</b>        | <b>525</b><br>1150           |
| <b>230/850YMB</b> | <b>850</b> | <b>1220</b> | <b>272.0</b> | <b>6.0</b>                           | <b>938</b>              | <b>1138</b>               | <b>23400</b>                         | <b>10200</b>             | <b>0.20</b>                                   | <b>3.37</b>                   | <b>5.02</b>                                  | <b>3.30</b>                                                         | <b>0.1771</b>                    | <b>230</b>                                   | <b>260</b>        | <b>1030</b><br>2260          |
| <b>240/850YMD</b> | <b>850</b> | <b>1220</b> | <b>365.0</b> | <b>6.0</b>                           | <b>931</b>              | <b>1138</b>               | <b>32600</b>                         | <b>13200</b>             | <b>0.26</b>                                   | <b>2.56</b>                   | <b>3.81</b>                                  | <b>2.50</b>                                                         | <b>0.1770</b>                    | <b>160</b>                                   | <b>170</b>        | <b>1380</b><br>3030          |
| <b>231/850YMB</b> | <b>850</b> | <b>1360</b> | <b>400.0</b> | <b>9.0</b>                           | <b>962</b>              | <b>1245</b>               | <b>36200</b>                         | <b>16900</b>             | <b>0.28</b>                                   | <b>2.44</b>                   | <b>3.63</b>                                  | <b>2.39</b>                                                         | <b>0.1810</b>                    | <b>150</b>                                   | <b>160</b>        | <b>2220</b><br>4890          |
| <b>232/850YMD</b> | <b>850</b> | <b>1500</b> | <b>515.0</b> | <b>11.0</b>                          | <b>990</b>              | <b>1347</b>               | <b>48400</b>                         | <b>23500</b>             | <b>0.33</b>                                   | <b>2.06</b>                   | <b>3.06</b>                                  | <b>2.01</b>                                                         | <b>0.1864</b>                    | <b>110</b>                                   | <b>120</b>        | <b>3880</b><br>8540          |
| <b>239/900YMB</b> | <b>900</b> | <b>1180</b> | <b>206.0</b> | <b>5.0</b>                           | <b>965</b>              | <b>1112</b>               | <b>18300</b>                         | <b>7120</b>              | <b>0.14</b>                                   | <b>4.69</b>                   | <b>6.98</b>                                  | <b>4.58</b>                                                         | <b>0.1801</b>                    | <b>220</b>                                   | <b>250</b>        | <b>592</b><br>1300           |
| <b>230/900YMB</b> | <b>900</b> | <b>1280</b> | <b>280.0</b> | <b>6.0</b>                           | <b>990</b>              | <b>1198</b>               | <b>25900</b>                         | <b>11100</b>             | <b>0.20</b>                                   | <b>3.41</b>                   | <b>5.08</b>                                  | <b>3.33</b>                                                         | <b>0.1828</b>                    | <b>210</b>                                   | <b>240</b>        | <b>1140</b><br>2520          |
| <b>240/900YMD</b> | <b>900</b> | <b>1280</b> | <b>375.0</b> | <b>6.0</b>                           | <b>983</b>              | <b>1197</b>               | <b>35600</b>                         | <b>14200</b>             | <b>0.26</b>                                   | <b>2.60</b>                   | <b>3.87</b>                                  | <b>2.54</b>                                                         | <b>0.1827</b>                    | <b>150</b>                                   | <b>160</b>        | <b>1530</b><br>3370          |
| <b>231/900YMB</b> | <b>900</b> | <b>1420</b> | <b>412.0</b> | <b>9.0</b>                           | <b>1018</b>             | <b>1300</b>               | <b>39400</b>                         | <b>17800</b>             | <b>0.27</b>                                   | <b>2.49</b>                   | <b>3.71</b>                                  | <b>2.43</b>                                                         | <b>0.1871</b>                    | <b>140</b>                                   | <b>150</b>        | <b>2450</b><br>5390          |
| <b>241/900YMD</b> | <b>900</b> | <b>1420</b> | <b>515.0</b> | <b>9.0</b>                           | <b>1008</b>             | <b>1298</b>               | <b>51000</b>                         | <b>21700</b>             | <b>0.34</b>                                   | <b>2.00</b>                   | <b>2.98</b>                                  | <b>1.96</b>                                                         | <b>0.1869</b>                    | <b>82</b>                                    | <b>85</b>         | <b>3060</b><br>6740          |
| <b>232/900YMD</b> | <b>900</b> | <b>1580</b> | <b>515.0</b> | <b>11.0</b>                          | <b>1056</b>             | <b>1423</b>               | <b>51400</b>                         | <b>24700</b>             | <b>0.32</b>                                   | <b>2.11</b>                   | <b>3.13</b>                                  | <b>2.06</b>                                                         | <b>0.1926</b>                    | <b>100</b>                                   | <b>110</b>        | <b>4280</b><br>9420          |
| <b>239/950YMB</b> | <b>950</b> | <b>1250</b> | <b>224.0</b> | <b>6.0</b>                           | <b>1025</b>             | <b>1187</b>               | <b>20700</b>                         | <b>8160</b>              | <b>0.15</b>                                   | <b>4.39</b>                   | <b>6.54</b>                                  | <b>4.29</b>                                                         | <b>0.1874</b>                    | <b>210</b>                                   | <b>240</b>        | <b>729</b><br>1600           |
| <b>230/950YMB</b> | <b>950</b> | <b>1360</b> | <b>300.0</b> | <b>6.0</b>                           | <b>1046</b>             | <b>1273</b>               | <b>27600</b>                         | <b>12100</b>             | <b>0.19</b>                                   | <b>3.49</b>                   | <b>5.19</b>                                  | <b>3.41</b>                                                         | <b>0.1899</b>                    | <b>200</b>                                   | <b>230</b>        | <b>1400</b><br>3080          |
| <b>240/950YMD</b> | <b>950</b> | <b>1360</b> | <b>412.0</b> | <b>6.0</b>                           | <b>1039</b>             | <b>1269</b>               | <b>41300</b>                         | <b>16400</b>             | <b>0.27</b>                                   | <b>2.53</b>                   | <b>3.77</b>                                  | <b>2.47</b>                                                         | <b>0.1898</b>                    | <b>130</b>                                   | <b>140</b>        | <b>1920</b><br>4230          |
| <b>231/950YMB</b> | <b>950</b> | <b>1500</b> | <b>438.0</b> | <b>9.0</b>                           | <b>1074</b>             | <b>1373</b>               | <b>44400</b>                         | <b>19900</b>             | <b>0.27</b>                                   | <b>2.47</b>                   | <b>3.68</b>                                  | <b>2.42</b>                                                         | <b>0.1937</b>                    | <b>130</b>                                   | <b>140</b>        | <b>2910</b><br>6400          |
| <b>241/950YMD</b> | <b>950</b> | <b>1500</b> | <b>545.0</b> | <b>9.0</b>                           | <b>1064</b>             | <b>1371</b>               | <b>57100</b>                         | <b>24100</b>             | <b>0.34</b>                                   | <b>2.00</b>                   | <b>2.97</b>                                  | <b>1.95</b>                                                         | <b>0.1935</b>                    | <b>75</b>                                    | <b>77</b>         | <b>3620</b><br>7970          |

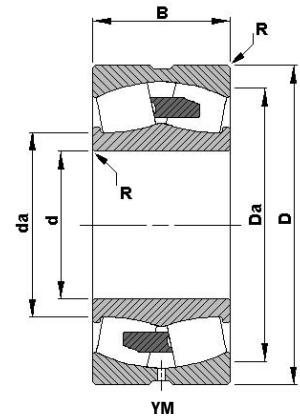
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# ROLLER BEARINGS

## SPHERICAL ROLLER BEARINGS - continued

- Timken inventory systems are designed to provide fast delivery for frequently-ordered sizes and styles.
- Consult your Timken representative for up-to-date information about the availability of the bearings you have selected.
- Life calculations, shaft and housing fits, internal clearances, tolerances and other technical data for these bearings are found in the engineering section of this catalog.
- Bearings are available with a tapered bore for adapter type mounting.
- To order, add the suffix "K" to bearing number (e.g., 23120K).



| Bearing Number | d Bore          | D O.D.          | B Width          | R Fillet <sup>(2)</sup> (max.) | Backing Diameter     |                        | Load Ratings                      |                       | Equivalent Radial Load Factors <sup>(1)</sup> |                               |        | Lubrication Life Adjustment Factor <sup>(4)</sup> C <sub>g</sub> | Reference Speed Grease RPM | Thermal Ratings <sup>(3)</sup> Oil RPM | Weight kg lbs. |                              |
|----------------|-----------------|-----------------|------------------|--------------------------------|----------------------|------------------------|-----------------------------------|-----------------------|-----------------------------------------------|-------------------------------|--------|------------------------------------------------------------------|----------------------------|----------------------------------------|----------------|------------------------------|
|                |                 |                 |                  |                                | d <sub>a</sub> Shaft | D <sub>a</sub> Housing | Static Load Rating C <sub>0</sub> | Dynamic Load Rating C | Dynamic                                       |                               | Static |                                                                  |                            |                                        |                |                              |
|                |                 |                 |                  |                                |                      |                        |                                   |                       | e                                             | $\frac{T}{R} \leq e$<br>X = 1 |        |                                                                  |                            |                                        |                | $\frac{T}{R} > e$<br>X = .67 |
| mm in.         | mm in.          | mm in.          | mm in.           | mm in.                         | mm in.               | kN lbs.                | kN lbs.                           |                       | Y                                             | Y                             |        |                                                                  |                            |                                        |                |                              |
| 239/1000YMB    | 1000<br>39.3701 | 1320<br>51.9685 | 236.0<br>9.2913  | 6.0<br>0.24                    | 1080<br>42.5         | 1252<br>49.3           | 23100<br>5190000                  | 9020<br>2030000       | 0.15                                          | 4.39                          | 6.54   | 4.29                                                             | 0.1939                     | 190                                    | 220            | 864<br>1900                  |
| 230/1000YMB    | 1000<br>39.3701 | 1420<br>55.9055 | 308.0<br>12.1260 | 6.0<br>0.24                    | 1101<br>43.4         | 1327<br>52.2           | 32100<br>7220000                  | 13400<br>3010000      | 0.20                                          | 3.44                          | 5.12   | 3.36                                                             | 0.1960                     | 180                                    | 200            | 1540<br>3400                 |
| 240/1000YMD    | 1000<br>39.3701 | 1420<br>55.9055 | 412.0<br>16.2205 | 6.0<br>0.24                    | 1094<br>43.1         | 1329<br>52.3           | 41800<br>9390000                  | 16600<br>3730000      | 0.25                                          | 2.69                          | 4.01   | 2.63                                                             | 0.1952                     | 130                                    | 140            | 2070<br>4540                 |
| 231/1000YMB    | 1000<br>39.3701 | 1580<br>62.2047 | 462.0<br>18.1890 | 9.0<br>0.35                    | 1131<br>44.5         | 1446<br>56.9           | 49500<br>11100000                 | 22000<br>4940000      | 0.27                                          | 2.47                          | 3.68   | 2.42                                                             | 0.2002                     | 120                                    | 130            | 3410<br>7500                 |
| 241/1000YMB    | 1000<br>39.3701 | 1580<br>62.2047 | 580.0<br>22.8346 | 9.0<br>0.35                    | 1120<br>44.1         | 1444<br>56.9           | 64400<br>14500000                 | 26800<br>6030000      | 0.34                                          | 1.98                          | 2.95   | 1.93                                                             | 0.2000                     | 69                                     | 71             | 4280<br>9420                 |
| 239/1060YMB    | 1060<br>41.7323 | 1400<br>55.1181 | 250.0<br>9.8425  | 6.0<br>0.24                    | 1145<br>45.1         | 1328<br>52.3           | 26500<br>5950000                  | 10200<br>2300000      | 0.16                                          | 4.25                          | 6.32   | 4.15                                                             | 0.2004                     | 180                                    | 200            | 1030<br>2270                 |
| 230/1060YMB    | 1060<br>41.7323 | 1500<br>59.0551 | 325.0<br>12.7953 | 7.0<br>0.28                    | 1165<br>45.9         | 1404<br>55.3           | 35800<br>8050000                  | 14800<br>3330000      | 0.20                                          | 3.44                          | 5.12   | 3.36                                                             | 0.2031                     | 170                                    | 190            | 1810<br>3970                 |
| 240/1060YMD    | 1060<br>41.7323 | 1500<br>59.0551 | 438.0<br>17.2441 | 7.0<br>0.28                    | 1157<br>45.6         | 1403<br>55.2           | 49500<br>11100000                 | 19000<br>4280000      | 0.26                                          | 2.61                          | 3.88   | 2.55                                                             | 0.2030                     | 110                                    | 120            | 2430<br>5350                 |
| 231/1060YMB    | 1060<br>41.7323 | 1660<br>65.3543 | 475.0<br>18.7008 | 11.0<br>0.43                   | 1194<br>47.0         | 1524<br>60.0           | 53500<br>12000000                 | 23700<br>5330000      | 0.27                                          | 2.53                          | 3.77   | 2.48                                                             | 0.2070                     | 110                                    | 120            | 3820<br>8410                 |
| 239/1120YMB    | 1120<br>44.0945 | 1460<br>57.4803 | 250.0<br>9.8425  | 6.0<br>0.24                    | 1205<br>47.4         | 1389<br>54.7           | 27100<br>6090000                  | 10400<br>2330000      | 0.15                                          | 4.62                          | 6.87   | 4.51                                                             | 0.2077                     | 170                                    | 190            | 1080<br>2380                 |
| 230/1120YMB    | 1120<br>44.0945 | 1580<br>62.2047 | 345.0<br>13.5827 | 7.0<br>0.28                    | 1229<br>48.4         | 1480<br>58.3           | 40200<br>9040000                  | 16500<br>3710000      | 0.20                                          | 3.42                          | 5.09   | 3.34                                                             | 0.2101                     | 160                                    | 170            | 2110<br>4650                 |
| 240/1120YMD    | 1120<br>44.0945 | 1580<br>62.2047 | 462.0<br>18.1890 | 7.0<br>0.28                    | 1220<br>48.1         | 1480<br>58.3           | 55600<br>12500000                 | 21200<br>4760000      | 0.26                                          | 2.62                          | 3.90   | 2.56                                                             | 0.2100                     | 110                                    | 110            | 2830<br>6230                 |
| 231/1120YMB    | 1120<br>44.0945 | 1750<br>68.8976 | 475.0<br>18.7008 | 11.0<br>0.43                   | 1262<br>49.7         | 1609<br>63.3           | 56100<br>12600000                 | 25000<br>5620000      | 0.25                                          | 2.67                          | 3.98   | 2.62                                                             | 0.2142                     | 110                                    | 110            | 4240<br>9320                 |
| 239/1180YMB    | 1180<br>46.4567 | 1540<br>60.6299 | 272.0<br>10.7087 | 6.0<br>0.24                    | 1269<br>50.0         | 1465<br>57.7           | 31500<br>7090000                  | 11900<br>2670000      | 0.15                                          | 4.48                          | 6.67   | 4.38                                                             | 0.2148                     | 160                                    | 180            | 1310<br>2890                 |
| 230/1180YMB    | 1180<br>46.4567 | 1660<br>65.3543 | 355.0<br>13.9764 | 7.0<br>0.28                    | 1293<br>50.9         | 1557<br>61.3           | 43500<br>9780000                  | 17800<br>4000000      | 0.19                                          | 3.50                          | 5.21   | 3.42                                                             | 0.2170                     | 150                                    | 160            | 2390<br>5250                 |
| 240/1180YMD    | 1180<br>46.4567 | 1660<br>65.3543 | 475.0<br>18.7008 | 7.0<br>0.28                    | 1284<br>50.6         | 1557<br>61.3           | 59800<br>13400000                 | 22700<br>5110000      | 0.25                                          | 2.67                          | 3.98   | 2.61                                                             | 0.2169                     | 98                                     | 110            | 3190<br>7030                 |
| 231/1180YMB    | 1180<br>46.4567 | 1850<br>72.8346 | 500.0<br>19.6850 | 11.0<br>0.43                   | 1332<br>52.5         | 1698<br>66.9           | 62400<br>14000000                 | 27600<br>6200000      | 0.25                                          | 2.68                          | 4.00   | 2.62                                                             | 0.2217                     | 97                                     | 100            | 5010<br>11000                |
| 239/1250YMB    | 1250<br>49.2126 | 1630<br>64.1732 | 280.0<br>11.0236 | 6.0<br>0.24                    | 1345<br>52.9         | 1551<br>61.1           | 34200<br>7680000                  | 12800<br>2890000      | 0.15                                          | 4.60                          | 6.85   | 4.50                                                             | 0.2227                     | 140                                    | 160            | 1510<br>3330                 |
| 230/1250YMB    | 1250<br>49.2126 | 1750<br>68.8976 | 375.0<br>14.7638 | 7.0<br>0.28                    | 1370<br>54.0         | 1640<br>64.6           | 48800<br>11000000                 | 19400<br>4350000      | 0.19                                          | 3.50                          | 5.21   | 3.42                                                             | 0.2250                     | 140                                    | 150            | 2770<br>6100                 |
| 240/1250YMD    | 1250<br>49.2126 | 1750<br>68.8976 | 500.0<br>19.6850 | 7.0<br>0.28                    | 1362<br>53.6         | 1639<br>64.5           | 66700<br>15000000                 | 24600<br>5530000      | 0.25                                          | 2.68                          | 3.99   | 2.62                                                             | 0.2249                     | 90                                     | 96             | 3700<br>8140                 |
| 231/1250YMB    | 1250<br>49.2126 | 1950<br>76.7717 | 530.0<br>20.8661 | 11.0<br>0.43                   | 1407<br>55.4         | 1794<br>70.6           | 70000<br>15700000                 | 30700<br>6900000      | 0.25                                          | 2.67                          | 3.98   | 2.62                                                             | 0.2296                     | 89                                     | 95             | 5860<br>12900                |

(1) These factors apply for both inch and metric calculations. See engineering section for instructions on use.

(2) Maximum shaft or housing fillet radius that bearing corners will clear.

\* Available in standard shaker screen bearing design configuration (example: 223xxYMW33W800C4).

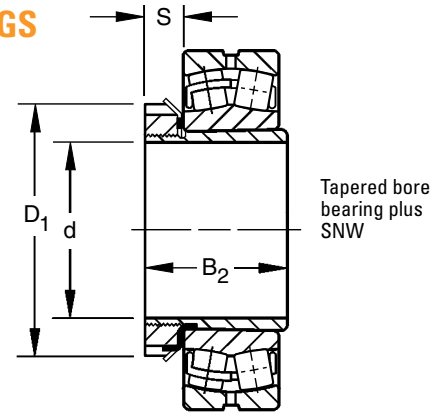
(3) See thermal speed ratings in the engineering section.

(4) Geometry constant for Lubrication Life Adjustment Factor a31. See "Bearing Load Ratings and Life Calculations."

SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS

SNW/SNP – PULL TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.



| Bearing Number | Accessory Numbers |        |         |                         | Shaft Dimensions Inchs |                    | Adapter Dimensions Inches |     |                | SNW/SNP Assembly Weight<br>lbs. |
|----------------|-------------------|--------|---------|-------------------------|------------------------|--------------------|---------------------------|-----|----------------|---------------------------------|
|                | Assembly          | Sleeve | Locknut | Lockwasher<br>Lockplate | Diameter<br>d          | Tolerance<br>+.000 | B <sub>2</sub>            | S   | D <sub>1</sub> |                                 |
|                |                   |        |         |                         | in.                    |                    | in.                       | in. | in.            |                                 |

FOR SERIES 222K

|        |        |      |       |      |         |       |         |         |         |      |
|--------|--------|------|-------|------|---------|-------|---------|---------|---------|------|
| 22209K | SNW-09 | S-09 | N-09  | W-09 | 1 7/16  | -.003 | 1 37/64 | 1/2     | 2 17/32 | 0.6  |
| 22210K | SNW-10 | S-10 | N-10  | W-10 | 1 11/16 | -.003 | 1 49/64 | 9/16    | 2 11/16 | 0.7  |
| 22211K | SNW-11 | S-11 | N-11  | W-11 | 1 15/16 | -.003 | 1 27/32 | 9/16    | 2 31/32 | 0.8  |
| 22212K | SNW-12 | S-12 | N-12  | W-12 | 2 1/16  | -.004 | 1 63/64 | 19/32   | 3 5/32  | 1.1  |
| 22213K | SNW-13 | S-13 | N-13  | W-13 | 2 3/16  | -.004 | 2 3/32  | 5/8     | 3 3/8   | 1.4  |
| 22214K | SNW-14 | S-14 | N-14  | W-14 | 2 5/16  | -.004 | 2 11/64 | 5/8     | 3 5/8   | 1.8  |
| 22215K | SNW-15 | S-15 | AN-15 | W-15 | 2 7/16  | -.004 | 2 19/64 | 43/64   | 3 7/8   | 2    |
| 22216K | SNW-16 | S-16 | AN-16 | W-16 | 2 11/16 | -.004 | 2 3/8   | 43/64   | 4 5/32  | 2.4  |
| 22217K | SNW-17 | S-17 | AN-17 | W-17 | 2 15/16 | -.004 | 2 31/64 | 45/64   | 4 13/32 | 3    |
| 22218K | SNW-18 | S-18 | AN-18 | W-18 | 3 3/16  | -.004 | 2 41/64 | 25/32   | 4 21/32 | 3    |
| 22219K | SNW-19 | S-19 | AN-19 | W-19 | 3 5/16  | -.004 | 2 49/64 | 13/16   | 4 15/16 | 3.3  |
| 22220K | SNW-20 | S-20 | AN-20 | W-20 | 3 7/16  | -.004 | 2 7/8   | 27/32   | 5 3/16  | 4.4  |
| 22222K | SNW-22 | S-22 | AN-22 | W-22 | 3 15/16 | -.004 | 3 13/64 | 29/32   | 5 23/32 | 5    |
| 22224K | SNW-24 | S-24 | AN-24 | W-24 | 4 3/16  | -.005 | 3 19/32 | 15/16   | 6 1/8   | 6.7  |
| 22226K | SNW-26 | S-26 | AN-26 | W-26 | 4 7/16  | -.005 | 3 49/64 | 1       | 6 3/4   | 8.6  |
| 22228K | SNW-28 | S-28 | AN-28 | W-28 | 4 15/16 | -.005 | 3 63/64 | 1 1/16  | 7 3/32  | 10.3 |
| 22230K | SNW-30 | S-30 | AN-30 | W-30 | 5 3/16  | -.005 | 4 15/64 | 1 1/8   | 7 11/16 | 13.5 |
| 22232K | SNW-32 | S-32 | AN-32 | W-32 | 5 7/16  | -.005 | 4 37/64 | 1 3/16  | 8 1/16  | 15.6 |
| 22234K | SNW-34 | S-34 | AN-34 | W-34 | 5 15/16 | -.005 | 4 27/32 | 1 7/32  | 8 21/32 | 19.4 |
| 22236K | SNW-36 | S-36 | AN-36 | W-36 | 6 7/16  | -.005 | 5 1/32  | 1 1/4   | 9 1/16  | 20.5 |
| 22238K | SNW-38 | S-38 | AN-38 | W-38 | 6 15/16 | -.005 | 5 17/64 | 1 9/32  | 9 15/32 | 23.4 |
| 22240K | SNW-40 | S-40 | AN-40 | W-40 | 7 3/16  | -.005 | 5 31/64 | 1 11/32 | 9 27/32 | 30.5 |
| 22244K | SNW-44 | S-44 | AN-44 | W-44 | 7 15/16 | -.005 | 5 29/32 | 1 3/8   | 11      | 33   |

FOR SERIES 230K

|        |          |        |       |       |          |       |         |         |         |      |
|--------|----------|--------|-------|-------|----------|-------|---------|---------|---------|------|
| 23024K | SNW-3024 | S-3024 | N-024 | W-024 | 4 3/16   | -.005 | 2 61/64 | 13/16   | 5 11/16 | 6.1  |
| 23026K | SNW-3026 | S-3026 | N-026 | W-026 | 4 7/16   | -.005 | 3 15/64 | 7/8     | 6 1/8   | 7.5  |
| 23028K | SNW-3028 | S-3028 | N-028 | W-028 | 4 15/16  | -.005 | 3 11/32 | 15/16   | 6 1/2   | 8.4  |
| 23030K | SNW-3030 | S-3030 | N-030 | W-030 | 5 3/16   | -.005 | 3 31/64 | 31/32   | 7 1/8   | 9.8  |
| 23032K | SNW-3032 | S-3032 | N-032 | W-032 | 5 7/16   | -.005 | 3 23/32 | 1 1/32  | 7 1/2   | 11.8 |
| 23034K | SNW-3034 | S-3034 | N-034 | W-034 | 5 15/16  | -.005 | 4 1/64  | 1 1/16  | 7 7/8   | 13.3 |
| 23036K | SNW-3036 | S-3036 | N-036 | W-036 | 6 7/16   | -.005 | 4 11/32 | 1 3/32  | 8 1/4   | 15.2 |
| 23038K | SNW-3038 | S-3038 | N-038 | W-038 | 6 15/16  | -.005 | 4 13/32 | 1 1/8   | 8 11/16 | 16.7 |
| 23040K | SNW-3040 | S-3040 | N-040 | W-040 | 7 3/16   | -.005 | 4 3/4   | 1 3/16  | 9 7/16  | 19.7 |
| 23044K | SNW-3044 | S-3044 | N-044 | W-044 | 7 15/16  | -.005 | 5 1/8   | 1 1/4   | 10 1/4  | 24.4 |
| 23048K | SNP-3048 | S-3048 | N-048 | P-048 | 8 15/16  | -.006 | 5 7/16  | 1 11/32 | 11 7/16 | 32.2 |
| 23052K | SNP-3052 | S-3052 | N-052 | P-052 | 9 7/16   | -.006 | 6 1/64  | 1 13/32 | 12 3/16 | 41.1 |
| 23056K | SNP-3056 | S-3056 | N-056 | P-056 | 10 7/16  | -.007 | 6 3/16  | 1 1/2   | 13      | 45.4 |
| 23060K | SNP-3060 | S-3060 | N-060 | P-060 | 10 15/16 | -.007 | 6 47/64 | 1 9/16  | 14 3/16 | 58.9 |
| 23064K | SNP-3064 | S-3064 | N-064 | P-064 | 11 15/16 | -.007 | 6 61/64 | 1 21/32 | 15      | 65.7 |
| 23068K | SNP-3068 | S-3068 | N-068 | P-068 | 12 7/16  | -.008 | 7 35/64 | 1 25/32 | 15 3/4  | 77.8 |
| 23072K | SNP-3072 | S-3072 | N-072 | P-072 | 13 7/16  | -.008 | 7 37/64 | 1 25/32 | 16 1/2  | 86.2 |
| 23076K | SNP-3076 | S-3076 | N-076 | P-076 | 13 15/16 | -.008 | 7 3/4   | 1 57/64 | 17 3/4  | 94.3 |
| 23080K | SNP-3080 | S-3080 | N-080 | P-080 | 15       | -.008 | 8 13/32 | 2 1/16  | 18 1/2  | 105  |



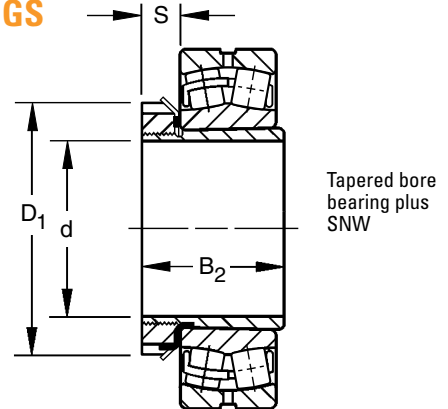


# ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS

### SNW/SNP – PULL TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.



| Bearing Number           | Accessory Numbers |        |         |                         | Shaft Dimensions Inches |                    | Adapter Dimensions Inches |   |                | SNW/SNP Assembly Weight lbs. |
|--------------------------|-------------------|--------|---------|-------------------------|-------------------------|--------------------|---------------------------|---|----------------|------------------------------|
|                          | Assembly          | Sleeve | Locknut | Lockwasher<br>Lockplate | Diameter<br>d           | Tolerance<br>+.000 | B <sub>2</sub>            | S | D <sub>1</sub> |                              |
|                          |                   |        |         |                         |                         |                    |                           |   |                |                              |
| FOR SERIES 223K and 232K |                   |        |         |                         |                         |                    |                           |   |                |                              |

|        |        |          |        |       |      |         |       |         |         |          |      |
|--------|--------|----------|--------|-------|------|---------|-------|---------|---------|----------|------|
| 22308K |        | SNW-108  | S-108  | N-08  | W-08 | 1 5/16  | -.003 | 2 1/64  | 1/2     | 2 1/4    | 0.8  |
| 22309K |        | SNW-109  | S-109  | N-09  | W-09 | 1 7/16  | -.003 | 2 9/64  | 1/2     | 2 17/32  | 0.8  |
| 22310K |        | SNW-110  | S-110  | N-10  | W-10 | 1 11/16 | -.003 | 2 25/64 | 9/16    | 2 11/16  | 0.9  |
| 22311K |        | SNW-111  | S-111  | N-11  | W-11 | 1 15/16 | -.003 | 2 33/64 | 9/16    | 2 31/32  | 0.9  |
| 22312K |        | SNW-112  | S-112  | N-12  | W-12 | 2 1/16  | -.004 | 2 21/32 | 19/32   | 3 5/32   | 1.2  |
| 22313K |        | SNW-113  | S-113  | N-13  | W-13 | 2 3/16  | -.004 | 2 49/64 | 5/8     | 3 3/8    | 1.7  |
| 22314K |        | SNW-114  | S-114  | N-14  | W-14 | 2 5/16  | -.004 | 2 61/64 | 5/8     | 3 5/8    | 2.3  |
| 22315K |        | SNW-115  | S-115  | AN-15 | W-15 | 2 7/16  | -.004 | 3 5/64  | 43/64   | 3 7/8    | 3    |
| 22316K |        | SNW-116  | S-116  | AN-16 | W-16 | 2 11/16 | -.004 | 3 13/64 | 43/64   | 4 5/32   | 3.2  |
| 22317K |        | SNW-117  | S-117  | AN-17 | W-17 | 2 15/16 | -.004 | 3 5/16  | 45/64   | 4 13/32  | 3.5  |
| 22318K |        | SNW-118  | S-118  | AN-18 | W-18 | 3 3/16  | -.004 | 3 35/64 | 25/32   | 4 21/32  | 4    |
| 22319K |        | SNW-119  | S-119  | AN-19 | W-19 | 3 5/16  | -.004 | 3 45/64 | 13/16   | 4 15/16  | 5    |
| 22320K | 23220K | SNW-120  | S-120  | AN-20 | W-20 | 3 7/16  | -.004 | 3 31/32 | 27/32   | 5 3/16   | 6.2  |
| 22322K | 23222K | SNW-122  | S-122  | AN-22 | W-22 | 3 15/16 | -.004 | 4 11/32 | 29/32   | 5 23/32  | 6.5  |
| 22324K | 23224K | SNW-124  | S-124  | AN-24 | W-24 | 4 3/16  | -.005 | 4 41/64 | 15/16   | 6 1/8    | 8    |
| 22326K | 23226K | SNW-126  | S-126  | AN-26 | W-26 | 4 7/16  | -.005 | 4 63/64 | 1       | 6 3/4    | 12.4 |
| 22328K | 23228K | SNW-128  | S-128  | AN-28 | W-28 | 4 15/16 | -.005 | 5 21/64 | 1 1/16  | 7 3/32   | 13   |
| 22330K | 23230K | SNW-130  | S-130  | AN-30 | W-30 | 5 3/16  | -.005 | 5 5/8   | 1 1/8   | 7 11/16  | 17.6 |
| 22332K | 23232K | SNW-132  | S-132  | AN-32 | W-32 | 5 7/16  | -.005 | 5 59/64 | 1 3/16  | 8 1/16   | 18.5 |
| 22334K | 23234K | SNW-134  | S-134  | AN-34 | W-34 | 5 15/16 | -.005 | 6 3/16  | 1 7/32  | 8 21/32  | 21   |
| 22336K | 23236K | SNW-136  | S-136  | AN-36 | W-36 | 6 7/16  | -.005 | 6 29/64 | 1 1/4   | 9 1/16   | 22.5 |
| 22338K | 23238K | SNW-138  | S-138  | AN-38 | W-38 | 6 15/16 | -.005 | 6 3/4   | 1 9/32  | 9 15/32  | 28   |
| 22340K | 23240K | SNW-140  | S-140  | AN-40 | W-40 | 7 3/16  | -.005 | 7 3/32  | 1 11/32 | 9 27/32  | 36   |
| 22344K | 23244K | SNW-144  | S-144  | AN-44 | W-44 | 7 15/16 | -.005 | 7 9/32  | 1 3/8   | 11       | 47   |
| 22348K | 23248K | SNP-148  | S-148  | N-048 | P-48 | 8 15/16 | -.006 | 8 7/64  | 1 11/32 | 11 7/16  | 38.3 |
| 22352K | 23252K | SNP-152  | S-152  | N-052 | P-52 | 9 7/16  | -.006 | 8 49/64 | 1 13/32 | 12 13/16 | 53.4 |
| 22356K | 23256K | SNP-3256 | S-3256 | N-056 | P-56 | 10 7/16 | -.007 | 8 15/16 | 1 1/2   | 13       | 61.3 |

### FOR SERIES 231K

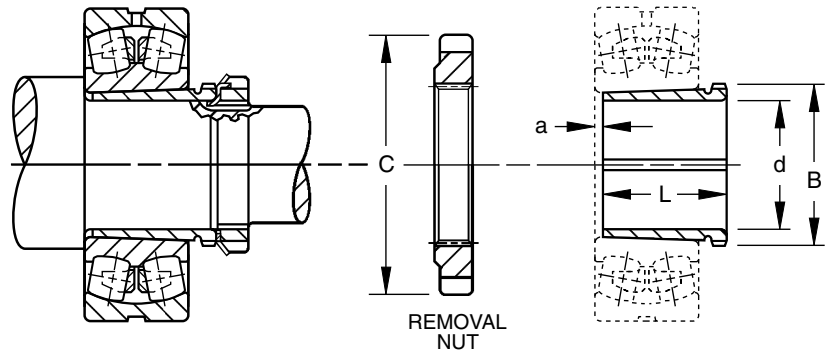
|        |  |          |        |       |       |          |       |         |         |         |      |
|--------|--|----------|--------|-------|-------|----------|-------|---------|---------|---------|------|
| 23122K |  | SNW-3122 | S-22   | N-022 | W-022 | 3 15/16  | -.004 | 3 13/64 | 25/32   | 5 5/32  | 4.2  |
| 23124K |  | SNW-3124 | S-24   | N-024 | W-024 | 4 3/16   | -.005 | 3 15/32 | 13/16   | 5 11/16 | 5.8  |
| 23126K |  | SNW-3126 | S-26   | N-026 | W-026 | 4 7/16   | -.005 | 3 49/64 | 7/8     | 6 1/8   | 8.3  |
| 23128K |  | SNW-3128 | S-28   | N-028 | W-028 | 4 15/16  | -.005 | 3 63/64 | 15/16   | 6 1/2   | 8.8  |
| 23130K |  | SNW-3130 | S-30   | N-030 | W-030 | 5 3/16   | -.005 | 4 15/64 | 31/32   | 7 1/8   | 13.7 |
| 23132K |  | SNW-3132 | S-32   | N-032 | W-032 | 5 7/16   | -.005 | 4 37/64 | 1 1/32  | 7 1/2   | 13.3 |
| 23134K |  | SNW-3134 | S-34   | N-034 | W-034 | 5 15/16  | -.005 | 4 27/32 | 1 1/16  | 7 7/8   | 16.1 |
| 23136K |  | SNW-3136 | S-36   | N-036 | W-036 | 6 7/16   | -.005 | 5 1/32  | 1 3/32  | 8 1/4   | 17.1 |
| 23138K |  | SNW-3138 | S-38   | N-038 | W-038 | 6 15/16  | -.005 | 5 17/64 | 1 1/8   | 8 11/16 | 19.7 |
| 23140K |  | SNW-3140 | S-40   | N-040 | W-040 | 7 3/16   | -.005 | 5 31/64 | 1 3/16  | 9 7/16  | 28.4 |
| 23144K |  | SNW-3144 | S-44   | N-044 | W-044 | 7 15/16  | -.005 | 5 29/32 | 1 1/4   | 10 1/4  | 28.1 |
| 23148K |  | SNP-3148 | S-48   | N-048 | P-48  | 8 15/16  | -.006 | 6 41/64 | 1 11/32 | 11 7/16 | 36   |
| 23152K |  | SNP-3152 | S-52   | N-052 | P-52  | 9 7/16   | -.006 | 7 19/32 | 1 13/32 | 12 3/16 | 39   |
| 23156K |  | SNP-3156 | S-3156 | N-056 | P-56  | 10 7/16  | -.007 | 7 49/64 | 1 1/2   | 13      | 60   |
| 23160K |  | SNP-3160 | S-3160 | N-060 | P-060 | 10 15/16 | -.007 | 8 3/8   | 1 9/16  | 14 3/16 | 65   |
| 23164K |  | SNP-3164 | S-3164 | N-064 | P-064 | 11 15/16 | -.007 | 9 7/64  | 1 21/32 | 15      | 70   |



**SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS**

**PUSH TYPE REMOVABLE SLEEVE LOCKNUT AND LOCKWASHER**

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.



Tapered bore bearing mounted with push type removable sleeve

| Bearing Number     | Accessory Numbers |         |                      |             | Shaft Dimensions |                 | Sleeve Dimensions |              |               | C Removal Nut O.D. | Sleeve Weight  |
|--------------------|-------------------|---------|----------------------|-------------|------------------|-----------------|-------------------|--------------|---------------|--------------------|----------------|
|                    | Sleeve            | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d       | Tolerance +.000 | B Pitch Dia.      | L            | a             |                    |                |
|                    |                   |         |                      |             | mm in.           | mm in.          | mm in.            | mm in.       | mm in.        | mm in.             | kg. lbs.       |
| <b>SERIES 222K</b> |                   |         |                      |             |                  |                 |                   |              |               |                    |                |
| 22216K             | SK-8022           | N-14    | W-14                 | AN-18       | 70<br>2.7559     | -.10<br>-.004   | 88.19<br>3.472    | 50<br>1.969  | 3.5<br>0.138  | 118.39<br>4.661    | 0.57<br>1.25   |
| 22217K             | SK-8522           | AN-15   | W-15                 | AN-19       | 75<br>2.9528     | -.10<br>-.004   | 93.35<br>3.675    | 52<br>2.047  | 3.5<br>0.138  | 125.55<br>4.943    | 0.65<br>1.44   |
| 22218K             | SK-9022           | AN-16   | W-16                 | AN-20       | 80<br>3.1496     | -.10<br>-.004   | 98.12<br>3.863    | 53<br>2.087  | 3.5<br>0.138  | 131.90<br>5.193    | 0.69<br>1.53   |
| 22219K             | SK-9522           | AN-17   | W-17                 | AN-21       | 85<br>3.3465     | -.10<br>-.004   | 103.28<br>4.066   | 57<br>2.244  | 4.0<br>0.157  | 138.25<br>5.443    | 0.82<br>1.81   |
| 22220K             | SK-10022          | AN-18   | W-18                 | AN-22       | 90<br>3.5433     | -.10<br>-.004   | 109.12<br>4.269   | 59<br>2.323  | 4.0<br>0.157  | 145.39<br>5.724    | 0.91<br>2.00   |
| 22222K             | SK-11022          | AN-20   | W-20                 | ARN-22      | 100<br>3.9370    | -.10<br>-.004   | 119.94<br>4.722   | 65<br>2.559  | 4.0<br>0.157  | 158.75<br>6.250    | 1.12<br>2.47   |
| 22224K             | SK-12022          | AN-22   | W-22                 | ARN-24      | 110<br>4.3307    | -.13<br>-.005   | 130.28<br>5.129   | 72<br>2.835  | 4.0<br>0.157  | 174.63<br>6.875    | 1.42<br>3.13   |
| 22226K             | SK-13022          | AN-22   | W-22                 | ARN-26      | 115<br>4.5276    | -.13<br>-.005   | 141.38<br>5.566   | 78<br>3.071  | 4.0<br>0.157  | 184.15<br>7.250    | 2.27<br>5.00   |
| 22228K             | SK-14022          | AN-24   | W-24                 | RN-28       | 125<br>4.9213    | -.13<br>-.005   | 152.73<br>6.013   | 82<br>3.228  | 5.0<br>0.197  | 200.03<br>7.875    | 2.67<br>5.88   |
| 22230K             | SK-15022          | AN-26   | W-26                 | RN-30       | 135<br>5.3150    | -.13<br>-.005   | 163.04<br>6.419   | 88<br>3.465  | 5.0<br>0.197  | 209.55<br>8.250    | 3.09<br>6.81   |
| 22232K             | SK-16022          | AN-28   | W-28                 | RN-32       | 140<br>5.5118    | -.13<br>-.005   | 173.76<br>6.841   | 96<br>3.780  | 5.0<br>0.197  | 225.43<br>8.875    | 4.51<br>9.94   |
| 22234K             | SK-17022          | AN-30   | W-30                 | RN-34       | 150<br>5.9055    | -.13<br>-.005   | 184.07<br>7.247   | 104<br>4.095 | 5.0<br>0.197  | 234.95<br>9.250    | 5.22<br>11.50  |
| 22236K             | SK-18022          | AN-32   | W-32                 | RN-36       | 160<br>6.2992    | -.13<br>-.005   | 194.79<br>7.669   | 104<br>4.095 | 5.0<br>0.197  | 247.65<br>9.750    | 5.67<br>12.50  |
| 22238K             | SK-19022          | AN-34   | W-34                 | RN-38       | 170<br>6.6929    | -.13<br>-.005   | 205.92<br>8.107   | 112<br>4.409 | 5.0<br>0.197  | 269.88<br>10.625   | 6.58<br>14.50  |
| 22240K             | SK-20022          | AN-36   | W-36                 | N-44        | 180<br>7.0866    | -.13<br>-.005   | 217.02<br>8.544   | 118<br>4.646 | 5.0<br>0.197  | 279.53<br>11.005   | 7.43<br>16.37  |
| 22244K             | SK-22022          | AN-40   | W-40                 | N-048       | 200<br>7.8740    | -.13<br>-.005   | 236.98<br>9.330   | 130<br>5.118 | 6.0<br>0.236  | 290.65<br>11.443   | 8.89<br>19.60  |
| 22248K             | SK-24022          | N-44    | W-44                 | N-052       | 220<br>8.6614    | -.15<br>-.006   | 256.03<br>10.080  | 144<br>5.669 | 6.0<br>0.236  | 309.70<br>12.193   | 11.02<br>24.30 |
| 22252K             | SK-26022          | N-048   | P-48                 | N-056       | 240<br>9.4488    | -.15<br>-.006   | 276.66<br>10.892  | 155<br>6.102 | 6.0<br>0.236  | 330.33<br>13.005   | 14.02<br>30.90 |
| 22256K             | SK-28022          | N-052   | P-52                 | RN-56       | 260<br>10.2362   | -.15<br>-.006   | 301.27<br>11.861  | 155<br>6.102 | 8.0<br>0.315  | 425.45<br>16.75    | 15.01<br>33.10 |
| 22260K             | SK-30022          | N-056   | P-56                 | RN-60       | 280<br>11.0236   | -.15<br>-.006   | 325.88<br>12.830  | 170<br>6.693 | 8.0<br>0.315  | 416.10<br>16.382   | 17.78<br>39.20 |
| 22264K             | SK-32022          | N-060   | P-60                 | RN-64       | 300<br>11.8110   | -.15<br>-.006   | 345.72<br>13.611  | 180<br>7.087 | 10.0<br>0.394 | 431.80<br>17.000   | 21.00<br>46.30 |

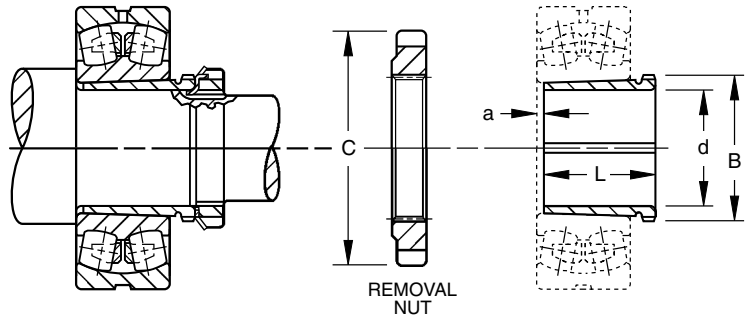


# ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS

### PUSH TYPE REMOVABLE SLEEVE, LOCKNUT AND LOCKWASHER

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.



Tapered bore bearing mounted with push type removable sleeve

| Bearing Number | Accessory Numbers |         |                      |             | Dimensions Shaft |                 | Sleeve Dimensions |        |        | C Removal Nut O.D. | Sleeve Weight |
|----------------|-------------------|---------|----------------------|-------------|------------------|-----------------|-------------------|--------|--------|--------------------|---------------|
|                | Sleeve            | Locknut | Lockwasher Lockplate | Removal Nut | Diameter d       | Tolerance +.000 | B Pitch Dia.      | L      | a      |                    |               |
|                |                   |         |                      |             | mm in.           | mm in.          | mm in.            | mm in. | mm in. | mm in.             | kg. lbs.      |

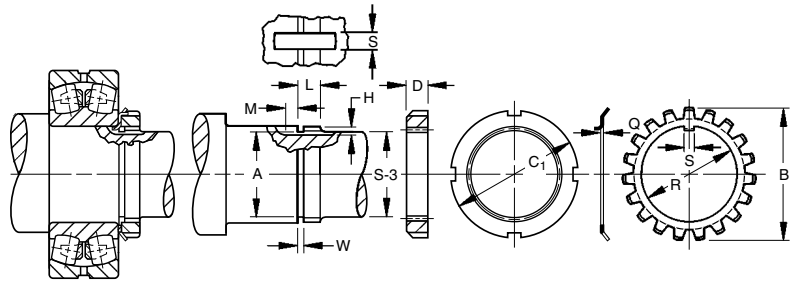
### SERIES 223K

|        |          |       |      |        |         |       |        |       |       |        |       |
|--------|----------|-------|------|--------|---------|-------|--------|-------|-------|--------|-------|
| 22308K | SK-4023  | N-07  | W-07 | N-09   | 35      | -.08  | 43.94  | 40    | 3.0   | 64.41  | 0.11  |
|        |          |       |      |        | 1.3780  | -.003 | 1.730  | 1.575 | 0.118 | 2.536  | 0.25  |
| 22309K | SK-4523  | N-08  | W-08 | N-10   | 40      | -.08  | 49.02  | 44    | 3.0   | 68.40  | 0.14  |
|        |          |       |      |        | 1.5748  | -.003 | 1.930  | 1.732 | 0.118 | 2.693  | 0.31  |
| 22310K | SK-5023  | N-09  | W-09 | RN-10  | 45      | -.08  | 55.04  | 50    | 3.0   | 76.20  | 0.21  |
|        |          |       |      |        | 1.7717  | -.003 | 2.167  | 1.969 | 0.118 | 3.000  | 0.47  |
| 22311K | SK-5523  | N-10  | W-10 | RN-11  | 50      | -.08  | 60.20  | 54    | 3.0   | 81.76  | 0.25  |
|        |          |       |      |        | 1.9685  | -.003 | 2.370  | 2.126 | 0.118 | 3.219  | 0.56  |
| 22312K | SK-6023  | N-11  | W-11 | RN-12  | 55      | -.10  | 65.76  | 57    | 3.5   | 87.33  | 0.31  |
|        |          |       |      |        | 2.1654  | -.004 | 2.589  | 2.244 | 0.138 | 3.438  | 0.69  |
| 22313K | SK-6523  | N-12  | W-12 | AN-15  | 60      | -.10  | 73.10  | 61    | 3.5   | 98.55  | 0.38  |
|        |          |       |      |        | 2.3622  | -.004 | 2.878  | 2.402 | 0.138 | 3.880  | 0.84  |
| 22314K | SK-7023  | N-12  | W-12 | AN-16  | 60      | -.10  | 78.28  | 65    | 3.5   | 105.69 | 0.69  |
|        |          |       |      |        | 2.3622  | -.004 | 3.082  | 2.559 | 0.138 | 4.161  | 1.53  |
| 22315K | SK-7523  | N-13  | W-13 | AN-17  | 65      | -.10  | 83.44  | 69    | 3.5   | 112.04 | 0.81  |
|        |          |       |      |        | 2.5591  | -.004 | 3.285  | 2.717 | 0.138 | 4.411  | 1.78  |
| 22316K | SK-8023  | N-14  | W-14 | AN-18  | 70      | -.10  | 88.19  | 72    | 3.5   | 118.39 | 0.91  |
|        |          |       |      |        | 2.7559  | -.004 | 3.472  | 2.835 | 0.138 | 4.661  | 2.00  |
| 22317K | SK-8523  | AN-15 | W-15 | AN-19  | 75      | -.10  | 93.35  | 75    | 3.5   | 125.55 | 1.02  |
|        |          |       |      |        | 2.9528  | -.004 | 3.675  | 2.953 | 0.138 | 4.943  | 2.25  |
| 22318K | SK-9023  | AN-16 | W-16 | AN-20  | 80      | -.10  | 98.12  | 80    | 3.5   | 131.90 | 1.16  |
|        |          |       |      |        | 3.1496  | -.004 | 3.863  | 3.150 | 0.138 | 5.193  | 2.56  |
| 22319K | SK-9523  | AN-17 | W-17 | AN-21  | 85      | -.10  | 103.28 | 85    | 4.0   | 138.25 | 1.33  |
|        |          |       |      |        | 3.3465  | -.004 | 4.066  | 3.346 | 0.157 | 5.443  | 2.94  |
| 22320K | SK-10023 | AN-18 | W-18 | AN-22  | 90      | -.10  | 109.12 | 90    | 4.0   | 145.39 | 1.53  |
|        |          |       |      |        | 3.5433  | -.004 | 4.269  | 3.543 | 0.157 | 5.724  | 3.38  |
| 22322K | SK-11023 | AN-20 | W-20 | ARN-22 | 100     | -.10  | 119.94 | 98    | 4.0   | 158.75 | 1.93  |
|        |          |       |      |        | 3.9370  | -.004 | 4.722  | 3.858 | 0.157 | 6.250  | 4.25  |
| 22324K | SK-12023 | AN-22 | W-22 | ARN-24 | 110     | -.13  | 130.28 | 105   | 4.0   | 174.63 | 2.27  |
|        |          |       |      |        | 4.3307  | -.005 | 5.129  | 4.134 | 0.157 | 6.875  | 5.00  |
| 22326K | SK-13023 | AN-22 | W-22 | ARN-26 | 115     | -.13  | 141.38 | 115   | 4.0   | 184.15 | 3.63  |
|        |          |       |      |        | 4.5276  | -.005 | 5.566  | 4.528 | 0.157 | 7.250  | 8.00  |
| 22328K | SK-14023 | AN-24 | W-24 | RN-28  | 125     | -.13  | 152.73 | 125   | 5.0   | 200.03 | 4.31  |
|        |          |       |      |        | 4.9213  | -.005 | 6.013  | 4.921 | 0.197 | 7.875  | 9.50  |
| 22330K | SK-15023 | AN-26 | W-26 | RN-30  | 135     | -.13  | 163.04 | 135   | 5.0   | 209.55 | 5.18  |
|        |          |       |      |        | 5.3150  | -.005 | 6.419  | 5.315 | 0.197 | 8.250  | 11.43 |
| 22332K | SK-16023 | AN-28 | W-28 | RN-32  | 140     | -.13  | 173.76 | 140   | 6.0   | 225.43 | 7.03  |
|        |          |       |      |        | 5.5118  | -.005 | 6.841  | 5.512 | 0.236 | 8.875  | 15.50 |
| 22334K | SK-17023 | AN-30 | W-30 | RN-34  | 150     | -.13  | 184.07 | 146   | 6.0   | 234.95 | 7.82  |
|        |          |       |      |        | 5.9055  | -.005 | 7.247  | 5.748 | 0.236 | 9.250  | 17.25 |
| 22336K | SK-18023 | AN-32 | W-32 | RN-36  | 160     | -.13  | 194.79 | 154   | 6.0   | 247.65 | 9.19  |
|        |          |       |      |        | 6.2992  | -.005 | 7.669  | 6.063 | 0.236 | 9.750  | 20.25 |
| 22338K | SK-19023 | AN-34 | W-34 | RN-38  | 170     | -.13  | 205.92 | 160   | 7.0   | 269.88 | 10.03 |
|        |          |       |      |        | 6.6929  | -.005 | 8.107  | 6.299 | 0.276 | 10.625 | 22.12 |
| 22340K | SK-20023 | AN-36 | W-36 | N-44   | 180     | -.13  | 217.02 | 170   | 7.0   | 279.53 | 11.45 |
|        |          |       |      |        | 7.0866  | -.005 | 8.544  | 6.693 | 0.276 | 11.005 | 25.25 |
| 22344K | SK-22023 | AN-40 | W-40 | N-048  | 200     | -.13  | 236.98 | 181   | 8.0   | 290.65 | 13.38 |
|        |          |       |      |        | 7.8740  | -.005 | 9.330  | 7.126 | 0.315 | 11.443 | 29.50 |
| 22348K | SK-24023 | N-44  | W-44 | N-052  | 220     | -.15  | 256.03 | 189   | 8.0   | 309.70 | 15.51 |
|        |          |       |      |        | 8.6614  | -.006 | 10.080 | 7.441 | 0.315 | 12.193 | 34.20 |
| 22352K | SK-26023 | N-048 | P-48 | N-056  | 240     | -.15  | 276.66 | 200   | 8.0   | 330.33 | 18.26 |
|        |          |       |      |        | 9.4488  | -.006 | 10.892 | 7.874 | 0.315 | 13.005 | 40.25 |
| 22356K | SK-28023 | N-052 | P-52 | RN-56  | 260     | -.15  | 301.27 | 210   | 10.0  | 425.45 | 22.00 |
|        |          |       |      |        | 10.2362 | -.006 | 11.861 | 8.268 | 0.394 | 16.75  | 48.50 |

SHAFT ADAPTER ACCESSORIES FOR CYLINDRICAL BORE BEARINGS

LOCKNUT AND LOCKWASHER

- The table below shows dimensions for locknuts and lockwashers used in the mounting of cylindrical bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations also are shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223, etc.).



| Bearing Bore | Lock-nut | Lock-washer | Thds. Per Inch | Threads    |        |            |        |            |             |                    | Shaft |      |      |      |      | Locknut        |      | Lockwasher |       |       |      |      |
|--------------|----------|-------------|----------------|------------|--------|------------|--------|------------|-------------|--------------------|-------|------|------|------|------|----------------|------|------------|-------|-------|------|------|
|              |          |             |                | Major Dia. |        | Pitch Dia. |        | Minor Dia. | Relief Dia. | S-3 <sup>(1)</sup> | W     | L    | H    | S    | M    | C <sub>1</sub> | D    | Q          | R     | B     | S    |      |
|              |          |             |                | Max.       | Min.   | Max.       | Min.   | Max.       | Max.        | Max.               | Max.  | Max. | Max. | Max. | Max. | Max.           | Max. | Max.       | Max.  | Max.  | Max. | Max. |
| 35           | N 07     | W 07        | 18             | 34.95      | 34.74  | 34.03      | 33.93  | 33.22      | 32.82       | 31.75              | 2.4   | 12.7 | 2.4  | 4.8  | 3.2  | 52.39          | 11.4 | 1.3        | 36.0  | 57.2  | 4.5  |      |
| 40           | N 08     | W 08        | 18             | 39.7       | 39.49  | 38.78      | 38.67  | 37.97      | 37.57       | 36.51              | 3.2   | 13.5 | 2.4  | 7.9  | 3.2  | 57.15          | 11.4 | 1.5        | 40.7  | 62.7  | 7.4  |      |
| 45           | N 09     | W 09        | 18             | 44.88      | 44.67  | 43.96      | 43.85  | 43.15      | 42.75       | 42.86              | 3.2   | 13.5 | 2.4  | 7.9  | 4.0  | 64.3           | 11.4 | 1.5        | 46.2  | 69.5  | 7.4  |      |
| 50           | N 10     | W 10        | 18             | 49.96      | 49.75  | 49.05      | 48.93  | 48.23      | 47.83       | 47.63              | 3.2   | 15.1 | 2.4  | 7.9  | 4.0  | 68.3           | 13.0 | 1.5        | 51.2  | 74.2  | 7.4  |      |
| 55           | N 11     | W 11        | 18             | 54.79      | 54.58  | 53.87      | 53.74  | 53.06      | 52.66       | 52.39              | 3.2   | 15.1 | 3.2  | 7.9  | 4.0  | 75.4           | 13.0 | 1.6        | 56.1  | 79.0  | 7.4  |      |
| 60           | N 12     | W 12        | 18             | 59.94      | 59.74  | 59.03      | 58.90  | 58.21      | 57.82       | 57.15              | 3.2   | 15.9 | 3.2  | 7.9  | 4.0  | 80.2           | 13.7 | 1.6        | 61.6  | 85.0  | 7.4  |      |
| 65           | N 13     | W 13        | 18             | 64.72      | 64.51  | 63.80      | 63.67  | 62.99      | 62.59       | 61.91              | 3.2   | 16.7 | 3.2  | 7.9  | 4.0  | 85.7           | 14.6 | 1.6        | 66.4  | 90.9  | 7.4  |      |
| 70           | N 14     | W 14        | 18             | 69.88      | 69.67  | 68.96      | 68.83  | 68.14      | 67.75       | 66.68              | 3.2   | 16.7 | 3.2  | 7.9  | 6.4  | 92.1           | 14.6 | 1.6        | 71.5  | 97.2  | 7.4  |      |
| 75           | AN 15    | W 15        | 12             | 74.50      | 74.21  | 73.12      | 72.99  | 71.90      | 71.11       | 71.44              | 4.0   | 17.5 | 3.2  | 7.9  | 6.4  | 98.4           | 15.3 | 1.6        | 76.3  | 104.4 | 7.4  |      |
| 80           | AN 16    | W 16        | 12             | 79.68      | 79.40  | 78.31      | 78.16  | 77.08      | 76.29       | 76.20              | 4.0   | 17.5 | 3.2  | 9.5  | 6.4  | 105.6          | 15.3 | 1.8        | 81.5  | 111.1 | 9.0  |      |
| 85           | AN 17    | W 17        | 12             | 84.84      | 84.55  | 83.46      | 83.31  | 82.24      | 81.45       | 80.96              | 4.0   | 16.7 | 3.2  | 9.5  | 6.4  | 111.9          | 16.1 | 1.8        | 87.0  | 117.5 | 9.0  |      |
| 90           | AN 18    | W 18        | 12             | 89.59      | 89.30  | 88.21      | 88.02  | 86.99      | 86.20       | 85.73              | 4.0   | 20.6 | 4.0  | 9.5  | 6.4  | 118.3          | 17.7 | 2.4        | 91.7  | 125.4 | 9.0  |      |
| 95           | AN 19    | W 19        | 12             | 94.74      | 94.46  | 93.37      | 93.18  | 92.15      | 91.35       | 90.49              | 4.0   | 21.4 | 4.0  | 9.5  | 6.4  | 125.4          | 18.5 | 2.4        | 97.3  | 132.6 | 9.0  |      |
| 100          | AN 20    | W 20        | 12             | 99.52      | 99.23  | 98.14      | 97.96  | 96.92      | 96.13       | 96.84              | 4.0   | 22.2 | 4.0  | 9.5  | 7.9  | 131.8          | 19.3 | 2.4        | 102.1 | 139.7 | 9.0  |      |
| 105          | AN 21    | W 21        | 12             | 104.70     | 104.41 | 103.32     | 103.11 | 102.10     | 101.31      | 100.01             | 4.0   | 22.2 | 4.0  | 9.5  | 7.9  | 138.1          | 19.3 | 2.4        | 107.2 | 144.9 | 9.0  |      |
| 110          | AN 22    | W 22        | 12             | 109.86     | 109.57 | 108.48     | 108.27 | 107.26     | 106.46      | 106.36             | 4.0   | 23.0 | 4.8  | 9.5  | 7.9  | 145.3          | 20.1 | 3.2        | 112.4 | 154.0 | 9.0  |      |
| 120          | AN 24    | W 24        | 12             | 119.79     | 119.50 | 118.41     | 118.20 | 117.19     | 116.40      | 115.89             | 4.0   | 23.8 | 4.8  | 9.5  | 7.9  | 155.6          | 20.9 | 3.2        | 122.7 | 164.3 | 9.0  |      |
| 130          | AN 26    | W 26        | 12             | 129.69     | 129.41 | 128.32     | 128.11 | 127.10     | 126.30      | 125.41             | 4.0   | 25.4 | 4.8  | 12.7 | 7.9  | 171.5          | 22.5 | 3.2        | 132.7 | 178.6 | 11.1 |      |
| 140          | AN 28    | W 28        | 12             | 139.62     | 139.34 | 138.25     | 138.04 | 137.03     | 136.23      | 134.94             | 4.0   | 27.0 | 4.8  | 15.9 | 7.9  | 180.2          | 24.1 | 3.2        | 142.7 | 188.9 | 15.0 |      |
| 150          | AN 30    | W 30        | 12             | 149.56     | 149.27 | 148.18     | 147.97 | 146.96     | 146.16      | 146.05             | 4.0   | 28.6 | 5.6  | 15.9 | 9.5  | 195.3          | 24.9 | 4.0        | 152.9 | 204.8 | 15.0 |      |
| 160          | AN 32    | W 32        | 8              | 159.61     | 159.23 | 157.55     | 157.32 | 155.72     | 154.92      | 153.99             | 6.4   | 30.2 | 6.0  | 15.9 | 9.5  | 204.8          | 26.4 | 4.0        | 163.2 | 214.3 | 15.0 |      |
| 170          | AN 34    | W 34        | 8              | 169.14     | 168.75 | 167.08     | 166.85 | 165.24     | 164.45      | 163.51             | 6.4   | 31.0 | 6.0  | 19.1 | 9.5  | 219.9          | 27.3 | 4.0        | 172.7 | 230.2 | 18.2 |      |
| 180          | AN 36    | W 36        | 8              | 179.48     | 179.09 | 177.41     | 177.18 | 175.58     | 174.79      | 174.63             | 6.4   | 31.8 | 6.0  | 19.1 | 9.5  | 230.2          | 28.0 | 4.0        | 183.0 | 239.7 | 18.2 |      |
| 190          | AN 38    | W 38        | 8              | 189.79     | 189.40 | 187.73     | 187.50 | 185.89     | 185.10      | 184.15             | 6.4   | 32.5 | 6.0  | 19.1 | 9.5  | 240.5          | 28.8 | 4.0        | 193.3 | 250.8 | 18.2 |      |
| 200          | AN 40    | W 40        | 8              | 199.31     | 198.93 | 197.25     | 196.96 | 195.42     | 194.62      | 193.68             | 6.4   | 34.1 | 6.0  | 22.2 | 9.5  | 250.0          | 30.4 | 4.0        | 203.6 | 261.9 | 21.3 |      |
| 220          | N 44     | W 44        | 8              | 219.15     | 218.77 | 217.09     | 216.78 | 215.25     | 214.46      | 211.14             | 6.4   | 34.9 | 9.5  | 27.0 | 9.5  | 279.4          | 31.8 | 3.2        | 221.1 | 290.5 | 23.9 |      |

<sup>(1)</sup> See page B383 for suggested S-3 shaft tolerances.

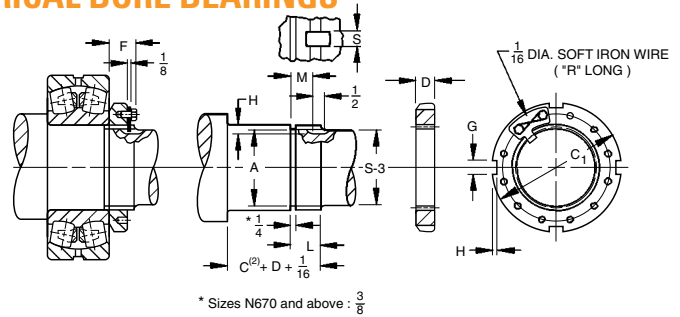


# ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR CYLINDRICAL BORE BEARINGS

### LOCKNUT AND LOCKPLATE

- The table below shows dimensions for locknuts and lockwashers used in the mounting of cylindrical bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations also are shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223, etc.).



\* Sizes N670 and above:  $\frac{3}{8}$

| Bearing Bore | Locknut | Lockwasher | Thds. Per Inch | Threads          |                   |                   |                   |                   |                   | Shaft              |                  |              |                 |                 | Locknut/Lockplate |                  |                |               |                 |                  |
|--------------|---------|------------|----------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|------------------|--------------|-----------------|-----------------|-------------------|------------------|----------------|---------------|-----------------|------------------|
|              |         |            |                | Major Dia.       |                   | Pitch Dia.        |                   | Minor Dia.        | Relief Dia. A     | S-3 <sup>(1)</sup> | L + 1/64 -0      | H + 1/64 -0  | S + 1/64 -0     | M + 1/64 -0     | C <sub>1</sub>    | D                | G              | H ±.010"      | R               | F                |
|              |         |            |                | mm in.           | mm in.            | mm in.            | mm in.            | mm in.            | mm in.            | mm in.             | mm in.           | mm in.       | mm in.          | mm in.          | mm in.            | mm in.           | mm in.         | mm in.        | mm in.          | mm in.           |
| 240          | N 048   | P 48       | 6              | 239.83<br>9.442  | 239.31<br>9.4218  | 237.08<br>9.3337  | 236.76<br>9.3213  | 234.63<br>9.2374  | 233.44<br>9.1905  | 233.36<br>9 3/16   | 42.86<br>1 11/16 | 11.1<br>7/16 | 28.6<br>1 1/8   | 34.9<br>1 3/8   | 290.5<br>11 7/16  | 34.1<br>1 11/32  | 22.48<br>0.885 | 9.5<br>3/8    | 203.2<br>8      | 43.26<br>1 45/64 |
| 260          | N 052   | P 52       | 6              | 258.88<br>10.192 | 258.36<br>10.1718 | 256.13<br>10.0837 | 255.8<br>10.0707  | 253.68<br>9.9874  | 252.49<br>9.9405  | 252.41<br>9 15/16  | 45.24<br>1 25/32 | 11.1<br>7/16 | 30.2<br>1 3/16  | 37.3<br>1 15/32 | 309.6<br>12 3/16  | 35.7<br>1 13/32  | 22.48<br>0.885 | 9.5<br>3/8    | 228.6<br>9      | 44.85<br>1 49/64 |
| 280          | N 056   | P 56       | 6              | 279.50<br>11.004 | 278.99<br>10.9838 | 276.75<br>10.8957 | 276.42<br>10.8827 | 274.31<br>10.7994 | 273.11<br>10.7525 | 273.05<br>10 3/4   | 47.63<br>1 7/8   | 11.1<br>7/16 | 31.8<br>1 1/4   | 39.7<br>1 9/16  | 330.2<br>13       | 38.1<br>1 1/2    | 25.65<br>1.010 | 9.5<br>3/8    | 228.6<br>9      | 47.23<br>1 55/64 |
| 300          | N 060   | P 60       | 6              | 299.34<br>11.785 | 298.83<br>11.7648 | 296.59<br>11.6767 | 296.26<br>11.6637 | 294.14<br>11.5804 | 292.95<br>11.5335 | 292.1<br>11 1/2    | 49.21<br>1 15/16 | 11.1<br>7/16 | 34.9<br>1 3/8   | 41.3<br>1 5/8   | 360.4<br>14 3/16  | 39.7<br>1 9/16   | 25.65<br>1.010 | 12.7<br>1/2   | 254.0<br>10     | 50.01<br>1 31/32 |
| 320          | N 064   | P 64       | 6              | 319.08<br>12.562 | 318.56<br>12.5418 | 316.32<br>12.4537 | 315.98<br>12.4402 | 313.88<br>12.3574 | 312.69<br>12.3105 | 312.74<br>12 5/16  | 51.59<br>2 1/32  | 11.1<br>7/16 | 36.5<br>1 7/16  | 43.7<br>1 23/32 | 381.0<br>15       | 42.1<br>1 21/32  | 25.65<br>1.010 | 12.7<br>1/2   | 254.0<br>10     | 52.39<br>2 1/16  |
| 340          | N 068   | P 68       | 5              | 337.90<br>13.303 | 337.49<br>13.287  | 335.36<br>13.203  | 334.95<br>13.187  | 332.31<br>13.083  | 331.11<br>13.036  | 331.79<br>13 1/16  | 56.36<br>2 7/32  | 11.1<br>7/16 | 38.1<br>1 1/2   | 48.4<br>1 29/32 | 400.1<br>15 9/4   | 45.2<br>1 25/32  | 25.65<br>1.010 | 12.7<br>1/2   | 279.4<br>11     | 55.56<br>2 3/16  |
| 360          | N 072   | P 72       | 5              | 359.00<br>14.134 | 358.60<br>14.118  | 356.46<br>14.034  | 356.06<br>14.018  | 353.42<br>13.914  | 352.22<br>13.867  | 350.84<br>13 13/16 | 56.36<br>2 7/32  | 12.7<br>1/2  | 38.1<br>1 1/2   | 48.4<br>1 29/32 | 419.1<br>16 1/2   | 45.2<br>1 25/32  | 32.00<br>1.260 | 12.7<br>1/2   | 279.4<br>11     | 55.56<br>2 3/16  |
| 380          | N 076   | P 76       | 5              | 378.99<br>14.921 | 378.59<br>14.905  | 376.45<br>14.821  | 376.05<br>14.805  | 373.41<br>14.701  | 372.21<br>14.654  | 371.48<br>14 9/8   | 59.53<br>2 11/32 | 12.7<br>1/2  | 38.1<br>1 1/2   | 51.59<br>2 1/32 | 450.9<br>17 3/4   | 48.4<br>1 29/32  | 32.00<br>1.260 | 15.1<br>19/32 | 304.8<br>12     | 61.12<br>2 13/32 |
| 400          | N 080   | P 80       | 5              | 399.01<br>15.709 | 398.60<br>15.693  | 396.47<br>15.609  | 396.06<br>15.593  | 393.42<br>15.489  | 392.23<br>15.442  | 390.53<br>15 5/8   | 63.50<br>2 1/2   | 12.7<br>1/2  | 41.3<br>1 5/8   | 55.6<br>2 3/16  | 469.9<br>18 1/2   | 52.4<br>2 1/16   | 32.00<br>1.260 | 15.1<br>19/32 | 330.2<br>13     | 65.09<br>2 9/16  |
| 420          | N 084   | P 84       | 5              | 419.00<br>16.496 | 418.59<br>16.480  | 416.46<br>16.396  | 416.05<br>16.380  | 413.41<br>16.276  | 412.22<br>16.229  | 411.16<br>16 3/16  | 63.50<br>2 1/2   | 12.7<br>1/2  | 41.3<br>1 5/8   | 55.6<br>2 3/16  | 490.5<br>19 5/16  | 52.4<br>2 1/16   | 35.18<br>1.385 | 15.1<br>19/32 | 330.2<br>13     | 65.09<br>2 9/16  |
| 440          | N 088   | P 88       | 5              | 438.99<br>17.283 | 438.58<br>17.267  | 436.45<br>17.183  | 436.05<br>17.167  | 433.40<br>17.063  | 432.21<br>17.016  | 431.80<br>17       | 71.44<br>2 13/16 | 12.7<br>1/2  | 46.0<br>1 13/16 | 63.50<br>2 1/2  | 520.7<br>20 1/2   | 60.3<br>2 3/8    | 35.18<br>1.385 | 15.1<br>19/32 | 355.6<br>14     | 75.41<br>2 31/32 |
| 460          | N 092   | P 92       | 5              | 459.00<br>18.071 | 458.60<br>18.055  | 456.46<br>17.971  | 456.06<br>17.955  | 453.42<br>17.851  | 452.22<br>17.804  | 450.85<br>17 3/4   | 71.44<br>2 13/16 | 12.7<br>1/2  | 46.0<br>1 13/16 | 63.50<br>2 1/2  | 539.8<br>21 1/4   | 60.3<br>2 3/8    | 35.18<br>1.385 | 15.1<br>19/32 | 406.4<br>16     | 75.41<br>2 31/32 |
| 480          | N 096   | P 96       | 5              | 478.99<br>18.858 | 478.59<br>18.842  | 476.45<br>18.758  | 476.05<br>18.742  | 473.41<br>18.638  | 472.21<br>18.591  | 469.9<br>18 1/2    | 71.44<br>2 13/16 | 12.7<br>1/2  | 46.0<br>1 13/16 | 63.50<br>2 1/2  | 560.4<br>22 1/16  | 60.3<br>2 3/8    | 38.35<br>1.510 | 15.1<br>19/32 | 406.4<br>16     | 75.41<br>2 31/32 |
| 500          | N 500   | P 500      | 5              | 499.01<br>19.646 | 498.60<br>19.630  | 496.47<br>19.546  | 496.06<br>19.530  | 493.42<br>19.426  | 492.23<br>19.379  | 489.0<br>19 1/4    | 79.4<br>3 1/8    | 12.7<br>1/2  | 46.0<br>1 13/16 | 71.4<br>2 13/16 | 579.4<br>22 13/16 | 68.3<br>2 11/16  | 38.35<br>1.510 | 15.1<br>19/32 | 406.4<br>16     | 83.3<br>3 9/32   |
| 530          | N 530   | P 530      | 4              | 529.01<br>20.827 | 528.50<br>20.807  | 526.37<br>20.702  | 525.96<br>20.682  | 523.31<br>20.557  | 522.15<br>20.494  | 517.5<br>20 3/8    | 79.4<br>3 1/8    | 12.7<br>1/2  | 46.0<br>1 13/16 | 71.4<br>2 13/16 | 630.2<br>24 13/16 | 68.3<br>2 11/16  | 41.53<br>1.635 | 20.6<br>13/16 | 425.5<br>16 3/4 | 83.3<br>3 9/32   |
| 560          | N 560   | P 560      | 4              | 559.00<br>22.008 | 558.50<br>21.988  | 556.37<br>21.883  | 555.96<br>21.863  | 553.31<br>21.738  | 552.15<br>21.675  | 549.3<br>21 5/8    | 85.7<br>3 3/8    | 12.7<br>1/2  | 46.0<br>1 13/16 | 77.8<br>3 1/16  | 649.3<br>25 9/16  | 71.4<br>2 15/16  | 41.53<br>1.635 | 20.6<br>13/16 | 476.3<br>18 3/4 | 89.7<br>3 17/32  |
| 600          | N 600   | P 600      | 4              | 599.01<br>23.583 | 598.50<br>23.563  | 596.37<br>23.458  | 595.96<br>23.438  | 593.31<br>23.313  | 592.15<br>23.250  | 587.4<br>23 1/8    | 85.7<br>3 3/8    | 12.7<br>1/2  | 46.0<br>1 13/16 | 77.8<br>3 1/16  | 700.1<br>27 9/16  | 74.6<br>2 15/16  | 41.53<br>1.635 | 20.6<br>13/16 | 508.0<br>20     | 89.7<br>3 17/32  |
| 630          | N 630   | P 630      | 4              | 629.01<br>24.764 | 628.50<br>24.744  | 626.37<br>24.639  | 625.96<br>24.619  | 623.31<br>24.494  | 622.15<br>24.431  | 619.1<br>24 3/8    | 85.7<br>3 3/8    | 12.7<br>1/2  | 50.8<br>2       | 77.8<br>3 1/16  | 730.3<br>28 3/4   | 74.6<br>2 15/16  | 47.88<br>1.885 | 20.6<br>13/16 | 520.7<br>20 1/2 | 92.1<br>3 5/8    |
| 670          | N 670   | P 670      | 4              | 669.01<br>26.339 | 668.50<br>26.319  | 666.37<br>26.214  | 665.96<br>26.194  | 663.31<br>26.069  | 662.15<br>26.006  | 657.2<br>25 7/8    | 90.5<br>3 9/16   | 12.7<br>1/2  | 50.8<br>2       | 82.6<br>3 1/4   | 779.5<br>30 11/16 | 79.4<br>3 1/8    | 47.88<br>1.885 | 20.6<br>13/16 | 546.1<br>21 1/2 | 96.8<br>3 13/16  |
| 710          | N 710   | P 710      | 3              | 709.02<br>27.914 | 708.33<br>27.887  | 706.77<br>27.747  | 706.09<br>27.720  | 704.02<br>27.56   | 702.42<br>27.497  | 695.3<br>27 5/8    | 101.6<br>4       | 15.9<br>5/8  | 50.8<br>2       | 93.7<br>3 11/16 | 830.3<br>32 11/16 | 90.5<br>3 9/16   | 51.30<br>2.020 | 25.4<br>1     | 571.5<br>22 1/2 | 108.0<br>4 1/4   |
| 750          | N 750   | P 750      | 3              | 749.02<br>29.489 | 748.34<br>29.462  | 746.78<br>29.322  | 746.09<br>29.295  | 744.03<br>29.135  | 738.43<br>29.072  | 736.6<br>29        | 101.6<br>4       | 15.9<br>5/8  | 50.8<br>2       | 93.7<br>3 11/16 | 870.0<br>34 1/4   | 90.5<br>3 9/16   | 57.66<br>2.270 | 25.4<br>1     | 584.2<br>23     | 108.0<br>4 1/4   |
| 800          | N 800   | P 800      | 3              | 799.01<br>31.457 | 798.32<br>31.430  | 796.77<br>31.290  | 796.09<br>31.263  | 794.02<br>31.103  | 788.42<br>31.040  | 787.4<br>31        | 101.6<br>4       | 15.9<br>5/8  | 50.8<br>2       | 93.7<br>3 11/16 | 920.8<br>36 1/4   | 90.5<br>3 9/16   | 57.66<br>2.270 | 25.4<br>1     | 616.0<br>24 1/4 | 108.0<br>4 1/4   |
| 850          | N 850   | P 850      | 3              | 849.02<br>33.426 | 848.34<br>33.399  | 846.78<br>33.259  | 846.09<br>33.232  | 844.03<br>33.072  | 838.43<br>33.009  | 835.0<br>32 7/8    | 101.6<br>4       | 15.9<br>5/8  | 50.8<br>2       | 93.7<br>3 11/16 | 979.5<br>38 9/16  | 90.5<br>3 9/16   | 64.01<br>2.520 | 25.4<br>1     | 647.7<br>25 1/2 | 108.0<br>4 1/4   |
| 900          | N 900   | P 900      | 3              | 899.01<br>35.394 | 898.32<br>35.367  | 896.77<br>35.227  | 896.09<br>35.200  | 894.02<br>35.040  | 888.42<br>34.977  | 885.8<br>34 7/8    | 111.1<br>4 3/8   | 15.9<br>5/8  | 50.8<br>2       | 103.2<br>4 1/16 | 1030.3<br>40 9/16 | 100.0<br>3 15/16 | 64.01<br>2.520 | 25.4<br>1     | 666.8<br>26 1/4 | 117.5<br>4 5/8   |
| 950          | N 950   | P 950      | 3              | 949.02<br>37.363 | 948.33<br>37.336  | 946.78<br>37.196  | 946.09<br>37.169  | 944.03<br>37.009  | 938.43<br>36.946  | 933.5<br>36 3/4    | 114.3<br>4 1/2   | 19.1<br>3/4  | 50.8<br>2       | 108<br>4 1/4    | 1092.2<br>43      | 100.0<br>3 15/16 | 64.01<br>2.520 | 25.4<br>1     | 692.2<br>27 1/4 | 117.5<br>4 5/8   |

(1) See page B395 for suggested S-3 shaft tolerances.

(2) C is outer ring width which may be obtained from bearing dimension tables.

## MOUNTING PROCEDURES

Depending on the size of the bearing and the application, there are different methods for mounting roller bearings. In all methods, certain basic rules must be followed.

### CLEANLINESS

- Choose a clean environment, free from dust or moisture.
- The installer should make every effort to ensure cleanliness by use of protective screens and clean cloths.

### PLAN THE WORK

- Know in advance your plans and have the necessary tools at hand. This reduces the amount of time for the job and decreases the chance for dirt to get into the bearing.

### INSPECTION AND PREPARATION

- All component parts of the machine should be on hand and thoroughly cleaned before proceeding.
- Housings should be cleaned, including blowing out the oil holes.
- Do not use air hose on bearings.
- If blind holes are used, insert a magnetic rod to remove metal chips that might be lodged there during fabrication.
- Shaft shoulders and spacer rings contacting the bearing should be square with the shaft axis.
- The shaft fillet must be small enough to clear the radius of the bearing.
- On original installations, all component parts should be checked against the detail specification prints for dimensional accuracy. Shaft and housing should be carefully checked for size and form (roundness, etc.).

### SHAFT AND HOUSING FINISH

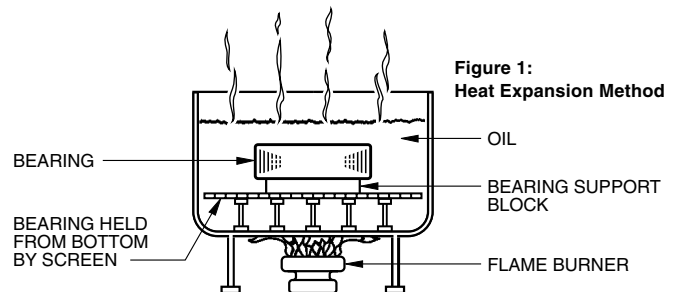
- Shaft surfaces on which the bearing will be mounted must be clean and free from nicks and burrs.
- For applications with stationary housing and rotating shaft, it is suggested that the bearing seat on the shaft be ground to 63 RMS (micro-inches) maximum.
- If it is impractical to use a ground finish, a machined finish of 125 RMS is acceptable in many cases, but the amount of interference fit should be slightly increased.
- For a stationary outer ring, which is required to float (e.g., slide axially in the housing), a housing finish of 63 RMS maximum is suggested.
- Where the outer ring is not required to float, a surface finish of 125 RMS maximum is generally satisfactory.

**DO NOT REMOVE THE BEARING FROM ITS WRAPPING UNTIL YOU ARE READY TO MOUNT IT.**

## MOUNTING CYLINDRICAL BORE BEARINGS

### HEAT EXPANSION METHOD

- Most applications require a tight interference fit on the shaft.
- Mounting is simplified by heating the bearing to expand it sufficiently to slide easily onto the shaft.
- Two methods of heating are commonly used:
  - Tank of heated oil.
  - Induction heating.
- The first is accomplished by heating the bearing in a tank of oil that has a high flash point.
- The oil temperature should not be allowed to exceed 121° C (250° F). A temperature of 93° C (200° F) is sufficient for most applications.
- The bearing should be heated for 20 or 30 minutes, until it is expanded sufficiently to slide onto the shaft easily.
- Induction heating method is used for mounting small bearings in production line assembly.
- Induction heating is rapid. Care must be taken to prevent bearing temperature from exceeding 93° C (200° F).
- Trial runs with the unit and bearing are usually necessary to obtain proper timing.
- Thermal crayons melted at predetermined temperatures can be used to check the bearing temperature.
- While bearing is hot, it should be positioned squarely against the shoulder.
- Lockwashers and locknuts or clamping plates are then installed to hold the bearing against the shoulder of the shaft.
- As the bearing cools, the locknut or clamping plate should be tightened.
- In cases of outer ring rotation, where the outer ring is a tight fit in the housing, the housing member can be expanded by heating.
- The oil bath is shown in Figure 1. The bearing should not be in direct contact with the heat source.
- The usual arrangement is to have a screen several inches from the bottom of the tank. Small support blocks separate the bearing from the screen.
- It is important to keep the bearing away from any localized high-heat source that may raise its temperature excessively, resulting in race hardness reduction.



- Flame-type burners are commonly used. An automatic device for temperature control is desirable.
- If safety regulations prevent the use of an open heated oil bath, a mixture of 15 percent soluble-oil water may be used. This mixture may be heated to a maximum of 93° C (200° F) without being flammable.



## ROLLER BEARINGS

### ARBOR PRESS METHOD

- The alternate method of mounting, generally used only on smaller sizes, is to press the bearing onto the shaft or into the housing. This can be done by using an arbor press and a mounting tube as shown in Figure 2.
- The tube can be made from soft steel with an inside diameter slightly larger than the shaft.
- The O.D. of the tube should not exceed the maximum shoulder height given in the table of dimensions.
- The tube should be faced square at both ends. It should be thoroughly clean inside and out, and long enough to clear the end of the shaft after the bearing is mounted.

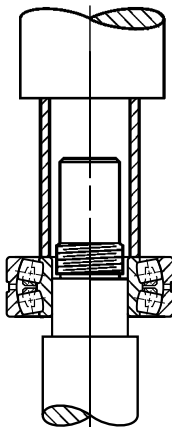


Figure 2:  
Arbor Press Method

- If outer ring is being pressed into housing, the O.D. of the mounting tube should be slightly smaller than the housing bore. The I.D. should not be less than the suggested housing basking diameter in the tables of dimensions.
- Coat the shaft with a light machine oil to reduce the force needed for a press fit.
- Carefully place the bearing on the shaft, making sure it is square with the shaft axis.
- Apply steady pressure from the arbor ram to drive the bearing firmly against the shoulder.
- Never attempt a press fit on a shaft by applying pressure to the outer ring, or a press fit in a housing by applying pressure to the inner ring.

### SHAFT MOUNTING TAPERED BORE SPHERICAL ROLLER BEARINGS

- Use a feeler gage with the thinnest blade of .0015 in.
- Place the bearing in an upright position with the inner and outer ring faces parallel.
- Place the thumbs on the inner ring bore and oscillate the inner ring two or three elements.
- Position the individual roller assemblies so that a roller is at the top of the inner ring on both sides of the bearing.
- With the roller in the correct position, insert a thin blade of the feeler gage between the roller and the outer ring.
- Move it carefully along the top roller, between the roller and outer ring raceway. Repeat this procedure, using thicker feeler gage blades, until one is found that will not go through.
- The blade thickness that preceded the "no-go" blade is a measure of RIC before installation.



- Start the mounting procedure by lubricating the tapered shaft with a light coat of machine oil.
- Slide bearing onto the shaft as far as it will go.
- As the locknut is tightened, the interference fit builds up resulting in expansion of the inner ring.
- Periodically measure to keep track of the reduction in RIC.
- Continue the procedure until the proper amount of reduction is obtained. Do not exceed suggested amount of reduction.
- As a final check, make sure that the remaining RIC equals or exceeds the minimum mounted clearance shown in the table to the right.



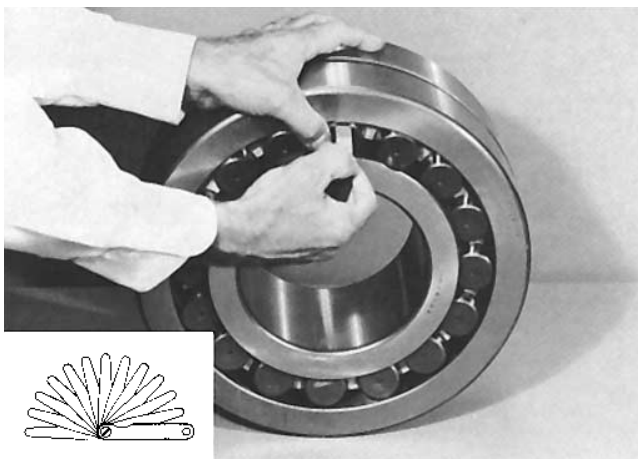
## MOUNTING TIMKEN® TAPERED BORE SPHERICAL ROLLER BEARINGS

| Nominal bearing bore (mm) |       | Radial Internal Clearance prior to mounting (mm) |       |       |       |       |       | Suggested reduction of RIC (mm) |       | Axial displacement tapered shaft installation (mm) |       |              |        | Minimum permissible RIC after installation |       |       |
|---------------------------|-------|--------------------------------------------------|-------|-------|-------|-------|-------|---------------------------------|-------|----------------------------------------------------|-------|--------------|--------|--------------------------------------------|-------|-------|
| over                      | incl. | Normal                                           |       | C3    |       | C4    |       | Min.                            | Max.  | 1:12 Taper**                                       |       | 1:30 Taper** |        | Normal                                     | C3    | C4    |
|                           |       | Min.                                             | Max.  | Min.  | Max.  | Min.  | Max.  |                                 |       | Min.                                               | Max.  |              |        |                                            |       |       |
| 30                        | 40    | 0.035                                            | 0.050 | 0.050 | 0.065 | 0.065 | 0.085 | 0.020                           | 0.025 | 0.300                                              | 0.380 | -            | -      | 0.015                                      | 0.025 | 0.040 |
| 40                        | 50    | 0.045                                            | 0.060 | 0.060 | 0.080 | 0.080 | 0.100 | 0.025                           | 0.030 | 0.380                                              | 0.460 | -            | -      | 0.020                                      | 0.030 | 0.050 |
| 50                        | 65    | 0.055                                            | 0.075 | 0.075 | 0.095 | 0.095 | 0.120 | 0.030                           | 0.040 | 0.460                                              | 0.560 | -            | -      | 0.025                                      | 0.040 | 0.060 |
| 65                        | 80    | 0.070                                            | 0.095 | 0.095 | 0.120 | 0.120 | 0.150 | 0.040                           | 0.050 | 0.560                                              | 0.760 | -            | -      | 0.025                                      | 0.045 | 0.075 |
| 80                        | 100   | 0.080                                            | 0.110 | 0.100 | 0.140 | 0.140 | 0.180 | 0.045                           | 0.065 | 0.680                                              | 0.970 | -            | -      | 0.035                                      | 0.050 | 0.075 |
| 100                       | 120   | 0.100                                            | 0.135 | 0.135 | 0.170 | 0.170 | 0.220 | 0.050                           | 0.070 | 0.760                                              | 1.070 | 1.900        | 2.540  | 0.050                                      | 0.060 | 0.100 |
| 120                       | 140   | 0.120                                            | 0.160 | 0.160 | 0.200 | 0.200 | 0.260 | 0.065                           | 0.090 | 0.890                                              | 1.270 | 2.290        | 3.050  | 0.055                                      | 0.075 | 0.115 |
| 140                       | 160   | 0.130                                            | 0.180 | 0.180 | 0.230 | 0.230 | 0.300 | 0.075                           | 0.100 | 1.140                                              | 1.520 | 2.670        | 3.430  | 0.055                                      | 0.075 | 0.125 |
| 160                       | 180   | 0.140                                            | 0.200 | 0.200 | 0.260 | 0.260 | 0.340 | 0.075                           | 0.115 | 1.140                                              | 1.650 | 2.670        | 4.060  | 0.060                                      | 0.090 | 0.150 |
| 180                       | 200   | 0.160                                            | 0.220 | 0.220 | 0.290 | 0.290 | 0.370 | 0.090                           | 0.125 | 1.400                                              | 1.900 | 3.050        | 4.450  | 0.070                                      | 0.100 | 0.165 |
| 200                       | 225   | 0.180                                            | 0.250 | 0.250 | 0.320 | 0.320 | 0.410 | 0.100                           | 0.140 | 1.520                                              | 2.030 | 3.560        | 4.830  | 0.075                                      | 0.115 | 0.180 |
| 225                       | 250   | 0.200                                            | 0.270 | 0.270 | 0.350 | 0.350 | 0.450 | 0.115                           | 0.150 | 1.780                                              | 2.290 | 4.060        | 5.330  | 0.090                                      | 0.115 | 0.200 |
| 250                       | 280   | 0.220                                            | 0.300 | 0.300 | 0.390 | 0.390 | 0.490 | 0.115                           | 0.165 | 1.780                                              | 2.540 | 4.060        | 5.840  | 0.100                                      | 0.140 | 0.230 |
| 280                       | 315   | 0.240                                            | 0.330 | 0.330 | 0.430 | 0.430 | 0.540 | 0.125                           | 0.180 | 1.900                                              | 2.670 | 4.450        | 6.220  | 0.100                                      | 0.150 | 0.250 |
| 315                       | 355   | 0.270                                            | 0.360 | 0.360 | 0.470 | 0.470 | 0.590 | 0.140                           | 0.190 | 2.030                                              | 2.790 | 4.830        | 6.600  | 0.115                                      | 0.165 | 0.280 |
| 355                       | 400   | 0.300                                            | 0.400 | 0.400 | 0.520 | 0.520 | 0.650 | 0.150                           | 0.200 | 2.290                                              | 3.050 | 5.330        | 7.110  | 0.130                                      | 0.190 | 0.330 |
| 400                       | 450   | 0.330                                            | 0.440 | 0.440 | 0.570 | 0.570 | 0.720 | 0.165                           | 0.215 | 2.540                                              | 3.300 | 5.840        | 7.620  | 0.150                                      | 0.230 | 0.360 |
| 450                       | 500   | 0.370                                            | 0.490 | 0.490 | 0.630 | 0.630 | 0.790 | 0.180                           | 0.230 | 2.670                                              | 3.430 | 6.220        | 8.000  | 0.165                                      | 0.270 | 0.410 |
| 500                       | 560   | 0.410                                            | 0.540 | 0.540 | 0.680 | 0.680 | 0.870 | 0.200                           | 0.250 | 3.050                                              | 3.810 | 7.110        | 8.890  | 0.180                                      | 0.290 | 0.440 |
| 560                       | 630   | 0.460                                            | 0.600 | 0.600 | 0.760 | 0.760 | 0.980 | 0.230                           | 0.280 | 3.430                                              | 4.190 | 8.000        | 9.780  | 0.200                                      | 0.320 | 0.510 |
| 630                       | 710   | 0.510                                            | 0.670 | 0.670 | 0.850 | 0.850 | 1.090 | 0.250                           | 0.300 | 3.810                                              | 4.570 | 8.890        | 10.670 | 0.200                                      | 0.370 | 0.550 |
| 710                       | 800   | 0.570                                            | 0.750 | 0.750 | 0.960 | 0.960 | 1.220 | 0.280                           | 0.350 | 4.190                                              | 5.330 | 9.780        | 12.450 | 0.230                                      | 0.390 | 0.610 |
| 800                       | 900   | 0.640                                            | 0.840 | 0.840 | 1.070 | 1.070 | 1.370 | 0.300                           | 0.380 | 4.570                                              | 5.720 | 10.670       | 13.330 | 0.250                                      | 0.460 | 0.690 |
| 900                       | 1000  | 0.710                                            | 0.930 | 0.930 | 1.190 | 1.190 | 1.520 | 0.350                           | 0.430 | 5.330                                              | 6.480 | 12.450       | 15.110 | 0.280                                      | 0.490 | 0.750 |
| 1000                      | 1120  | 0.770                                            | 1.030 | 1.030 | 1.300 | 1.300 | 1.670 | 0.400                           | 0.480 | 6.100                                              | 7.240 | 14.220       | 16.890 | 0.280                                      | 0.550 | 0.810 |
| 1120                      | 1250  | 0.830                                            | 1.120 | 1.120 | 1.420 | 1.420 | 1.830 | 0.430                           | 0.500 | 6.480                                              | 7.620 | 15.110       | 17.780 | 0.330                                      | 0.610 | 0.910 |



\* Axial displacement values apply to solid steel shafts or to hollow steel shafts with bore diameter less than half the shaft diameter. For shaft materials other than steel or for thin-wall shafts, please consult your Timken representative.

\*\* 1:12 Taper used for 222, 223, 230, 231, 232, 233, 239 series. 1:30 Taper used for 240, 241, 242 series. For sleeve mounting, multiply axial displacement values by 1.1 for 1:12 taper or by 1.05 for 1:30 taper. Questions on tapered shaft data, consult your Timken representative.



Example: Bearing 22328K C3 (140 mm bore with a C3 clearance pattern) is being mounted on a tapered shaft.

a. By measuring with feeler gage, initial RIC is established to be .007 in.

b. Reference to chart above indicates proper fit is obtained when RIC is reduced by .0025 in. to .0035 in., or approximately .003 in.

Initial clearance     .007"  
Reduction of RIC     -.003"  
                                   .004"

c. Locknut is tightened until RIC reaches .004 in.. Final check against minimum RIC after mounting shows this value to be safe.

**Note:** Tapered bore bearings must have the proper amount of radial internal clearance before installation to provide for the required reduction of RIC during mounting and to compensate for any further internal reduction from abnormal temperature conditions. For special applications, send complete operating data to your Timken representative for suggestions on radial internal clearance.

- During mounting, the RIC should be checked at the unloaded roller. If this is at the bottom, make sure that the roller is raised to seat firmly at the inboard position of the inner race.
- When the suggested amount of reduction of RIC has been accomplished, the bearing is properly fitted.
- Complete the procedure by peening the lockwasher tang into the locknut slot or securing the lockplate.





## **ROLLER BEARINGS**



### **NOTES**

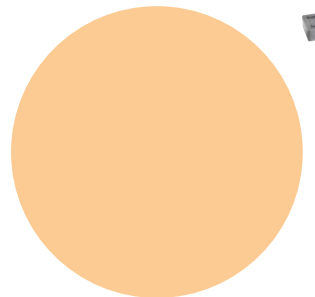
**B**



## SPHERICAL ROLLER BEARING PILLOW BLOCKS

**Overview:** Spherical roller bearing pillow blocks combine rugged cast iron or steel housings with high-capacity bearings to meet the toughest demands of industry. Each pillow block contains an advanced-design spherical roller bearing with improved geometry and raceway finish for maximum load capacity and service life. Integrated housing and bearing features enhance unit lubrication characteristics. Multiple sealing options protect against contamination.

- **Sizes:** 35 mm - 300 mm shafts (1.37795 in. - 11.811 in.). Special shaft sizes up to 1000 mm (39.37 in.) and beyond.
- **Markets:** Conveyors, mining, rolling mills and pulp and paper mills.
- **Features:** Split construction for convenient assembly and disassembly. These units include pry tool slots and the exclusive Pry-Lug fulcrum, which simplify bearing inspection, service and replacement.
- **Benefits:** Caps can be removed easily and quickly without damage to the bearing or housing.





### Pillow Blocks

- SAF** two- or four-bolt pillow block, cast iron
- SDAF** four-bolt heavy duty type pillow block, cast iron
- SAFS** two- or four-bolt pillow block, cast steel
- FSAF** four-bolt pillow block, cast iron (only when an option)
- FSAFS** four-bolt pillow block, cast steel (only when an option)
- SDAFS** four-bolt heavy-duty pillow block, cast steel

To indicate shaft size and used only for pillow block units of 8 7/16 in. shaft size or larger.

**SDAF**

**23152**

**K - 9 1/2**

**FXOP**

Number indicates basic spherical bearing series. See product data charts for spherical bearing number.

**K** indicated on adapter type mounting arrangement (for 230, 231, 232 Series, SDAF231K and SDAF232K Series)  
**DV** DUSTAC seals - both sides  
**DC** DUSTAC seals - one side

**Indicate construction:**  
**FXOP** fixed open  
**FXCL** fixed closed  
**FLOP** float open  
**FLCL** float closed



# Spherical Roller Bearing Pillow Blocks

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## SPHERICAL ROLLER BEARINGS

### INTRODUCTION

Timken capabilities in the engineering and manufacture of heavy-duty pillow blocks provide important benefits to users.

Another very important benefit is Timken's worldwide sales organization, staffed with experienced bearing engineers who are available for consultation on any pillow block or bearing application. Expert engineering assistance is available for applications involving shaft sizes 40 inches and larger such as BOF trunnions, bridge blocks and ball mills. If your design calls for shaft sizes or loads not listed in this catalog, contact your Timken representative for information about availability of special units.

### DESIGN AND CONSTRUCTION

Timken supplies pillow blocks equipped with either tapered bore bearings plus adapters for mounting on straight shafts or cylindrical bore bearings for assembly on shouldered shafts.

Timken spherical roller bearing pillow blocks are made of split construction for convenient assembly and disassembly. These units include pry tool slots and the exclusive Pry-Lug fulcrum that simplify bearing inspection, service, and replacement. Caps can be removed easily and quickly without damage to the bearing or housing.

Precision fit is assured by the Timken system of doweling caps and bases together at an early stage of manufacturing so that they remain a single unit during machining. They are not interchangeable as separate parts and become precisely mated components.

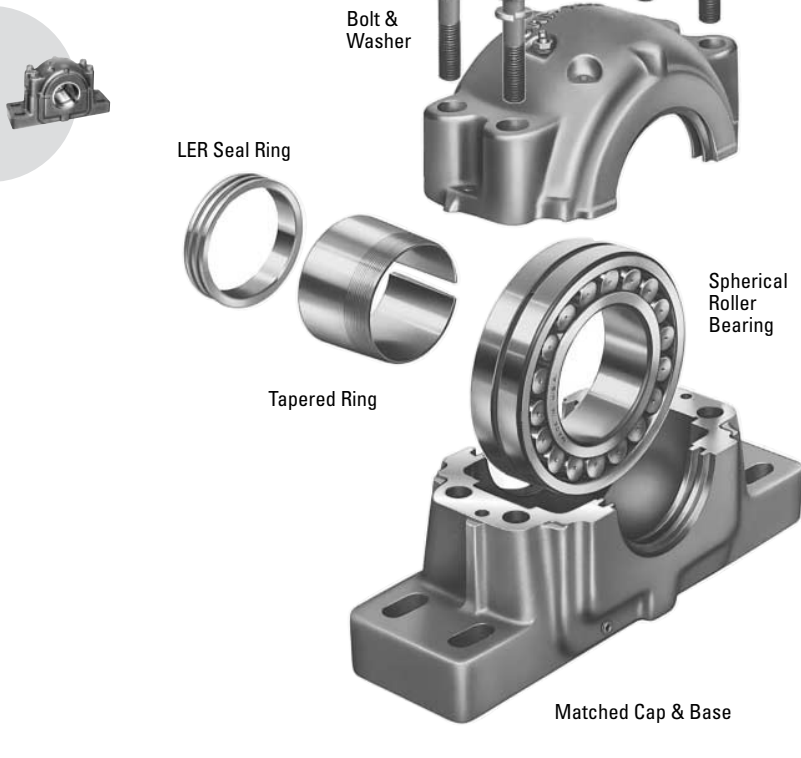
Timken manufactures pillow blocks in two styles: SAF and SDAF. The larger SDAF block is suggested for extreme duty applications.

Caps and bases are made from high-grade stress-relieved cast iron as standard. They also are available in cast steel.

All Timken pillow blocks are designed for four-bolt mounting. Certain smaller sizes are normally furnished for two-bolt mounting. These assemblies are indicated in the tables and can be ordered with optional four-bolt base.

Four cap bolts are used in most Timken pillow blocks in order to equalize the pressure between cap and base, preventing loss of lubricant.

The illustration below shows all parts of a pillow block assembly that are described throughout this section.



Exploded view of a Timken spherical roller bearing pillow block, showing tapered bore spherical roller bearing, adapter sleeve, locknut and lockwasher, stabilizing ring and triple labyrinth seals. Recesses in cap and base, that form pry tool slot, and integral fulcrum lugs in base and cap are shown.



### MOUNTING

#### ADAPTER VS. STRAIGHT BORE

Usually a spherical roller bearing pillow block assembly is mounted on a straight shaft using a tapered bore bearing and adapter assembly. Standard commercial shafting can be used without additional machining. (Suggested shaft diameters are shown on page B395). Adapter mount also permits maximum flexibility in the axial positioning of the bearing on the shaft and will accommodate light locational thrust loads. Timken pillow blocks for tapered bore and adapter mounted bearings are available in Series 225, 226, 230, 231K and 232K.

Adapter mounted spherical roller bearings require the correct removal of diametral clearance from the bearing to prevent relative rotation between inner race and sleeve or shaft. Failure to employ proper mounting procedures can cause heating and reduced bearing performance. For proper shaft mounting of adapter type spherical roller bearings, see B380 of the spherical roller bearing section.

When application conditions produce heavy thrust loads, or a need exists for exact axial location or a positive shaft interference fit, a direct straight bore mounting may be the best option. This requires a shouldered shaft, machined for proper fit, and a straight bore bearing. Timken pillow block assemblies for straight bore applications are available in Series 222, 223, 231 and 232.

Suggested fits for shafts in cylindrical bore spherical roller bearings are shown in the engineering section. For applications involving heavy shock, vibration, unbalanced rotating loads or other abnormal conditions, consult your Timken representative.

#### FIXED AND FLOAT PILLOW BLOCKS

Any style of Timken pillow blocks can be easily installed either at the float or fixed position on the shaft. For the fixed position, a stabilizing ring is added between the bearing outer face ring and the housing shoulder to positively locate the shaft and prevent axial movement.

Some applications require centering of the bearing in its housing. To accomplish this, two special width stabilizing rings can be ordered.

In the float position, the ring is not used, allowing the bearing to move axially (a maximum of  $\frac{3}{8}$  in.) to compensate for thermal expansion or contraction of the shaft.

Pillow blocks ordered by the numbers in the dimension tables are fixed units. To order float units, specify by adding suffix "Float" or "FL" to the pillow block number.

#### CLOSED END INSTALLATIONS

In some applications, the shaft end is designed to terminate inside the pillow block. For this design, positive fitting end-closure inserts are available to seal out contaminants and retain lubricant. Timken heavy-duty end plugs include O-rings for positive sealing.

Designers and installers need to make sure the shaft end does not contact the closure. A minimum of  $\frac{1}{8}$  in. clearance at maximum thermal expansion is suggested between the end of the shaft and the closure. Dimension "Y" in the tables defines the maximum permissible length of shaft from centerline of the pillow block housing. If end closure is desired, specify by adding "CL" (one end closed) to the pillow block assembly number.

### LUBRICATION

Timken pillow block housings have been designed for grease and oil bath lubrication. They also can be modified easily to accommodate circulating oil or oil/air mist systems. Grease fittings or sight gages are available upon request.

A lubrication groove and oil holes are provided in the bearing outer ring. This feature, designated by adding suffix "W33" to the bearing number, should be specified whenever re-ordering bearings for pillow blocks. In most cases, the fresh lubricant is fed directly to the center of the bearing between the rows of rollers and distributed to the rest of the bearing. This assures the used lubricant is purged from the bearing.

### SEALS

Precision triple ring labyrinth seals are supplied with all Timken pillow blocks to exclude foreign matter and retain lubricants. The pillow block base includes extra large oil return holes at the bottom of the seal grooves to prevent leakage past the seals.

For extremely contaminated or abrasive environments, Timken has developed the exclusive DUSTAC™ seal. This patented seal offers protection against concentrations of dust or abrasive material that a labyrinth seal cannot keep out. See page B398 for further information on DUSTAC.

### LOAD RATINGS AND LIFE

Load ratings for the spherical roller bearings that are used in pillow blocks are found in the dimension tables on pages B356 through B372.

Life calculation formulas are found in the engineering section.

In addition to individual bearing selection, the ability of the pillow block to carry the operating load should be considered.

It should be noted that the load rating figures supplied in this catalog are applicable only when the load direction is generally toward the base of the pillow block. If the pillow block must be mounted so that the load could be applied in any other direction, consult your Timken representative.

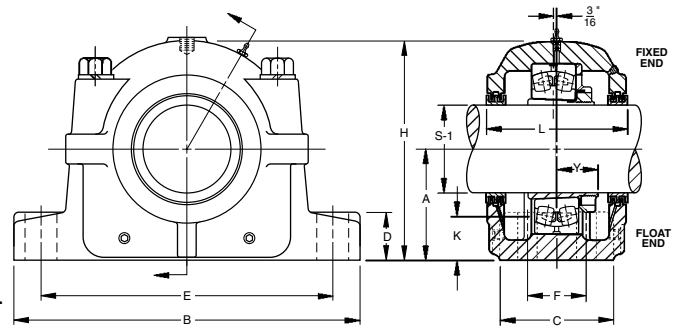






**TAPERED BORE MOUNTING  
SDAF225 AND SDAF226 SERIES**

- Each assembly includes the housing cap and base, cap bolts, bearing, bearing adapter, locknut and washer, stabilizing ring and triple ring seals.
- To order pillow block housing only, use the number listed in the "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals and stabilizing ring.
- Assembly and pillow blocks as described on this page constitute fixed units.
- To order float units, specify part number plus suffix "Float" or "FL".
- Assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SASF 22515).



| Pillow Block Assembly | Standard Shaft <sup>(1)</sup> Diam. S-1 | A   | B   | C   | D   | E   |        | F      | H   | K   | L   | Y   | Base Bolts Required<br>No. Size | Bearing Number | Adapter <sup>(4)</sup> Assembly Number | Housing <sup>(2)</sup> Only | Stabilizing Ring <sup>(3)</sup> 1 Req'd | Triple Seal 2 Req'd | Ass'y Wt.<br>lbs. |
|-----------------------|-----------------------------------------|-----|-----|-----|-----|-----|--------|--------|-----|-----|-----|-----|---------------------------------|----------------|----------------------------------------|-----------------------------|-----------------------------------------|---------------------|-------------------|
|                       |                                         | in. | in. | in. | in. | in. | (Max.) | (Min.) | in. | in. | in. | in. |                                 |                |                                        |                             |                                         |                     |                   |

**SERIES SDAF225**

|           |         |         |        |        |       |        |        |       |          |         |         |         |         |        |        |         |          |        |     |
|-----------|---------|---------|--------|--------|-------|--------|--------|-------|----------|---------|---------|---------|---------|--------|--------|---------|----------|--------|-----|
| SDAF22520 | 3 7/16  | 4 1/2   | 15 1/4 | 6      | 1 7/8 | 13 1/8 | 11 5/8 | 3 3/8 | 8 15/16  | 1 3/4   | 6 3/4   | 1 49/64 | 4 3/4   | 22220K | SNW-20 | SDAF520 | SR-20-17 | LER75  | 81  |
| SDAF22522 | 3 15/16 | 4 15/16 | 16 1/2 | 6 3/4  | 2 1/8 | 14 1/2 | 12 5/8 | 4     | 9 7/8    | 1 7/8   | 7 1/4   | 1 61/64 | 4 7/8   | 22222K | SNW-22 | SDAF522 | SR-22-19 | LER93  | 94  |
| SDAF22524 | 4 3/16  | 5 1/4   | 16 1/2 | 6 7/8  | 2 1/4 | 14 1/2 | 13 1/4 | 4 1/8 | 10 1/2   | 1 15/16 | 7 3/8   | 2 3/32  | 4 7/8   | 22224K | SNW-24 | SDAF524 | SR-24-20 | LER113 | 137 |
| SDAF22526 | 4 7/16  | 6       | 18 3/8 | 7 1/2  | 2 3/8 | 16     | 14 5/8 | 4 1/2 | 11 7/8   | 2 7/16  | 8       | 2 17/64 | 4 1     | 22226K | SNW-26 | SDAF526 | SR-26-0  | LER117 | 159 |
| SDAF22528 | 4 15/16 | 6       | 20 1/8 | 7 1/2  | 2 3/8 | 17 1/8 | 16     | 4 1/2 | 12 1/16  | 2 1/8   | 7 13/16 | 2 13/32 | 4 1 1/8 | 22228K | SNW-28 | SDAF528 | SR-28-0  | LER122 | 189 |
| SDAF22530 | 5 3/16  | 6 5/16  | 21 1/4 | 7 7/8  | 2 1/2 | 18 1/4 | 17     | 4 3/4 | 12 13/16 | 2 3/16  | 8 3/8   | 2 37/64 | 4 1 1/8 | 22230K | SNW-30 | SDAF530 | SR-30-0  | LER125 | 225 |
| SDAF22532 | 5 7/16  | 6 11/16 | 22     | 8 1/4  | 2 1/2 | 19 1/4 | 17 3/8 | 5     | 13 11/16 | 2 3/16  | 8 3/4   | 2 49/64 | 4 1 1/8 | 22232K | SNW-32 | SDAF532 | SR-32-0  | LER130 | 300 |
| SDAF22534 | 5 15/16 | 7 1/16  | 24 3/4 | 9      | 2 1/2 | 21 5/8 | 19 3/8 | 5 1/2 | 14 1/4   | 2 5/16  | 9 5/8   | 2 59/64 | 4 1 1/4 | 22234K | SNW-34 | SDAF534 | SR-34-0  | LER140 | 310 |
| SDAF22536 | 6 7/16  | 7 1/2   | 26 3/4 | 9 3/8  | 2 3/4 | 23 5/8 | 20 7/8 | 5 7/8 | 15 3/16  | 2 9/16  | 10      | 2 61/64 | 4 1 1/4 | 22236K | SNW-36 | SDAF536 | SR-36-30 | LER148 | 350 |
| SDAF22538 | 6 15/16 | 7 7/8   | 27 5/8 | 10     | 3     | 23 1/2 | 21 1/2 | 6 1/4 | 16 1/4   | 2 5/8   | 10 5/8  | 3 7/64  | 4 1 3/8 | 22238K | SNW-38 | SDAF538 | SR-38-32 | LER224 | 420 |
| SDAF22540 | 7 3/16  | 8 1/4   | 28 3/4 | 10 1/2 | 3 1/4 | 25     | 23     | 6 3/4 | 17 1/8   | 2 11/16 | 11 1/8  | 3 3/32  | 4 1 3/8 | 22240K | SNW-40 | SDAF540 | SR-40-34 | LER228 | 545 |
| SDAF22544 | 7 15/16 | 9 1/2   | 32     | 11 1/4 | 3 1/2 | 27 7/8 | 25 5/8 | 7 1/4 | 19 1/4   | 3 3/8   | 11 7/8  | 3 17/32 | 4 1 1/2 | 22244K | SNW-44 | SDAF544 | SR-44-36 | LER236 | 665 |

**SERIES SDAF226**

|           |         |         |        |        |       |        |        |       |          |         |          |         |         |        |         |         |          |        |     |
|-----------|---------|---------|--------|--------|-------|--------|--------|-------|----------|---------|----------|---------|---------|--------|---------|---------|----------|--------|-----|
| SDAF22617 | 2 15/16 | 4 1/2   | 15 1/4 | 6      | 1 7/8 | 13 1/8 | 11 5/8 | 3 3/8 | 8 15/16  | 1 13/16 | 6 3/4    | 1 57/64 | 4 3/4   | 22317K | SNW-117 | SDAF617 | SR-20-17 | LER59  | 94  |
| SDAF22618 | 3 3/16  | 4 3/4   | 15 1/2 | 6 1/8  | 2     | 13 1/2 | 12     | 3 5/8 | 9 7/16   | 2       | 6 7/8    | 2 3/64  | 4 3/4   | 22318K | SNW-118 | SDAF618 | SR-21-18 | LER69  | 137 |
| SDAF22620 | 3 7/16  | 5 1/4   | 16 1/2 | 6 7/8  | 2 1/4 | 14 1/2 | 13 1/4 | 4 1/8 | 10 1/2   | 2 1/8   | 7 3/8    | 2 19/64 | 4 7/8   | 22320K | SNW-120 | SDAF620 | SR-24-20 | LER75  | 159 |
| SDAF22622 | 3 15/16 | 6       | 18 3/8 | 7 1/2  | 2 3/8 | 16     | 14 5/8 | 4 1/2 | 11 7/8   | 2 1/2   | 8        | 2 31/64 | 4 1     | 22322K | SNW-122 | SDAF622 | SR-0-22  | LER93  | 189 |
| SDAF22624 | 4 3/16  | 6 5/16  | 21 1/4 | 7 7/8  | 2 1/2 | 18 1/4 | 17     | 4 3/4 | 12 13/16 | 2 9/16  | 8 3/8    | 2 41/64 | 4 1 1/8 | 22324K | SNW-124 | SDAF624 | SR-0-24  | LER113 | 225 |
| SDAF22626 | 4 7/16  | 6 11/16 | 22     | 8 1/4  | 2 1/2 | 19 1/4 | 17 3/8 | 5     | 13 11/16 | 2 5/8   | 8 3/4    | 2 27/64 | 4 1 1/8 | 22326K | SNW-126 | SDAF626 | SR-0-26  | LER117 | 300 |
| SDAF22628 | 4 15/16 | 7 1/16  | 24 3/4 | 9      | 2 1/2 | 21 5/8 | 19 3/8 | 5 1/2 | 14 1/4   | 2 11/16 | 9 5/8    | 3 5/64  | 4 1 1/8 | 22328K | SNW-128 | SDAF628 | SR-0-28  | LER122 | 310 |
| SDAF22630 | 5 3/16  | 7 1/2   | 26 3/4 | 9 3/8  | 2 3/4 | 23 5/8 | 20 7/8 | 5 7/8 | 15 3/16  | 2 7/8   | 9 3/4    | 3 17/64 | 4 1 1/4 | 22330K | SNW-130 | SDAF630 | SR-36-30 | LER125 | 395 |
| SDAF22632 | 5 7/16  | 7 7/8   | 27 5/8 | 10     | 3     | 23 1/2 | 21 1/2 | 6 1/4 | 16 1/4   | 2 15/16 | 10 5/8   | 3 7/16  | 4 1 3/8 | 22332K | SNW-132 | SDAF632 | SR-38-32 | LER211 | 420 |
| SDAF22634 | 5 15/16 | 8 1/4   | 28 3/4 | 10 1/2 | 3 1/4 | 25     | 23     | 6 3/4 | 17 1/8   | 3 1/16  | 11 1/8   | 3 19/32 | 4 1 3/8 | 22334K | SNW-134 | SDAF634 | SR-40-34 | LER215 | 525 |
| SDAF22636 | 6 7/16  | 8 7/8   | 30 1/2 | 10 3/4 | 3 1/4 | 26 3/8 | 24 1/8 | 6 7/8 | 17 15/16 | 3 7/8   | 11 3/8   | 3 47/64 | 4 1 1/2 | 22336K | SNW-136 | SDAF636 | SR-0-36  | LER220 | 645 |
| SDAF22638 | 6 15/16 | 9 1/2   | 32     | 11 1/4 | 3 1/2 | 27 7/8 | 25 5/8 | 7 1/4 | 19 1/4   | 3 11/16 | 11 13/16 | 4 57/64 | 4 1 1/2 | 22338K | SNW-138 | SDAF638 | SR-44-38 | LER224 | 705 |
| SDAF22640 | 7 3/16  | 9 7/8   | 33 1/2 | 11 3/4 | 3 1/2 | 29 1/4 | 26 5/8 | 7 5/8 | 19 15/16 | 3 3/4   | 12 1/4   | 4 5/64  | 4 1 5/8 | 22340K | SNW-140 | SDAF640 | SR-0-40  | LER228 | 825 |

<sup>(1)</sup> See page B395 for suggested shaft diameter S-1 tolerances.

<sup>(2)</sup> "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required.

<sup>(3)</sup> Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

<sup>(4)</sup> Includes sleeve, locknut and lockwasher. Add shaft size to order.

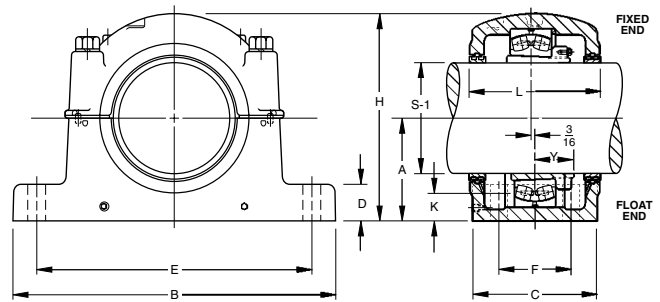
**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.



# SPHERICAL ROLLER BEARINGS

## TAPERED BORE MOUNTING SAF230K, SDAF230K SERIES

- Each assembly includes the housing cap and base, cap bolts, bearing, bearing adapter, locknut and washer, stabilizing ring and triple ring seals.
- If only the pillow block is desired, use the numbers listed in column "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals and stabilizing ring.
- Assembly and pillow blocks as described on this page constitute fixed units.
- To order float units, specify part number plus suffix "Float" or "FL".
- All assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SAFS 23024).
- Please note that for applications SAF23048 and larger, the shaft size must be included in the part description when ordering (e.g., SAF23048-8 15/16).



Two stabilizing rings are supplied with housings SAF048 through SAF056 and SDAF060K through SDAF076K. For fixed applications **both rings must be used. Do not use stabilizing rings for float mounting.**

| Pillow Block Assembly | Standard Shaft <sup>(1)</sup> Dia. S-1 | A      | B      | C     | D     | E     |       | F     | H     | K     | L     | Y     | 4 Base Bolts Req'd. Size | Bearing Number | Adapter <sup>(4)</sup> Assembly Number | Housing <sup>(2)</sup> Only | Stabilizing <sup>(3)</sup> Ring | Triple Seal 2 Req'd | Ass'y Wt. |
|-----------------------|----------------------------------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------------|----------------|----------------------------------------|-----------------------------|---------------------------------|---------------------|-----------|
|                       |                                        | (Max.) | (Min.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) | (in.) |                          |                |                                        |                             |                                 |                     |           |

### SERIES SAF230K

|                   |         |         |        |       |       |        |        |       |          |         |         |         |       |        |                  |                 |          |          |     |
|-------------------|---------|---------|--------|-------|-------|--------|--------|-------|----------|---------|---------|---------|-------|--------|------------------|-----------------|----------|----------|-----|
| SAF23024K         | 4 3/16  | 4 1/2   | 15 1/4 | 4 3/8 | 1 3/4 | 13 1/8 | 11 5/8 | 2 3/8 | 8 11/16  | 1 3/16  | 6       | 1 55/64 | 3/4   | 23024K | SNW-3024         | SAF024K         | SR-20-17 | LER113   | 60  |
| SAF23026K         | 4 7/16  | 4 15/16 | 16 1/2 | 4 3/4 | 2     | 14 1/2 | 12 5/8 | 2 3/4 | 9 9/16   | 1 11/16 | 6 3/8   | 2 1/32  | 3/4   | 23026K | SNW-3026         | SAF026K         | SR-22-19 | LER117   | 76  |
| SAF23028K         | 4 15/16 | 5 1/4   | 16 1/2 | 4 3/4 | 2 1/8 | 14 1/2 | 13 1/4 | 2 3/4 | 10 1/4   | 1 13/16 | 7 3/8   | 2 1/8   | 3/4   | 23028K | SNW-3028         | SAF028K         | SR-0-20  | LER122   | 90  |
| SAF23030K         | 5 3/16  | 6       | 18 3/8 | 5 1/8 | 2 3/8 | 16     | 14 5/8 | 3 1/4 | 11 9/16  | 2 5/16  | 8       | 2 13/64 | 7/8   | 23030K | SNW-3030         | SAF030K         | SR-0-21  | LER125   | 125 |
| SAF23032K         | 5 7/16  | 6       | 18 3/8 | 5 1/8 | 2 3/8 | 16     | 14 5/8 | 3 1/4 | 11 9/16  | 2 1/16  | 8       | 2 11/32 | 7/8   | 23032K | SNW-3032         | SAF032K         | SR-0-22  | LER130   | 132 |
| SAF23034K         | 5 15/16 | 6       | 20 1/8 | 5 7/8 | 2 3/8 | 17 1/8 | 16     | 3 3/8 | 11 3/4   | 1 3/4   | 7 3/4   | 2 33/64 | 1     | 23034K | SNW-3034         | SAF034K         | SR-0-24  | LER140   | 154 |
| SAF23036K         | 6 7/16  | 6 11/16 | 22     | 6 1/4 | 2 5/8 | 19 1/4 | 17 3/8 | 3 3/4 | 13 5/16  | 2 3/16  | 8 3/4   | 2 11/16 | 1     | 23036K | SNW-3036         | SAF036K         | SR-0-26  | LER148   | 212 |
| SAF23038K         | 6 15/16 | 6 11/16 | 22     | 6 1/4 | 2 5/8 | 19 1/4 | 17 3/8 | 3 3/4 | 13 5/16  | 1 15/16 | 8 3/4   | 2 47/64 | 1     | 23038K | SNW-3038         | SAF038K         | SR-32-0  | LER155   | 220 |
| SAF23040K         | 7 3/16  | 7 1/16  | 24 3/4 | 6 3/4 | 3 3/4 | 21 5/8 | 19 3/8 | 4 1/4 | 14 9/16  | 2 13/16 | 9 3/8   | 2 15/16 | 1     | 23040K | SNW-3040         | SAF040K         | SR-34-0  | LER159   | 295 |
| SAF23044K         | 7 15/16 | 7 7/8   | 28     | 7 1/2 | 3 3/4 | 24 3/8 | 21 5/8 | 4 1/2 | 15 11/16 | 2 3/8   | 10 3/4  | 3 5/32  | 1 1/4 | 23044K | SNW-3044         | SAF044K         | SR-38-32 | LER167   | 370 |
| SAF23048K-8 7/16  | 8 7/16  | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 2 1/4   | 11 1/8  | 3 17/32 | 1 1/4 | 23048K | SNP-3048-8 7/16  | SAF048K-8 7/16  | A8897    | LER526   | 430 |
| SAF23048K-8 1/2   | 8 1/2   | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 2 1/4   | 11 1/8  | 3 17/32 | 1 1/4 | 23048K | SNP-3048-8 1/2   | SAF048K-8 1/2   | A8897    | LER527   | 428 |
| SAF23048K-8 15/16 | 8 15/16 | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 2 1/4   | 11 1/8  | 3 17/32 | 1 1/4 | 23048K | SNP-3048-8 15/16 | SAF048K-8 15/16 | A8897    | LER529   | 422 |
| SAF23048K-9       | 9       | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 2 1/4   | 11 1/8  | 3 17/32 | 1 1/4 | 23048K | SNP-3048-9       | SAF048K-9       | A8897    | LER530   | 420 |
| SAF23052K-9 7/16  | 9 7/16  | 9 1/2   | 32 3/4 | 8 3/4 | 3 3/4 | 27 7/8 | 24 3/4 | 5 1/4 | 19 7/16  | 2 15/16 | 11 7/8  | 3 53/64 | 1 1/2 | 23052K | SNP-3052-9 7/16  | SAF052K-9 7/16  | A8898    | LER178-1 | 587 |
| SAF23052K-9 1/2   | 9 1/2   | 9 1/2   | 32 3/4 | 8 3/4 | 3 3/4 | 27 7/8 | 24 3/4 | 5 1/4 | 19 7/16  | 2 15/16 | 11 7/8  | 3 53/64 | 1 1/2 | 23052K | SNP-3052-9 1/2   | SAF052K-9 1/2   | A8898    | LER178   | 585 |
| SAF23056K-9 15/16 | 9 15/16 | 9 7/8   | 34 1/4 | 9     | 4     | 29 1/2 | 26 1/4 | 5 1/2 | 20 3/16  | 2 15/16 | 12 1/16 | 3 61/64 | 1 1/2 | 23056K | SNP-3056-9 15/16 | SAF056K-9 15/16 | A8819    | ER751    | 640 |
| SAF23056K-10      | 10      | 9 7/8   | 34 1/4 | 9     | 4     | 29 1/2 | 26 1/4 | 5 1/2 | 20 3/16  | 2 15/16 | 12 1/16 | 3 61/64 | 1 1/2 | 23056K | SNP-3056-10      | SAF056K-10      | A8819    | ER705    | 635 |
| SAF23056K-10 7/16 | 10 7/16 | 9 7/8   | 34 1/4 | 9     | 4     | 29 1/2 | 26 1/4 | 5 1/2 | 20 3/16  | 2 15/16 | 12 1/16 | 3 61/64 | 1 1/2 | 23056K | SNP-3056-10 7/16 | SAF056K-10 7/16 | A8819    | ER745    | 625 |
| SAF23056K-10 1/2  | 10 1/2  | 9 7/8   | 34 1/4 | 9     | 4     | 29 1/2 | 26 1/4 | 5 1/2 | 20 3/16  | 2 15/16 | 12 1/16 | 3 61/64 | 1 1/2 | 23056K | SNP-3056-10 1/2  | SAF056K-10 1/2  | A8819    | ER710    | 620 |

### SERIES SDAF230K

|                     |          |          |        |        |        |        |        |        |         |         |        |         |         |           |                   |                    |        |       |      |
|---------------------|----------|----------|--------|--------|--------|--------|--------|--------|---------|---------|--------|---------|---------|-----------|-------------------|--------------------|--------|-------|------|
| SDAF23060K-10 15/16 | 10 15/16 | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 7/16  | 15 1/2 | 4 9/32  | 1 5/8   | 23060K    | SNP-3060-10 15/16 | SDAF060K-10 15/16  | A8967  | ER858 | 1175 |
| SDAF23060K-11       | 11       | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 7/16  | 15 1/2 | 4 9/32  | 1 5/8   | 23060K    | SNP-3060-11       | SDAF060K-11        | A8967  | ER825 | 1174 |
| SDAF23064K-11 7/16  | 11 7/16  | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/16  | 15 1/2 | 4 7/16  | 1 5/8   | 23064K    | SNP-3064-11 7/16  | SDAF064K-11 7/16   | A8968  | ER861 | 1275 |
| SDAF23064K-11 1/2   | 11 1/2   | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/16  | 15 1/2 | 4 7/16  | 1 5/8   | 23064K    | SNP-3064-11 1/2   | SDAF064K-11 1/2    | A8968  | ER832 | 1274 |
| SDAF23064K-11 15/16 | 11 15/16 | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/16  | 15 1/2 | 4 7/16  | 1 5/8   | 23064K    | SNP-3064-11 15/16 | SDAF064K-11 15/16  | A8968  | ER859 | 1269 |
| SDAF23064K-12       | 12       | 12       | 38 1/4 | 14 3/4 | 3 1/2  | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/16  | 15 1/2 | 4 7/16  | 1 5/8   | 23064K    | SNP-3064-12       | SDAF064K-12        | A8968  | ER818 | 1268 |
| SDAF23068K-12 7/16  | 12 7/16  | 12       | 39     | 15 1/4 | 4 3/16 | 33 1/2 | 32     | 10     | 24      | 3 7/16  | 15 3/4 | 4 13/16 | 1 7/8   | 23068K    | SNP-3068-12 7/16  | SDAF068K-12 7/16   | A8969  | ER865 | 1553 |
| SDAF23068K-12 1/2   | 12 1/2   | 12       | 39     | 15 1/4 | 4 3/16 | 33 1/2 | 32     | 10     | 24      | 3 7/16  | 15 3/4 | 4 13/16 | 1 7/8   | 23068K    | SNP-3068-12 1/2   | SDAF068K-12 1/2    | A8969  | ER866 | 1552 |
| SDAF23072K-12 15/16 | 12 15/16 | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/8   | 16 1/4 | 4 53/64 | 1 7/8   | 23072K    | SNP-3072-12 15/16 | SDAF072K-12 15/16  | A8970  | ER869 | 1632 |
| SDAF23072K-13       | 13       | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/8   | 16 1/4 | 4 53/64 | 1 7/8   | 23072K    | SNP-3072-13       | SDAF072K-13        | A8970  | ER846 | 1630 |
| SDAF23072K-13 7/16  | 13 7/16  | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/8   | 16 1/4 | 4 53/64 | 1 7/8   | 23072K    | SNP-3072-13 7/16  | SDAF072K-13 7/16   | A8970  | ER872 | 1614 |
| SDAF23072K-13 1/2   | 13 1/2   | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/8   | 16 1/4 | 4 53/64 | 1 7/8   | 23072K    | SNP-3072-13 1/2   | SDAF072K-13 1/2    | A8970  | ER823 | 1610 |
| SDAF23076K-13 15/16 | 13 15/16 | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/16  | 16 1/4 | 5 1/16  | 1 7/8   | 23076K    | SNP-3076-13 15/16 | SDAF076K-13 15/16  | A8971  | ER875 | 1687 |
| SDAF23076K-14       | 14       | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2  | 36 1/2 | 35     | 10 1/2 | 26      | 3 7/16  | 16 1/4 | 5 1/16  | 1 7/8   | 23076K    | SNP-3076-14       | SDAF076K-14        | A8971  | ER876 | 1685 |
| SDAF23080K-15       | 15       | 14 1/2   | 46     | 17 1/8 | 5 1/4  | 40 3/4 | 39 1/4 | 11     | 29      | 4 7/16  | 17 5/8 | 5 17/32 | 4,2     | 23080K    | SNP-3080-15       | SDAF080K-15        | 1A8974 | ER847 | 2300 |
| SDAF23084K-15 3/4   | 15 3/4   | 14 1/2   | 46     | 17 1/8 | 5 1/4  | 40 3/4 | 39 1/4 | 11     | 29      | 4 1/16  | 17 5/8 | 5 9/16  | 4,2     | 23087K    | SNP-3084-15 3/4   | SDAF084K-15 3/4    | 1A8978 | ER885 | 2300 |
| SDAF23088K-16 1/2   | 16 1/2   | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2  | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 4 1/2   | 19 1/4 | 5 3/4   | 4,2/1,4 | 23088AK   | SNP-3088-16 1/2   | SDAF088K-16 1/2    | 2A8979 | ER958 | 2550 |
| SDAF23092K-17       | 17       | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2  | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 4       | 19 1/4 | 5 7/8   | 4,2/1,4 | 23082K    | SNP-3092-17       | SDAF092K-17        | 2A8980 | ER838 | 2850 |
| SDAF23096K-18       | 18       | 17       | 53     | 21     | 5 1/2  | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 5 1/8   | 21 3/4 | 5 29/32 | 4,2/1,4 | 23096K    | SNP-3096-18       | SDAF096K-18        | 2A8984 | ER888 | 4250 |
| SDAF230/530K-18 1/2 | 18 1/2   | 17       | 53     | 21     | 5 1/2  | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 4 3/4   | 21 3/4 | 6 1/2   | 4,2/1,4 | 230/500K  | SNP-30-500-18 1/2 | SDAF30-500K-18 1/2 | 2A8976 | ER978 | 4350 |
| SDAF230/530K-19 1/2 | 19 1/2   | 18       | 54 1/4 | 21 5/8 | 5 3/4  | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 4 13/16 | 22 1/4 | 6 27/32 | 4,2/1,4 | 230/530/K | SNP-30-530-19 1/2 | SDAF30-530K-19 1/2 | ER926  | 5200  |      |

(1) See page B395 for suggested shaft diameter S-1 tolerances.

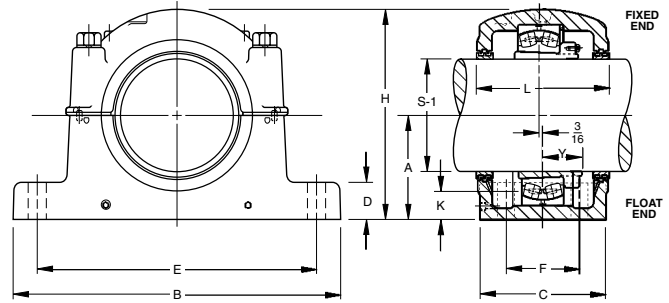
(2) "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required.

(3) Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

(4) Includes adapter, locknut, lockwasher or lockplate. Add shaft size to ordering.

**TAPERED BORE MOUNTING**  
**SDAF231K AND SDAF232K SERIES**

- Each assembly includes the housing cap and base, cap bolts, bearing, bearing adapter, locknut and washer, stabilizing ring and triple ring seals.
- To order pillow block housing only, use the numbers listed in the "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals and stabilizing ring.
- Assembly and pillow blocks described on this page constitute fixed units.
- To order float units, specify part number plus suffix "Float" or "FL".
- All assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SDAFS 23152K).



| Pillow Block Assembly  | Standard Shaft <sup>(1)</sup> Dia. S-1 | A        | B      | C      | D     | E      |        | F      | H       | K       | L      | 4 Base Bolts Req'd. Size | Bearing Number | Adapter <sup>(4)</sup> Assembly Number | Housing Only <sup>(2)</sup> | Stabilizing <sup>(3)</sup> 2 Req'd | Triple Seal Ring 2 Req'd | Ass'y Wt. lbs. |
|------------------------|----------------------------------------|----------|--------|--------|-------|--------|--------|--------|---------|---------|--------|--------------------------|----------------|----------------------------------------|-----------------------------|------------------------------------|--------------------------|----------------|
|                        |                                        | in.      | in.    | in.    | in.   | in.    | (Max.) | (Min.) | in.     | in.     | in.    |                          |                |                                        |                             |                                    |                          |                |
| <b>SERIES SDAF231K</b> |                                        |          |        |        |       |        |        |        |         |         |        |                          |                |                                        |                             |                                    |                          |                |
| SDAF23152K             | 9 7/16                                 | 10 1/4   | 35     | 13 1/8 | 3 3/4 | 30 1/2 | 29     | 8 3/4  | 20 7/8  | 3 3/8   | 13 3/4 | 1 5/8                    | 23152K         | SNP-3152                               | SDAF3152K                   | A5679                              | ER891                    | 1050           |
| SDAF23156K             | 10 7/16                                | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/4   | 15 3/8 | 1 5/8                    | 23156K         | SNP-3156                               | SDAF3156K                   | A8967                              | ER973                    | 1300           |
| SDAF23160K             | 10 15/16                               | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/8   | 15 3/8 | 1 5/8                    | 23160K         | SNP-3160                               | SDAF3160K                   | A8975                              | ER858                    | 1350           |
| SDAF23164K             | 11 15/16                               | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2 | 36 1/2 | 35     | 10 1/2 | 25 3/4  | 4 3/8   | 16 1/4 | 1 7/8                    | 23164K         | SNP-3164                               | SDAF3164K                   | A8970                              | ER942                    | 1900           |
| SDAF23168K             | 12 7/16                                | 14       | 43 3/4 | 17 3/4 | 5     | 38 1/4 | 36 3/4 | 10 3/4 | 27 7/8  | 4 15/16 | 18 1/4 | 2                        | 23168K         | SNP-3168                               | SDAF3168K                   | A8977                              | ER975                    | 2550           |
| SDAF23172K             | 13 7/16                                | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 5       | 17 3/4 | 2                        | 23172K         | SNP-3172                               | SDAF3172K                   | A8974                              | ER872                    | 2600           |
| SDAF23176K             | 13 15/16                               | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 4 5/8   | 17 3/4 | 2                        | 23176K         | SNP-3176                               | SDAF3176K                   | A8978                              | ER875                    | 2600           |
| SDAF23180K             | 15                                     | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 5 1/8   | 19 1/4 | 2 1/4                    | 23180K         | SNP-3180                               | SDAF3180K                   | A8979                              | ER847                    | 3000           |
| SDAF23184K             | 15 3/4                                 | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 6       | 21 3/4 | 2 1/4                    | 23184K         | SNP-3184                               | SDAF3184K                   | A8984                              | ER914                    | 4400           |
| SDAF23188K             | 16 1/2                                 | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 5 9/16  | 21 3/4 | 2 1/4                    | 23188K         | SNP-3188                               | SDAF3188K                   | A8976                              | ER947                    | 4600           |
| SDAF23192K             | 17                                     | 18       | 54 1/4 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 6       | 22 1/4 | 2 1/2                    | 23192K         | SNP-3192                               | SDAF3192K                   | A8990                              | ER838                    | 5100           |
| SDAF23196K             | 18                                     | 18       | 54 1/4 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 5 1/2   | 22 1/4 | 2 1/2                    | 23196K         | SNP-3196                               | SDAF3196K                   | A8998                              | ER954                    | 5200           |
| <b>SERIES SDAF232K</b> |                                        |          |        |        |       |        |        |        |         |         |        |                          |                |                                        |                             |                                    |                          |                |
| SDAF23248K             | 8 15/16                                | 10 1/4   | 35     | 13 1/8 | 3 3/4 | 30 1/2 | 29     | 8 3/4  | 20 7/8  | 3 9/16  | 13 3/4 | 1 5/8                    | 23248K         | SNP-148                                | SDAF3248K                   | A5679                              | ER939                    | 1100           |
| SDAF23252K             | 9 7/16                                 | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/4   | 15 3/8 | 1 5/8                    | 23252K         | SNP-152                                | SDAF3252K                   | A8968                              | ER891                    | 1400           |
| SDAF23256K             | 10 7/16                                | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/8   | 15 3/8 | 1 5/8                    | 23256K         | SNP-3256                               | SDAF3256K                   | A8975                              | ER973                    | 1400           |
| SDAF23260K             | 10 15/16                               | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2 | 36 1/2 | 35     | 10 1/2 | 25 3/4  | 4 1/2   | 16 1/4 | 1 7/8                    | 23260K         | SNP-3260                               | SDAF3260K                   | A8970                              | ER941                    | 1900           |
| SDAF23264K             | 11 15/16                               | 14       | 43 3/4 | 17 3/4 | 5     | 38 1/4 | 36 3/4 | 10 3/4 | 27 7/8  | 5 1/8   | 18 1/4 | 2                        | 23264K         | SNP-3264                               | SDAF3264K                   | A8977                              | ER942                    | 2600           |
| SDAF23268K             | 12 7/16                                | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 5       | 17 3/4 | 2                        | 23268K         | SNP-3268                               | SDAF3268K                   | A8978                              | ER944                    | 2700           |
| SDAF23272K             | 13 7/16                                | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 5 1/2   | 19 1/4 | 2 1/4                    | 23272K         | SNP-3272                               | SDAF3272K                   | A8979                              | ER872                    | 3050           |
| SDAF23276K             | 13 15/16                               | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 4 3/8   | 19 1/4 | 2 1/4                    | 23276K         | SNP-3276                               | SDAF3276K                   | A8980                              | ER875                    | 3000           |
| SDAF23280K             | 14 15/16                               | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 6       | 21 3/4 | 2 1/4                    | 23280K         | SNP-3280                               | SDAF3280K                   | A8976                              | ER976                    | 4650           |
| SDAF23284K             | 15 3/4                                 | 18       | 54 1/4 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 6 3/8   | 22 1/4 | 2 1/2                    | 23284K         | SNP-3284                               | SDAF3284K                   | A8990                              | ER951                    | 4900           |
| SDAF23288K             | 16 1/2                                 | 18       | 54 1/4 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 5 7/8   | 22 1/4 | 2 1/2                    | 23288K         | SNP-3288                               | SDAF3288K                   | A8988                              | ER952                    | 5200           |

<sup>(1)</sup> See page B395 for suggested shaft diameter S-1 tolerances.

<sup>(2)</sup> "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required. Add shaft size to order.

<sup>(3)</sup> Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

<sup>(4)</sup> Includes sleeve, locknut and lockwasher. Add shaft size to order.

**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.

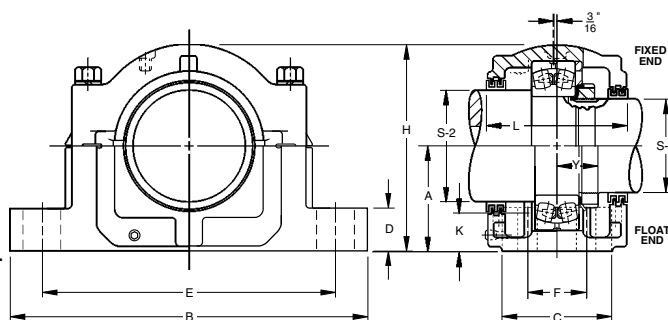




# SPHERICAL ROLLER BEARINGS

## STRAIGHT BORE MOUNTING SAF222 AND SAF223 SERIES

- Each assembly includes the housing cap and base, cap bolts, bearing, locknut and washer, stabilizing ring and triple ring seals.
- To order pillow block housing only, use the numbers listed in "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals and stabilizing ring.
- Assembly and pillow blocks described on this page constitute fixed units.
- To order float units, specify part number plus suffix "Float" or "FL".
- All assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SAFS 22217).
- Four-bolt bases are standard on all assemblies, except as noted.



| Pillow Block Assembly | Standard Shaft <sup>(1)</sup> Dia. |     | A | B | C | D | E      |        | F | H | K | L | Y | Base Bolts Required | Bearing Number | Lock Nut | Lock Washer | Housing <sup>(2)</sup> Only Ring | Stabilizing <sup>(3)</sup> 1 Req'd | Triple Seal 1 Req'd | Triple Seal S-2 | Triple Seal S-3 | Ass'y Wt. |
|-----------------------|------------------------------------|-----|---|---|---|---|--------|--------|---|---|---|---|---|---------------------|----------------|----------|-------------|----------------------------------|------------------------------------|---------------------|-----------------|-----------------|-----------|
|                       | S-2                                | S-3 |   |   |   |   | (Max.) | (Min.) |   |   |   |   |   |                     |                |          |             |                                  |                                    |                     |                 |                 |           |

### SERIES SAF222

|           |         |         |         |        |       |       |        |        |       |          |         |          |         |   |       |       |      |     |         |          |        |        |     |
|-----------|---------|---------|---------|--------|-------|-------|--------|--------|-------|----------|---------|----------|---------|---|-------|-------|------|-----|---------|----------|--------|--------|-----|
| SAF22217  | 3 15/16 | 3 3/16  | 3 3/4   | 13     | 3 1/2 | 1 1/4 | 11     | 9 7/8  | —     | 7 1/4    | 1 7/16  | 4 15/16  | 1 27/64 | 2 | 3/4   | 22217 | AN17 | W17 | SAF217  | SR-17-14 | LER89  | LER63  | 43  |
| FSAF22217 | 3 15/16 | 3 3/16  | 3 3/4   | 13     | 3 1/2 | 1 1/4 | 11     | 9 7/8  | 2 1/8 | 7 1/4    | 1 7/16  | 4 15/16  | 1 27/64 | 4 | 5/8   | 22217 | AN17 | W17 | FSAF217 | SR-17-14 | LER89  | LER63  | 43  |
| SAF22218  | 4 1/8   | 3 3/8   | 4       | 13 3/4 | 3 7/8 | 1 1/2 | 11 5/8 | 10 3/8 | —     | 7 3/4    | 1 17/32 | 6 1/4    | 1 37/64 | 2 | 3/4   | 22218 | AN18 | W18 | SAF218  | SR-18-15 | LER96  | LER72  | 50  |
| FSAF22218 | 4 1/8   | 3 3/8   | 4       | 13 3/4 | 3 7/8 | 1 1/2 | 11 5/8 | 10 3/8 | 2 1/8 | 7 3/4    | 1 17/32 | 6 1/4    | 1 37/64 | 4 | 5/8   | 22218 | AN18 | W18 | FSAF218 | SR-18-15 | LER96  | LER72  | 50  |
| SAF22220  | 4 1/2   | 3 13/16 | 4 1/2   | 15 1/4 | 4 3/8 | 1 3/4 | 13 1/8 | 11 5/8 | —     | 8 11/16  | 1 3/4   | 6        | 1 49/64 | 2 | 7/8   | 22220 | AN20 | W20 | SAF220  | SR-20-17 | LER118 | LER106 | 71  |
| FSAF22220 | 4 1/2   | 3 13/16 | 4 1/2   | 15 1/4 | 4 3/8 | 1 3/4 | 13 1/8 | 11 5/8 | 2 3/8 | 8 11/16  | 1 3/4   | 6        | 1 49/64 | 4 | 3/4   | 22220 | AN20 | W20 | FSAF220 | SR-20-17 | LER118 | LER106 | 71  |
| SAF22222  | 4 7/8   | 4 3/16  | 4 15/16 | 16 1/2 | 4 3/4 | 2     | 14 1/2 | 12 5/8 | 2 3/4 | 9 9/16   | 1 7/8   | 6 3/8    | 1 61/64 | 4 | 3/4   | 22222 | AN22 | W22 | SAF222  | SR-22-19 | LER121 | LER113 | 81  |
| SAF22224  | 5 5/16  | 4 9/16  | 5 1/4   | 16 1/2 | 4 3/4 | 2 1/8 | 14 1/2 | 13 1/4 | 2 3/4 | 10 1/4   | 1 15/16 | 7 3/8    | 2 3/32  | 4 | 3/4   | 22224 | AN24 | W24 | SAF224  | SR-24-20 | LER127 | LER119 | 90  |
| SAF22226  | 5 7/8   | 4 15/16 | 6       | 18 3/8 | 5 1/8 | 2 3/8 | 16     | 14 5/8 | 3 1/4 | 11 9/16  | 2 7/16  | 8        | 2 17/64 | 4 | 7/8   | 22226 | AN26 | W26 | SAF226  | SR-26-0  | LER136 | LER122 | 127 |
| SAF22228  | 6 1/4   | 5 5/16  | 6       | 20 1/8 | 5 7/8 | 2 3/8 | 17 1/8 | 16     | 3 3/8 | 11 3/4   | 2 1/8   | 7 3/4    | 2 13/32 | 4 | 1     | 22228 | AN28 | W28 | SAF228  | SR-28-0  | LER144 | LER127 | 149 |
| SAF22230  | 6 5/8   | 5 3/4   | 6 5/16  | 21 1/4 | 6 1/4 | 2 1/2 | 18 1/4 | 17     | 3 3/4 | 12 1/2   | 2 3/16  | 8 3/8    | 2 37/64 | 4 | 1     | 22230 | AN30 | W30 | SAF230  | SR-30-0  | LER151 | LER134 | 175 |
| SAF22232  | 7       | 6 1/16  | 6 11/16 | 22     | 6 1/4 | 2 5/8 | 19 1/4 | 17 3/8 | 3 3/4 | 13 5/16  | 2 3/16  | 8 3/4    | 2 49/64 | 4 | 1     | 22232 | AN32 | W32 | SAF232  | SR-32-0  | LER156 | LER142 | 210 |
| SAF22234  | 7 7/16  | 6 7/16  | 7 1/16  | 24 3/4 | 6 3/4 | 2 3/4 | 21 5/8 | 19 3/8 | 4 1/4 | 14 9/16  | 2 5/16  | 9 3/8    | 2 59/64 | 4 | 1     | 22234 | AN34 | W34 | SAF234  | SR-34-0  | LER161 | LER148 | 280 |
| SAF22236  | 7 13/16 | 6 7/8   | 7 1/2   | 26 3/4 | 7 1/8 | 3     | 23 3/8 | 20 7/8 | 4 5/8 | 15 1/2   | 2 9/16  | 9 11/16  | 2 61/64 | 4 | 1     | 22236 | AN36 | W36 | SAF236  | SR-36-0  | LER165 | LER154 | 305 |
| SAF22238  | 8 3/8   | 7 1/4   | 7 7/8   | 28     | 7 1/2 | 3 1/8 | 24 3/8 | 21 5/8 | 4 1/2 | 15 11/16 | 2 5/8   | 10 3/4   | 3 7/64  | 4 | 1 1/4 | 22238 | AN38 | W38 | SAF238  | SR-38-32 | LER171 | LER160 | 350 |
| SAF22240  | 8 3/4   | 7 5/8   | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 2 11/16 | 10 13/16 | 3 3/32  | 4 | 1 1/4 | 22240 | AN40 | W40 | SAF240  | SR-40-34 | LER175 | LER164 | 420 |
| SAF22244  | 9 9/16  | 8 3/16  | 9 1/2   | 32 3/4 | 8 3/4 | 3 3/4 | 27 7/8 | 24 3/4 | 5 1/4 | 19 5/8   | 3 3/8   | 11 1/2   | 3 17/32 | 4 | 1 1/2 | 22244 | N44  | W44 | SAF244  | SR-44-38 | LER179 | LER170 | 590 |

### SERIES SAF223

|           |         |         |         |        |       |       |        |        |       |          |         |          |         |   |       |       |      |     |         |          |        |        |     |
|-----------|---------|---------|---------|--------|-------|-------|--------|--------|-------|----------|---------|----------|---------|---|-------|-------|------|-----|---------|----------|--------|--------|-----|
| SAF22317  | 3 15/16 | 3 3/16  | 4 1/2   | 15 1/4 | 4 3/8 | 1 3/4 | 13 1/8 | 11 5/8 | —     | 8 11/16  | 1 13/16 | 6        | 1 57/64 | 2 | 7/8   | 22317 | AN17 | W17 | SAF317  | SR-20-17 | LER109 | LER188 | 80  |
| FSAF22317 | 3 15/16 | 3 3/16  | 4 1/2   | 15 1/4 | 4 3/8 | 1 3/4 | 13 1/8 | 11 5/8 | 2 3/8 | 8 11/16  | 1 13/16 | 6        | 1 57/64 | 4 | 3/4   | 22317 | AN17 | W17 | FSAF317 | SR-20-17 | LER109 | LER188 | 80  |
| SAF22318  | 4 1/8   | 3 3/8   | 4 3/4   | 15 1/2 | 4 3/8 | 2     | 13 1/2 | 12     | 2 1/4 | 9 3/16   | 2       | 7        | 2 3/64  | 4 | 3/4   | 22318 | AN18 | W18 | FSAF318 | SR-21-18 | LER112 | LER191 | 92  |
| SAF22320  | 4 1/2   | 3 13/16 | 5 1/4   | 16 1/2 | 4 3/4 | 2 1/8 | 14 1/2 | 13 1/4 | 2 3/4 | 10 1/4   | 2 1/8   | 7 3/8    | 2 19/64 | 4 | 3/4   | 22320 | AN20 | W20 | SAF320  | SR-24-20 | LER118 | LER106 | 109 |
| SAF22322  | 4 7/8   | 4 3/16  | 6       | 18 3/8 | 5 1/8 | 2 3/8 | 16     | 14 5/8 | 3 1/4 | 11 9/16  | 2 1/2   | 8        | 2 31/64 | 4 | 7/8   | 22322 | AN22 | W22 | SAF322  | SR-0-22  | LER121 | LER113 | 145 |
| SAF22324  | 5 5/16  | 4 9/16  | 6 5/16  | 21 1/4 | 6 1/4 | 2 1/2 | 18 1/4 | 17     | 3 3/4 | 12 1/2   | 2 9/16  | 8 3/8    | 2 41/64 | 4 | 1     | 22324 | AN24 | W24 | SAF324  | SR-0-24  | LER127 | LER119 | 195 |
| SAF22326  | 5 7/8   | 4 15/16 | 6 11/16 | 22     | 6 1/4 | 2 5/8 | 19 1/4 | 17 3/8 | 3 3/4 | 13 15/16 | 2 5/8   | 8 3/4    | 2 27/32 | 4 | 1     | 22326 | AN26 | W26 | SAF326  | SR-0-26  | LER136 | LER122 | 235 |
| SAF22328  | 6 1/4   | 5 5/16  | 7 1/16  | 24 3/4 | 6 3/4 | 2 3/4 | 21 5/8 | 19 3/8 | 4 1/4 | 14 9/16  | 2 11/16 | 9 3/8    | 3 5/64  | 4 | 1     | 22328 | AN28 | W28 | SAF328  | SR-0-28  | LER144 | LER127 | 300 |
| SAF22330  | 6 5/8   | 5 3/4   | 7 1/2   | 26 3/4 | 7 1/8 | 3     | 23 3/8 | 20 7/8 | 4 5/8 | 15 1/2   | 2 7/8   | 9 11/16  | 3 17/64 | 4 | 1     | 22330 | AN30 | W30 | SAF330  | SR-36-30 | LER151 | LER134 | 335 |
| SAF22332  | 7       | 6 1/16  | 7 7/8   | 28     | 7 1/2 | 3 1/8 | 24 3/8 | 21 5/8 | 4 1/2 | 15 11/16 | 2 15/16 | 10 3/4   | 3 7/16  | 4 | 1 1/4 | 22332 | AN32 | W32 | SAF332  | SR-38-32 | LER156 | LER142 | 405 |
| SAF22334  | 7 7/16  | 6 7/16  | 8 1/4   | 29 1/2 | 8     | 3 3/8 | 25     | 22 1/2 | 5     | 17 3/16  | 3 1/16  | 10 13/16 | 3 19/32 | 4 | 1 1/4 | 22334 | AN34 | W34 | SAF334  | SR-40-34 | LER161 | LER148 | 465 |
| SAF22336  | 7 13/16 | 6 7/8   | 8 7/8   | 31 1/4 | 8 1/4 | 3 1/2 | 26 5/8 | 24     | 5 1/4 | 18 1/2   | 3 3/8   | 11 1/4   | 3 47/64 | 4 | 1 1/4 | 22336 | AN36 | W36 | SAF336  | SR-0-36  | LER165 | LER154 | 525 |
| SAF22338  | 8 3/8   | 7 1/4   | 9 1/2   | 32 3/4 | 8 3/4 | 3 3/4 | 27 7/8 | 24 3/4 | 5 1/4 | 19 5/8   | 3 11/16 | 11 1/2   | 3 57/64 | 4 | 1 1/2 | 22338 | AN38 | W38 | SAF338  | SR-44-38 | LER171 | LER160 | 635 |
| SAF22340  | 8 3/4   | 7 5/8   | 9 7/8   | 34 1/4 | 9     | 4     | 29 1/2 | 26 1/4 | 5 1/2 | 20 3/16  | 3 3/4   | 12 1/4   | 4 5/64  | 4 | 1 1/2 | 22340 | AN40 | W40 | SAF340  | SR-0-40  | LER175 | LER164 | 700 |

<sup>(1)</sup> See page B395 for suggested shaft diameter S-2, S-3 tolerances.

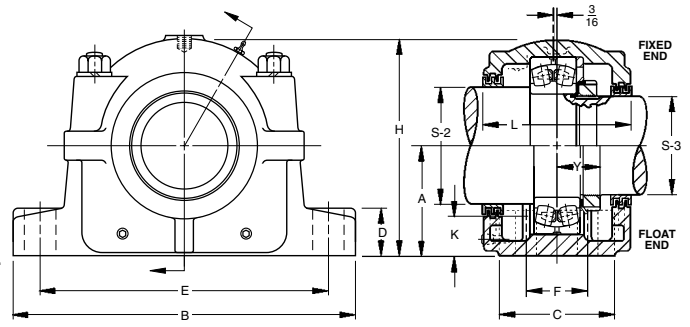
<sup>(2)</sup> "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required.

<sup>(3)</sup> Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.

**STRAIGHT BORE MOUNTING  
SDAF222 AND SDAF223 SERIES**

- Each assembly includes the housing cap and base, cap bolts, bearing, locknut and washer, stabilizing ring, and triple ring seals.
- To order pillow block housing only, use the numbers listed in the "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals and stabilizing ring.
- Assembly and pillow blocks described on this page constitute fixed units.
- To order float units, specify part number plus suffix "float" or "FL".
- All assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SDA<sub>S</sub> 22220).



B

| Pillow Block Assembly | Standard Shaft <sup>(1)</sup> Dia. |         | A       | B      | C      | D     | E      |        | F     | H        | K       | L       | Y       | Base Bolts Required | Bearing Number | Lock Nut | Lock Washer | Housing <sup>(2)</sup> Only Ring | Stabilizing <sup>(3)</sup> 1 Req'd | Triple Seal S-2 | Triple Seal S-3 | Ass'y Wt. |
|-----------------------|------------------------------------|---------|---------|--------|--------|-------|--------|--------|-------|----------|---------|---------|---------|---------------------|----------------|----------|-------------|----------------------------------|------------------------------------|-----------------|-----------------|-----------|
|                       | S-2                                | S-3     |         |        |        |       | (Max.) | (Min.) |       |          |         |         |         |                     |                |          |             |                                  |                                    |                 |                 |           |
| <b>SERIES SDAF222</b> |                                    |         |         |        |        |       |        |        |       |          |         |         |         |                     |                |          |             |                                  |                                    |                 |                 |           |
| SDAF22220             | 4 1/2                              | 3 13/16 | 4 1/2   | 15 1/4 | 6      | 1 7/8 | 13 1/8 | 11 5/8 | 3 3/8 | 8 15/16  | 1 3/4   | 6 3/4   | 1 49/64 | 4 3/4               | 22220          | AN20     | W20         | SDAF220                          | SR-20-17                           | LER118          | LER106          | 81        |
| SDAF22222             | 4 7/8                              | 4 3/16  | 4 15/16 | 16 1/2 | 6 3/4  | 2 1/8 | 14 1/2 | 12 5/8 | 4     | 9 7/8    | 1 7/8   | 7 1/4   | 1 61/64 | 4 7/8               | 22222          | AN22     | W22         | SDAF222                          | SR-22-19                           | LER121          | LER113          | 109       |
| SDAF22224             | 5 5/16                             | 4 9/16  | 5 1/4   | 16 1/2 | 6 7/8  | 2 1/4 | 14 1/2 | 13 3/4 | 4 1/8 | 10 1/2   | 1 15/16 | 7 3/8   | 2 3/32  | 4 7/8               | 22224          | AN24     | W24         | SDAF224                          | SR-24-20                           | LER127          | LER119          | 113       |
| SDAF22226             | 5 7/8                              | 4 15/16 | 6       | 18 3/8 | 7 1/2  | 2 3/8 | 16     | 14 5/8 | 4 1/2 | 11 7/8   | 2 7/16  | 8       | 2 17/64 | 4 1                 | 22226          | AN26     | W26         | SDAF226                          | SR-26-0                            | LER136          | LER122          | 151       |
| SDAF22228             | 6 1/4                              | 5 5/16  | 6       | 20 1/8 | 7 1/2  | 2 3/8 | 17 1/8 | 16     | 4 1/2 | 12 1/16  | 2 1/8   | 7 13/16 | 2 19/32 | 4 1                 | 22228          | AN28     | W28         | SDAF228                          | SR-28-0                            | LER144          | LER127          | 175       |
| SDAF22230             | 6 5/8                              | 5 3/4   | 6 5/16  | 21 1/4 | 7 7/8  | 2 1/2 | 18 1/4 | 17     | 4 3/4 | 12 13/16 | 2 3/16  | 8 3/8   | 2 37/64 | 4 1 1/8             | 22230          | AN30     | W30         | SDAF230                          | SR-30-0                            | LER151          | LER134          | 201       |
| SDAF22232             | 7                                  | 6 1/16  | 6 11/16 | 22     | 8 1/4  | 2 1/2 | 19 1/4 | 17 3/8 | 5     | 13 11/16 | 2 3/16  | 8 3/4   | 2 49/64 | 4 1 1/8             | 22232          | AN32     | W32         | SDAF232                          | SR-32-0                            | LER156          | LER142          | 245       |
| SDAF22234             | 7 7/16                             | 6 7/16  | 7 1/16  | 24 3/4 | 9      | 2 1/2 | 21 3/8 | 19 3/8 | 5 1/2 | 14 1/4   | 2 5/16  | 9 5/8   | 2 29/64 | 4 1 1/4             | 22234          | AN34     | W34         | SDAF234                          | SR-34-0                            | LER161          | LER148          | 300       |
| SDAF22236             | 7 13/16                            | 6 7/8   | 7 1/2   | 26 3/4 | 9 3/8  | 2 3/4 | 23 5/8 | 20 7/8 | 5 7/8 | 15 3/16  | 2 9/16  | 10      | 2 61/64 | 4 1 1/4             | 22236          | AN36     | W36         | SDAF236                          | SR-36-30                           | LER165          | LER154          | 335       |
| SDAF22238             | 8 3/8                              | 7 1/4   | 7 7/8   | 27 5/8 | 10     | 3     | 23 1/2 | 21 1/2 | 6 1/4 | 16 1/4   | 2 5/8   | 10 5/8  | 3 7/64  | 4 1 3/8             | 22238          | AN38     | W38         | SDAF238                          | SR-38-32                           | LER240          | LER229          | 405       |
| SDAF22240             | 8 3/4                              | 7 5/8   | 8 1/4   | 28 3/4 | 10 1/2 | 3 1/4 | 25     | 23     | 6 3/4 | 17 1/8   | 2 11/16 | 11 1/8  | 3 3/32  | 4 1 3/8             | 22240          | AN40     | W40         | SDAF240                          | SR-40-34                           | LER244          | LER233          | 465       |
| SDAF22244             | 9 3/16                             | 8 5/16  | 9 1/2   | 32     | 11 1/4 | 3 1/2 | 27 7/8 | 25 5/8 | 7 1/4 | 19 1/4   | 3 3/8   | 11 7/8  | 3 17/32 | 4 1 1/2             | 22244          | N44      | W44         | SDAF240                          | SR-44-38                           | LER248          | LER239          | 650       |

|                       |         |         |         |        |        |       |        |        |       |          |         |          |         |         |       |      |     |         |          |        |        |     |
|-----------------------|---------|---------|---------|--------|--------|-------|--------|--------|-------|----------|---------|----------|---------|---------|-------|------|-----|---------|----------|--------|--------|-----|
| <b>SERIES SDAF223</b> |         |         |         |        |        |       |        |        |       |          |         |          |         |         |       |      |     |         |          |        |        |     |
| SDAF22317             | 3 15/16 | 3 3/16  | 4 1/2   | 15 1/4 | 6      | 1 7/8 | 13 1/8 | 11 5/8 | 3 3/8 | 8 15/16  | 1 3/16  | 6 3/4    | 1 57/64 | 4 3/4   | 22317 | AN17 | W17 | SDAF317 | SR-20-17 | LER109 | LER188 | 80  |
| SDAF22318             | 4 1/8   | 3 3/8   | 4 3/4   | 15 1/2 | 6 1/8  | 2     | 13 1/2 | 12     | 3 5/8 | 9 7/16   | 2       | 6 7/8    | 2 3/64  | 4 3/4   | 22318 | AN18 | W18 | SDAF318 | SR-21-18 | LER112 | LER191 | 92  |
| SDAF22320             | 4 1/2   | 3 13/16 | 5 1/4   | 16 1/2 | 6 7/8  | 2 1/4 | 14 1/2 | 13 3/4 | 4 1/8 | 10 1/2   | 2 1/8   | 7 3/8    | 2 19/64 | 4 7/8   | 22320 | AN20 | W20 | SDAF320 | SR-24-20 | LER118 | LER106 | 109 |
| SDAF22322             | 4 7/8   | 4 3/16  | 6       | 18 3/8 | 7 1/2  | 2 3/8 | 16     | 14 5/8 | 4 1/2 | 11 7/8   | 2 1/2   | 8        | 2 21/64 | 4 1     | 22322 | AN22 | W22 | SDAF322 | SR-0-22  | LER121 | LER113 | 145 |
| SDAF22324             | 5 5/16  | 4 9/16  | 6 5/16  | 21 1/4 | 7 7/8  | 2 1/2 | 18 1/4 | 17     | 4 3/4 | 12 13/16 | 2 3/16  | 8 3/8    | 2 41/64 | 4 1 1/8 | 22324 | AN24 | W24 | SDAF324 | SR-0-24  | LER127 | LER119 | 195 |
| SDAF22326             | 5 7/8   | 4 15/16 | 6 11/16 | 22     | 8 1/4  | 2 1/2 | 19 1/4 | 17 3/8 | 5     | 13 11/16 | 2 5/8   | 8 3/4    | 2 27/64 | 4 1 1/8 | 22326 | AN26 | W26 | SDAF326 | SR-0-26  | LER136 | LER122 | 280 |
| SDAF22328             | 6 1/4   | 5 5/16  | 7 1/16  | 24 3/4 | 9      | 2 1/2 | 21 3/8 | 19 3/8 | 5 1/2 | 14 1/4   | 2 11/16 | 9 5/8    | 3 3/64  | 4 1 1/4 | 22328 | AN28 | W28 | SDAF328 | SR-0-28  | LER144 | LER127 | 305 |
| SDAF22330             | 6 5/8   | 5 3/4   | 7 1/2   | 26 3/4 | 9 3/8  | 2 3/4 | 23 5/8 | 20 7/8 | 5 7/8 | 15 3/16  | 2 7/8   | 9 3/4    | 3 17/64 | 4 1 1/4 | 22330 | AN30 | W30 | SDAF330 | SR-36-30 | LER151 | LER134 | 375 |
| SDAF22332             | 7       | 6 1/16  | 7 7/8   | 27 5/8 | 10     | 3     | 23 1/2 | 21 1/2 | 6 1/4 | 16 1/4   | 2 19/16 | 10 5/8   | 3 7/16  | 4 1 3/8 | 22332 | AN32 | W32 | SDAF332 | SR-38-32 | LER225 | LER217 | 445 |
| SDAF22334             | 7 7/16  | 6 7/16  | 8 1/4   | 28 3/4 | 10 1/2 | 3 1/4 | 25     | 23     | 6 3/4 | 17 1/8   | 3 1/16  | 11 1/8   | 3 19/32 | 4 1 3/8 | 22334 | AN34 | W34 | SDAF334 | SR-40-34 | LER230 | LER220 | 525 |
| SDAF22336             | 7 13/16 | 6 7/8   | 8 7/8   | 30 1/2 | 10 3/4 | 3 1/4 | 26 3/8 | 24 1/8 | 6 7/8 | 17 15/16 | 3 3/8   | 11 3/8   | 3 47/64 | 4 1 1/2 | 22336 | AN36 | W36 | SDAF336 | SR-0-36  | LER234 | LER223 | 635 |
| SDAF22338             | 8 3/8   | 7 1/4   | 9 1/2   | 32     | 11 1/4 | 3 1/2 | 27 7/8 | 25 5/8 | 7 1/4 | 19 1/4   | 3 11/16 | 11 13/16 | 3 57/64 | 4 1 1/2 | 22338 | AN38 | W38 | SDAF338 | SR-44-38 | LER240 | LER229 | 700 |
| SDAF22340             | 8 3/4   | 7 5/8   | 9 7/8   | 33 1/2 | 11 3/4 | 3 1/2 | 29 1/4 | 26 5/8 | 7 5/8 | 19 15/16 | 3 3/4   | 12 1/4   | 4 5/64  | 4 1 5/8 | 22340 | AN40 | W40 | SDAF340 | SR-0-40  | LER244 | LER233 | 725 |

(1) See page B395 for suggested shaft diameter S-2, S-3 tolerances.  
 (2) "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required.  
 (3) Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.

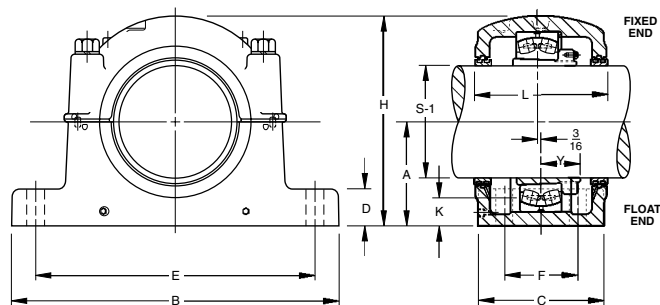




# SPHERICAL ROLLER BEARINGS

## STRAIGHT BORE MOUNTING SDAF231 AND SDAF232 SERIES

- Each assembly includes the housing cap and base, cap bolts, bearing, locknut and washer, stabilizing ring and triple ring seals.
- To order pillow block housing only, use the numbers listed in the "Housing Only" column. These units include: cap, base, cap bolts, triple ring seals, and stabilizing ring.
- Assembly and pillow blocks described on this page constitute fixed units.
- To order float units, specify part number plus suffix "Float" or "FL".
- All assemblies shown are furnished in cast iron. If cast steel is desired, add the letter "S" to the alpha prefix (e.g., SDAFS 23152).
- For fixed applications, both stabilizing rings must be used. Do not use stabilizing rings for "float" mounting.



| Pillow Block Assembly | Standard Shaft <sup>(1)</sup> Dia. |     | A | B | C | D | E      |        | F | H | K Oil Level | L | 4 Base Bolts Req'd | Bearing Number | Lock Nut | Lock Washer | Housing <sup>(2)</sup> Only | Stabilizing Ring <sup>(3)</sup> 2 Req'd | Triple Seal 1 Req'd S-2 | Triple Seal 1 Req'd S-3 | Ass'y Wt. |
|-----------------------|------------------------------------|-----|---|---|---|---|--------|--------|---|---|-------------|---|--------------------|----------------|----------|-------------|-----------------------------|-----------------------------------------|-------------------------|-------------------------|-----------|
|                       | S-2                                | S-3 |   |   |   |   | (Max.) | (Min.) |   |   |             |   |                    |                |          |             |                             |                                         |                         |                         |           |

### SERIES SDAF231

|           |        |          |          |        |        |       |        |        |        |         |         |        |       |       |      |     |          |       |       |       |      |
|-----------|--------|----------|----------|--------|--------|-------|--------|--------|--------|---------|---------|--------|-------|-------|------|-----|----------|-------|-------|-------|------|
| SDAF23152 | 11 1/2 | 9 15/16  | 10 1/4   | 35     | 13 1/8 | 3 3/4 | 30 1/2 | 29     | 8 3/4  | 20 7/8  | 3 3/8   | 14 1/4 | 1 5/8 | 23152 | N052 | P52 | SDAF3152 | A5679 | ER832 | ER845 | 1050 |
| SDAF23156 | 12 1/2 | 10 3/4   | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/4   | 15 7/8 | 1 5/8 | 23156 | N056 | P56 | SDAF3156 | A8967 | ER866 | ER826 | 1250 |
| SDAF23160 | 13     | 11 1/2   | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 1/8   | 15 7/8 | 1 5/8 | 23160 | N060 | P60 | SDAF3160 | A8975 | ER824 | ER832 | 1350 |
| SDAF23164 | 14     | 12 1/4   | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2 | 36 1/2 | 35     | 10 1/2 | 25 3/4  | 4 3/8   | 16 3/4 | 1 7/8 | 23164 | N064 | P64 | SDAF3164 | A8970 | ER876 | ER983 | 1850 |
| SDAF23168 | 15     | 13       | 14       | 43 3/4 | 17 3/4 | 5     | 38 1/4 | 36 3/4 | 10 3/4 | 27 7/8  | 4 15/16 | 18 3/4 | 2     | 23168 | N068 | P68 | SDAF3168 | A8977 | ER847 | ER846 | 2450 |
| SDAF23172 | 16     | 13 13/16 | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 5       | 18     | 2     | 23172 | N072 | P72 | SDAF3172 | A8974 | ER809 | ER874 | 2500 |
| SDAF23176 | 17     | 14 5/8   | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 4 9/8   | 18     | 2     | 23176 | N076 | P76 | SDAF3176 | A8978 | ER811 | ER946 | 2500 |
| SDAF23180 | 17 1/2 | 15 1/4   | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 5 1/8   | 19 3/4 | 2 1/4 | 23180 | N080 | P80 | SDAF3180 | A8979 | ER948 | ER895 | 2800 |
| SDAF23184 | 18 1/2 | 16 3/16  | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 6       | 22 1/4 | 2 1/4 | 23184 | N084 | P84 | SDAF3184 | A8984 | ER949 | ER914 | 4300 |
| SDAF23188 | 19 1/2 | 17       | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 5 9/16  | 22 1/4 | 2 1/4 | 23188 | N088 | P88 | SDAF3188 | A8976 | ER950 | ER811 | 4300 |
| SDAF23192 | 20     | 17 3/4   | 18       | 54 1/4 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 6       | 22 3/4 | 2 1/2 | 23192 | N092 | P92 | SDAF3192 | A8990 | ER808 | ER953 | 5000 |

### SERIES SDAF232

|           |        |          |          |        |        |       |        |        |        |         |        |        |       |       |      |     |          |       |       |       |      |
|-----------|--------|----------|----------|--------|--------|-------|--------|--------|--------|---------|--------|--------|-------|-------|------|-----|----------|-------|-------|-------|------|
| SDAF23248 | 10 1/2 | 9 3/16   | 10 1/4   | 35     | 13 1/8 | 3 3/4 | 30 1/2 | 29     | 8 3/4  | 20 7/8  | 3 9/16 | 14 1/4 | 1 5/8 | 23248 | N048 | P48 | SDAF3248 | A5679 | ER840 | ER945 | 1100 |
| SDAF23252 | 11 1/2 | 9 15/16  | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/4  | 15 7/8 | 1 5/8 | 23252 | N052 | P52 | SDAF3252 | A8968 | ER832 | ER845 | 1350 |
| SDAF23256 | 12 1/2 | 10 3/4   | 12       | 38 1/4 | 14 3/4 | 3 3/8 | 33 1/2 | 32 3/4 | 9      | 23 7/16 | 4 3/8  | 15 7/8 | 1 5/8 | 23256 | N056 | P56 | SDAF3256 | A8975 | ER866 | ER826 | 1400 |
| SDAF23260 | 13     | 11 1/2   | 12 13/16 | 41 3/4 | 15 3/4 | 4 1/2 | 36 1/2 | 35     | 10 1/2 | 25 3/4  | 4 1/2  | 16 3/4 | 1 7/8 | 23260 | N060 | P60 | SDAF3260 | A8970 | ER846 | ER856 | 1900 |
| SDAF23264 | 14     | 12 1/4   | 14       | 43 3/4 | 17 3/4 | 5     | 38 1/4 | 36 3/4 | 10 3/4 | 27 7/8  | 5 1/8  | 18 3/4 | 2     | 23264 | N064 | P64 | SDAF3264 | A8977 | ER876 | ER983 | 2500 |
| SDAF23268 | 15     | 13       | 14 1/2   | 46     | 17 1/8 | 5 1/4 | 40 3/4 | 39 1/4 | 11     | 28 7/8  | 5      | 18     | 2     | 23268 | N068 | P68 | SDAF3268 | A8978 | ER847 | ER846 | 2650 |
| SDAF23272 | 16     | 13 13/16 | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 5 1/2  | 19 3/4 | 2 1/4 | 23272 | N072 | P72 | SDAF3272 | A8979 | ER809 | ER874 | 2950 |
| SDAF23276 | 17     | 14 5/8   | 15 1/2   | 48 3/4 | 18 3/4 | 5 1/2 | 43 1/2 | 41 3/4 | 12 1/4 | 30 1/2  | 4 3/8  | 19 3/4 | 2 1/4 | 23276 | N076 | P76 | SDAF3276 | A8980 | ER811 | ER946 | 3050 |
| SDAF23280 | 17 1/2 | 15 1/4   | 17       | 52     | 21     | 5 1/2 | 46 1/8 | 44 3/8 | 14 1/2 | 33 3/4  | 6      | 22 1/4 | 2 1/4 | 23280 | N080 | P80 | SDAF3280 | A8976 | ER948 | ER895 | 4500 |
| SDAF23284 | 18 1/2 | 16 3/16  | 18       | 54 1/2 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 6 3/8  | 22 3/4 | 2 1/2 | 23284 | N084 | P84 | SDAF3284 | A8990 | ER955 | ER951 | 5000 |
| SDAF23288 | 19 1/2 | 17       | 18       | 54 1/2 | 21 5/8 | 5 3/4 | 48 7/8 | 47 1/8 | 15     | 35 3/4  | 5 7/8  | 22 3/4 | 2 1/2 | 23288 | N088 | P88 | SDAF3288 | A8988 | ER956 | ER838 | 5050 |

(1) See page B395 for suggested shaft diameter S-2, S-3 tolerances.

(2) "Housing Only" includes: cap, base, cap bolts, triple ring seals and stabilizing rings as required.

(3) Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.

SHAFT DIAMETERS

SUGGESTED S-1, S-2, S-3 SHAFT DIAMETERS (INCHES)

|         | max.   | min.   |
|---------|--------|--------|
| 1 1/16  | 1.4375 | 1.4345 |
| 1 11/16 | 1.6875 | 1.6845 |
| 1 7/8   | 1.8750 | 1.8720 |
| 1 15/16 | 1.9375 | 1.9345 |
| 2 1/16  | 2.0625 | 2.0585 |
| 2 1/8   | 2.1250 | 2.1210 |
| 2 3/16  | 2.1875 | 2.1835 |
| 2 1/4   | 2.2500 | 2.2460 |
| 2 3/8   | 2.3750 | 2.3710 |
| 2 7/16  | 2.4375 | 2.4335 |
| 2 9/16  | 2.5625 | 2.5585 |
| 2 5/8   | 2.6250 | 2.6210 |
| 2 11/16 | 2.6875 | 2.6835 |
| 2 13/16 | 2.8125 | 2.8085 |
| 2 7/8   | 2.8750 | 2.8710 |
| 2 15/16 | 2.9375 | 2.9335 |
| 3       | 3.0000 | 2.9960 |
| 3 1/16  | 3.0625 | 3.0585 |
| 3 3/16  | 3.1875 | 3.1835 |
| 3 1/4   | 3.2500 | 3.2460 |
| 3 3/8   | 3.3750 | 3.3710 |
| 3 7/16  | 3.4375 | 3.4335 |
| 3 5/8   | 3.6250 | 3.6210 |
| 3 15/16 | 3.9375 | 3.9335 |
| 4 1/8   | 4.1250 | 4.1200 |
| 4 3/16  | 4.1875 | 4.1825 |
| 4 7/16  | 4.4375 | 4.4325 |
| 4 1/2   | 4.5000 | 4.4950 |
| 4 9/16  | 4.5625 | 4.5575 |
| 4 7/8   | 4.8750 | 4.8700 |
| 4 15/16 | 4.9375 | 4.9325 |
| 5 3/16  | 5.1875 | 5.1825 |
| 5 5/16  | 5.3125 | 5.3075 |
| 5 7/16  | 5.4375 | 5.4325 |
| 5 3/4   | 5.7500 | 5.7450 |
| 5 7/8   | 5.8750 | 5.8700 |
| 5 15/16 | 5.9375 | 5.9325 |
| 6 1/16  | 6.0625 | 6.0575 |
| 6 1/4   | 6.2500 | 6.2450 |
| 6 7/16  | 6.4375 | 6.4325 |
| 6 5/8   | 6.6250 | 6.6200 |
| 6 7/8   | 6.8750 | 6.8700 |
| 6 15/16 | 6.9375 | 6.9325 |
| 7       | 7.0000 | 6.9950 |
| 7 3/16  | 7.1875 | 7.1825 |

|          | max.    | min.    |
|----------|---------|---------|
| 7 1/4    | 7.2500  | 7.2450  |
| 7 7/16   | 7.4375  | 7.4325  |
| 7 5/8    | 7.6250  | 7.6200  |
| 7 13/16  | 7.8125  | 7.8075  |
| 7 15/16  | 7.9375  | 7.9325  |
| 8 9/16   | 8.3125  | 8.3065  |
| 8 3/8    | 8.3750  | 8.3690  |
| 8 7/16   | 8.4375  | 8.4315  |
| 8 1/2    | 8.5000  | 8.4940  |
| 8 3/4    | 8.7500  | 8.7440  |
| 8 15/16  | 8.9375  | 8.9315  |
| 9        | 9.0000  | 8.9940  |
| 9 7/16   | 9.4375  | 9.4315  |
| 9 1/2    | 9.5000  | 9.4940  |
| 9 9/16   | 9.5625  | 9.5565  |
| 9 15/16  | 9.9375  | 9.9315  |
| 10       | 10.0000 | 9.9940  |
| 10 7/16  | 10.4375 | 10.4305 |
| 10 1/2   | 10.5000 | 10.4930 |
| 10 15/16 | 10.9375 | 10.9305 |
| 11       | 11.0000 | 10.9930 |
| 11 7/16  | 11.4375 | 11.4305 |
| 11 1/2   | 11.5000 | 11.4930 |
| 11 15/16 | 11.9375 | 11.9305 |
| 12       | 12.0000 | 11.9930 |
| 12 7/16  | 12.4375 | 12.4295 |
| 12 1/2   | 12.5000 | 12.4920 |
| 12 15/16 | 12.9375 | 12.9295 |
| 13       | 13.0000 | 12.9920 |
| 13 7/16  | 13.4375 | 13.4295 |
| 13 1/2   | 13.5000 | 13.4920 |
| 13 15/16 | 13.9375 | 13.9295 |
| 14       | 14.0000 | 13.9920 |
| 15       | 15.0000 | 14.9920 |
| 16       | 16.0000 | 15.9920 |
| 17       | 17.0000 | 16.9920 |
| 17 1/2   | 17.5000 | 17.4920 |
| 18 1/2   | 18.5000 | 18.4920 |
| 19 1/2   | 19.5000 | 19.4920 |
| 20       | 20.0000 | 19.9920 |

B



Triple lip seals for other shaft diameters are available upon special order.

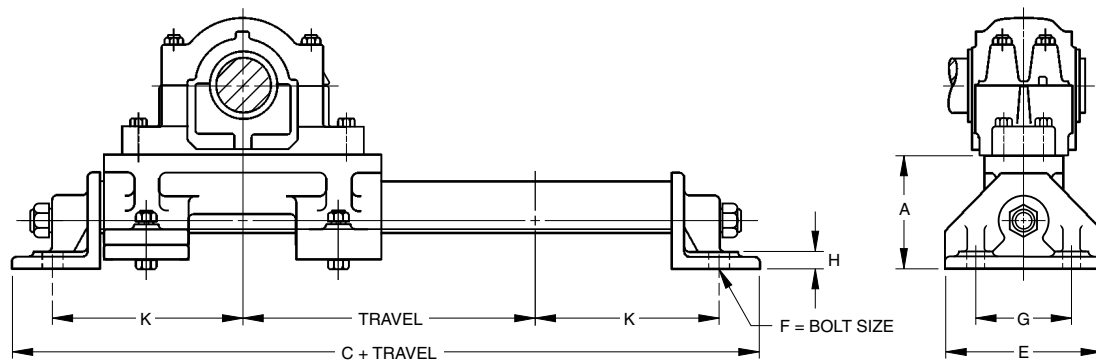




## SPHERICAL ROLLER BEARINGS

### TU TAKE-UP UNITS

- The same care taken in the selection of stationary pillow blocks must be applied to selecting the proper take-up unit.
- Load requirements should be carefully evaluated before specifying a particular Timken take-up assembly.
- The pedestal is made of stress-relieved cast iron. End bases are made of ductile iron. The guide rail and screw are steel.
- Units are available with travel lengths from 12 to 36 inches, in 6-inch increments.
- Catalog numbers shown here are for the TU take-up unit only; pillow block assemblies must be ordered separately.
- Both two- and four-bolt pedestals are available and must be specified.



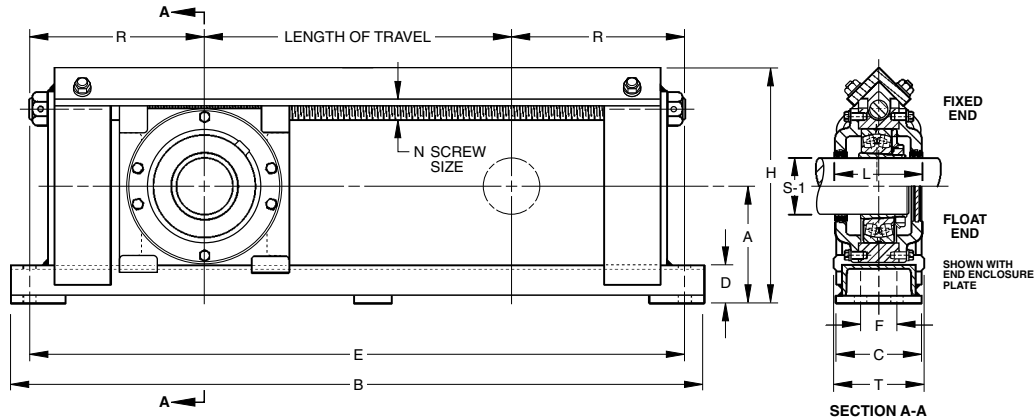
| TU Take-Up Unit Catalog Number | Pillow Block Housing Number (SAF or SDAF) |      | A     | C      | E     | F Bolt Size | G     | H   | K      |
|--------------------------------|-------------------------------------------|------|-------|--------|-------|-------------|-------|-----|--------|
|                                |                                           |      | in.   | in.    | in.   | in.         | in.   | in. | in.    |
| TU-3x*                         | 515L                                      | —    | 4 7/8 | 20     | 6 1/2 | 5/8         | 4     | 3/4 | 8 1/4  |
| TU-4x*                         | 516L                                      | —    | 5     | 21 3/4 | 6 1/2 | 3/4         | 4     | 3/4 | 9 1/8  |
| TU-5x*                         | 518L                                      | —    | 5 1/4 | 23     | 7 1/2 | 3/4         | 5     | 3/4 | 9 3/4  |
| TU-6x*                         | 520L                                      | —    | 5 1/2 | 24 3/4 | 7 1/2 | 3/4         | 5     | 7/8 | 10 3/4 |
| TU-7x*                         | 522L                                      | 524L | 6     | 26     | 9     | 3/4         | 6 1/2 | 1   | 11 1/2 |
| TU-8x*                         | 526L                                      | —    | 6     | 28     | 9     | 3/4         | 6 1/2 | 1   | 12 1/2 |
| TU-8-1x*                       | 528L                                      | —    | 6     | 29 1/2 | 9     | 3/4         | 6 1/2 | 1   | 13 1/4 |

\* Enter 12, 18, 24, 30 or 36 to indicate travel in inches.



## TTU TAKE-UP UNITS

- The same care taken in the selection of stationary pillow blocks must be applied to selecting the proper take-up unit.
- Load requirements should be carefully evaluated before specifying a particular take-up assembly.
- Frame assembly and adjusting screw of TTU units are made of steel.
- The bearing housing is cast iron. Steel or ductile iron housings are additional options.
- Units include housing for adapter mounted bearings only, for either fixed or float position (be sure to specify).
- One stabilizing ring is included for fixed position assemblies.
- Sealing is triple ring labyrinth or end closures.
- For extremely contaminated environments, the DUSTAC seal is suggested. (See the next page for more information on DUSTAC.)



| Take-Up Unit and Frame Number (Travel in Bold) | Standard Shaft <sup>(1)</sup> Dia. S-1 | A      | B      | C     | D      | E      | F     | G      | H      | L     | N      | R      | T      | Bearing Number | Adapter <sup>(3)</sup> Assembly Number | Stabilizing <sup>(2)</sup> Ring 1 Req'd | Triple Seal 2 Req'd | Approx. Wt. lbs. |
|------------------------------------------------|----------------------------------------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|--------|----------------|----------------------------------------|-----------------------------------------|---------------------|------------------|
|                                                |                                        | in.    | in.    | in.   | in.    | in.    | in.   | in.    | in.    | in.   | in.    | in.    | in.    |                |                                        |                                         |                     |                  |
| TTU-55-12                                      | 1 15/16                                | 4 5/8  | 28 1/2 | 3 1/2 | 1 3/4  | 26 1/2 | -     | 5/8    | 9      | 4     | 3/4    | 7 1/4  | 4      | 22211K         | SNW-11                                 | SR-11-0                                 | LER24               | 55               |
| TTU-55-18                                      | 4 5/8                                  | 34 1/2 | 3 1/2  | 1 3/4 | 32 1/2 | -      | 5/8   | 9      | 4      | 3/4   | 7 1/4  | 4      | 22211K | SNW-11         | SR-11-0                                | LER24                                   | 60                  |                  |
| TTU-55-24                                      | 4 5/8                                  | 40 1/2 | 3 1/2  | 1 3/4 | 38 1/2 | -      | 5/8   | 9      | 4      | 3/4   | 7 1/4  | 4      | 22211K | SNW-11         | SR-11-0                                | LER24                                   | 65                  |                  |
| TTU-65-12                                      | 2 3/16                                 | 5      | 29 1/2 | 3 1/2 | 1 3/4  | 27 1/2 | -     | 5/8    | 10     | 4 1/2 | 3/4    | 7 3/4  | 4      | 22213K         | SNW-13                                 | SR-13-0                                 | LER29               | 60               |
| TTU-65-18                                      | 5                                      | 35 1/2 | 3 1/2  | 1 3/4 | 33 1/2 | -      | 5/8   | 10     | 4 1/2  | 3/4   | 7 3/4  | 4      | 22213K | SNW-13         | SR-13-0                                | LER29                                   | 65                  |                  |
| TTU-65-24                                      | 5                                      | 41 1/2 | 3 1/2  | 1 3/4 | 39 1/2 | -      | 5/8   | 10     | 4 1/2  | 3/4   | 7 3/4  | 4      | 22213K | SNW-13         | SR-13-0                                | LER29                                   | 70                  |                  |
| TTU-75-6                                       | 2 7/16                                 | 5 3/16 | 24 1/2 | 3 1/2 | 1 3/4  | 22 1/2 | -     | 3/4    | 10 1/2 | 4 1/2 | 7/8    | 8 1/4  | 4      | 22215K         | SNW-15                                 | SR-15-0                                 | LER37               | 65               |
| TTU-75-12                                      | 5 3/16                                 | 30 1/2 | 3 1/2  | 1 3/4 | 28 1/2 | -      | 3/4   | 10 1/2 | 4 1/2  | 7/8   | 8 1/4  | 4      | 22215K | SNW-15         | SR-15-0                                | LER37                                   | 70                  |                  |
| TTU-75-18                                      | 5 3/16                                 | 36 1/2 | 3 1/2  | 1 3/4 | 34 1/2 | -      | 3/4   | 10 1/2 | 4 1/2  | 7/8   | 8 1/4  | 4      | 22215K | SNW-15         | SR-15-0                                | LER37                                   | 75                  |                  |
| TTU-75-24                                      | 5 3/16                                 | 42 1/2 | 3 1/2  | 1 3/4 | 40 1/2 | -      | 3/4   | 10 1/2 | 4 1/2  | 7/8   | 8 1/4  | 4      | 22215K | SNW-15         | SR-15-0                                | LER37                                   | 80                  |                  |
| TTU-75-30                                      | 5 3/16                                 | 48 1/2 | 3 1/2  | 1 3/4 | 46 1/2 | -      | 3/4   | 10 1/2 | 4 1/2  | 7/8   | 8 1/4  | 4      | 22215K | SNW-15         | SR-15-0                                | LER37                                   | 85                  |                  |
| TTU-85-6                                       | 2 15/16                                | 6      | 26 1/2 | 4 5/8 | 2      | 24 1/2 | 2     | 5/8    | 12 1/4 | 4 3/4 | 1      | 9 1/4  | 5      | 22217K         | SNW-17                                 | SR-17-14                                | LER53               | 95               |
| TTU-85-12                                      | 6                                      | 32 1/2 | 4 5/8  | 2     | 30 1/2 | 2      | 5/8   | 12 1/4 | 4 3/4  | 1     | 9 1/4  | 5      | 22217K | SNW-17         | SR-17-14                               | LER53                                   | 100                 |                  |
| TTU-85-18                                      | 6                                      | 38 1/2 | 4 5/8  | 2     | 36 1/2 | 2      | 5/8   | 12 1/4 | 4 3/4  | 1     | 9 1/4  | 5      | 22217K | SNW-17         | SR-17-14                               | LER53                                   | 105                 |                  |
| TTU-85-24                                      | 6                                      | 44 1/2 | 4 5/8  | 2     | 42 1/2 | 2      | 5/8   | 12 1/4 | 4 3/4  | 1     | 9 1/4  | 5      | 22217K | SNW-17         | SR-17-14                               | LER53                                   | 110                 |                  |
| TTU-85-30                                      | 6                                      | 50 1/2 | 4 5/8  | 2     | 48 1/2 | 2      | 5/8   | 12 1/4 | 4 3/4  | 1     | 9 1/4  | 5      | 22217K | SNW-17         | SR-17-14                               | LER53                                   | 115                 |                  |
| TTU-100-12                                     | 3 7/16                                 | 6 5/8  | 34 1/4 | 4 5/8 | 2      | 32     | 2     | 3/4    | 13 7/8 | 6     | 1 1/8  | 10     | 5 1/2  | 22220K         | SNW-20                                 | SR-20-17                                | LER102              | 140              |
| TTU-100-18                                     | 6 5/8                                  | 40 1/4 | 4 5/8  | 2     | 38     | 2      | 3/4   | 13 7/8 | 6      | 1 1/8 | 10     | 5 1/2  | 22220K | SNW-20         | SR-20-17                               | LER102                                  | 145                 |                  |
| TTU-100-24                                     | 6 5/8                                  | 46 1/4 | 4 5/8  | 2     | 44     | 2      | 3/4   | 13 7/8 | 6      | 1 1/8 | 10     | 5 1/2  | 22220K | SNW-20         | SR-20-17                               | LER102                                  | 150                 |                  |
| TTU-100-30                                     | 6 5/8                                  | 52 1/4 | 4 5/8  | 2     | 50     | 2      | 3/4   | 13 7/8 | 6      | 1 1/8 | 10     | 5 1/2  | 22220K | SNW-20         | SR-20-17                               | LER102                                  | 155                 |                  |
| TTU-110-12                                     | 3 15/16                                | 7 3/4  | 38 1/2 | 5 5/8 | 2 1/4  | 36     | 2 1/2 | 3/4    | 16 1/4 | 6 1/2 | 1 1/4  | 12     | 7      | 22222K         | SNW-22                                 | SR-22-19                                | LER109              | 200              |
| TTU-110-18                                     | 7 3/4                                  | 44 1/2 | 5 5/8  | 2 1/4 | 42     | 2 1/2  | 3/4   | 16 1/4 | 6 1/2  | 1 1/4 | 12     | 7      | 22222K | SNW-22         | SR-22-19                               | LER109                                  | 210                 |                  |
| TTU-110-24                                     | 7 3/4                                  | 50 1/2 | 5 5/8  | 2 1/4 | 48     | 2 1/2  | 3/4   | 16 1/4 | 6 1/2  | 1 1/4 | 12     | 7      | 22222K | SNW-22         | SR-22-19                               | LER109                                  | 220                 |                  |
| TTU-110-30                                     | 7 3/4                                  | 56 1/2 | 5 5/8  | 2 1/4 | 54     | 2 1/2  | 3/4   | 16 1/4 | 6 1/2  | 1 1/4 | 12     | 7      | 22222K | SNW-22         | SR-22-19                               | LER109                                  | 230                 |                  |
| TTU-110-36                                     | 7 3/4                                  | 62 1/2 | 5 5/8  | 2 1/4 | 60     | 2 1/2  | 3/4   | 16 1/4 | 6 1/2  | 1 1/4 | 12     | 7      | 22222K | SNW-22         | SR-22-19                               | LER109                                  | 240                 |                  |
| TTU-130-12                                     | 4 7/16                                 | 8 5/8  | 45 3/4 | 8 3/4 | 2 3/4  | 40 3/4 | 5     | 1 1/8  | 18 7/8 | 7 1/4 | 2      | 14 3/8 | 10     | 22226K         | SNW-26                                 | SR-26-0                                 | LER117              | 360              |
| TTU-130-18                                     | 8 5/8                                  | 51 3/4 | 8 3/4  | 2 3/4 | 46 3/4 | 5      | 1 1/8 | 18 7/8 | 7 1/4  | 2     | 14 3/8 | 10     | 22226K | SNW-26         | SR-26-0                                | LER117                                  | 380                 |                  |
| TTU-130-24                                     | 8 5/8                                  | 57 3/4 | 8 3/4  | 2 3/4 | 52 3/4 | 5      | 1 1/8 | 18 7/8 | 7 1/4  | 2     | 14 3/8 | 10     | 22226K | SNW-26         | SR-26-0                                | LER117                                  | 400                 |                  |
| TTU-130-30                                     | 8 5/8                                  | 63 3/4 | 8 3/4  | 2 3/4 | 58 3/4 | 5      | 1 1/8 | 18 7/8 | 7 1/4  | 2     | 14 3/8 | 10     | 22226K | SNW-26         | SR-26-0                                | LER117                                  | 420                 |                  |
| TTU-140-12                                     | 4 15/16                                | 9 1/2  | 49 1/2 | 9 3/4 | 3      | 44 1/2 | 5 1/2 | 1 1/4  | 20 3/8 | 7 1/2 | 2 1/4  | 16 1/4 | 11     | 22228K         | SNW-28                                 | SR-28-0                                 | LER122              | 460              |
| TTU-140-18                                     | 9 1/2                                  | 55 1/2 | 9 3/4  | 3     | 50 1/2 | 5 1/2  | 1 1/4 | 20 3/8 | 7 1/2  | 2 1/4 | 16 1/4 | 11     | 22228K | SNW-28         | SR-28-0                                | LER122                                  | 480                 |                  |
| TTU-140-24                                     | 9 1/2                                  | 61 1/2 | 9 3/4  | 3     | 56 1/2 | 5 1/2  | 1 1/4 | 20 3/8 | 7 1/2  | 2 1/4 | 16 1/4 | 11     | 22228K | SNW-28         | SR-28-0                                | LER122                                  | 510                 |                  |
| TTU-140-30                                     | 9 1/2                                  | 67 1/2 | 9 3/4  | 3     | 62 1/2 | 5 1/2  | 1 1/4 | 20 3/8 | 7 1/2  | 2 1/4 | 16 1/4 | 11     | 22228K | SNW-28         | SR-28-0                                | LER122                                  | 530                 |                  |

(1) See page B395 for suggested shaft diameter S-1 tolerances.

**Note:** Limiting speeds are found in dimension tables in the spherical roller bearing section.

(2) Stabilizing ring is used for fixed (FX) block; do not use for float (FL) mounting.

(3) Includes sleeve, locknut and lockwasher. Add shaft size to order.





## SPHERICAL ROLLER BEARINGS

### DUSTACT™ SHAFT SEAL

- Suggested for pillow blocks used in extremely contaminated environments, such as taconite mines.
- Provides protection against residual and airborne contaminants that exceeds the triple labyrinth shaft seal.
- Contributes significantly to extending bearing life; reduces costs by helping prevent premature bearing damage.
- Because of its unique design, no special finish is required on the shaft. DUSTAC is a patented device utilizing a V-shaped nitrile ring, which rotates with the shaft and applies pressure to the cartridge face to exclude contaminants.

B

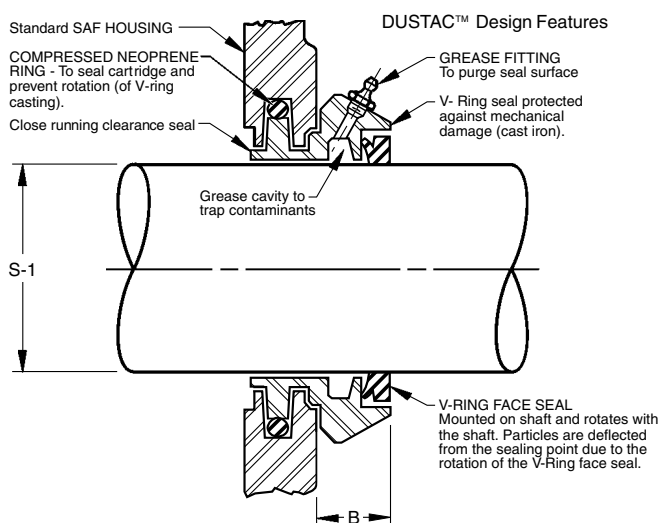
| Pillow Block Housing Number |     | Shaft Diameter<br>S-1 | Assembly Standout<br>B | DUSTACT™ Seal Assembly | V-Ring Seal | O-Ring | End Plug |
|-----------------------------|-----|-----------------------|------------------------|------------------------|-------------|--------|----------|
| 500                         | 600 |                       |                        |                        |             |        |          |
| 515                         | 615 | 2 7/16                | 59/64                  | DV-37                  | V-60-A      | 2-228  | EPS-4    |
| 516                         | 616 | 2 1 1/16              | 59/64                  | DV-44                  | V-65-A      | 2-231  | EPS-5    |
| 517                         | —   | 2 1 9/16              | 1                      | DV-53                  | V-75-A      | 2-230  | EPS-6    |
| 518                         | —   | 3 3/16                | 1                      | DV-69                  | V-80-A      | 2-235  | EPS-9    |
| 520                         | 620 | 3 7/16                | 1                      | DV-102                 | V-85-A      | 2-234  | EPS-11   |
| 522                         | 622 | 3 1 5/16              | 1                      | DV-109                 | V-100-A     | 2-239  | EPS-13   |
| 524                         | 624 | 4 3/16                | 1 1/16                 | DV-113                 | V-110-A     | 2-238  | EPS-14   |
| 526                         | 626 | 4 7/16                | 1 1/16                 | DV-117                 | V-110-A     | 2-242  | EPS-15   |
| 528                         | 628 | 4 1 5/16              | 1 1/16                 | DV-122                 | V-130-A     | 2-244  | EPS-16   |
| 530                         | 630 | 5 3/16                | 1 1/16                 | DV-125                 | V-130-A     | 2-247  | EPS-17   |
| 532                         | 632 | 5 7/16                | 1 1/16                 | DV-130                 | V-140-A     | 2-249  | EPS-18   |
| 534                         | 634 | 5 1 5/16              | 1 1/16                 | DV-140                 | V-150-A     | 2-253  | EPS-20   |
| 536                         | 636 | 6 7/16                | 1 9/64                 | DV-148                 | V-160-A     | 2-259  | EPS-21   |
| 538                         | 638 | 6 1 5/16              | 1 9/64                 | DV-155                 | V-180-A     | 2-259  | EPS-22   |
| 540                         | 640 | 7 3/16                | 1 9/64                 | DV-159                 | V-180-A     | 2-259  | EPS-23   |
| 544                         | —   | 7 1 5/16              | 1 1 5/32               | DV-167                 | V-200-A     | 2-262  | EPS-25   |

### ORDER INSTRUCTIONS

- Shaft seal may be ordered in place of the standard LER triple ring seals supplied with the pillow blocks listed. They also are available to retrofit existing installations.
- To order any pillow block housings with DUSTAC shaft seal on both sides, add the suffix "DV" to the number (e.g., SAF2522DV).
- To order pillow block housings with DUSTAC shaft seal and one end closed, add the suffix "DC" to the number (e.g., SAF2252DC).
- Standard sizes of DUSTAC shaft seals are shown in the table. Other sizes are available upon request.

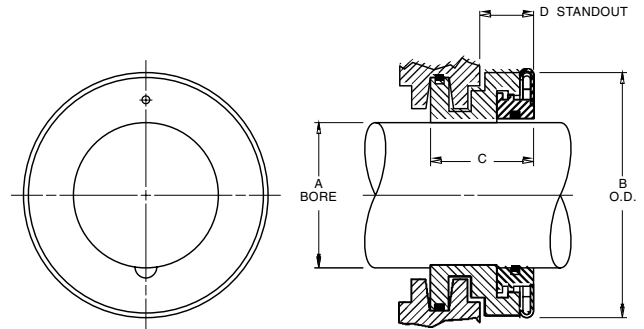
### INSTALLATION PROCEDURE

1. Check shaft diameters to print specification. Remove any burrs or sharp edges. Be sure shaft surface is clean and dry beyond the area of seal location.
2. Expand the V-ring seal over the shaft to the approximate inboard position (reference dimension "B" in the tables). *Make sure the lip of the seal faces the bearing.*
3. Slide the seal cartridge onto the shaft until the V-ring fits into its cavity.
4. Mount the bearing, sleeve, lockwasher and locknut in normal manner and adjust for internal clearance.
5. If both ends have seals, repeat steps 2 and 3 with the V-ring going on last with its lip facing the bearing.
6. Thoroughly clean the housing base and remove any paint or burrs from the mating surfaces of the housing cap.
7. Lower shaft, bearing and seals into the housing base, taking care to guide the seals into the seal grooves.
8. On each shaft there must be only one fixed bearing. If bearing is to be fixed, the stabilizing ring can be inserted between the bearing outer ring and the housing shoulder on the locknut side of the bearing. All other bearings on this shaft should be centered in the housing.
9. The upper half of the housing or cap should be thoroughly cleaned and checked for burrs. Place it over the bearing and seals. The dowel pins will align the cap to the base. **NOTE:** housing caps and bases are not interchangeable.
10. After cap bolts are tightened, it is most important to position the V-ring seal to its proper fitted width. This is accomplished by moving the seal until it is flush with the outside face of the cavity. This provides proper compression of the lip against the cartridge face.



## TORR-GARD SEALS

- Using the TORR-GARD greatly increases the operating time between maintenance intervals of rotating equipment.
- Used in split pillow blocks.
- Endures extreme environments such as pulp and paper, chemical and mining because of its exceptional design.
- Two-piece labyrinth seal of Teflon® PTFE fluoropolymer resin. The assembly inhibits the passage of contaminants or lubricants and prevents the components from coming apart during installation and service.
- Installation is simple compared to many other lip-contact type seals and is more effective in reducing lubricant loss, improving plant safety. It is also environmentally friendly.



B

### OTHER BENEFITS INCLUDE:

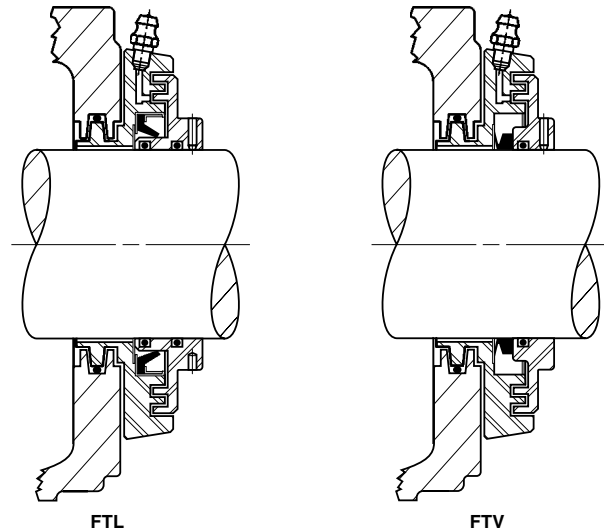
- Drop-in style eliminates machining or modification to housing.
- Interchangeable with LER or Taconite seals.
- Available for standard SAF and SNH pillow blocks (1 3/4 in. to 8 in. shaft diameter).
- Minimizes lubricant leakage.
- Accommodates greater shaft misalignment or eccentricity.
- Reduced number of components over conventional seals.

## TACONITE SEALS

### FTV SERIES

#### FLINGER TACONITE SEAL WITH V RING

- Combines the qualities of the face labyrinth seal and the DUSTAC seal to improve the sealing efficiency for extremely contaminated environments.
- The rotating flinger, added to the basic design, incorporates face labyrinth grooves and compressing the O-ring in the bore. This protects against incursion of foreign matters and ensures regular pressure of the V-ring to the cartridge face.



### FTL SERIES

#### FLINGER TACONITE SEAL WITH LIP SEAL

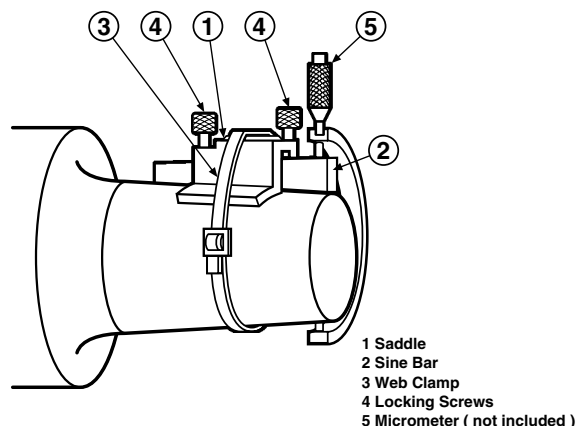
- The FTL seal has the same property as the FTV Series, but above the V-ring is substituted to a lip seal working directly on the Flinger Lip to prevent the shaft of any grooving.
- The FTV and FTL Taconite seals can be substituted in either ER or LER ring SAF pillow block series and do not require modifications to the standard housings.
- **NOTE:** Flinger Taconite seals can be substituted to "ER" or "LER" seal. Add the suffix "L" to the number when it is for a housing using LER Seals (e.g., TFV-515L for SAF-515L pillow block).



## SPHERICAL ROLLER BEARINGS

### SINE BAR GAGES

- Tapered bore, anti-friction bearings are mounted either on adapter sleeves or on tapered shaft seats.
- In cases where tapered bore bearings are mounted directly on the shaft, the shaft must conform to the tapered bore of the bearing to assure proper fit. If proper fit is not achieved, the results could be:
  1. Turning of the bearing inner race on the shaft.
  2. Uneven loading of the bearing.
  3. Severe inner race hoop stress.
  4. Insufficient support (back-up) of the inner race on the shaft.
- All of these conditions could lead to premature bearing damage. Therefore, the manufacture, maintenance and measurement of accurate shaft tapers is important.
- There are two accepted ways of measuring tapered shafts: ring gages and sine bar gages.
- Precision measurement of tapered shafts is difficult with ring gages and may be impossible in the case of large shafts, where gages are large, cumbersome and heavy.
- Sine bar gages provide an accurate and easy method of measurement.
- Lightweight and easy to handle and learn, sine bar gages achieve precise gaging of the shaft size and taper.



- A complete set for measurement of 1:12 shaft tapers consists of 3 in., 4 in., 5 1/2 in., 7 in., 10 in. and 14 in. sine bar gages, sine bar saddle no. T-5491-C, web clamp no. T-5489-A and a wooden box no. T-5224-C. A complete set for 1:30 shaft tapers consists of 4 in., 6 in., 8 in. and 12 in. sine bar gages.
- Sine bars can be purchased individually, or in any combination of sizes to meet your individual needs.
- All sine bars require a sine bar saddle and web clamp. A wooden box is optional.
- For information on the use of sine bars, prices and delivery, consult your Timken representative.

| PART NUMBER | SIZE INCH | FOR BEARINGS                             |
|-------------|-----------|------------------------------------------|
| T-3071-C    | 3.0000    | 22232K to 22240K                         |
| T-3071-C    | 3.0000    | 22322K to 22328K                         |
| T-3071-C    | 3.0000    | 23040K to 23048K                         |
| T-3071-C    | 3.0000    | 23130K to 23136K                         |
| T-3071-C    | 3.0000    | 23226K to 23230K<br>23960K to 23972K     |
| T-3072-C    | 4.0000    | 22248K to 22256K                         |
| T-3072-C    | 4.0000    | 22330K to 22340K                         |
| T-3072-C    | 4.0000    | 23052K to 23076K                         |
| T-3072-C    | 4.0000    | 23138K to 23148K                         |
| T-3072-C    | 4.0000    | 23232K to 23240K<br>23976K to 239/560K   |
| T-3073-C    | 5.5000    | 22260K to 22264K                         |
| T-3073-C    | 5.5000    | 22344K to 22356K                         |
| T-3073-C    | 5.5000    | 23080K to 230/500K                       |
| T-3073-C    | 5.5000    | 23152K to 23164K                         |
| T-3073-C    | 5.5000    | 23244K to 23256K<br>239/600K to 239/710K |

Note: All sine bars require a sine bar saddle, T-5491-C and a web clamp T-5489-A.

| PART NUMBER | SIZE INCH | FOR BEARINGS                              |
|-------------|-----------|-------------------------------------------|
| T-3074-C    | 7.0000    | 230/530K to 230/750K                      |
| T-3074-C    | 7.0000    | 23168K to 23196K                          |
| T-3074-C    | 7.0000    | 23260K to 23276K<br>239/750K to 239/1120K |
| T-3075-C    | 10.0000   | 230/800K to 230/1180                      |
| T-3075-C    | 10.0000   | 231/500K to 231/710K                      |
| T-3075-C    | 10.0000   | 23280K to 232/530K<br>230/1250 and up     |
| T-3076-C    | 14.0000   | 231/750K and up                           |
| T-3076-C    | 14.0000   | 232/560K and up<br>239/118K and up        |
| T-5476-C    | 4.0000    | 24040K to 24056K                          |
| T-5476-C    | 4.0000    | 24132K to 24144K                          |
| T-5477-C    | 6.0000    | 24060K to 24084K                          |
| T-5477-C    | 6.0000    | 24148K to 24160K                          |
| T-5478-C    | 8.0000    | 24089K to 240/630K                        |
| T-5478-C    | 8.0000    | 24164K to 24192K                          |
| T-5479-C    | 12.0000   | 240/670K and up                           |
| T-5479-C    | 12.0000   | 24196K and up                             |

The table above represents the sine bar sizes developed for a full range of tapered bore bearings with 1:12 and a 1:30 taper. Additional sizes are available to fit a variety of width and taper combinations. Consult your local Timken representative for availability.

## HYDRAULIC NUTS

### INTRODUCTION

- Designed to install and remove tapered bore bearings with minimal effort.
- Allow better control of the bearing internal clearance reduction without damaging the bearing or other components.
- Substantially reduces downtime during installation or removal of tapered bore bearings.

### DESCRIPTION

- Consist of a female threaded ring and a male ring with two O-ring seals.
- All hydraulic nuts are supplied with:
  - Quick connection fittings (male ¼ in. B.S.P. and female 3/8 in. N.P.T.).
  - Two pipe plugs ¼" B.S.P.
  - One set of spare O-rings.

### ORDERING COMPONENTS:

- To order spare components for the hydraulic nuts, order part numbers as listed below:
  - O-ring Seal Kits:  
Use the hydraulic nut part number plus the number 132.  
Example: **HMVC 40/132**
  - Pipe Plug ¼ in. B.S.P.:  
Use the hydraulic nut part number plus the number 647.  
Example: **HMVC 40/647**
  - Quick Connection Fittings (male ¼ in. B.S.P. and female 3/8 in. N.P.T.):  
Use the hydraulic nut part number plus the number 849.  
Example: **HMVC 40/849**

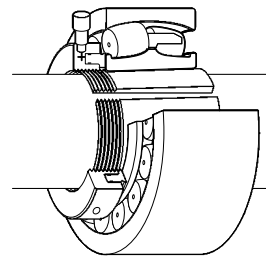
### ENGINEERING SERVICES

- Special applications should be referred to a Timken representative for review.

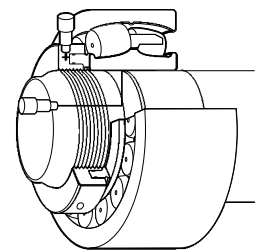
## INSTRUCTIONS

- When the hydraulic nut is used, the piston must be in the innermost position.
- For this operation, please ensure that the valve of the hydraulic hose is disconnected from the nut so that the nut is not under pressure.
- To contract the piston inside the female threaded ring, insert a rod or bar in one of the four drilled holes located on the outside diameter of the female threaded ring.
- Screw the hydraulic nut on the thread with the piston in contact with the surface, until the groove machined on the outside diameter of the piston near the outboard face is level with the face of the female threaded ring.
- One of the two threaded holes must be plugged with the ¼" B.S.P. pipe plug before the hydraulic nut is pressurized.
- The maximum pressure permissible in the hydraulic nut is 14,000 psi (110 Kpa).
- The oil viscosity suggested is 1400 SUS (300cst) at operating temperature (SAE 90 oil).
- To avoid overextension of the piston, a second groove has been machined on the outside diameter of the piston inboard of the one used to judge contraction.
- When this second groove is level with the face of the female threaded ring, the piston has reached its length of travel as shown in the illustration. If the second groove of the piston travels past the face of the female threaded ring the hydraulic nut can be damaged.
- Should the oil start to leak from the piston area, it is certain that the O-ring seals are damaged or worn and need to be replaced.
- When the hydraulic nut is not in use, ensure that the threaded holes are plugged to prevent entry of contaminants in the piston cavity.
- To help prevent against corrosion during storage, apply a coat of light oil on the hydraulic nut surfaces.
- Contact your Timken representative to receive special warnings against reasonably unforeseen dangers.

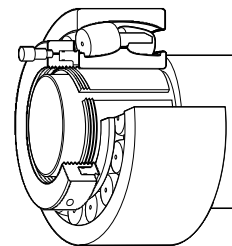
### INSTALLATION



Hydraulic nut used to mount the bearing on a pull type sleeve.

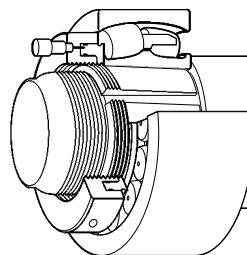


Hydraulic nut used to mount the bearing on tapered journal.



Hydraulic nut used to mount the bearing on a push type adapter sleeve.

### REMOVAL



Hydraulic nut used to withdraw a push type adapter sleeve.



# SPHERICAL ROLLER BEARINGS

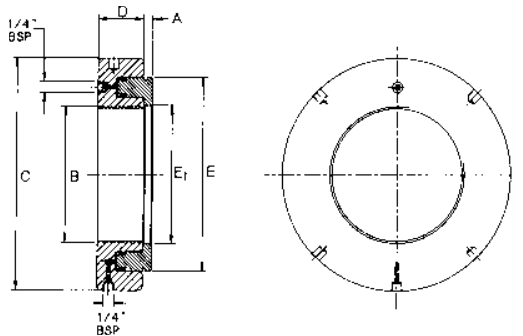
## HYDRAULIC NUTS – METRIC

| Part Number | Threads<br>B | C    | Dimensions |      |                |    | Piston Length<br>of Travel | Piston<br>Area | Assembly<br>weight |
|-------------|--------------|------|------------|------|----------------|----|----------------------------|----------------|--------------------|
|             |              |      | D          | E    | E <sub>1</sub> | A  |                            |                |                    |
|             | mm           | mm   | mm         | mm   | mm             | mm | mm <sup>2</sup>            | kg.            |                    |
| HMV - 10    | M 50X1.5     | 114  | 38         | 86   | 51             | 4  | 5                          | 2900           | 2.5                |
| HMV - 12    | M 60X2       | 125  | 38         | 94   | 61             | 5  | 5                          | 3200           | 2.8                |
| HMV - 13    | M 65X2       | 135  | 38         | 101  | 66             | 5  | 5                          | 3500           | 3.0                |
| HMV - 14    | M 70X2       | 140  | 38         | 107  | 71             | 5  | 5                          | 3900           | 3.3                |
| HMV - 15    | M 75X2       | 145  | 38         | 112  | 76             | 5  | 5                          | 4100           | 3.5                |
| HMV - 16    | M 80X2       | 150  | 38         | 117  | 81             | 5  | 5                          | 4200           | 3.8                |
| HMV - 17    | M 85X2       | 155  | 38         | 122  | 86             | 5  | 5                          | 4400           | 3.9                |
| HMV - 18    | M 90X2       | 160  | 38         | 127  | 91             | 5  | 5                          | 4800           | 4.1                |
| HMV - 19    | M 95X2       | 165  | 38         | 133  | 96             | 5  | 5                          | 5000           | 4.4                |
| HMV - 20    | M 100X2      | 170  | 38         | 138  | 101            | 6  | 5                          | 5200           | 4.5                |
| HMV - 21    | M 105X2      | 175  | 38         | 143  | 106            | 6  | 5                          | 5400           | 5.4                |
| HMV - 22    | M 110X2      | 180  | 38         | 149  | 111            | 6  | 5                          | 5700           | 5.7                |
| HMV - 23    | M 115X2      | 185  | 38         | 154  | 116            | 6  | 5                          | 5900           | 5.1                |
| HMV - 24    | M 120X2      | 190  | 38         | 159  | 121            | 6  | 5                          | 6100           | 5.3                |
| HMV - 25    | M 125X2      | 195  | 38         | 164  | 126            | 6  | 5                          | 6300           | 5.4                |
| HMV - 26    | M 130X2      | 200  | 38         | 170  | 131            | 6  | 5                          | 6500           | 5.7                |
| HMV - 27    | M 135X2      | 205  | 38         | 175  | 136            | 6  | 5                          | 6700           | 5.9                |
| HMV - 28    | M 140X2      | 210  | 38         | 180  | 141            | 7  | 5                          | 6900           | 6.1                |
| HMV - 29    | M 145X2      | 215  | 39         | 186  | 146            | 7  | 5                          | 7300           | 6.5                |
| HMV - 30    | M 150X2      | 220  | 39         | 190  | 151            | 7  | 5                          | 7500           | 6.6                |
| HMV - 31    | M 155X3      | 225  | 39         | 198  | 156            | 7  | 5                          | 8100           | 6.9                |
| HMV - 32    | M 160X3      | 235  | 40         | 206  | 161            | 7  | 6                          | 8600           | 7.7                |
| HMV - 33    | M 165X3      | 240  | 40         | 209  | 166            | 7  | 6                          | 9000           | 8.0                |
| HMV - 34    | M 170X3      | 245  | 41         | 215  | 171            | 7  | 6                          | 9500           | 8.4                |
| HMV - 36    | M 180X3      | 255  | 41         | 227  | 181            | 7  | 6                          | 10300          | 9.1                |
| HMV - 38    | M 190X3      | 270  | 42         | 239  | 191            | 8  | 7                          | 11500          | 10.8               |
| HMV - 40    | M 200X3      | 280  | 43         | 251  | 201            | 8  | 8                          | 12500          | 11.4               |
| HMV - 41    | Tr 205X4     | 290  | 43         | 256  | 207            | 8  | 8                          | 12900          | 12.2               |
| HMV - 42    | Tr 210X4     | 295  | 44         | 262  | 212            | 8  | 9                          | 13500          | 12.5               |
| HMV - 43    | Tr 215X4     | 300  | 44         | 267  | 217            | 8  | 9                          | 13800          | 13.0               |
| HMV - 44    | Tr 220X4     | 305  | 44         | 273  | 222            | 8  | 9                          | 14400          | 13.4               |
| HMV - 45    | Tr 225X4     | 315  | 45         | 280  | 227            | 8  | 9                          | 15200          | 14.6               |
| HMV - 46    | Tr 230X4     | 320  | 45         | 285  | 232            | 8  | 9                          | 15600          | 14.8               |
| HMV - 47    | Tr 235X4     | 325  | 46         | 291  | 237            | 8  | 10                         | 16200          | 16.0               |
| HMV - 48    | Tr 240X4     | 330  | 46         | 296  | 242            | 9  | 10                         | 16500          | 16.3               |
| HMV - 50    | Tr 250X4     | 345  | 46         | 307  | 252            | 9  | 10                         | 17800          | 17.6               |
| HMV - 52    | Tr 260X4     | 355  | 47         | 319  | 262            | 9  | 11                         | 18800          | 19.0               |
| HMV - 54    | Tr 270X4     | 370  | 48         | 330  | 272            | 9  | 12                         | 19700          | 20.4               |
| HMV - 56    | Tr 280X4     | 380  | 49         | 341  | 282            | 9  | 12                         | 21100          | 22.0               |
| HMV - 58    | Tr 290X4     | 390  | 49         | 353  | 292            | 9  | 13                         | 22600          | 22.5               |
| HMV - 60    | Tr 300X4     | 405  | 51         | 364  | 302            | 10 | 14                         | 23600          | 25.6               |
| HMV - 62    | Tr 310X5     | 415  | 52         | 375  | 312            | 10 | 14                         | 24900          | 27.0               |
| HMV - 64    | Tr 320X5     | 430  | 53         | 387  | 322            | 10 | 14                         | 26300          | 29.6               |
| HMV - 66    | Tr 330X5     | 440  | 53         | 397  | 332            | 10 | 14                         | 27000          | 31.0               |
| HMV - 68    | Tr 340X5     | 450  | 53         | 408  | 342            | 10 | 14                         | 28400          | 32.5               |
| HMV - 69    | Tr 345X5     | 455  | 54         | 414  | 347            | 10 | 14                         | 29400          | 33.6               |
| HMV - 70    | Tr 350X5     | 465  | 56         | 420  | 352            | 10 | 14                         | 30000          | 35.0               |
| HMV - 72    | Tr 360X5     | 475  | 56         | 431  | 362            | 10 | 15                         | 31300          | 37.0               |
| HMV - 73    | Tr 365X5     | 482  | 57         | 436  | 367            | 11 | 15                         | 31700          | 38.5               |
| HMV - 74    | Tr 370X5     | 490  | 57         | 442  | 372            | 11 | 16                         | 32800          | 39.2               |
| HMV - 76    | Tr 380X5     | 500  | 58         | 452  | 382            | 11 | 16                         | 33600          | 41.0               |
| HMV - 77    | Tr 385X5     | 505  | 58         | 459  | 387            | 11 | 16                         | 34700          | 42.0               |
| HMV - 80    | Tr 400X5     | 525  | 60         | 475  | 402            | 11 | 17                         | 36700          | 46.0               |
| HMV - 82    | Tr 410X5     | 535  | 61         | 486  | 412            | 11 | 17                         | 38300          | 48.2               |
| HMV - 84    | Tr 420X5     | 545  | 61         | 498  | 422            | 11 | 17                         | 40000          | 50.4               |
| HMV - 86    | Tr 430X5     | 555  | 62         | 508  | 432            | 11 | 17                         | 40800          | 53.0               |
| HMV - 88    | Tr 440X5     | 565  | 62         | 519  | 442            | 12 | 17                         | 42500          | 55.0               |
| HMV - 90    | Tr 450X5     | 580  | 64         | 530  | 452            | 12 | 17                         | 44100          | 58.2               |
| HMV - 92    | Tr 460X5     | 590  | 64         | 541  | 462            | 12 | 17                         | 45000          | 61.0               |
| HMV - 94    | Tr 470X5     | 600  | 65         | 552  | 472            | 12 | 18                         | 46900          | 63.7               |
| HMV - 96    | Tr 480X5     | 612  | 65         | 563  | 482            | 12 | 19                         | 48500          | 65.0               |
| HMV - 98    | Tr 490X5     | 625  | 66         | 573  | 492            | 12 | 19                         | 49800          | 69.0               |
| HMV - 100   | Tr 500X5     | 635  | 67         | 585  | 502            | 12 | 19                         | 52000          | 71.5               |
| HMV - 102   | Tr 510X6     | 645  | 68         | 596  | 512            | 12 | 20                         | 53300          | 75.0               |
| HMV - 104   | Tr 520X6     | 657  | 68         | 606  | 522            | 13 | 20                         | 54200          | 77.0               |
| HMV - 106   | Tr 530X6     | 670  | 69         | 617  | 532            | 13 | 21                         | 56200          | 80.0               |
| HMV - 108   | Tr 540X6     | 680  | 69         | 629  | 542            | 13 | 21                         | 58200          | 83.0               |
| HMV - 110   | Tr 550X6     | 692  | 70         | 639  | 552            | 13 | 21                         | 59200          | 86.0               |
| HMV - 112   | Tr 560X6     | 705  | 71         | 650  | 562            | 13 | 22                         | 61200          | 90.0               |
| HMV - 114   | Tr 570X6     | 715  | 72         | 661  | 572            | 13 | 23                         | 63200          | 93.0               |
| HMV - 116   | Tr 580X6     | 725  | 72         | 671  | 582            | 13 | 23                         | 64200          | 96.0               |
| HMV - 120   | Tr 600X6     | 750  | 73         | 693  | 602            | 13 | 23                         | 67400          | 100.0              |
| HMV - 126   | Tr 630X6     | 780  | 74         | 726  | 632            | 14 | 23                         | 72900          | 110.0              |
| HMV - 130   | Tr 650X6     | 805  | 75         | 747  | 652            | 14 | 23                         | 76200          | 116.0              |
| HMV - 134   | Tr 670X6     | 825  | 76         | 768  | 672            | 14 | 24                         | 79500          | 123.0              |
| HMV - 138   | Tr 690X6     | 850  | 77         | 791  | 692            | 14 | 25                         | 84200          | 130.0              |
| HMV - 142   | Tr 710X7     | 870  | 78         | 812  | 712            | 15 | 25                         | 87700          | 137.0              |
| HMV - 150   | Tr 750X7     | 915  | 79         | 855  | 752            | 15 | 25                         | 97000          | 150.0              |
| HMV - 160   | Tr 800X7     | 970  | 80         | 908  | 802            | 16 | 25                         | 104000         | 173.0              |
| HMV - 170   | Tr 850X7     | 1020 | 83         | 962  | 852            | 16 | 26                         | 114600         | 190.0              |
| HMV - 180   | Tr 900X7     | 1070 | 86         | 1015 | 902            | 17 | 30                         | 124000         | 210.0              |
| HMV - 190   | Tr 950X8     | 1125 | 86         | 1069 | 952            | 17 | 30                         | 135600         | 238.0              |
| HMV - 200   | Tr 1000X8    | 1180 | 88         | 1122 | 1002           | 17 | 34                         | 145600         | 263.0              |
| HMV - 212   | Tr 1060X8    | 1255 | 95         | 1184 | 1063           | 18 | 34                         | 161200         | 325.0              |
| HMV - 216   | Tr 1080X8    | 1280 | 100        | 1206 | 1083           | 18 | 34                         | 167400         | 345.0              |
| HMV - 224   | Tr 1120X8    | 1340 | 106        | 1250 | 1123           | 19 | 36                         | 178200         | 410.0              |
| HMV - 236   | Tr 1180X8    | 1420 | 115        | 1320 | 1183           | 22 | 40                         | 189200         | 530.0              |

HMV - 10 through HMV - 40 have a Metric ISO fine thread profile.  
 HMV - 41 through HMV-236 have a Metric ISO trapezoidal thread.



HYDRAULIC NUTS – ENGLISH



| Part Number | B<br>Maj. Dia. | Threads<br>no. per inch | Dimensions |           |           |                        |           | Piston Length<br>of Travel | Piston<br>Area | Assembly<br>weight |
|-------------|----------------|-------------------------|------------|-----------|-----------|------------------------|-----------|----------------------------|----------------|--------------------|
|             |                |                         | C<br>inch  | D<br>inch | E<br>inch | E <sub>1</sub><br>inch | A<br>inch |                            |                |                    |
| HMVC - 10   | 1.967          | 18                      | 4.488      | 1.496     | 3.386     | 2.008                  | 0.157     | 0.197                      | 4.5            | 5.5                |
| HMVC - 12   | 2.360          | 18                      | 4.921      | 1.496     | 3.701     | 2.402                  | 0.197     | 0.197                      | 5.0            | 6.2                |
| HMVC - 13   | 2.548          | 18                      | 5.315      | 1.496     | 3.976     | 2.598                  | 0.197     | 0.197                      | 5.4            | 6.6                |
| HMVC - 14   | 2.751          | 18                      | 5.512      | 1.496     | 4.213     | 2.795                  | 0.197     | 0.197                      | 6.0            | 7.3                |
| HMVC - 15   | 2.933          | 12                      | 5.709      | 1.496     | 4.409     | 2.992                  | 0.197     | 0.197                      | 6.3            | 7.7                |
| HMVC - 16   | 3.137          | 12                      | 5.906      | 1.496     | 4.606     | 3.189                  | 0.197     | 0.197                      | 6.5            | 8.4                |
| HMVC - 17   | 3.340          | 12                      | 6.102      | 1.496     | 4.803     | 3.386                  | 0.197     | 0.197                      | 6.8            | 8.6                |
| HMVC - 18   | 3.527          | 12                      | 6.299      | 1.496     | 5.000     | 3.583                  | 0.197     | 0.197                      | 7.4            | 9.0                |
| HMVC - 19   | 3.730          | 12                      | 6.496      | 1.496     | 5.236     | 3.780                  | 0.197     | 0.197                      | 7.7            | 9.7                |
| HMVC - 20   | 3.918          | 12                      | 6.693      | 1.496     | 5.433     | 3.976                  | 0.236     | 0.197                      | 8.1            | 10.0               |
| HMVC - 22   | 4.325          | 12                      | 7.087      | 1.496     | 5.866     | 4.370                  | 0.236     | 0.197                      | 8.8            | 12.5               |
| HMVC - 24   | 4.716          | 12                      | 7.480      | 1.496     | 6.260     | 4.764                  | 0.236     | 0.197                      | 9.5            | 11.7               |
| HMVC - 26   | 5.106          | 12                      | 7.874      | 1.496     | 6.693     | 5.157                  | 0.236     | 0.197                      | 10.1           | 12.5               |
| HMVC - 28   | 5.497          | 12                      | 8.268      | 1.496     | 7.087     | 5.551                  | 0.276     | 0.197                      | 10.7           | 13.4               |
| HMVC - 30   | 5.888          | 12                      | 8.661      | 1.535     | 7.480     | 5.945                  | 0.276     | 0.197                      | 11.6           | 14.5               |
| HMVC - 32   | 6.284          | 8                       | 9.252      | 1.575     | 8.110     | 6.339                  | 0.276     | 0.236                      | 13.3           | 17.0               |
| HMVC - 34   | 6.659          | 8                       | 9.645      | 1.614     | 8.465     | 6.732                  | 0.276     | 0.236                      | 14.7           | 18.5               |
| HMVC - 36   | 7.066          | 8                       | 10.039     | 1.615     | 8.858     | 7.126                  | 0.276     | 0.236                      | 16.0           | 20.0               |
| HMVC - 38   | 7.472          | 8                       | 10.630     | 1.653     | 9.409     | 7.520                  | 0.315     | 0.276                      | 17.8           | 23.1               |
| HMVC - 40   | 7.847          | 8                       | 11.024     | 1.693     | 9.882     | 7.913                  | 0.315     | 0.276                      | 19.4           | 25.1               |
| HMVC - 44   | 8.628          | 8                       | 12.008     | 1.732     | 10.748    | 8.740                  | 0.315     | 0.354                      | 22.3           | 29.5               |
| HMVC - 48   | 9.442          | 6                       | 12.992     | 1.811     | 11.654    | 9.528                  | 0.354     | 0.394                      | 25.6           | 35.9               |
| HMVC - 52   | 10.192         | 6                       | 13.976     | 1.850     | 12.559    | 10.315                 | 0.354     | 0.433                      | 29.1           | 41.8               |
| HMVC - 56   | 11.004         | 6                       | 14.961     | 1.929     | 13.425    | 11.102                 | 0.354     | 0.472                      | 32.7           | 48.4               |
| HMVC - 60   | 11.785         | 6                       | 15.945     | 2.008     | 14.331    | 11.890                 | 0.394     | 0.551                      | 36.6           | 56.3               |
| HMVC - 64   | 12.562         | 6                       | 16.929     | 2.087     | 15.236    | 12.677                 | 0.394     | 0.551                      | 40.8           | 65.1               |
| HMVC - 68   | 13.334         | 5                       | 17.717     | 2.087     | 16.063    | 13.465                 | 0.394     | 0.551                      | 44.0           | 71.5               |
| HMVC - 72   | 14.170         | 5                       | 18.701     | 2.205     | 16.969    | 14.252                 | 0.394     | 0.590                      | 48.5           | 81.4               |
| HMVC - 76   | 14.957         | 5                       | 19.685     | 2.283     | 17.795    | 15.039                 | 0.433     | 0.630                      | 52.1           | 90.2               |
| HMVC - 80   | 15.745         | 5                       | 20.669     | 2.362     | 18.701    | 15.827                 | 0.433     | 0.669                      | 56.9           | 101.2              |
| HMVC - 84   | 16.532         | 5                       | 21.457     | 2.401     | 19.606    | 16.614                 | 0.433     | 0.669                      | 62.0           | 110.9              |
| HMVC - 88   | 17.319         | 5                       | 22.244     | 2.441     | 20.433    | 17.402                 | 0.472     | 0.669                      | 65.9           | 121.0              |
| HMVC - 92   | 18.107         | 5                       | 23.228     | 2.520     | 21.299    | 18.189                 | 0.472     | 0.669                      | 69.8           | 134.2              |
| HMVC - 96   | 18.894         | 5                       | 24.094     | 2.559     | 22.165    | 18.976                 | 0.472     | 0.748                      | 75.2           | 143.0              |
| HMVC - 100  | 19.682         | 5                       | 25.000     | 2.598     | 23.031    | 19.764                 | 0.472     | 0.748                      | 80.6           | 157.3              |
| HMVC - 106  | 20.867         | 4                       | 26.378     | 2.716     | 24.291    | 20.945                 | 0.512     | 0.827                      | 87.1           | 176.0              |
| HMVC - 112  | 21.923         | 4                       | 27.756     | 2.795     | 25.591    | 22.126                 | 0.512     | 0.866                      | 94.9           | 198.0              |
| HMVC - 120  | 23.623         | 4                       | 29.528     | 2.874     | 27.283    | 23.701                 | 0.512     | 0.905                      | 104.5          | 220.0              |
| HMVC - 126  | 24.804         | 4                       | 30.709     | 2.913     | 28.583    | 24.882                 | 0.551     | 0.905                      | 113.0          | 242.0              |
| HMVC - 134  | 26.379         | 4                       | 32.480     | 2.992     | 30.236    | 26.457                 | 0.551     | 0.945                      | 123.2          | 270.6              |
| HMVC - 142  | 27.961         | 3                       | 34.252     | 3.071     | 31.969    | 28.031                 | 0.590     | 0.984                      | 135.9          | 301.4              |
| HMVC - 150  | 29.536         | 3                       | 36.024     | 3.110     | 33.661    | 29.606                 | 0.590     | 0.984                      | 150.4          | 330.0              |
| HMVC - 160  | 31.504         | 3                       | 38.189     | 3.150     | 35.748    | 31.575                 | 0.630     | 0.984                      | 161.2          | 380.6              |
| HMVC - 170  | 33.473         | 3                       | 40.157     | 3.268     | 37.874    | 33.543                 | 0.630     | 1.024                      | 177.6          | 418.0              |
| HMVC - 180  | 35.441         | 3                       | 42.126     | 3.386     | 39.960    | 35.511                 | 0.669     | 1.181                      | 192.2          | 462.0              |
| HMVC - 190  | 37.410         | 3                       | 44.291     | 3.386     | 42.087    | 37.480                 | 0.669     | 1.181                      | 210.2          | 523.6              |

HMVC - 10 through HMVC - 64 have American National Threads Class 3.  
 HMVC - 68 through HMVC-190 have Acme General Purpose Threads Class 3G.



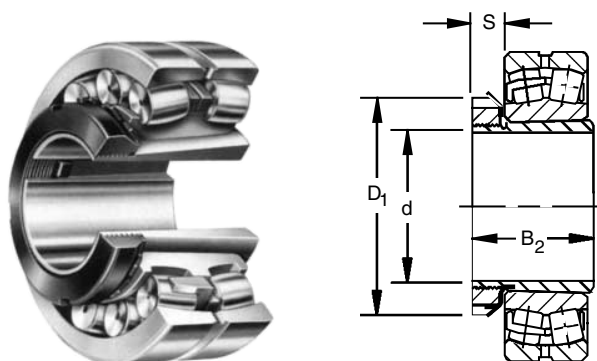


# SPHERICAL ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS

### SNW/SNP - PULL TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.



Tapered bore bearing plus SNW.

| Bearing Number | Accessory Numbers |        |         |                      | Shaft Dimensions |                    | Adapter Dimensions |     |                | SNW/SNP Assembly Weight |
|----------------|-------------------|--------|---------|----------------------|------------------|--------------------|--------------------|-----|----------------|-------------------------|
|                | Assembly          | Sleeve | Locknut | Lockwasher Lockplate | d Diameter       | Tolerance +.000" 0 | B <sub>2</sub>     | S   | D <sub>1</sub> |                         |
|                |                   |        |         |                      | in.              | in.                | in.                | in. | in.            | lbs.                    |

### SERIES 222K

|        |        |      |       |      |         |       |         |         |         |      |
|--------|--------|------|-------|------|---------|-------|---------|---------|---------|------|
| 22209K | SNW-09 | S-09 | N-09  | W-09 | 1 7/16  | -.003 | 1 37/64 | 1/2     | 2 17/32 | 0.6  |
| 22210K | SNW-10 | S-10 | N-10  | W-10 | 1 11/16 | -.003 | 1 49/64 | 9/16    | 2 11/16 | 0.7  |
| 22211K | SNW-11 | S-11 | N-11  | W-11 | 1 15/16 | -.003 | 1 27/32 | 9/16    | 2 31/32 | 0.8  |
| 22212K | SNW-12 | S-12 | N-12  | W-12 | 2 1/16  | -.004 | 1 63/64 | 19/32   | 3 5/32  | 1.1  |
| 22213K | SNW-13 | S-13 | N-13  | W-13 | 2 3/16  | -.004 | 2 3/32  | 5/8     | 3 3/8   | 1.4  |
| 22214K | SNW-14 | S-14 | N-14  | W-14 | 2 5/16  | -.004 | 2 11/64 | 5/8     | 3 5/8   | 1.8  |
| 22215K | SNW-15 | S-15 | AN-15 | W-15 | 2 7/16  | -.004 | 2 19/64 | 43/64   | 3 7/8   | 2.0  |
| 22216K | SNW-16 | S-16 | AN-16 | W-16 | 2 11/16 | -.004 | 2 3/8   | 43/64   | 4 5/32  | 2.4  |
| 22217K | SNW-17 | S-17 | AN-17 | W-17 | 2 15/16 | -.004 | 2 31/64 | 45/64   | 4 13/32 | 3.0  |
| 22218K | SNW-18 | S-18 | AN-18 | W-18 | 3 3/16  | -.004 | 2 41/64 | 25/32   | 4 21/32 | 3.0  |
| 22219K | SNW-19 | S-19 | AN-19 | W-19 | 3 5/16  | -.004 | 2 49/64 | 13/16   | 4 15/16 | 3.3  |
| 22220K | SNW-20 | S-20 | AN-20 | W-20 | 3 7/16  | -.004 | 2 7/8   | 27/32   | 5 3/16  | 4.4  |
| 22222K | SNW-22 | S-22 | AN-22 | W-22 | 3 15/16 | -.004 | 3 13/64 | 29/32   | 5 23/32 | 5.0  |
| 22224K | SNW-24 | S-24 | AN-24 | W-24 | 4 3/16  | -.005 | 3 15/32 | 15/16   | 6 1/8   | 6.7  |
| 22226K | SNW-26 | S-26 | AN-26 | W-26 | 4 7/16  | -.005 | 3 49/64 | 1       | 6 3/4   | 8.6  |
| 22228K | SNW-28 | S-28 | AN-28 | W-28 | 4 15/16 | -.005 | 3 63/64 | 1 1/16  | 7 3/32  | 10.3 |
| 22230K | SNW-30 | S-30 | AN-30 | W-30 | 5 3/16  | -.005 | 4 15/64 | 1 1/8   | 7 11/16 | 13.5 |
| 22232K | SNW-32 | S-32 | AN-32 | W-32 | 5 7/16  | -.005 | 4 37/64 | 1 3/16  | 8 1/16  | 15.6 |
| 22234K | SNW-34 | S-34 | AN-34 | W-34 | 5 15/16 | -.005 | 4 27/32 | 1 7/32  | 8 21/32 | 19.4 |
| 22236K | SNW-36 | S-36 | AN-36 | W-36 | 6 7/16  | -.005 | 5 1/32  | 1 1/4   | 9 1/16  | 20.5 |
| 22238K | SNW-38 | S-38 | AN-38 | W-38 | 6 15/16 | -.005 | 5 17/64 | 1 9/32  | 9 15/32 | 23.4 |
| 22240K | SNW-40 | S-40 | AN-40 | W-40 | 7 3/16  | -.005 | 5 31/64 | 1 11/32 | 9 27/32 | 30.5 |
| 22244K | SNW-44 | S-44 | N-044 | W-44 | 7 15/16 | -.005 | 5 29/32 | 1 3/8   | 11      | 33.0 |

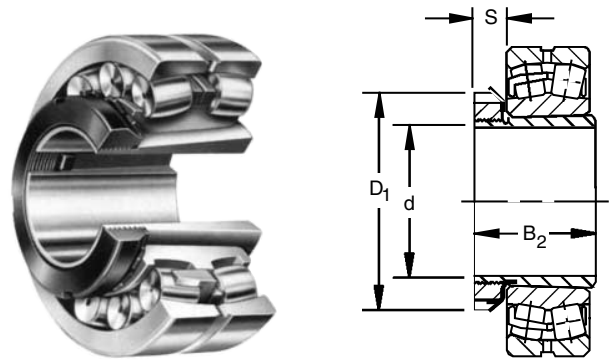
### SERIES 230K

|        |          |        |       |       |          |       |         |         |         |       |
|--------|----------|--------|-------|-------|----------|-------|---------|---------|---------|-------|
| 23024K | SNW-3024 | S-3024 | N-024 | W-024 | 4 3/16   | -.005 | 2 61/64 | 13/16   | 5 11/16 | 6.1   |
| 23026K | SNW-3026 | S-3026 | N-026 | W-026 | 4 7/16   | -.005 | 3 15/64 | 7/8     | 6 1/8   | 7.5   |
| 23028K | SNW-3028 | S-3028 | N-028 | W-028 | 4 15/16  | -.005 | 3 11/32 | 15/16   | 6 1/2   | 8.4   |
| 23030K | SNW-3030 | S-3030 | N-030 | W-030 | 5 3/16   | -.005 | 3 31/64 | 31/32   | 7 1/8   | 9.8   |
| 23032K | SNW-3032 | S-3032 | N-032 | W-032 | 5 7/16   | -.005 | 3 23/32 | 1 1/32  | 7 1/2   | 11.8  |
| 23034K | SNW-3034 | S-3034 | N-034 | W-034 | 5 15/16  | -.005 | 4 1/64  | 1 1/16  | 7 7/8   | 13.3  |
| 23036K | SNW-3036 | S-3036 | N-036 | W-036 | 6 7/16   | -.005 | 4 11/32 | 1 3/32  | 8 1/4   | 15.2  |
| 23038K | SNW-3038 | S-3038 | N-038 | W-038 | 6 15/16  | -.005 | 4 13/32 | 1 1/8   | 8 11/16 | 16.7  |
| 23040K | SNW-3040 | S-3040 | N-040 | W-040 | 7 3/16   | -.005 | 4 3/4   | 1 3/16  | 9 7/16  | 19.7  |
| 23044K | SNW-3044 | S-3044 | N-044 | W-044 | 7 15/16  | -.005 | 5 1/8   | 1 1/4   | 10 1/4  | 24.4  |
| 23048K | SNP-3048 | S-3048 | N-048 | P-48  | 8 15/16  | -.006 | 5 7/16  | 1 11/32 | 11 7/16 | 32.2  |
| 23052K | SNP-3052 | S-3052 | N-052 | P-52  | 9 7/16   | -.006 | 6 1/64  | 1 13/32 | 12 3/16 | 41.1  |
| 23056K | SNP-3056 | S-3056 | N-056 | P-56  | 10 7/16  | -.007 | 6 3/16  | 1 1/2   | 13      | 45.4  |
| 23060K | SNP-3060 | S-3060 | N-060 | P-60  | 10 15/16 | -.007 | 6 47/64 | 1 9/16  | 14 3/16 | 58.9  |
| 23064K | SNP-3064 | S-3064 | N-064 | P-64  | 11 15/16 | -.007 | 6 61/64 | 1 21/32 | 15      | 65.7  |
| 23068K | SNP-3068 | S-3068 | N-068 | P-68  | 12 7/16  | -.008 | 7 35/64 | 1 25/32 | 15 3/4  | 77.8  |
| 23072K | SNP-3072 | S-3072 | N-072 | P-72  | 13 7/16  | -.008 | 7 37/64 | 1 25/32 | 16 1/2  | 86.2  |
| 23076K | SNP-3076 | S-3076 | N-076 | P-76  | 13 15/16 | -.008 | 7 3/4   | 1 57/64 | 17 3/4  | 94.3  |
| 23080K | SNP-3080 | S-3080 | N-080 | P-80  | 15       | -.008 | 8 13/32 | 2 1/16  | 18 1/2  | 100.0 |

**SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS**

**SNW/SNP - PULL TYPE SLEEVE, LOCKNUT, LOCKWASHER/LOCKPLATE ASSEMBLIES**

- The table below shows dimensions for adapter assemblies and components used in the mounting of tapered bore bearings on shafts.
- SNW assembly consists of a sleeve, locknut and lockwasher.
- SNP assembly consists of a sleeve, locknut and lockplate.



Tapered bore bearing plus SNW.



| Bearing Number | Accessory Numbers |        |         |                      | Shaft Dimensions |                    | Adapter Dimensions |     |                | SNW/SNP Assembly Weight |
|----------------|-------------------|--------|---------|----------------------|------------------|--------------------|--------------------|-----|----------------|-------------------------|
|                | Assembly          | Sleeve | Locknut | Lockwasher Lockplate | d Diameter       | Tolerance +.000" 0 | B <sub>2</sub>     | S   | D <sub>1</sub> |                         |
|                |                   |        |         |                      | in.              | in.                | in.                | in. | in.            | lbs.                    |

**SERIES 223K AND 232K**

|        |        |          |        |       |      |         |       |         |         |          |      |
|--------|--------|----------|--------|-------|------|---------|-------|---------|---------|----------|------|
| 22308K |        | SNW-108  | S-108  | N-08  | W-08 | 1 5/16  | -.003 | 2 1/64  | 1/2     | 2 1/4    | 0.8  |
| 22309K |        | SNW-109  | S-109  | N-09  | W-09 | 1 7/16  | -.003 | 2 9/64  | 1/2     | 2 17/32  | 0.8  |
| 22310K |        | SNW-110  | S-110  | N-10  | W-10 | 1 11/16 | -.003 | 2 29/64 | 9/16    | 2 11/16  | 0.9  |
| 22311K |        | SNW-111  | S-111  | N-11  | W-11 | 1 15/16 | -.003 | 2 39/64 | 9/16    | 2 31/32  | 0.9  |
| 22312K |        | SNW-112  | S-112  | N-12  | W-12 | 2 1/16  | -.004 | 2 21/32 | 19/32   | 3 5/32   | 1.2  |
| 22313K |        | SNW-113  | S-113  | N-13  | W-13 | 2 3/16  | -.004 | 2 49/64 | 5/8     | 3 3/8    | 1.7  |
| 22314K |        | SNW-114  | S-114  | N-14  | W-14 | 2 5/16  | -.004 | 2 61/64 | 5/8     | 3 5/8    | 2.3  |
| 22315K |        | SNW-115  | S-115  | AN-15 | W-15 | 2 7/16  | -.004 | 3 5/64  | 43/64   | 3 7/8    | 3.0  |
| 22316K |        | SNW-116  | S-116  | AN-16 | W-16 | 2 11/16 | -.004 | 3 13/64 | 43/64   | 4 5/32   | 3.2  |
| 22317K |        | SNW-117  | S-117  | AN-17 | W-17 | 2 15/16 | -.004 | 3 5/16  | 45/64   | 4 13/32  | 3.5  |
| 22318K |        | SNW-118  | S-118  | AN-18 | W-18 | 3 3/16  | -.004 | 3 39/64 | 29/32   | 4 21/32  | 4.0  |
| 22319K |        | SNW-119  | S-119  | AN-19 | W-19 | 3 5/16  | -.004 | 3 45/64 | 13/16   | 4 15/16  | 5.0  |
| 22320K | 23220K | SNW-120  | S-120  | AN-20 | W-20 | 3 7/16  | -.004 | 3 31/32 | 27/32   | 5 3/16   | 6.2  |
| 22322K | 23222K | SNW-122  | S-122  | AN-22 | W-22 | 3 15/16 | -.004 | 4 11/32 | 29/32   | 5 23/32  | 6.5  |
| 22324K | 23224K | SNW-124  | S-124  | AN-24 | W-24 | 4 3/16  | -.005 | 4 41/64 | 19/16   | 6 1/8    | 8.0  |
| 22326K | 23226K | SNW-126  | S-126  | AN-26 | W-26 | 4 7/16  | -.005 | 4 63/64 | 1       | 6 3/4    | 12.4 |
| 22328K | 23228K | SNW-128  | S-128  | AN-28 | W-28 | 4 15/16 | -.005 | 5 21/64 | 1 1/16  | 7 3/32   | 13.0 |
| 22330K | 23230K | SNW-130  | S-130  | AN-30 | W-30 | 5 3/16  | -.005 | 5 5/8   | 1 1/8   | 7 11/16  | 17.6 |
| 22332K | 23232K | SNW-132  | S-132  | AN-32 | W-32 | 5 7/16  | -.005 | 5 59/64 | 1 3/16  | 8 1/16   | 18.5 |
| 22334K | 23234K | SNW-134  | S-134  | AN-34 | W-34 | 5 11/16 | -.005 | 6 3/16  | 1 7/32  | 8 21/32  | 21.0 |
| 22336K | 23236K | SNW-136  | S-136  | AN-36 | W-36 | 6 1/16  | -.005 | 6 29/64 | 1 1/4   | 9 1/16   | 22.5 |
| 22338K | 23238K | SNW-138  | S-138  | AN-38 | W-38 | 6 5/16  | -.005 | 6 3/4   | 1 9/32  | 9 15/32  | 28.0 |
| 22340K | 23240K | SNW-140  | S-140  | AN-40 | W-40 | 7 3/16  | -.005 | 7 3/32  | 1 11/32 | 9 27/32  | 36.0 |
| 22344K | 23244K | SNW-144  | S-144  | N-044 | W-44 | 7 19/16 | -.005 | 7 9/32  | 1 3/8   | 11       | 47.0 |
| 22348K | 23248K | SNP-148  | S-148  | N-048 | P-48 | 8 15/16 | -.006 | 8 7/64  | 1 11/32 | 11 7/16  | 38.3 |
| 22352K | 23252K | SNP-152  | S-152  | N-052 | P-52 | 9 7/16  | -.006 | 8 49/64 | 1 13/32 | 12 13/16 | 53.4 |
| 22356K | 23256K | SNP-3256 | S-3256 | N-056 | P-56 | 10 7/16 | -.007 | 8 15/16 | 1 1/2   | 13       | 61.3 |



**SERIES 231K**

|        |  |          |        |       |       |          |       |         |         |         |      |
|--------|--|----------|--------|-------|-------|----------|-------|---------|---------|---------|------|
| 23122K |  | SNW-3122 | S-22   | N-022 | W-022 | 3 15/16  | -.004 | 3 13/64 | 29/32   | 5 5/32  | 4.2  |
| 23124K |  | SNW-3124 | S-24   | N-024 | W-024 | 4 3/16   | -.005 | 3 15/32 | 13/16   | 5 11/16 | 5.8  |
| 23126K |  | SNW-3126 | S-26   | N-026 | W-026 | 4 7/16   | -.005 | 3 49/64 | 7/8     | 6 1/8   | 8.3  |
| 23128K |  | SNW-3128 | S-28   | N-028 | W-028 | 4 15/16  | -.005 | 3 63/64 | 15/16   | 6 1/2   | 8.8  |
| 23130K |  | SNW-3130 | S-30   | N-030 | W-030 | 5 3/16   | -.005 | 4 15/64 | 31/32   | 7 1/8   | 13.7 |
| 23132K |  | SNW-3132 | S-32   | N-032 | W-032 | 5 7/16   | -.005 | 4 37/64 | 1 1/32  | 7 1/2   | 13.3 |
| 23134K |  | SNW-3134 | S-34   | N-034 | W-034 | 5 11/16  | -.005 | 4 27/32 | 1 1/16  | 7 7/8   | 16.1 |
| 23136K |  | SNW-3136 | S-36   | N-036 | W-036 | 6 1/16   | -.005 | 5 1/32  | 1 3/32  | 8 1/4   | 17.1 |
| 23138K |  | SNW-3138 | S-38   | N-038 | W-038 | 6 5/16   | -.005 | 5 17/64 | 1 1/8   | 8 11/16 | 19.7 |
| 23140K |  | SNW-3140 | S-40   | N-040 | W-040 | 7 3/16   | -.005 | 5 31/64 | 1 3/16  | 9 7/16  | 28.4 |
| 23144K |  | SNW-3144 | S-44   | N-044 | W-044 | 7 15/16  | -.005 | 5 29/32 | 1 1/4   | 10 1/4  | 28.1 |
| 23148K |  | SNP-3148 | S-48   | N-048 | P-48  | 8 15/16  | -.006 | 6 41/64 | 1 11/32 | 11 7/16 | 36.0 |
| 23152K |  | SNP-3152 | S-52   | N-052 | P-52  | 9 7/16   | -.006 | 7 19/32 | 1 13/32 | 12 3/16 | 39.0 |
| 23156K |  | SNP-3156 | S-3156 | N-056 | P-56  | 10 7/16  | -.007 | 7 49/64 | 1 1/2   | 13      | 60.0 |
| 23160K |  | SNP-3160 | S-3160 | N-060 | P-60  | 10 15/16 | -.007 | 8 3/8   | 1 9/16  | 14 3/16 | 65.0 |
| 23164K |  | SNP-3164 | S-3164 | N-064 | P-64  | 11 15/16 | -.007 | 9 7/64  | 1 21/32 | 15      | 70.0 |

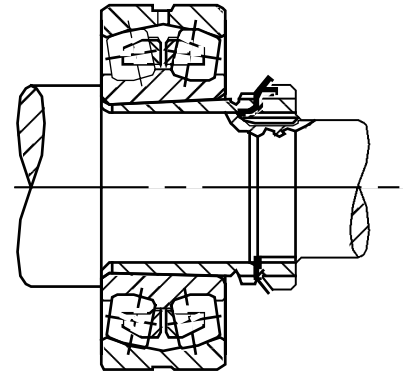


# SPHERICAL ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR TAPERED BORE BEARINGS

### PUSH TYPE REMOVABLE SLEEVE, LOCKNUT AND LOCKWASHER

- The chart below shows dimensions for adapter assemblies and components used in the tapered bore bearings on shafts.



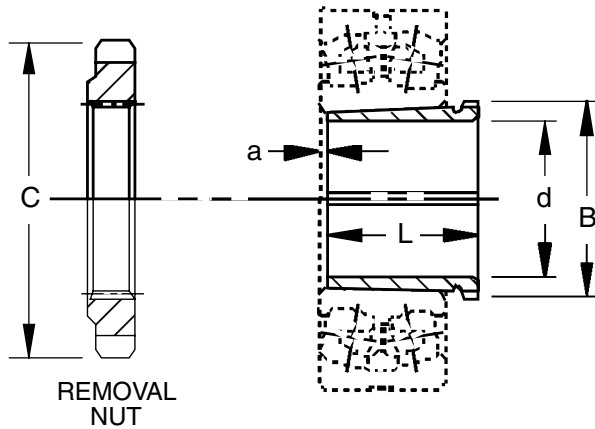
B

| Bearing Number | Accessory Numbers |         |                      |             | Shaft Dimensions |             | Adapter Dimensions |        |        | C Removal Nut O.D. | Sleeve Weight |
|----------------|-------------------|---------|----------------------|-------------|------------------|-------------|--------------------|--------|--------|--------------------|---------------|
|                | Sleeve            | Locknut | Lockwasher Lockplate | Removal Nut | d Diameter       | Tolerance   | B Pitch Diameter   | L      | a      |                    |               |
|                |                   |         |                      |             |                  | +.000*<br>0 |                    |        |        |                    |               |
| mm in.         | mm in.            | mm in.  | mm in.               | mm in.      | mm in.           | mm in.      | mm in.             | mm in. | mm in. | kg. lbs.           |               |

### SERIES 222K

|        |          |       |      |        |                |               |                  |              |                |                  |              |
|--------|----------|-------|------|--------|----------------|---------------|------------------|--------------|----------------|------------------|--------------|
| 22216K | SK-8022  | N-14  | W-14 | AN-18  | 70<br>2.7559   | -.10<br>-.004 | 88.19<br>3.472   | 50<br>1.969  | 3.50<br>0.138  | 118.39<br>4.661  | 0.5<br>1.2   |
| 22217K | SK-8522  | AN-15 | W-15 | AN-19  | 75<br>2.9528   | -.10<br>-.004 | 93.35<br>3.675   | 52<br>2.047  | 3.50<br>0.138  | 125.55<br>4.943  | 0.6<br>1.4   |
| 22218K | SK-9022  | AN-16 | W-16 | AN-20  | 80<br>3.1496   | -.10<br>-.004 | 98.12<br>3.863   | 53<br>2.087  | 3.50<br>0.138  | 131.90<br>5.193  | 0.6<br>1.5   |
| 22219K | SK-9522  | AN-17 | W-17 | AN-21  | 85<br>3.3465   | -.10<br>-.004 | 103.28<br>4.066  | 57<br>2.244  | 4.00<br>0.157  | 138.25<br>5.443  | 0.8<br>1.8   |
| 22220K | SK-10022 | AN-18 | W-18 | AN-22  | 90<br>3.5433   | -.10<br>-.004 | 109.12<br>4.269  | 59<br>2.323  | 4.00<br>0.157  | 145.39<br>5.724  | 0.9<br>2.0   |
| 22222K | SK-11022 | AN-20 | W-20 | ARN-22 | 100<br>3.9370  | -.10<br>-.004 | 119.94<br>4.722  | 65<br>2.559  | 4.00<br>0.157  | 158.75<br>6.250  | 1.1<br>2.4   |
| 22224K | SK-12022 | AN-22 | W-22 | ARN-24 | 110<br>4.3307  | -.13<br>-.005 | 130.28<br>5.129  | 72<br>2.835  | 4.00<br>0.157  | 174.63<br>6.875  | 1.4<br>3.1   |
| 22226K | SK-13022 | AN-22 | W-22 | ARN-26 | 115<br>4.5276  | -.13<br>-.005 | 141.38<br>5.566  | 78<br>3.071  | 4.00<br>0.157  | 184.15<br>7.250  | 2.2<br>5.0   |
| 22228K | SK-14022 | AN-24 | W-24 | RN-28  | 125<br>4.9213  | -.13<br>-.005 | 152.73<br>6.013  | 82<br>3.228  | 5.00<br>0.197  | 200.03<br>7.875  | 2.6<br>5.8   |
| 22230K | SK-15022 | AN-26 | W-26 | RN-30  | 135<br>5.3150  | -.13<br>-.005 | 163.04<br>6.419  | 88<br>3.465  | 5.00<br>0.197  | 209.55<br>8.250  | 3.0<br>6.8   |
| 22232K | SK-16022 | AN-28 | W-28 | RN-32  | 140<br>5.5118  | -.13<br>-.005 | 173.76<br>6.841  | 96<br>3.780  | 5.00<br>0.197  | 225.43<br>8.875  | 4.5<br>9.9   |
| 22234K | SK-17022 | AN-30 | W-30 | RN-34  | 150<br>5.9055  | -.13<br>-.005 | 184.07<br>7.247  | 104<br>4.095 | 5.00<br>0.197  | 234.95<br>9.250  | 5.2<br>11.5  |
| 22236K | SK-18022 | AN-32 | W-32 | RN-36  | 160<br>6.2992  | -.13<br>-.005 | 194.79<br>7.669  | 104<br>4.095 | 5.00<br>0.197  | 247.65<br>9.750  | 5.6<br>12.5  |
| 22238K | SK-19022 | AN-34 | W-34 | RN-38  | 170<br>6.6929  | -.13<br>-.005 | 205.92<br>8.107  | 112<br>4.409 | 5.00<br>0.197  | 269.88<br>10.625 | 6.5<br>14.5  |
| 22240K | SK-20022 | AN-36 | W-36 | N-044  | 180<br>7.0866  | -.13<br>-.005 | 217.02<br>8.544  | 118<br>4.646 | 5.00<br>0.197  | 279.53<br>11.005 | 7.4<br>16.3  |
| 22244K | SK-22022 | AN-40 | W-40 | N-048  | 200<br>7.8740  | -.13<br>-.005 | 236.98<br>9.330  | 130<br>5.118 | 6.00<br>0.236  | 290.65<br>11.443 | 8.8<br>19.6  |
| 22248K | SK-24022 | N-44  | W-44 | N-052  | 220<br>8.6614  | -.15<br>-.006 | 256.03<br>10.080 | 144<br>5.669 | 6.00<br>0.236  | 309.70<br>12.193 | 11.0<br>24.3 |
| 22252K | SK-26022 | N-048 | P-48 | N-056  | 240<br>9.4488  | -.15<br>-.006 | 276.66<br>10.892 | 155<br>6.102 | 6.00<br>0.236  | 330.33<br>13.005 | 14.0<br>30.9 |
| 22256K | SK-28022 | N-052 | P-52 | RN-56  | 260<br>10.2362 | -.15<br>-.006 | 301.27<br>11.861 | 155<br>6.102 | 8.00<br>0.315  | 425.45<br>16.750 | 15.0<br>33.1 |
| 22260K | SK-30022 | N-056 | P-56 | RN-60  | 280<br>11.0236 | -.15<br>-.006 | 325.88<br>12.830 | 170<br>6.693 | 8.00<br>0.315  | 416.10<br>16.382 | 17.7<br>39.2 |
| 22264K | SK-32022 | N-060 | P-60 | RN-64  | 300<br>11.8110 | -.15<br>-.006 | 345.72<br>13.611 | 180<br>7.087 | 10.00<br>0.394 | 431.8<br>17.000  | 21.0<br>46.3 |

# Spherical Roller Bearing Pillow Blocks



Tapered bore bearing mounted with push type removable sleeve.

B

| Bearing Number | Accessory Numbers |         |                      |             | Shaft Dimensions |                    | Adapter Dimensions |        |        | C Removal Nut O.D. | Sleeve Weight |
|----------------|-------------------|---------|----------------------|-------------|------------------|--------------------|--------------------|--------|--------|--------------------|---------------|
|                | Sleeve            | Locknut | Lockwasher Lockplate | Removal Nut | d Diameter       | Tolerance +.000* 0 | B Pitch Diameter   | L      | a      |                    |               |
|                |                   |         |                      |             | mm in.           | mm in.             | mm in.             | mm in. | mm in. | mm in.             | kg. lbs.      |

## SERIES 223K

|        |          |       |      |        |                |               |                  |              |                |                  |              |
|--------|----------|-------|------|--------|----------------|---------------|------------------|--------------|----------------|------------------|--------------|
| 22308K | SK-4023  | N-07  | W-07 | N-09   | 35<br>1.3780   | -.08<br>-.003 | 43.94<br>1.730   | 40<br>1.575  | 3.00<br>0.118  | 64.41<br>2.536   | 0.1<br>0.2   |
| 22309K | SK-4523  | N-08  | W-08 | N-10   | 40<br>1.5748   | -.08<br>-.003 | 49.02<br>1.930   | 44<br>1.732  | 3.00<br>0.118  | 68.40<br>2.693   | 0.1<br>0.3   |
| 22310K | SK-5023  | N-09  | W-09 | RN-10  | 45<br>1.7717   | -.08<br>-.003 | 55.04<br>2.167   | 50<br>1.969  | 3.00<br>0.118  | 76.20<br>3.000   | 0.2<br>0.4   |
| 22311K | SK-5523  | N-10  | W-10 | RN-11  | 50<br>1.9685   | -.08<br>-.003 | 60.20<br>2.370   | 54<br>2.126  | 3.00<br>0.118  | 81.76<br>3.219   | 0.2<br>0.5   |
| 22312K | SK-6023  | N-11  | W-11 | RN-12  | 55<br>2.1654   | -.10<br>-.004 | 65.76<br>2.589   | 57<br>2.244  | 3.50<br>0.138  | 87.33<br>3.438   | 0.3<br>0.6   |
| 22313K | SK-6523  | N-12  | W-12 | AN-15  | 60<br>2.3622   | -.10<br>-.004 | 73.10<br>2.878   | 61<br>2.402  | 3.50<br>0.138  | 98.55<br>3.880   | 0.3<br>0.8   |
| 22314K | SK-7023  | N-12  | W-12 | AN-16  | 60<br>2.3622   | -.10<br>-.004 | 78.28<br>3.082   | 65<br>2.559  | 3.50<br>0.138  | 105.69<br>4.161  | 0.6<br>1.5   |
| 22315K | SK-7523  | N-13  | W-13 | AN-17  | 65<br>2.5591   | -.10<br>-.004 | 83.44<br>3.285   | 69<br>2.717  | 3.50<br>0.138  | 112.04<br>4.411  | 0.8<br>1.7   |
| 22316K | SK-8023  | N-14  | W-14 | AN-18  | 70<br>2.7559   | -.10<br>-.004 | 88.19<br>3.472   | 72<br>2.835  | 3.50<br>0.138  | 118.39<br>4.661  | 0.9<br>2.0   |
| 22317K | SK-8523  | AN-15 | W-15 | AN-19  | 75<br>2.9528   | -.10<br>-.004 | 93.35<br>3.675   | 75<br>2.953  | 3.50<br>0.138  | 125.55<br>4.943  | 1.0<br>2.2   |
| 22318K | SK-9023  | AN-16 | W-16 | AN-20  | 80<br>3.1496   | -.10<br>-.004 | 98.12<br>3.863   | 80<br>3.150  | 3.50<br>0.138  | 131.90<br>5.193  | 1.1<br>2.5   |
| 22319K | SK-9523  | AN-17 | W-17 | AN-21  | 85<br>3.3465   | -.10<br>-.004 | 103.28<br>4.066  | 85<br>3.346  | 4.00<br>0.157  | 138.25<br>5.443  | 1.3<br>2.9   |
| 22320K | SK-10023 | AN-18 | W-18 | AN-22  | 90<br>3.5433   | -.10<br>-.004 | 109.12<br>4.269  | 90<br>3.543  | 4.00<br>0.157  | 145.39<br>5.724  | 1.5<br>3.3   |
| 22322K | SK-11023 | AN-20 | W-20 | ARN-22 | 100<br>3.9370  | -.10<br>-.004 | 119.94<br>4.722  | 98<br>3.858  | 4.00<br>0.157  | 158.75<br>6.250  | 1.9<br>4.2   |
| 22324K | SK-12023 | AN-22 | W-22 | ARN-24 | 110<br>4.3307  | -.13<br>-.005 | 130.28<br>5.129  | 105<br>4.134 | 4.00<br>0.157  | 174.63<br>6.875  | 2.2<br>5.0   |
| 22326K | SK-13023 | AN-22 | W-22 | ARN-26 | 115<br>4.5276  | -.13<br>-.005 | 141.38<br>5.566  | 115<br>4.528 | 4.00<br>0.157  | 184.15<br>7.250  | 3.6<br>8.0   |
| 22328K | SK-14023 | AN-24 | W-24 | RN-28  | 125<br>4.9213  | -.13<br>-.005 | 152.73<br>6.013  | 125<br>4.921 | 5.00<br>0.197  | 200.03<br>7.875  | 4.3<br>9.5   |
| 22330K | SK-15023 | AN-26 | W-26 | RN-30  | 135<br>5.3150  | -.13<br>-.005 | 163.04<br>6.419  | 135<br>5.315 | 5.00<br>0.197  | 209.55<br>8.250  | 5.1<br>11.4  |
| 22332K | SK-16023 | AN-28 | W-28 | RN-32  | 140<br>5.5118  | -.13<br>-.005 | 173.76<br>6.841  | 140<br>5.512 | 6.00<br>0.236  | 225.43<br>8.875  | 7.0<br>15.5  |
| 22334K | SK-17023 | AN-30 | W-30 | RN-34  | 150<br>5.9055  | -.13<br>-.005 | 184.07<br>7.247  | 146<br>5.748 | 6.00<br>0.236  | 234.95<br>9.250  | 7.8<br>17.2  |
| 22336K | SK-18023 | AN-32 | W-32 | RN-36  | 160<br>6.2992  | -.13<br>-.005 | 194.79<br>7.669  | 154<br>6.063 | 6.00<br>0.236  | 247.65<br>9.750  | 9.1<br>20.2  |
| 22338K | SK-19023 | AN-34 | W-34 | RN-38  | 170<br>6.6929  | -.13<br>-.005 | 205.92<br>8.107  | 160<br>6.299 | 7.00<br>0.276  | 269.88<br>10.625 | 10.0<br>22.1 |
| 22340K | SK-20023 | AN-36 | W-36 | N-044  | 180<br>7.0866  | -.13<br>-.005 | 217.02<br>8.544  | 170<br>6.693 | 7.00<br>0.276  | 279.53<br>11.005 | 11.4<br>25.2 |
| 22344K | SK-22023 | AN-40 | W-40 | N-048  | 200<br>7.8740  | -.13<br>-.005 | 236.98<br>9.330  | 181<br>7.126 | 8.00<br>0.315  | 290.65<br>11.443 | 13.3<br>29.5 |
| 22348K | SK-24023 | N-44  | W-44 | N-052  | 220<br>8.6614  | -.15<br>-.006 | 256.03<br>10.080 | 189<br>7.441 | 8.00<br>0.315  | 309.70<br>12.193 | 15.5<br>34.2 |
| 22352K | SK-26023 | N-048 | P-48 | N-056  | 240<br>9.4488  | -.15<br>-.006 | 276.66<br>10.892 | 200<br>7.874 | 8.00<br>0.315  | 330.33<br>13.005 | 18.2<br>40.2 |
| 22356K | SK-28023 | N-052 | P-52 | RN-56  | 260<br>10.2362 | -.15<br>-.006 | 301.27<br>11.861 | 210<br>8.268 | 10.00<br>0.394 | 425.45<br>16.75  | 22.0<br>48.5 |



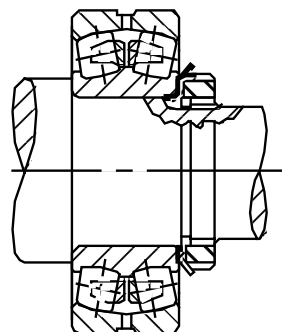


# SPHERICAL ROLLER BEARINGS

## SHAFT ADAPTER ACCESSORIES FOR STRAIGHT BORE BEARINGS

### LOCKNUT AND LOCKWASHER

- The chart below shows dimensions for locknuts and lockwashers used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configurations are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222 and 223 etc.).

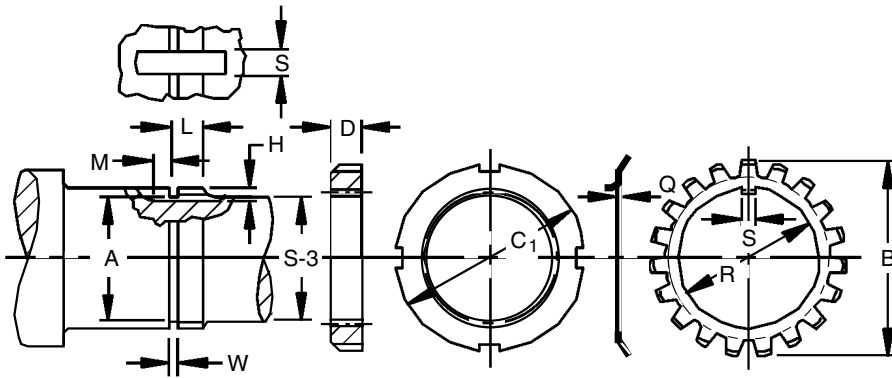


B

| Bearing Bore | Locknut | Lockwasher | Threads Per Inch | Threads           |                   |                   |                   |                   |                   |
|--------------|---------|------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|              |         |            |                  | Major Diameter    |                   | Pitch Diameter    |                   | Minor Dia.        | A Relief Dia.     |
|              |         |            |                  | Min.              | Max.              | Min.              | Max.              |                   |                   |
| mm           |         |            |                  | mm inch           | mm inch           | mm inch           | mm inch           | mm inch           | mm inch           |
| 35           | N 07    | W 07       | 18               | 34.740<br>1.3678  | 34.950<br>1.3760  | 33.930<br>1.3359  | 34.030<br>1.3399  | 33.220<br>1.3078  | 32.820<br>1.2922  |
| 40           | N 08    | W 08       | 18               | 39.490<br>1.5548  | 39.700<br>1.5630  | 38.670<br>1.5224  | 38.780<br>1.5269  | 37.970<br>1.4948  | 37.570<br>1.4792  |
| 45           | N 09    | W 09       | 18               | 44.670<br>1.7588  | 44.880<br>1.7670  | 43.850<br>1.7264  | 43.960<br>1.7309  | 43.150<br>1.6988  | 42.750<br>1.6832  |
| 50           | N 10    | W 10       | 18               | 49.750<br>1.9588  | 49.960<br>1.9670  | 48.930<br>1.9264  | 49.050<br>1.9309  | 48.230<br>1.8988  | 47.830<br>1.8832  |
| 55           | N 11    | W 11       | 18               | 54.580<br>2.1488  | 54.790<br>2.1570  | 53.740<br>2.1158  | 53.870<br>2.1209  | 53.060<br>2.0888  | 52.660<br>2.0732  |
| 60           | N 12    | W 12       | 18               | 59.740<br>2.3518  | 59.940<br>2.3600  | 58.900<br>2.3188  | 59.030<br>2.3239  | 58.210<br>2.2918  | 57.820<br>2.2762  |
| 65           | N 13    | W 13       | 18               | 64.510<br>2.5398  | 64.720<br>2.5480  | 63.670<br>2.5068  | 63.800<br>2.5119  | 62.990<br>2.4798  | 62.590<br>2.4642  |
| 70           | N 14    | W 14       | 18               | 69.670<br>2.7428  | 69.880<br>2.7510  | 68.830<br>2.7098  | 68.960<br>2.7149  | 68.140<br>2.6828  | 67.750<br>2.6672  |
| 75           | AN 15   | W 15       | 12               | 74.210<br>2.9218  | 74.500<br>2.9330  | 72.990<br>2.8735  | 73.120<br>2.8789  | 71.900<br>2.8308  | 71.110<br>2.7995  |
| 80           | AN 16   | W 16       | 12               | 79.400<br>3.1258  | 79.680<br>3.1370  | 78.160<br>3.0770  | 78.310<br>3.0829  | 77.080<br>3.0348  | 76.290<br>3.0035  |
| 85           | AN 17   | W 17       | 12               | 84.550<br>3.3288  | 84.840<br>3.3400  | 83.310<br>3.2800  | 83.460<br>3.2859  | 82.240<br>3.2378  | 81.450<br>3.2065  |
| 90           | AN 18   | W 18       | 12               | 89.300<br>3.5158  | 89.590<br>3.5270  | 88.020<br>3.4655  | 88.210<br>3.4729  | 86.990<br>3.4248  | 86.200<br>3.3935  |
| 95           | AN 19   | W 19       | 12               | 94.460<br>3.7188  | 94.740<br>3.7300  | 93.180<br>3.6685  | 93.370<br>3.6759  | 92.150<br>3.6278  | 91.350<br>3.5965  |
| 100          | AN 20   | W 20       | 12               | 99.230<br>3.9068  | 99.520<br>3.9180  | 97.960<br>3.8565  | 98.140<br>3.8639  | 96.920<br>3.8158  | 96.130<br>3.7845  |
| 105          | AN 21   | W 21       | 12               | 104.410<br>4.1108 | 104.700<br>4.1220 | 103.110<br>4.0596 | 103.320<br>4.0679 | 102.100<br>4.0198 | 101.310<br>3.9885 |
| 110          | AN 22   | W 22       | 12               | 109.570<br>4.3138 | 109.860<br>4.3250 | 108.270<br>4.2626 | 108.480<br>4.2709 | 107.260<br>4.2228 | 106.460<br>4.1915 |
| 120          | AN 24   | W 24       | 12               | 119.500<br>4.7048 | 119.790<br>4.7160 | 118.200<br>4.6536 | 118.410<br>4.6619 | 117.190<br>4.6138 | 116.400<br>4.5825 |
| 130          | AN 26   | W 26       | 12               | 129.410<br>5.0948 | 129.690<br>5.1060 | 128.110<br>5.0436 | 128.320<br>5.0519 | 127.100<br>5.0038 | 126.300<br>4.9725 |
| 140          | AN 28   | W 28       | 12               | 139.340<br>5.4858 | 139.620<br>5.4970 | 138.040<br>5.4346 | 138.250<br>5.4429 | 137.030<br>5.3948 | 136.230<br>5.3635 |
| 150          | AN 30   | W 30       | 12               | 149.270<br>5.8768 | 149.560<br>5.8880 | 147.970<br>5.8256 | 148.180<br>5.8339 | 146.960<br>5.7858 | 146.160<br>5.7545 |
| 160          | AN 32   | W 32       | 8                | 159.230<br>6.2688 | 159.610<br>6.2840 | 157.320<br>6.1937 | 157.550<br>6.2028 | 155.720<br>6.1306 | 154.920<br>6.0993 |
| 170          | AN 34   | W 34       | 8                | 168.750<br>6.6438 | 169.140<br>6.6590 | 166.850<br>6.5687 | 167.080<br>6.5778 | 165.240<br>6.5056 | 164.450<br>6.4743 |
| 180          | AN 36   | W 36       | 8                | 179.090<br>7.0508 | 179.480<br>7.0660 | 177.180<br>6.9757 | 177.410<br>6.9848 | 175.580<br>6.9126 | 174.790<br>6.8813 |
| 190          | AN 38   | W 38       | 8                | 189.400<br>7.4568 | 189.790<br>7.4720 | 187.500<br>7.3817 | 187.730<br>7.3908 | 185.890<br>7.3186 | 185.100<br>7.2873 |
| 200          | AN 40   | W 40       | 8                | 198.930<br>7.8318 | 199.310<br>7.8470 | 196.960<br>7.7544 | 197.250<br>7.7658 | 195.420<br>7.6936 | 194.620<br>7.6623 |
| 220          | N 044   | W 44       | 8                | 218.770<br>8.6128 | 219.150<br>8.6280 | 216.780<br>8.5347 | 217.090<br>8.5468 | 215.250<br>8.4746 | 214.460<br>8.4433 |

(1) See page B395 for suggested S-3 shaft limits.

## Spherical Roller Bearing Pillow Blocks



B

| S-3 <sup>(1)</sup> | Shaft            |                  |                  |                  |                  | Locknut           |                | Lockwasher    |                 |                   |                |
|--------------------|------------------|------------------|------------------|------------------|------------------|-------------------|----------------|---------------|-----------------|-------------------|----------------|
|                    | W<br>+ 1/64<br>0 | L<br>+ 1/64<br>0 | H<br>+ 1/64<br>0 | S<br>+ 1/64<br>0 | M<br>+ 1/64<br>0 | C <sub>1</sub>    | D              | Q             | R               | B                 | S              |
| mm<br>inch         | mm<br>inch       | mm<br>inch       | mm<br>inch       | mm<br>inch       | mm<br>inch       | mm<br>inch        | mm<br>inch     | mm<br>inch    | mm<br>inch      | mm<br>inch        | mm<br>inch     |
| 31.750<br>1 1/4    | 2.4<br>3/32      | 12.7<br>1/2      | 2.4<br>3/32      | 4.8<br>3/16      | 3.2<br>1/8       | 52.39<br>2 1/16   | 11.40<br>0.448 | 1.30<br>0.050 | 36.00<br>1.416  | 57.20<br>2 1/4    | 4.50<br>0.176  |
| 36.510<br>1 7/16   | 3.2<br>1/8       | 13.5<br>1/2      | 2.4<br>3/32      | 7.9<br>5/16      | 3.2<br>1/8       | 57.15<br>2 1/4    | 11.40<br>0.448 | 1.50<br>0.058 | 40.70<br>1.603  | 62.70<br>2 1/2    | 7.40<br>0.290  |
| 42.860<br>1 11/16  | 3.2<br>1/8       | 13.5<br>1/2      | 2.4<br>3/32      | 7.9<br>5/16      | 4.0<br>5/32      | 64.30<br>2 17/32  | 11.40<br>0.448 | 1.50<br>0.058 | 46.20<br>1.817  | 69.50<br>2 7/16   | 7.40<br>0.290  |
| 47.630<br>1 7/8    | 3.2<br>1/8       | 15.1<br>19/32    | 2.4<br>3/32      | 7.9<br>5/16      | 4.0<br>5/32      | 68.30<br>2 11/16  | 13.00<br>0.510 | 1.50<br>0.058 | 51.20<br>2.017  | 74.20<br>2 59/64  | 7.40<br>0.290  |
| 52.390<br>2 1/16   | 3.2<br>1/8       | 15.1<br>19/32    | 3.2<br>1/8       | 7.9<br>5/16      | 4.0<br>5/32      | 75.40<br>2 31/32  | 13.00<br>0.510 | 1.60<br>0.063 | 56.10<br>2.207  | 79.00<br>3 7/64   | 7.40<br>0.290  |
| 57.150<br>2 1/4    | 3.2<br>1/8       | 15.9<br>5/8      | 3.2<br>1/8       | 7.9<br>5/16      | 4.0<br>5/32      | 80.20<br>3 5/32   | 13.70<br>0.541 | 1.60<br>0.063 | 61.60<br>2.425  | 85.00<br>3 11/32  | 7.40<br>0.290  |
| 61.910<br>2 7/16   | 3.2<br>1/8       | 16.7<br>21/32    | 3.2<br>1/8       | 7.9<br>5/16      | 4.0<br>5/32      | 85.70<br>3 3/8    | 14.60<br>0.573 | 1.60<br>0.063 | 66.40<br>2.613  | 90.90<br>3 37/64  | 7.40<br>0.290  |
| 66.680<br>2 5/8    | 3.2<br>1/8       | 16.7<br>21/32    | 3.2<br>1/8       | 7.9<br>5/16      | 6.4<br>1/4       | 92.10<br>3 5/8    | 14.60<br>0.573 | 1.60<br>0.063 | 71.50<br>2.816  | 92.20<br>3 53/64  | 7.40<br>0.290  |
| 71.440<br>2 13/16  | 4.0<br>5/32      | 17.5<br>11/16    | 3.2<br>1/8       | 7.9<br>5/16      | 6.4<br>1/4       | 98.40<br>3 7/8    | 15.30<br>0.604 | 1.60<br>0.072 | 76.30<br>3.003  | 104.40<br>4 7/64  | 7.40<br>0.290  |
| 76.200<br>3        | 4.0<br>5/32      | 17.5<br>11/16    | 3.2<br>1/8       | 9.5<br>3/8       | 6.4<br>1/4       | 105.60<br>4 5/32  | 15.30<br>0.604 | 1.80<br>0.072 | 81.50<br>3.207  | 111.10<br>4 3/8   | 9.00<br>0.353  |
| 80.960<br>3 1/16   | 4.0<br>5/32      | 16.7<br>21/32    | 3.2<br>1/8       | 9.5<br>3/8       | 6.4<br>1/4       | 111.90<br>4 13/32 | 16.10<br>0.635 | 1.80<br>0.072 | 87.00<br>3.425  | 117.50<br>4 5/8   | 9.00<br>0.353  |
| 85.730<br>3 3/8    | 4.0<br>5/32      | 20.6<br>19/16    | 4.0<br>5/32      | 9.5<br>3/8       | 6.4<br>1/4       | 118.30<br>4 21/32 | 17.70<br>0.698 | 2.40<br>0.094 | 91.70<br>3.612  | 125.40<br>4 15/16 | 9.00<br>0.353  |
| 90.490<br>3 9/16   | 4.0<br>5/32      | 21.4<br>21/32    | 4.0<br>5/32      | 9.5<br>3/8       | 6.4<br>1/4       | 125.40<br>4 15/16 | 18.50<br>0.729 | 2.40<br>0.094 | 97.30<br>3.830  | 132.60<br>5 7/32  | 9.00<br>0.353  |
| 96.840<br>3 13/16  | 4.0<br>5/32      | 22.2<br>7/8      | 4.0<br>5/32      | 9.5<br>3/8       | 7.9<br>5/16      | 131.80<br>5 3/16  | 19.30<br>0.760 | 2.40<br>0.094 | 102.10<br>4.018 | 139.70<br>5 1/2   | 9.00<br>0.353  |
| 100.010<br>3 15/16 | 4.0<br>5/32      | 22.2<br>7/8      | 4.0<br>5/32      | 9.5<br>3/8       | 7.9<br>5/16      | 138.10<br>5 7/16  | 19.30<br>0.760 | 2.40<br>0.094 | 107.20<br>4.222 | 144.90<br>5 45/64 | 9.00<br>0.353  |
| 106.360<br>4 3/16  | 4.0<br>5/32      | 23<br>29/32      | 4.8<br>3/16      | 9.5<br>3/8       | 7.9<br>5/16      | 145.30<br>5 23/32 | 20.10<br>0.791 | 3.20<br>0.125 | 112.40<br>4.425 | 154.00<br>6 1/16  | 9.00<br>0.353  |
| 115.890<br>4 9/16  | 4.0<br>5/32      | 23.8<br>19/16    | 4.8<br>3/16      | 9.5<br>3/8       | 7.9<br>5/16      | 155.60<br>6 1/8   | 20.90<br>0.823 | 3.20<br>0.125 | 122.70<br>4.831 | 164.30<br>6 15/32 | 9.00<br>0.353  |
| 125.410<br>4 15/16 | 4.0<br>5/32      | 25.4<br>1        | 4.8<br>3/16      | 12.7<br>1/2      | 7.9<br>5/16      | 171.50<br>6 3/4   | 22.50<br>0.885 | 3.20<br>0.125 | 132.70<br>5.226 | 178.60<br>7 1/32  | 11.10<br>0.435 |
| 134.940<br>5 1/16  | 4.0<br>5/32      | 27<br>1 1/16     | 4.8<br>3/16      | 15.9<br>5/8      | 7.9<br>5/16      | 180.20<br>7 3/32  | 24.10<br>0.948 | 3.20<br>0.125 | 142.70<br>5.617 | 188.90<br>7 7/16  | 15.00<br>0.590 |
| 146.050<br>5 3/4   | 4.0<br>5/32      | 28.6<br>1 1/8    | 5.6<br>7/32      | 15.9<br>5/8      | 9.5<br>3/8       | 195.30<br>7 11/16 | 24.90<br>0.979 | 4.00<br>0.156 | 152.90<br>6.018 | 204.80<br>8 1/16  | 15.00<br>0.590 |
| 153.990<br>6 1/16  | 6.4<br>1/4       | 30.2<br>1 3/16   | 6.0<br>15/64     | 15.9<br>5/8      | 9.5<br>3/8       | 204.80<br>8 1/16  | 26.40<br>1.041 | 4.00<br>0.156 | 163.20<br>6.424 | 214.30<br>8 7/16  | 15.00<br>0.590 |
| 163.510<br>6 7/16  | 6.4<br>1/4       | 31<br>1 7/32     | 6.0<br>15/64     | 19.1<br>3/4      | 9.5<br>3/8       | 219.90<br>8 21/32 | 27.30<br>1.073 | 4.00<br>0.156 | 172.70<br>6.799 | 230.20<br>9 1/16  | 18.20<br>0.715 |
| 174.630<br>6 7/8   | 6.4<br>1/4       | 31.8<br>1 1/4    | 6.0<br>15/64     | 19.1<br>3/4      | 9.5<br>3/8       | 230.20<br>9 1/16  | 28.00<br>1.104 | 4.00<br>0.156 | 183.00<br>7.206 | 239.70<br>9 7/16  | 18.20<br>0.715 |
| 184.150<br>7 1/4   | 6.4<br>1/4       | 32.5<br>1 9/32   | 6.0<br>15/64     | 19.1<br>3/4      | 9.5<br>3/8       | 240.50<br>9 15/32 | 28.80<br>1.135 | 4.00<br>0.156 | 193.30<br>7.612 | 250.80<br>9 7/8   | 18.20<br>0.715 |
| 193.680<br>7 3/8   | 6.4<br>1/4       | 34.1<br>1 11/32  | 6.0<br>15/64     | 22.2<br>7/8      | 9.5<br>3/8       | 250.00<br>9 27/32 | 30.40<br>1.198 | 4.00<br>0.156 | 203.60<br>8.017 | 261.90<br>10 5/16 | 21.30<br>0.840 |
| 211.140<br>8 5/16  | 6.4<br>1/4       | 34.9<br>1 3/8    | 9.5<br>3/8       | 27.0<br>1 1/16   | 9.5<br>3/8       | 279.40<br>11      | 31.80<br>1.250 | 3.20<br>0.125 | 221.10<br>8.703 | 290.50<br>11 1/16 | 23.90<br>0.940 |

<sup>(1)</sup> See page B395 for suggested S-3 shaft limits.



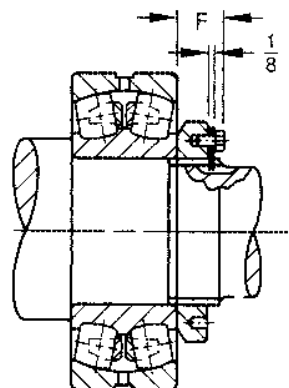


## SPHERICAL ROLLER BEARINGS

### SHAFT ADAPTER ACCESSORIES FOR STRAIGHT BORE BEARINGS

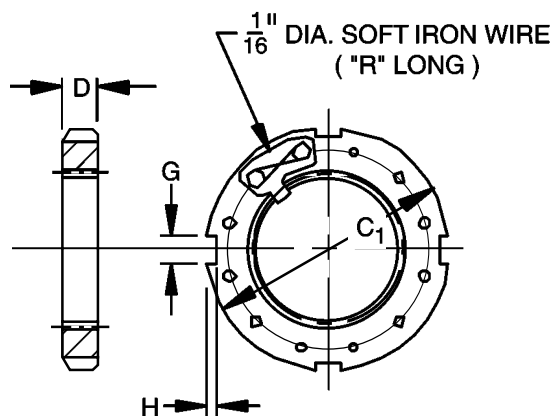
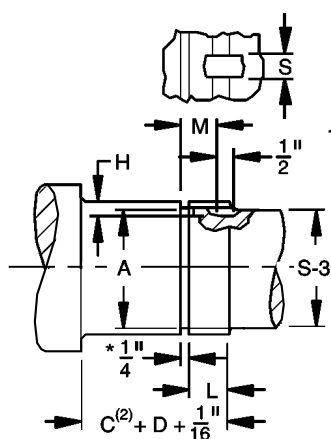
#### LOCKNUT AND LOCKPLATE

- The chart below shows dimensions for locknuts and lockplates used in the mounting of straight bore bearings on shafts.
- Other dimensions and tolerances related to shaft configuration are also shown.
- Dimensions are presented according to bearing bore size and are applicable to bearings in the various series (e.g., 222, 223 etc.).



| Bearing Bore | Locknut | Lockplate | Threads Per Inch | Threads           |                  |                   |                   |                   |                   |
|--------------|---------|-----------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|
|              |         |           |                  | Major Diameter    |                  | Pitch Diameter    |                   | Minor Dia.        | A Relief Dia.     |
|              |         |           |                  | Min.              | Max.             | Min.              | Max.              |                   |                   |
| mm           |         |           | mm<br>inch       | mm<br>inch        | mm<br>inch       | mm<br>inch        | mm<br>inch        | mm<br>inch        |                   |
| 240          | N 048   | P 48      | 6                | 239.31<br>9.4218  | 239.83<br>9.442  | 236.76<br>9.3213  | 237.08<br>9.3337  | 234.63<br>9.2374  | 233.44<br>9.1905  |
| 260          | N 052   | P 52      | 6                | 258.36<br>10.1718 | 258.88<br>10.192 | 255.8<br>10.0707  | 256.13<br>10.0837 | 253.68<br>9.9874  | 252.49<br>9.9405  |
| 280          | N 056   | P 56      | 6                | 278.99<br>10.9838 | 279.50<br>11.004 | 276.42<br>10.8827 | 276.75<br>10.8957 | 274.31<br>10.7994 | 273.11<br>10.7525 |
| 300          | N 060   | P 60      | 6                | 298.83<br>11.7648 | 299.34<br>11.785 | 296.26<br>11.6637 | 296.59<br>11.6767 | 294.14<br>11.5804 | 292.95<br>11.5335 |
| 320          | N 064   | P 64      | 6                | 318.56<br>12.5418 | 319.08<br>12.562 | 315.98<br>12.4402 | 316.32<br>12.4537 | 313.88<br>12.3574 | 312.69<br>12.3105 |
| 340          | N 068   | P 68      | 5                | 337.49<br>13.287  | 337.90<br>13.303 | 334.95<br>13.187  | 335.36<br>13.203  | 332.31<br>13.083  | 331.11<br>13.036  |
| 360          | N 072   | P 72      | 5                | 358.60<br>14.118  | 359.00<br>14.134 | 356.06<br>14.018  | 356.46<br>14.034  | 353.42<br>13.914  | 352.22<br>13.867  |
| 380          | N 076   | P 76      | 5                | 378.59<br>14.905  | 378.99<br>14.921 | 376.05<br>14.805  | 376.45<br>14.821  | 373.41<br>14.701  | 372.21<br>14.654  |
| 400          | N 080   | P 80      | 5                | 398.60<br>15.693  | 399.01<br>15.709 | 396.06<br>15.593  | 396.47<br>15.609  | 393.42<br>15.489  | 392.23<br>15.442  |
| 420          | N 084   | P 84      | 5                | 418.59<br>16.480  | 419.00<br>16.496 | 416.05<br>16.380  | 416.46<br>16.396  | 413.41<br>16.276  | 412.22<br>16.229  |
| 440          | N 088   | P 88      | 5                | 438.58<br>17.267  | 438.99<br>17.283 | 436.05<br>17.167  | 436.45<br>17.183  | 433.40<br>17.063  | 432.21<br>17.016  |
| 460          | N 092   | P 92      | 5                | 458.60<br>18.055  | 459.00<br>18.071 | 456.06<br>17.955  | 456.46<br>17.971  | 453.42<br>17.851  | 452.22<br>17.804  |
| 480          | N 096   | P 96      | 5                | 478.59<br>18.842  | 478.99<br>18.858 | 476.05<br>18.742  | 476.45<br>18.758  | 473.41<br>18.638  | 472.21<br>18.591  |
| 500          | N 500   | P 500     | 5                | 498.60<br>19.630  | 499.01<br>19.646 | 496.06<br>19.530  | 496.47<br>19.546  | 493.42<br>19.426  | 492.23<br>19.379  |
| 530          | N 530   | P 530     | 4                | 528.50<br>20.807  | 529.01<br>20.827 | 525.32<br>20.682  | 525.83<br>20.702  | 522.15<br>20.557  | 520.55<br>20.494  |
| 560          | N 560   | P 560     | 4                | 558.50<br>21.988  | 559.00<br>22.008 | 555.32<br>21.863  | 555.83<br>21.883  | 552.15<br>21.738  | 550.55<br>21.675  |
| 600          | N 600   | P 600     | 4                | 598.50<br>23.563  | 599.01<br>23.583 | 595.33<br>23.438  | 595.83<br>23.458  | 592.15<br>23.313  | 590.55<br>23.250  |
| 630          | N 630   | P 630     | 4                | 628.50<br>24.744  | 629.01<br>24.764 | 625.32<br>24.619  | 625.83<br>24.639  | 622.15<br>24.494  | 620.55<br>24.431  |
| 670          | N 670   | P 670     | 4                | 668.50<br>26.319  | 669.01<br>26.339 | 665.33<br>26.194  | 665.84<br>26.214  | 662.15<br>26.069  | 660.55<br>26.006  |
| 710          | N 710   | P 710     | 3                | 708.33<br>27.887  | 709.02<br>27.914 | 704.09<br>27.720  | 704.77<br>27.747  | 700.02<br>27.56   | 698.42<br>27.497  |
| 750          | N 750   | P 750     | 3                | 748.34<br>29.462  | 749.02<br>29.489 | 744.09<br>29.295  | 744.78<br>29.322  | 740.03<br>29.135  | 738.43<br>29.072  |
| 800          | N 800   | P 800     | 3                | 798.32<br>31.430  | 799.01<br>31.457 | 794.08<br>31.263  | 794.77<br>31.290  | 790.02<br>31.103  | 788.42<br>31.040  |
| 850          | N 850   | P 850     | 3                | 848.34<br>33.399  | 849.02<br>33.426 | 844.09<br>33.232  | 844.78<br>33.259  | 840.03<br>33.072  | 838.43<br>33.009  |
| 900          | N 900   | P 900     | 3                | 898.32<br>35.367  | 899.01<br>35.394 | 894.08<br>35.200  | 894.77<br>35.227  | 890.02<br>35.040  | 888.42<br>34.977  |
| 950          | N 950   | P 950     | 3                | 948.33<br>37.336  | 949.02<br>37.363 | 944.09<br>37.169  | 944.78<br>37.196  | 940.03<br>37.009  | 938.43<br>36.946  |

## Spherical Roller Bearing Pillow Blocks



\* Sizes N670 and above :  $\frac{3}{8}$  "

| Shaft              |                  |                  |                  |                  | Locknut / Lockplate |                  |                |               |                 |                  |
|--------------------|------------------|------------------|------------------|------------------|---------------------|------------------|----------------|---------------|-----------------|------------------|
| S-3 <sup>(1)</sup> | L<br>+ 1/64<br>0 | H<br>+ 1/64<br>0 | S<br>+ 1/64<br>0 | M<br>+ 1/64<br>0 | C <sub>1</sub>      | D                | G              | H<br>±.010"   | R               | F                |
| mm<br>inch         | mm<br>inch       | mm<br>inch       | mm<br>inch       | mm<br>inch       | mm<br>inch          | mm<br>inch       | mm<br>inch     | mm<br>inch    | mm<br>inch      | mm<br>inch       |
| 233.36<br>9 3/16   | 42.86<br>1 11/16 | 11.1<br>7/16     | 28.6<br>1 1/8    | 34.9<br>1 3/8    | 290.5<br>11 7/16    | 34.1<br>1 11/32  | 22.48<br>0.885 | 9.5<br>3/8    | 203.2<br>8      | 43.26<br>1 45/64 |
| 252.41<br>9 15/16  | 45.24<br>1 25/32 | 11.1<br>7/16     | 30.2<br>1 3/16   | 37.3<br>1 15/32  | 309.6<br>12 3/16    | 35.7<br>1 13/32  | 22.48<br>0.885 | 9.5<br>3/8    | 228.6<br>9      | 44.85<br>1 49/64 |
| 273.05<br>10 3/4   | 47.63<br>1 7/8   | 11.1<br>7/16     | 31.8<br>1 1/4    | 39.7<br>1 9/16   | 330.2<br>13         | 38.1<br>1 1/2    | 25.65<br>1.010 | 9.5<br>3/8    | 228.6<br>9      | 47.23<br>1 55/64 |
| 292.1<br>11 1/2    | 49.21<br>1 15/16 | 11.1<br>7/16     | 34.9<br>1 3/8    | 41.3<br>1 5/8    | 360.4<br>14 3/16    | 39.7<br>1 43/64  | 25.65<br>1.010 | 12.7<br>1/2   | 254.0<br>10     | 50.01<br>1 31/32 |
| 312.74<br>12 5/16  | 51.59<br>2 1/32  | 11.1<br>7/16     | 36.5<br>1 7/16   | 43.7<br>1 23/32  | 381.0<br>15         | 42.1<br>1 21/32  | 25.65<br>1.010 | 12.7<br>1/2   | 254.0<br>10     | 52.39<br>2 1/16  |
| 331.79<br>13 1/16  | 56.36<br>2 1/32  | 11.1<br>7/16     | 38.1<br>1 1/2    | 48.4<br>1 29/32  | 400.1<br>15 3/4     | 45.2<br>1 25/32  | 25.65<br>1.010 | 12.7<br>1/2   | 279.4<br>11     | 55.56<br>2 3/16  |
| 350.84<br>13 13/16 | 56.36<br>2 1/32  | 12.7<br>1/2      | 38.1<br>1 1/2    | 48.4<br>1 29/32  | 419.1<br>16 1/2     | 45.2<br>1 25/32  | 32.00<br>1.260 | 12.7<br>1/2   | 279.4<br>11     | 55.56<br>2 3/16  |
| 371.48<br>14 5/8   | 59.53<br>2 11/32 | 12.7<br>1/2      | 38.1<br>1 1/2    | 51.59<br>2 1/8   | 450.9<br>17 3/4     | 48.4<br>1 29/32  | 32.00<br>1.260 | 15.1<br>19/32 | 304.8<br>12     | 61.12<br>2 13/32 |
| 390.53<br>15 3/8   | 63.50<br>2 1/2   | 12.7<br>1/2      | 41.3<br>1 5/8    | 55.6<br>2 3/16   | 469.9<br>18 1/2     | 52.4<br>2 1/16   | 32.00<br>1.260 | 15.1<br>19/32 | 330.2<br>13     | 65.09<br>2 9/16  |
| 411.16<br>16 3/16  | 63.50<br>2 1/2   | 12.7<br>1/2      | 41.3<br>1 5/8    | 55.6<br>2 3/16   | 490.5<br>19 9/16    | 52.4<br>2 1/16   | 35.18<br>1.385 | 15.1<br>19/32 | 330.2<br>13     | 65.09<br>2 9/16  |
| 431.80<br>17       | 71.44<br>2 13/16 | 12.7<br>1/2      | 46.0<br>1 13/16  | 63.50<br>2 1/2   | 520.7<br>20 1/2     | 60.3<br>2 3/8    | 35.18<br>1.385 | 15.1<br>19/32 | 355.6<br>14     | 75.41<br>2 31/32 |
| 450.85<br>17 3/4   | 71.44<br>2 13/16 | 12.7<br>1/2      | 46.0<br>1 13/16  | 63.50<br>2 1/2   | 539.8<br>21 1/4     | 60.3<br>2 3/8    | 35.18<br>1.385 | 15.1<br>19/32 | 406.4<br>16     | 75.41<br>2 31/32 |
| 469.9<br>18 1/2    | 71.44<br>2 13/16 | 12.7<br>1/2      | 46.0<br>1 13/16  | 63.50<br>2 1/2   | 560.4<br>22 1/16    | 60.3<br>2 3/8    | 38.35<br>1.510 | 15.1<br>19/32 | 406.4<br>16     | 75.41<br>2 31/32 |
| 489.0<br>19 1/4    | 79.4<br>3 1/8    | 12.7<br>1/2      | 46.0<br>1 13/16  | 71.4<br>2 13/16  | 579.4<br>22 13/16   | 68.3<br>2 11/16  | 38.35<br>1.510 | 15.1<br>19/32 | 406.4<br>16     | 83.3<br>3 9/32   |
| 517.5<br>20 3/8    | 79.4<br>3 1/8    | 12.7<br>1/2      | 46.0<br>1 13/16  | 71.4<br>2 13/16  | 630.2<br>24 13/16   | 68.3<br>2 11/16  | 41.53<br>1.635 | 20.6<br>13/16 | 425.5<br>16 3/4 | 83.3<br>3 9/32   |
| 549.3<br>21 5/8    | 85.7<br>3 3/8    | 12.7<br>1/2      | 46.0<br>1 13/16  | 77.8<br>3 1/16   | 649.3<br>25 9/16    | 74.6<br>2 15/16  | 41.53<br>1.635 | 20.6<br>13/16 | 476.3<br>18 3/4 | 89.7<br>3 17/32  |
| 587.4<br>23 1/8    | 85.7<br>3 3/8    | 12.7<br>1/2      | 46.0<br>1 13/16  | 77.8<br>3 1/16   | 700.1<br>27 9/16    | 74.6<br>2 15/16  | 41.53<br>1.635 | 20.6<br>13/16 | 508.0<br>20     | 89.7<br>3 17/32  |
| 619.1<br>24 3/8    | 85.7<br>3 3/8    | 12.7<br>1/2      | 50.8<br>2        | 77.8<br>3 1/16   | 730.3<br>28 3/4     | 74.6<br>2 15/16  | 47.88<br>1.885 | 20.6<br>13/16 | 520.7<br>20 1/2 | 92.1<br>3 5/8    |
| 657.2<br>25 7/8    | 90.5<br>3 9/16   | 12.7<br>1/2      | 50.8<br>2        | 82.6<br>3 1/4    | 779.5<br>30 11/16   | 79.4<br>3 1/8    | 47.88<br>1.885 | 20.6<br>13/16 | 546.1<br>21 1/2 | 96.8<br>3 13/16  |
| 695.3<br>27 3/8    | 101.6<br>4       | 15.9<br>5/8      | 50.8<br>2        | 93.7<br>3 11/16  | 830.3<br>32 11/16   | 90.5<br>3 9/16   | 51.30<br>2.020 | 25.4<br>1     | 571.5<br>22 1/2 | 108.0<br>4 1/4   |
| 736.6<br>29        | 101.6<br>4       | 15.9<br>5/8      | 50.8<br>2        | 93.7<br>3 11/16  | 870.0<br>34 1/4     | 90.5<br>3 9/16   | 57.66<br>2.270 | 25.4<br>1     | 584.2<br>23     | 108.0<br>4 1/4   |
| 787.4<br>31        | 101.6<br>4       | 15.9<br>5/8      | 50.8<br>2        | 93.7<br>3 11/16  | 920.8<br>36 1/4     | 90.5<br>3 9/16   | 57.66<br>2.270 | 25.4<br>1     | 616.0<br>24 1/4 | 108.0<br>4 1/4   |
| 835.0<br>32 1/8    | 101.6<br>4       | 15.9<br>5/8      | 50.8<br>2        | 93.7<br>3 11/16  | 979.5<br>38 9/16    | 90.5<br>3 9/16   | 64.01<br>2.520 | 25.4<br>1     | 647.7<br>25 1/2 | 108.0<br>4 1/4   |
| 885.8<br>34 7/8    | 111.1<br>4 3/8   | 15.9<br>5/8      | 50.8<br>2        | 103.2<br>4 1/16  | 1030.3<br>40 9/16   | 100.0<br>3 15/16 | 64.01<br>2.520 | 25.4<br>1     | 666.8<br>26 1/4 | 117.5<br>4 5/8   |
| 933.5<br>36 3/4    | 114.3<br>4 1/2   | 19.1<br>3/4      | 50.8<br>2        | 108<br>4 1/4     | 1092.2<br>43        | 100.0<br>3 15/16 | 64.01<br>2.520 | 25.4<br>1     | 692.2<br>27 1/4 | 117.5<br>4 5/8   |

(1) See page B395 for suggested S-3 shaft limits.

(2) C is outer ring width that may be obtained from bearing dimension tables.

B



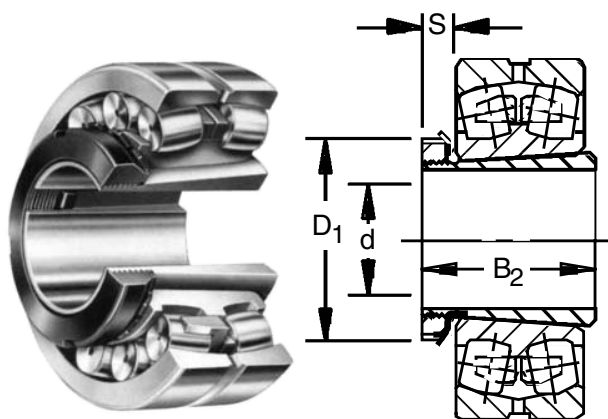


## SPHERICAL ROLLER BEARINGS

### METRIC ADAPTER ACCESSORIES

#### PULL TYPE SLEEVES, LOCKNUTS AND WASHERS TO METRIC STANDARDS

- Sleeve numbers with the prefix "H" are listed in the chart below and are for metric standard shafts. Use metric standard locknuts, indicated by the prefix "KM" on nut number and metric standard washer, indicated by prefix "MB" on washer number.
- Metric standard sleeves are also available with bores to English standard shafts by changing letter prefix designation to "HE".
- Sleeves with bores for American standard shafts are available by using the prefix "HA".



#### EXAMPLES:

**H 316** complete assembly of sleeve with 70 mm bore, locknut and lockwasher

**HE 316** complete assembly of sleeve with 2 3/4 in. bore, locknut and lockwasher

**HA 316** complete assembly of sleeve with 2 11/16 in. bore, locknut and lockwasher

**Note:** Sleeves are not sold as separate units.

| Bearing    |            | Catalog Numbers        |                   |                   | Adapter Dimensions        |       |         |             |                |    |                | Assembly Weight<br>lbs. |
|------------|------------|------------------------|-------------------|-------------------|---------------------------|-------|---------|-------------|----------------|----|----------------|-------------------------|
| Series 222 | Series 231 | Sleeve Assembly Number | Assembly Includes |                   | d Standard Shaft Diameter |       |         |             | B <sub>2</sub> | S  | D <sub>1</sub> |                         |
|            |            |                        | Nut Number        | Lockwasher Number | H                         | HE    | HA      | Tol. +0.000 |                |    |                |                         |
|            |            |                        |                   |                   | mm                        | inch  | inch    | inch        | mm             | mm | mm             |                         |
| 22211K     | —          | H 311                  | KM11              | MB11              | 50                        | 2     | 1 15/16 | -0.004      | 45             | 12 | 75             | 0.7                     |
| 22213K     | —          | H 313                  | KM13              | MB13              | 60                        | 2 1/4 | 2 3/16  | -0.004      | 50             | 14 | 85             | 1.0                     |
| 22215K     | —          | H 315                  | KM15              | MB15              | 65                        | 2 1/2 | 2 7/16  | -0.004      | 55             | 15 | 98             | 1.8                     |
| 22216K     | —          | H 316                  | KM16              | MB16              | 70                        | 2 3/4 | 2 11/16 | -0.004      | 59             | 17 | 105            | 2.2                     |
| 22217K     | —          | H 317                  | KM17              | MB17              | 75                        | 3     | 2 15/16 | -0.004      | 63             | 18 | 110            | 2.6                     |
| 22218K     | —          | H 318                  | KM18              | MB18              | 80                        | 3 1/4 | 3 3/16  | -0.004      | 65             | 18 | 120            | 3.0                     |
| 22219K     | —          | H 319                  | KM19              | MB19              | 85                        | 3 1/4 | 3 5/16  | -0.004      | 68             | 19 | 125            | 3.4                     |
| 22220K     | —          | H 320                  | KM20              | MB20              | 90                        | 3 1/2 | 3 7/16  | -0.004      | 71             | 20 | 130            | 3.7                     |
| 22222K     | 23122K     | H 322                  | KM22              | MB22              | 100                       | 4     | 3 15/16 | -0.004      | 77             | 21 | 145            | 4.8                     |
| 22224K     | 23124K     | H 3124                 | KM24              | MB24              | 110                       | 4 1/4 | 4 3/16  | -0.005      | 88             | 22 | 155            | 5.8                     |
| 22226K     | 23126K     | H 3126                 | KM26              | MB26              | 115                       | 4 1/2 | 4 7/16  | -0.005      | 92             | 23 | 165            | 8.0                     |
| 22228K     | 23128K     | H 3128                 | KM28              | MB28              | 125                       | 5     | 4 15/16 | -0.005      | 97             | 24 | 180            | 9.5                     |
| 22230K     | 23130K     | H 3130                 | KM30              | MB30              | 135                       | 5 1/4 | 5 3/16  | -0.005      | 111            | 26 | 195            | 12.2                    |
| 22232K     | 23132K     | H 3132                 | KM32              | MB32              | 140                       | 5 1/2 | 5 7/16  | -0.005      | 119            | 28 | 210            | 16.9                    |
| 22234K     | 23134K     | H 3134                 | KM34              | MB34              | 150                       | 6     | 5 15/16 | -0.005      | 122            | 29 | 220            | 18.5                    |
| 22236K     | 23136K     | H 3136                 | KM36              | MB36              | 160                       | 6 1/2 | 6 7/16  | -0.005      | 131            | 30 | 230            | 20.9                    |
| 22238K     | 23138K     | H 3138                 | KM38              | MB38              | 170                       | 6 3/4 | 6 15/16 | -0.005      | 141            | 31 | 240            | 23.8                    |
| 22240K     | 23140K     | H 3140                 | KM40              | MB40              | 180                       | 7     | 7 3/16  | -0.005      | 150            | 32 | 250            | 26.7                    |
| 22244K     | 23144K     | H 3144A                | HMS3144           | MS44              | 200                       | —     | 7 15/16 | -0.005      | 158            | 32 | 280            | 33.5                    |

## Spherical Roller Bearing Pillow Blocks

| Bearing    |            | Catalog Numbers        |                   |                   | Adapter Dimensions        |      |         |             |                |    |                | Assembly Weight |
|------------|------------|------------------------|-------------------|-------------------|---------------------------|------|---------|-------------|----------------|----|----------------|-----------------|
|            |            | Sleeve Assembly Number | Assembly Includes |                   | d Standard Shaft Diameter |      |         |             | B <sub>2</sub> | S  | D <sub>1</sub> |                 |
| Series 223 | Series 232 |                        | Nut Number        | Lockwasher Number | H                         | HE   | HA      | Tol. +0.000 |                |    |                | mm              |
|            |            |                        |                   |                   | mm                        | inch | inch    | inch        | mm             | mm | mm             | lbs.            |
| 22308K     | 23208K     | H 2308                 | KM8               | MB8               | 35                        | 1 ¼  | 1 ⅝     | -.003       | 46             | 10 | 58             | 0.4             |
| 22309K     | 23209K     | H 2309                 | KM9               | MB9               | 40                        | 1 ½  | 1 ⅞     | -.003       | 50             | 11 | 65             | 0.6             |
| 22310K     | 23210K     | H 2310                 | KM10              | MB10              | 45                        | 1 ¾  | 1 11/16 | -.003       | 55             | 12 | 70             | 0.8             |
| 22311K     | 23211K     | H 2311                 | KM11              | MB11              | 50                        | 2    | 1 15/16 | -.003       | 59             | 12 | 75             | 0.9             |
| 22313K     | 23213K     | H 2313                 | KM13              | MB13              | 60                        | 2 ¼  | 2 ⅜     | -.004       | 65             | 14 | 85             | 1.2             |
| 22315K     | 23215K     | H 2315                 | KM15              | MB15              | 65                        | 2 ½  | 2 7/16  | -.004       | 73             | 15 | 98             | 2.3             |
| 22316K     | 23216K     | H 2316                 | KM16              | MB16              | 70                        | 2 ¾  | 2 11/16 | -.004       | 78             | 17 | 105            | 2.8             |
| 22317K     | 23217K     | H 2317                 | KM17              | MB17              | 75                        | 3    | 2 15/16 | -.004       | 82             | 18 | 110            | 3.2             |
| 22318K     | 23218K     | H 2318                 | KM18              | MB18              | 80                        | —    | 3 ⅜     | -.004       | 86             | 18 | 120            | 3.7             |
| 22320K     | 23220K     | H 2320                 | KM20              | MB20              | 90                        | 3 ½  | 3 7/16  | -.004       | 97             | 20 | 130            | 4.7             |
| 22322K     | 23222K     | H 2322                 | KM22              | MB22              | 100                       | 4    | 3 15/16 | -.004       | 105            | 21 | 145            | 6.0             |
| 22324K     | 23224K     | H 2324                 | KM24              | MB24              | 110                       | 4 ¼  | 4 ⅜     | -.004       | 112            | 22 | 155            | 7.0             |
| 22326K     | 23226K     | H 2326                 | KM26              | MB26              | 115                       | 4 ½  | 4 7/16  | -.005       | 121            | 23 | 165            | 10.1            |
| 22328K     | 23228K     | H 2328                 | KM28              | MB28              | 125                       | 5    | 4 15/16 | -.005       | 131            | 24 | 180            | 12.2            |
| 22330K     | 23230K     | H 2330                 | KM30              | MB30              | 135                       | 5 ¼  | 5 ⅜     | -.005       | 139            | 26 | 195            | 14.6            |
| 22332K     | 23232K     | H 2332                 | KM32              | MB32              | 140                       | 5 ½  | 5 7/16  | -.005       | 147            | 28 | 210            | 20.2            |
| 22334K     | 23234K     | H 2334                 | KM34              | MB34              | 150                       | 6    | 5 15/16 | -.005       | 154            | 29 | 220            | 22.5            |
| 22336K     | 23236K     | H 2336                 | KM36              | MB36              | 160                       | 6 ½  | 6 7/16  | -.005       | 161            | 30 | 230            | 24.9            |
| 22338K     | 23238K     | H 2338                 | KM38              | MB38              | 170                       | 6 ¾  | 6 15/16 | -.005       | 169            | 31 | 240            | 27.8            |
| 22340K     | 23240K     | H 2340                 | KM40              | MB40              | 180                       | 7    | 7 ⅜     | -.005       | 176            | 32 | 250            | 30.6            |
| —          | 23244K     | H 2344A                | HM44T             | MB44              | 200                       | —    | —       | -.005       | 186            | 35 | 280            | 37.9            |
| —          | 23248K     | H 2348A                | HM48T             | MB48              | 220                       | —    | —       | -.006       | 199            | 37 | 300            | 44.5            |
| —          | 23252K     | H 2352A                | HM52T             | MB52              | 240                       | —    | —       | -.006       | 211            | 39 | 330            | 54.9            |
| —          | 23256K     | H 2356A                | HM56T             | MB56              | 260                       | —    | —       | -.007       | 224            | 41 | 350            | 63.1            |
| —          | 23260K     | H 3260                 | HM3160            | MS3160            | 280                       | —    | —       | -.007       | 240            | 40 | 380            | 75.2            |
| —          | 23264K     | H 3264                 | HM3164            | MS3164            | 300                       | —    | —       | -.007       | 258            | 42 | 400            | 86.7            |

B





## **SPHERICAL ROLLER BEARINGS**



### **NOTES**

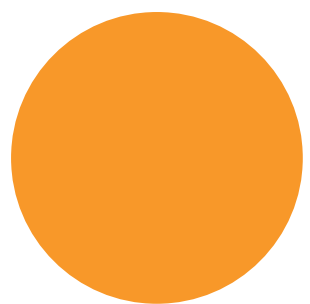
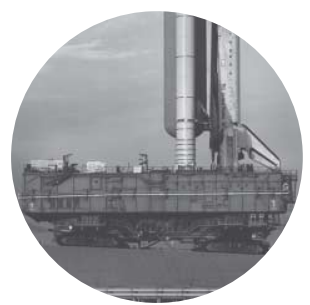
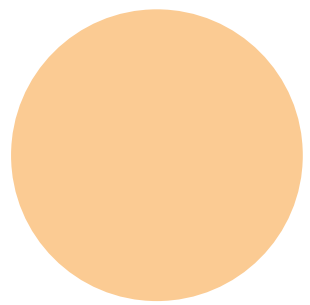
B



## SPHERICAL PLAIN

**Overview:** Timken's spherical plain bearings consist of a spherically ground inner ring housed in a mating outer ring without any rolling elements.

- **Sizes:** 12.7 mm - 600 mm bore (0.5 in. - 23.622 in.).
- **Markets:** Construction, mining, metals, power generation, oils and gas, aggregate, paper and forest products.
- **Applications:** Articulation joints, A-frames, cylinders (steering, lift, tilt, dump), struts, traction bars.
- **Features:** Lubrication grooves and holes, seals to retain lubricant and prevent contamination, special materials available.
- **Benefits:** Can carry radial and axial loads in a small envelope and can accommodate moderate misalignment.





## Spherical Plain Bearings

One, two, or three digit "Series" number.  
*For inch series*, the number indicates the nominal bore size (e.g., 10 is 1.00 in.) or an approximate bore size (e.g., 17 is 1.75 in.).  
*For metric series*, the number indicates the exact bore size (e.g., 40 is 40 mm).

7

SF

**Seal Designator:**  
**TT** reinforced rubber seals  
**SS** synthetic resin seals

12 - SS

**SF** spherical plain type (radial inch); single fractured outer ring  
**SFH** spherical plain type (radial inch); single fractured outer ring, wide inner ring  
**SBB** spherical plain type (radial inch); double fractured outer ring  
**SBT** spherical plain angular contact type (radial inch)  
**FS** spherical plain type (radial metric); single fractured outer ring  
**FSH** spherical plain type (radial metric); single fractured outer ring, wide inner ring

One, two, or three digit number.  
*For inch series*, the number indicates the exact bore size in  $\frac{1}{16}$ ths of an inch (e.g., 12 refers to  $\frac{12}{16}$  in. which is a  $\frac{3}{4}$  in. bore).  
*For metric series*, the number indicates the exact outside diameter size (e.g., 62 is 62 mm).



# Spherical Plain Bearings

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## SPHERICAL PLAIN BEARINGS

### INTRODUCTION

The spherical plain bearing has a spherically shaped inner ring with a ground cylindrical bore for shaft mounting. The cylindrical outer surface of the outer ring permits convenient mounting in a housing.

Spherical plain bearings offer the following advantages:

- High capacity
- Ability to accommodate misalignment
- Superior performance in low frequency oscillating applications
- Simplified housing and shaft design
- Easy installation
- Radial types available with seals

For all types of spherical plain bearings, both the inner and outer rings are manufactured from through-hardened steel and are precision ground.

The dimensional data lists spherical plain bearings successively by larger bore sizes.

Timken also supplies spherical plain bearings made to special designs. These include standard design bearings made with special materials, clearances, and finishes or bearings with special configurations, such as extended inner rings.

B

### GENERAL FEATURES

#### METAL ON METAL BEARINGS

Rings are phosphate treated and coated with molybdenum disulfide ( $MoS_2$ ) to minimize friction of contacting surfaces.

These bearings are available as radial types (SF Series and FS Series) and angular contact thrust (SBT Series).

SF and FS Series include lubrication holes and grooves in both inner and the outer rings to permit relubrication through either the shaft or housing.

SBT angular contact bearings have lubricating holes and grooves in the outer ring for relubrication through the housing.

SF and FS Series are available with integral seals as SF...TT, SF...SS, FS...TT and FS...SS, and incorporate lip seals designed to retain lubricant and protect the spherical surfaces from external contamination.

### BEARING TYPES

#### SF & FS

These bearings are designed primarily to carry radial loads and handle moderate misalignment. The outer ring is usually fractured axially in one place, parallel to its axis, to permit assembly of the bearing rings, which do not have loading slots.

These types can also be supplied with double-fractured outer rings (designation SBB) when this feature is desired for easier assembly in an application.



SF and FS

#### SF...TT, SF...SS, FS...TT, FS...SS

These bearings are dimensionally interchangeable with the SF and FS Series, and have the same general characteristics. However, they also incorporate lip seals.

The seals are securely retained in the outer ring and will withstand high grease pressures during relubrication. Positive retention of the seals assures full distribution of the lubricant to all bearing surfaces. SF...TT and FS...TT incorporate two reinforced nitrile rubber seals. SF...SS and FS...SS are assembled with synthetic resin seals; Operating temperatures of the seals should not exceed 212° F (100° C).



SF and FS

#### SBT & SBDT

These bearings are designed for single direction thrust loading and some misalignment. Inner and outer rings are separable. The raceways are essentially hemispherical, and the rings are designed to provide maximum spherical raceway contact in the axial direction.

The SBDT style is designed for single direction thrust loading while the SBDT style is designed for thrust loading in two directions



SBT



SBDT



## INTERNAL CLEARANCES

Radial internal clearance is defined as the total possible movement of the inner ring relative to the outer ring in a radial direction. Axial internal clearance is the total possible movement of the inner relative to the outer ring in an axial direction.

Radial internal clearances listed for the SF and FS Series are for finish ground, unmounted bearings prior to fracture of the outer ring. The molybdenum disulfide coating reduces this clearance by a maximum of .05 mm (.002 in.). The maximum interference fits using suggested housing and shaft dimensions will maintain a satisfactory minimum internal clearance in the mounted condition, accommodating coating thickness, outer ring compression, and inner ring expansion.

## LOAD RATINGS

### DYNAMIC LOAD RATINGS

#### SF & FS

The dynamic load rating listed in the tables of dimensions is based on a maximum stress level of 85 megapascals (approximately 12,300 psi) between the sliding contact surfaces. It is the maximum load suggested for bearings subjected to intermittent operation with periodic lubrication.

The dynamic load rating is based on the radially projected area of the inner ring bore under the condition where, with the suggested fitting practice and periodic lubrication, rotation normally takes place.

For intermittent loading and operation, the applied radial load should not exceed the dynamic load rating. For constant loading and continuous operation, the applied radial load should not exceed 75 percent of the dynamic load rating. For dynamic or static thrust loading, use 25 percent of the respective radial load rating value should be used. For combined radial and thrust ratings, consult your Timken representative.

#### SBT

The dynamic load rating is based on the same stress levels as SF shown above and is the maximum thrust load suggested for extended life with periodic lubrication. It is based on the axially projected area of the spherical surfaces in contact. Where the shaft shoulder supports high thrust loads, it is suggested that hardened shafts be employed.

### EQUIVALENT THRUST LOAD

#### SBT

For combined radial and thrust loading under intermittent dynamic conditions, the equivalent thrust load ( $T_e$ ) must not exceed the dynamic load rating. For constant loading and continuous operation, the equivalent load ( $T_e$ ), or the axial load (T) when the radial load (R) is zero, must not exceed 70 percent of the dynamic load rating:

$$T_e = T + 1.4R$$

$T_e$  = Equivalent thrust load per bearing

T = Applied thrust load and/or preload

R = Applied radial load per bearing

The limit load rating of all spherical plain bearings listed is the maximum static load that can be applied to the bearing. This load should not be exceeded. The ultimate, or static fracture rating of the bearing is at least 1.5 times the limit load rating.

Shaft and housing stresses should be checked when the applied load approaches the limit load rating since the shaft or housing may then become the critical factor.



## SPHERICAL PLAIN BEARINGS

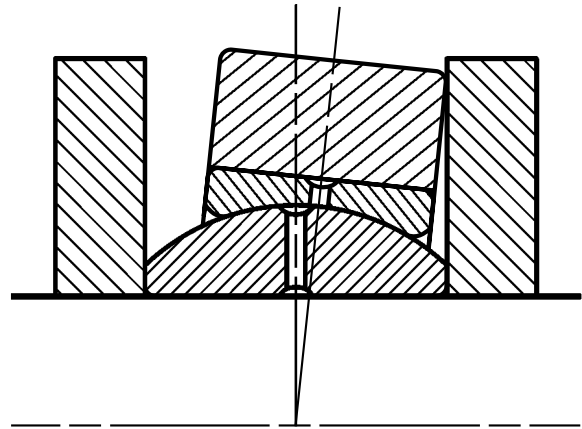
### MISALIGNMENT

In many applications, the degree of misalignment of the radial types of spherical plain bearings is determined by the side clearance between the yoke and the bearing housing as illustrated.

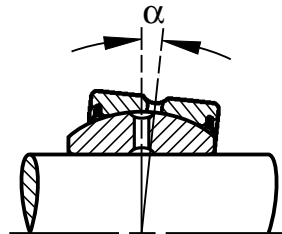
When the bearing is mounted without such restrictions, a larger misalignment can be accommodated:  $\alpha$  is the maximum angle of misalignment for sealed bearings as illustrated. If  $\alpha$  is exceeded, the seal lips will slide off the spherical surface. Seal effectiveness is then lost and damage to the seal lip will occur if contact is made between the seal lip and shaft shoulder.

Greater misalignment under light to medium loads is possible with unsealed plain radial bearings as shown by angle  $\alpha'$ . This requires limiting the shaft shoulder diameter to the suggested dimension ( $d_a$ ) and also requires sufficient side clearance for the outer ring and housing.

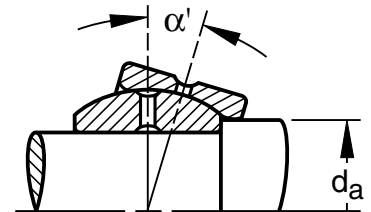
Misalignment greater than  $\alpha'$  reduces the load carrying ability of the radial plain spherical bearings. When extreme misalignment is present, the strength of the shaft in shear and bending should be carefully checked, since the shaft support may be some distance away from the bearing.



Side clearance between yoke and bearing housing

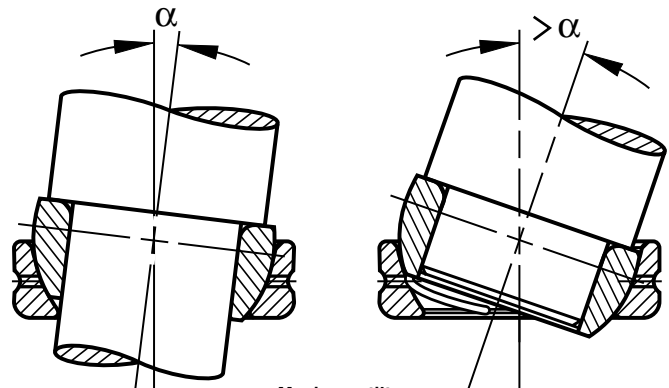


Maximum tilt sealed bearing



Maximum tilt unsealed bearing

Type SBT angular contact bearing permits a tilting angle  $\alpha$  provided the housing shoulder clears the shaft. Such misalignment is limited by the bore of the outer ring touching the through shaft, as shown. A larger angle of misalignment is possible where a stub shaft is used. If the tilting angle exceeds  $\alpha$ , your Timken representative should be consulted for suggestions.



Maximum tilt (provided housing shoulder clears shaft)

## HOUSING DESIGN

The housing should be strong enough to support the loads applied to the bearings without distortion or risk of fatigue damage.

When using a housing of the type illustrated, with a load applied in directions "X" or "Y", the compressive yield strength of the housing material should be greater than the applied load divided by  $(B_a \cdot D)$ .

When the load is applied in direction "Y", the yield strength of the housing in tension should be greater than the applied load times  $K/B_a(D_a-D)$ , where K is a stress concentration factor from Table 1.

The suggested housing bore tolerances closely approximate N7 tolerances. This produces an interference fit that ensures proper rounding of the outer ring. Light metal housings or housings with thin cross sections may require a tighter fit. An interference fit in the housing is also necessary to prevent creeping by the outer ring with resultant wear of the housing bore and shoulder. Split housings should be avoided.

To resist thrust loads, the bearing should be mounted as shown in the mounting details above the table dimensions.

When plain angular contact bearings (SBT) are axially loaded, the housing expands. For proper and safe bearing function, it is vital to provide a substantial section for the housing. If the thrust limit load ratings are applied for these bearings, not only should the section of the housing be generous, but the housing bore diameter ( $d_b$ ) must not be exceeded. This not only supports the thrust load, but strengthens the housing in the radial direction as well.

The suggested housing bore for the Type SBT angular contact bearing produces a tight transition fit.

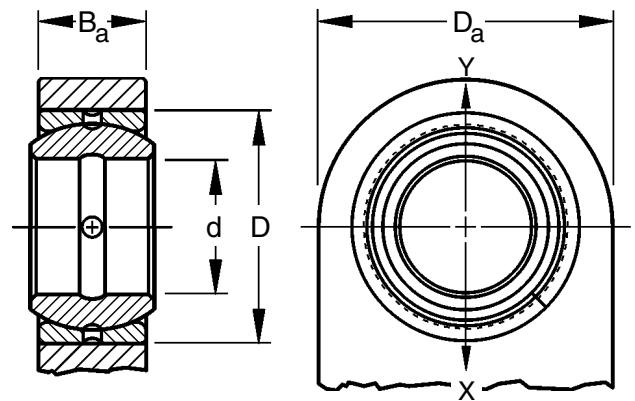
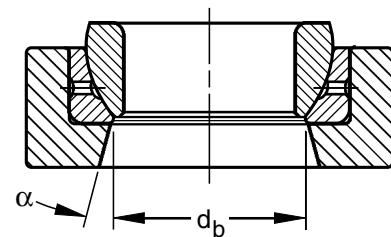


TABLE 1 – STRESS CONCENTRATION FACTOR

| $D_a/D$ | K   | $D_a/D$ | K   | $D_a/D$ | K   |
|---------|-----|---------|-----|---------|-----|
| 1.2     | 1.8 | 1.8     | 2.4 | 3       | 3.7 |
| 1.4     | 2   | 2       | 2.7 | 4       | 4.7 |
| 1.6     | 2.2 | 2.5     | 3.2 | 5       | 5.5 |



Housing section - angular contact bearing

## SHAFT DESIGN

In applications with heavy radial loads, although alignment takes place at the spherical bearing surface, rotation or oscillation normally occurs between the bore of the inner ring and the shaft even though an interference fit may have been used. For this reason, and to facilitate assembly, the shaft dimensions listed in the tables should be used.

To obtain satisfactory performance with heavy loads or under abrasive conditions, the shaft should be hardened to 655 VPN or 58 HRC minimum. Additionally, the shaft should have sufficient strength to withstand the applied loads in both shear and bending. The surface finish of the bearing seat should not exceed 0.8 micrometers or 32 microinches (on the Ra scale). The shaft should always be supported as close to the inner ring as possible to minimize bending.

When the loads are light, it is possible to prevent rotation between the inner ring and shaft by using an ISO m6 shaft tolerance or by clamping across the inner ring. Under these conditions, a fully hardened shaft is not necessary.

When the bearing is loaded axially, the load is transmitted between the end face of the inner ring and the adjacent shaft shoulder. The shoulder surface must be of sufficient strength and hardness not to deform permanently under load. If the inner ring is to rotate, the finish of this surface should not exceed 0.8 micrometers or 32 microinches (on the Ra scale).



## SPHERICAL PLAIN BEARINGS

### LUBRICATION (SF, FS, SBT)

The dry film lubricant (MoS<sub>2</sub>) is sufficient for static applications and for relatively short periods of dynamic operation.

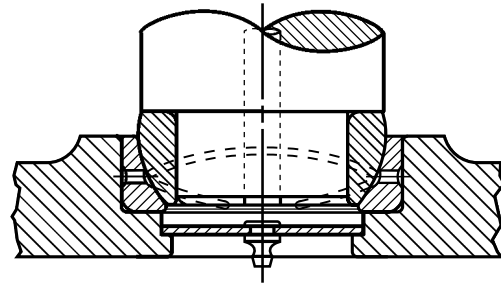
The bonds between the rings and MoS<sub>2</sub> coating may be destroyed by any fluid including oils, greases and water. Any abrasive material present on the dynamic bearing surfaces will ruin the MoS<sub>2</sub> coating. If the bearing is subjected to such operating or environmental conditions, it is necessary to relubricate frequently.

The radial bearings, both with and without seals, have lubricating holes and grooves in both the inner and outer rings, permitting relubrication through either the shaft or the housing.

The angular contact bearings have lubricating holes and grooves in the outer ring for relubrication through the bearing housing. The lubrication grooves in the spherical bore of the outer ring traverse a pattern designed to provide effective lubrication. These grooves extend into the small bore of the ring, permitting relubrication through the end of the housing as illustrated.

The relubrication cycle will depend on the magnitude of the load, frequency and amplitude of oscillation, environmental conditions and the effectiveness of the sealing used to exclude foreign materials from the bearing surfaces.

If bearings are relubricated, the dynamic load rating depends on the film strength of the added lubricant. High quality EP greases are suggested for best results.



SBT – Relubricatable mounting

### TEMPERATURE

Spherical plain bearings without seals will operate satisfactorily up to temperatures of 392° F (200° C). For operation at greater temperatures, special materials and lubricants will be required. Operating temperatures for sealed bearings should not exceed 212° F (100° C).

### SHAFT FITS

- The shaft diameters listed in the dimension tables show the suggested fits for normal service.
- The table below is to be used only for applications where a shaft interference fit is required. Consult your Timken representative for suggestions.

#### (SF, SFH, FS, FSH, SBT) BEARINGS,

#### Shaft Diameter Tolerance for Interference Fit for Inch and Metric Series

| Bore Diameter, d |       |        |        | Shaft Tolerance<br>m6 |        |         |         |
|------------------|-------|--------|--------|-----------------------|--------|---------|---------|
| mm               |       | inch   |        | mm                    |        | inch    |         |
| over             | incl. | over   | incl.  | high                  | low    | high    | low     |
| 10               | 18    | 0.3937 | 0.7087 | +0.018                | +0.007 | +0.0007 | +0.0003 |
| 18               | 30    | 0.7087 | 1.1811 | +0.021                | +0.008 | +0.0008 | +0.0003 |
| 30               | 50    | 1.1811 | 1.9685 | +0.025                | +0.009 | +0.0010 | +0.0004 |
| 50               | 80    | 1.9685 | 3.1496 | +0.030                | +0.011 | +0.0012 | +0.0005 |
| 80               | 120   | 3.1496 | 4.7244 | +0.035                | +0.013 | +0.0014 | +0.0005 |
| 120              | 180   | 4.7244 | 7.0866 | +0.040                | +0.015 | +0.0016 | +0.0006 |
| 180              | 250   | 7.0866 | 9.8425 | +0.046                | +0.017 | +0.0018 | +0.0007 |

**TOLERANCES**

- Tolerances on pages B412-B420 list the nominal bearing dimensions.
- Tolerances for these dimensions are listed in Tables 1 through 4. They are expressed as variances from nominal.
- Metric-inch conversions are shown in the following tables.

**TABLE 1 INNER RING (FS, FSH) BEARINGS, METRIC SERIES**

| Bore Diameter, d |       |        |         | Single Mean Bore Diameter, $d_{mp}^{(1)}$ |        |      |         | Width, B1 |       |      |        |
|------------------|-------|--------|---------|-------------------------------------------|--------|------|---------|-----------|-------|------|--------|
| mm               |       | inch   |         | mm                                        |        | inch |         | mm        |       | in.  |        |
| over             | incl. | over   | incl.   | high                                      | low    | high | low     | high      | low   | high | low    |
| 10               | 18    | 0.3937 | 0.7087  | +0                                        | -0.008 | +0   | -0.0003 | +0        | -0.12 | +0   | -0.005 |
| 18               | 30    | 0.7087 | 1.1811  | +0                                        | -0.010 | +0   | -0.0004 | +0        | -0.12 | +0   | -0.005 |
| 30               | 50    | 1.1811 | 1.9685  | +0                                        | -0.012 | +0   | -0.0005 | +0        | -0.12 | +0   | -0.005 |
| 50               | 80    | 1.9685 | 3.1496  | +0                                        | -0.015 | +0   | -0.0006 | +0        | -0.15 | +0   | -0.006 |
| 80               | 120   | 3.1496 | 4.7244  | +0                                        | -0.020 | +0   | -0.0008 | +0        | -0.20 | +0   | -0.008 |
| 120              | 180   | 4.7244 | 7.0866  | +0                                        | -0.025 | +0   | -0.0010 | +0        | -0.25 | +0   | -0.010 |
| 180              | 250   | 7.0866 | 9.8425  | +0                                        | -0.030 | +0   | -0.0012 | +0        | -0.30 | +0   | -0.012 |
| 250              | 315   | 9.8425 | 12.4015 | +0                                        | -0.035 | +0   | -0.0014 | +0        | -0.35 | +0   | -0.014 |

<sup>(1)</sup> "Single Mean Diameter" is defined as the mean diameter in a single radial plane.

**TABLE 2 OUTER RING (FS, FSH) BEARINGS, METRIC SERIES**

| Outside Diameter, D |       |         |         | Single Mean Outside Diameter, $D_{mp}^{(2)}$ |        |      |         | Width, B |       |      |        |
|---------------------|-------|---------|---------|----------------------------------------------|--------|------|---------|----------|-------|------|--------|
| mm                  |       | inch    |         | mm                                           |        | inch |         | mm       |       | in.  |        |
| over                | incl. | over    | incl.   | high                                         | low    | high | low     | high     | low   | high | low    |
| 18                  | 30    | 0.7087  | 1.1811  | +0                                           | -0.009 | +0   | -0.0004 | +0       | -0.24 | +0   | -0.009 |
| 30                  | 50    | 1.1811  | 1.9685  | +0                                           | -0.011 | +0   | -0.0004 | +0       | -0.24 | +0   | -0.009 |
| 50                  | 80    | 1.9685  | 3.1496  | +0                                           | -0.013 | +0   | -0.0005 | +0       | -0.30 | +0   | -0.012 |
| 80                  | 120   | 3.1496  | 4.7244  | +0                                           | -0.015 | +0   | -0.0006 | +0       | -0.40 | +0   | -0.016 |
| 120                 | 150   | 4.7244  | 5.9055  | +0                                           | -0.018 | +0   | -0.0007 | +0       | -0.50 | +0   | -0.020 |
| 150                 | 180   | 5.9055  | 7.0866  | +0                                           | -0.025 | +0   | -0.0010 | +0       | -0.50 | +0   | -0.020 |
| 180                 | 250   | 7.0866  | 9.8425  | +0                                           | -0.030 | +0   | -0.0012 | +0       | -0.60 | +0   | -0.024 |
| 250                 | 315   | 9.8425  | 12.4015 | +0                                           | -0.035 | +0   | -0.0014 | +0       | -0.70 | +0   | -0.028 |
| 315                 | 400   | 12.4015 | 15.7480 | +0                                           | -0.040 | +0   | -0.0016 | +0       | -0.80 | +0   | -0.031 |
| 400                 | 500   | 15.7480 | 19.6850 | +0                                           | -0.045 | +0   | -0.0018 | +0       | -0.90 | +0   | -0.035 |

<sup>(2)</sup> Tolerances apply before coating with MoS<sub>2</sub> and fracturing outer ring. "Single Mean Diameter" is defined as the mean diameter in a single radial plane.

**TABLE 3 INNER RING (SF, SFH, SBT, SBDT) BEARINGS, INCH SERIES**

| Bore Diameter, d |         |        |        | Single Mean Bore Diameter, $d_{mp}^{(1)}$ |        |      |         | Width, B1 |       |      |        |
|------------------|---------|--------|--------|-------------------------------------------|--------|------|---------|-----------|-------|------|--------|
| mm               |         | inch   |        | mm                                        |        | inch |         | mm        |       | in.  |        |
| over             | incl.   | over   | incl.  | high                                      | low    | high | low     | high      | low   | high | low    |
| 11.112           | 50.800  | 0.4375 | 2.0000 | +0                                        | -0.013 | +0   | -0.0005 | +0        | -0.13 | +0   | -0.005 |
| 50.800           | 76.200  | 2.0000 | 3.0000 | +0                                        | -0.015 | +0   | -0.0006 | +0        | -0.13 | +0   | -0.005 |
| 76.200           | 120.650 | 3.0000 | 4.7500 | +0                                        | -0.020 | +0   | -0.0008 | +0        | -0.13 | +0   | -0.005 |
| 120.6500         | 152.400 | 4.7500 | 6.0000 | +0                                        | -0.025 | +0   | -0.0010 | +0        | -0.13 | +0   | -0.005 |

<sup>(1)</sup> "Single Mean Diameter" is defined as the mean diameter in a single radial plane.

**TABLE 4 OUTER RING (SF, SFH, SBT, SBDT) BEARINGS, INCH SERIES**

| Outside Diameter, D |         |        |        | Single Mean Outside Diameter, $D_{mp}^{(2)}$ |        |      |         | Width, B |       |      |        |
|---------------------|---------|--------|--------|----------------------------------------------|--------|------|---------|----------|-------|------|--------|
| mm                  |         | inch   |        | mm                                           |        | inch |         | mm       |       | in.  |        |
| over                | incl.   | over   | incl.  | high                                         | low    | high | low     | high     | low   | high | low    |
| 20.638              | 50.800  | 0.8125 | 2.0000 | +0                                           | -0.013 | +0   | -0.0005 | +0       | -0.13 | 0    | -0.005 |
| 50.800              | 80.962  | 2.0000 | 3.1875 | +0                                           | -0.015 | +0   | -0.0006 | +0       | -0.13 | 0    | -0.005 |
| 80.962              | 120.650 | 3.1875 | 4.7500 | +0                                           | -0.020 | +0   | -0.0008 | +0       | -0.13 | 0    | -0.005 |
| 120.650             | 177.800 | 4.7500 | 7.0000 | +0                                           | -0.025 | +0   | -0.0010 | +0       | -0.13 | 0    | -0.005 |
| 177.800             | 222.250 | 7.0000 | 8.7500 | +0                                           | -0.030 | +0   | -0.0012 | +0       | -0.13 | 0    | -0.005 |

<sup>(2)</sup> Tolerances apply before coating with MoS<sub>2</sub> and fracturing outer ring. "Single Mean Diameter" is defined as the mean diameter in a single radial plane.





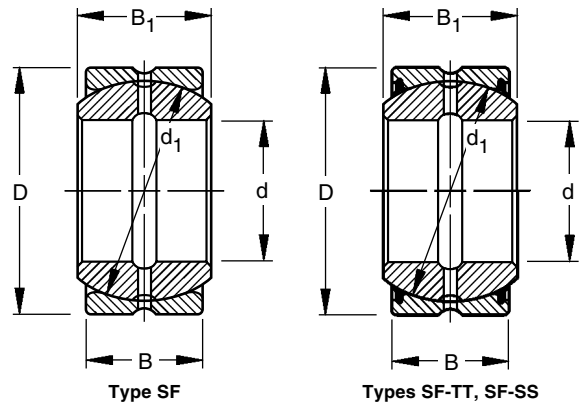
# SPHERICAL PLAIN BEARINGS

## RADIAL BEARINGS TYPE SF

B

- Unit assembly consisting of a solid, spherical O.D. inner ring and a spherical I.D. outer ring.
- Outer ring has a single fracture to permit assembly.
- Both inner and outer rings are phosphate treated and then coated with molybdenum disulphide (MoS<sub>2</sub>).
- Bearings 7SF12 through 50SBB80 are available with reinforced rubber seals. To order, add suffix “-TT” to bearing designation – Example: 25SF40-TT.
- Bearings 27SF44 through 608BB96 are available with synthetic resin seals. To order, add suffix “-SS” to bearing designation – Example: 27SF44-SS.
- Before ordering any bearing, check for availability.
- Metric-inch conversions have been included. The controlling dimensions are in inches.
- For tolerances, see Tables 3 and 4. Dimensions listed are after the bearing has been coated with molybdenum disulphide.

- The axial internal clearance is approximately three times the radial internal clearance.
- $\alpha$  is the maximum tilting angle for sealed radial bearings. To utilize the maximum tilting angle  $\alpha$  for unsealed radial bearings, the suggested shaft shoulder diameter,  $d_a$ , shown in the drawing on the facing page, must not be exceeded.
- Dimensions and locations of lubrication holes and grooves may be obtained from your Timken representative.



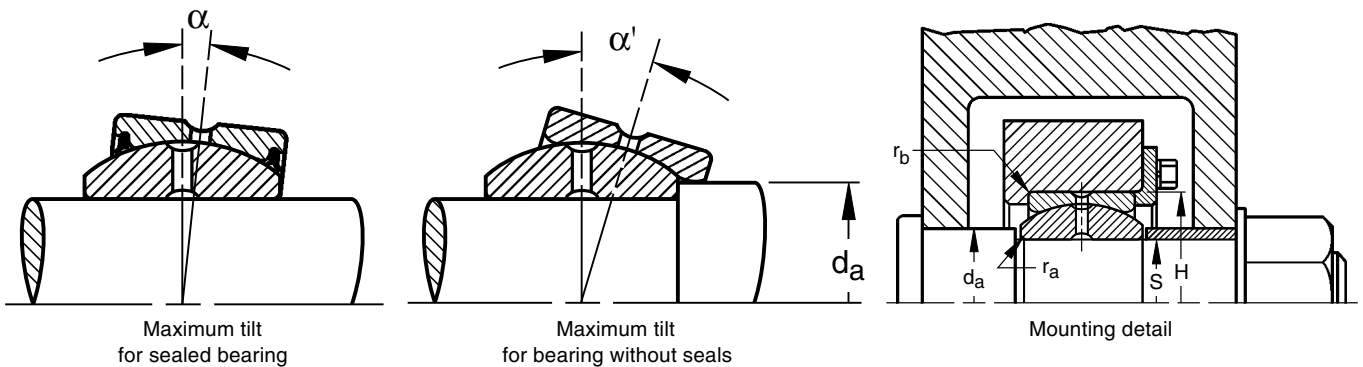
### DIMENSIONS - LOAD RATINGS

| Bearing Number | Bore d  |        | Outside Diameter D |        | Inner Ring Width B <sub>1</sub> |       | Outer ring Width B |       | Spherical Diameter d <sub>1</sub><br>(Ref.) | Radial Clearance* (unmounted) |       |       |      | Load Ratings | Dynamic |                    |
|----------------|---------|--------|--------------------|--------|---------------------------------|-------|--------------------|-------|---------------------------------------------|-------------------------------|-------|-------|------|--------------|---------|--------------------|
|                | mm      | in.    | mm                 | in.    | mm                              | in.   | mm                 | in.   |                                             | mm                            | in.   | min.  | max. | min.         | max.    | Radial Load Rating |
| 5SF8           | 12.700  | 0.5000 | 22.225             | 0.8750 | 11.10                           | 0.437 | 9.52               | 0.375 | 18.26                                       | 0.719                         | 0.004 | 0.008 | 0.10 | 0.20         | 8330    | 2690               |
| 6SF10          | 15.875  | 0.6250 | 26.988             | 1.0625 | 13.89                           | 0.547 | 11.91              | 0.469 | 22.83                                       | 0.899                         | 0.004 | 0.008 | 0.10 | 0.20         | 13000   | 4200               |
| 7SF12          | 19.050  | 0.7500 | 31.750             | 1.2500 | 16.66                           | 0.656 | 14.27              | 0.562 | 27.43                                       | 1.080                         | 0.005 | 0.009 | 0.13 | 0.23         | 18700   | 6070               |
| 8SF14          | 22.225  | 0.8750 | 36.512             | 1.4375 | 19.43                           | 0.765 | 16.66              | 0.656 | 31.95                                       | 1.258                         | 0.005 | 0.009 | 0.13 | 0.23         | 25500   | 8250               |
| 10SF16         | 25.400  | 1.0000 | 41.275             | 1.6250 | 22.22                           | 0.875 | 19.05              | 0.750 | 36.50                                       | 1.437                         | 0.005 | 0.009 | 0.13 | 0.23         | 33300   | 10800              |
| 12SF20         | 31.750  | 1.2500 | 50.800             | 2.0000 | 27.76                           | 1.093 | 23.80              | 0.937 | 45.59                                       | 1.795                         | 0.005 | 0.009 | 0.13 | 0.23         | 52000   | 16800              |
| 13SF22         | 34.925  | 1.3750 | 55.562             | 2.1875 | 30.15                           | 1.187 | 26.19              | 1.031 | 49.20                                       | 1.937                         | 0.005 | 0.009 | 0.13 | 0.23         | 61300   | 20100              |
| 15SF24         | 38.100  | 1.5000 | 61.912             | 2.4375 | 33.32                           | 1.312 | 28.58              | 1.125 | 54.74                                       | 2.155                         | 0.005 | 0.009 | 0.13 | 0.23         | 75000   | 24300              |
| 17SF28         | 44.450  | 1.7500 | 71.438             | 2.8125 | 38.89                           | 1.531 | 33.32              | 1.312 | 63.88                                       | 2.515                         | 0.005 | 0.009 | 0.13 | 0.23         | 102000  | 33000              |
| 20SF32         | 50.800  | 2.0000 | 80.962             | 3.1875 | 44.45                           | 1.750 | 38.10              | 1.500 | 73.02                                       | 2.875                         | 0.005 | 0.009 | 0.13 | 0.23         | 133000  | 43200              |
| 22SF36         | 57.150  | 2.2500 | 90.488             | 3.5625 | 50.01                           | 1.969 | 42.85              | 1.687 | 82.17                                       | 3.235                         | 0.006 | 0.010 | 0.15 | 0.25         | 169000  | 54600              |
| 25SF40         | 63.500  | 2.5000 | 100.012            | 3.9375 | 55.55                           | 2.187 | 47.62              | 1.875 | 91.19                                       | 3.590                         | 0.006 | 0.010 | 0.15 | 0.25         | 208000  | 67400              |
| 27SF44         | 69.850  | 2.7500 | 111.125            | 4.3750 | 61.11                           | 2.406 | 52.37              | 2.062 | 100.33                                      | 3.950                         | 0.006 | 0.010 | 0.15 | 0.25         | 252000  | 81600              |
| 30SF48         | 76.200  | 3.0000 | 120.650            | 4.7500 | 66.68                           | 2.625 | 57.15              | 2.250 | 109.52                                      | 4.312                         | 0.006 | 0.010 | 0.15 | 0.25         | 300000  | 97100              |
| 32SF52         | 82.550  | 3.2500 | 130.175            | 5.1250 | 72.24                           | 2.844 | 61.90              | 2.437 | 118.74                                      | 4.675                         | 0.007 | 0.011 | 0.18 | 0.28         | 353000  | 114000             |
| 35SF56         | 88.900  | 3.5000 | 139.700            | 5.5000 | 77.77                           | 3.062 | 66.68              | 2.625 | 128.02                                      | 5.040                         | 0.007 | 0.011 | 0.18 | 0.28         | 410000  | 132000             |
| 37SF60         | 95.250  | 3.7500 | 149.225            | 5.8750 | 83.34                           | 3.281 | 71.42              | 2.812 | 136.91                                      | 5.390                         | 0.007 | 0.011 | 0.18 | 0.28         | 467000  | 152000             |
| 40SF64         | 101.600 | 4.0000 | 158.750            | 6.2500 | 88.90                           | 3.500 | 76.20              | 3.000 | 146.05                                      | 5.750                         | 0.007 | 0.011 | 0.18 | 0.28         | 533000  | 173000             |
| 45SBB72        | 114.300 | 4.5000 | 177.800            | 7.0000 | 100.00                          | 3.937 | 85.72              | 3.375 | 164.46                                      | 6.475                         | 0.007 | 0.011 | 0.18 | 0.28         | 673000  | 218000             |
| 50SBB80        | 127.000 | 5.0000 | 196.850            | 7.7500 | 111.13                          | 4.375 | 95.25              | 3.750 | 182.63                                      | 7.190                         | 0.007 | 0.011 | 0.18 | 0.28         | 833000  | 270000             |
| 60SBB96        | 152.400 | 6.0000 | 222.250            | 8.7500 | 120.65                          | 4.750 | 104.78             | 4.125 | 207.16                                      | 8.156                         | 0.007 | 0.011 | 0.18 | 0.28         | 1050000 | 351000             |

\* Prior to coating with MoS<sub>2</sub> and fracturing outer ring.

**MOUNTING**

- Housing bore dimensions listed below are applicable to bearings mounted in steel.
- Because of fracturing, the outer ring may be slightly out-of-round.
- Roundness will be restored when the bearing is mounted in a housing of sufficient cross section.
- Preferred shaft and housing bore dimensions are listed below.
- Refer to the m6 tolerance limits per ANSI B4.1 in the Shaft Diameter Tolerance table on page B410 for a shaft interference fit.



**MOUNTING DIMENSIONS**

| Weight    |        | Tilting Angle |           | Shaft Shoulder Diameter $d_a$ |      | Shaft Fillet Radius* $r_a^\dagger$ (Max.) |       | Housing Fillet Radius $r_b^\ddagger$ (Max.) |       | Shaft Diameter S |         |        |        | Housing Bore H |         |        |        |
|-----------|--------|---------------|-----------|-------------------------------|------|-------------------------------------------|-------|---------------------------------------------|-------|------------------|---------|--------|--------|----------------|---------|--------|--------|
| (Approx.) |        | $\alpha$      | $\alpha'$ |                               |      |                                           |       |                                             |       | mm               |         | in.    |        | mm             |         | in.    |        |
| kg        | lbs.   | deg.          | deg.      | mm                            | in.  | mm                                        | in.   | mm                                          | in.   | max.             | min.    | max.   | min.   | max.           | min.    | min.   | max.   |
| 0.020     | 0.044  | 5.5           | 14        | 14.3                          | 0.56 | *                                         | *     | 0.6                                         | 0.022 | 12.695           | 12.685  | 0.4998 | 0.4994 | 22.197         | 22.217  | 0.8739 | 0.8747 |
| 0.036     | 0.079  | 6             | 14        | 17.8                          | 0.70 | *                                         | *     | 0.8                                         | 0.032 | 15.870           | 15.860  | 0.6248 | 0.6244 | 26.960         | 26.980  | 1.0614 | 1.0622 |
| 0.057     | 0.126  | 6             | 14.5      | 21.4                          | 0.84 | *                                         | *     | 0.8                                         | 0.032 | 19.042           | 19.029  | 0.7497 | 0.7492 | 31.717         | 31.742  | 1.2487 | 1.2497 |
| 0.087     | 0.193  | 6             | 14.5      | 25.0                          | 0.98 | *                                         | *     | 0.8                                         | 0.032 | 22.217           | 22.204  | 0.8747 | 0.8742 | 36.479         | 36.504  | 1.4362 | 1.4372 |
| 0.125     | 0.276  | 6             | 14.5      | 28.6                          | 1.12 | *                                         | *     | 0.8                                         | 0.032 | 25.392           | 25.379  | 0.9997 | 0.9992 | 41.242         | 41.267  | 1.6237 | 1.6247 |
| 0.234     | 0.516  | 6             | 14.5      | 35.7                          | 1.41 | *                                         | *     | 0.8                                         | 0.032 | 31.740           | 31.725  | 1.2496 | 1.2490 | 50.762         | 50.792  | 1.9985 | 1.9997 |
| 0.349     | 0.770  | 5.5           | 14        | 38.9                          | 1.53 | *                                         | *     | 0.8                                         | 0.032 | 34.915           | 34.900  | 1.3746 | 1.3740 | 55.524         | 55.554  | 2.1860 | 2.1872 |
| 0.424     | 0.934  | 6             | 14.5      | 43.3                          | 1.70 | *                                         | *     | 0.8                                         | 0.032 | 38.090           | 38.075  | 1.4996 | 1.4990 | 61.874         | 61.904  | 2.4360 | 2.4372 |
| 0.649     | 1.430  | 6             | 15.5      | 50.0                          | 1.97 | *                                         | *     | 0.8                                         | 0.032 | 44.440           | 44.425  | 1.7496 | 1.7490 | 71.399         | 71.429  | 2.8110 | 2.8122 |
| 0.939     | 2.070  | 6             | 15.5      | 57.2                          | 2.25 | *                                         | *     | 0.8                                         | 0.032 | 50.790           | 50.772  | 1.9996 | 1.9989 | 80.914         | 80.950  | 3.1856 | 3.1870 |
| 1.324     | 2.920  | 6             | 14        | 65.1                          | 2.56 | *                                         | *     | 0.8                                         | 0.032 | 57.140           | 57.122  | 2.2496 | 2.2489 | 90.439         | 90.475  | 3.5606 | 3.5620 |
| 1.855     | 4.090  | 6             | 14        | 72.2                          | 2.84 | *                                         | *     | 0.8                                         | 0.032 | 63.490           | 63.472  | 2.4996 | 2.4989 | 99.964         | 100.000 | 3.9356 | 3.9370 |
| 2.440     | 5.380  | 6             | 12        | 79.4                          | 3.12 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 69.840           | 69.822  | 2.7496 | 2.7489 | 111.077        | 111.113 | 4.3731 | 4.3745 |
| 3.116     | 6.870  | 6             | 12        | 86.5                          | 3.41 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 76.190           | 76.172  | 2.9996 | 2.9989 | 120.594        | 120.635 | 4.7478 | 4.7494 |
| 3.914     | 8.630  | 6             | 12        | 94.1                          | 3.70 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 82.537           | 82.514  | 3.2495 | 3.2486 | 130.119        | 130.160 | 5.1228 | 5.1244 |
| 4.853     | 10.700 | 6             | 12        | 101.0                         | 3.97 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 88.887           | 88.864  | 3.4995 | 3.4986 | 139.644        | 139.685 | 5.4978 | 5.4994 |
| 5.897     | 13.000 | 6             | 12        | 108.0                         | 4.25 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 95.237           | 95.214  | 3.7495 | 3.7486 | 149.169        | 149.210 | 5.8728 | 5.8744 |
| 7.076     | 15.600 | 6             | 11.5      | 116.0                         | 4.56 | 0.6                                       | 0.022 | 0.8                                         | 0.032 | 101.587          | 101.564 | 3.9995 | 3.9986 | 158.694        | 158.735 | 6.2478 | 6.2494 |
| 9.934     | 21.900 | 6             | 12        | 130.0                         | 5.12 | 0.8                                       | 0.032 | 1.1                                         | 0.044 | 114.287          | 114.264 | 4.4995 | 4.4986 | 177.744        | 177.785 | 6.9978 | 6.9994 |
| 13.472    | 29.700 | 6             | 12        | 144.0                         | 5.69 | 0.8                                       | 0.032 | 1.1                                         | 0.044 | 126.985          | 126.960 | 4.9994 | 4.9984 | 196.784        | 196.830 | 7.7474 | 7.7492 |
| 17.600    | 38.800 | 5             | 10.5      | 168.0                         | 6.59 | 0.8                                       | 0.032 | 1.1                                         | 0.044 | 152.385          | 152.360 | 5.9994 | 5.9984 | 222.184        | 222.230 | 8.7474 | 8.7492 |

\* For bearing sizes 5SF8 through 25SF40, shaft and shoulder should be undercut to eliminate fillet.

† Equal to minimum inner ring bore chamfer.

‡ Equal to minimum outer ring O.D. chamfer.

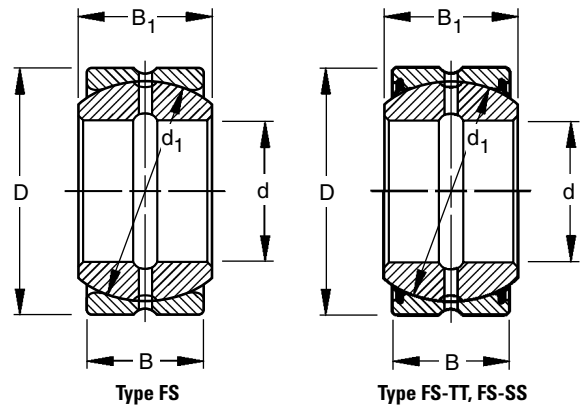


# SPHERICAL PLAIN BEARINGS

## RADIAL BEARINGS TYPE FS

- Type FS spherical plain radial bearing is a unit assembly consisting of a solid, spherical O.D. inner ring and a spherical I.D. outer ring.
- The outer ring has a single fracture to permit assembly. Both inner and outer rings are phosphate treated and then coated with molybdenum disulphide (MoS<sub>2</sub>).
- Bearings 16FS30 through 60FS90 are available with reinforced rubber seals. To order, add suffix "TT" to bearing designation - Example: 16FS30-TT.
- Bearings 70FS105 through 300FS430 are available with synthetic resin seals. To order, add suffix "SS" to bearing designation - Example: 70FS105-SS.
- Before ordering any bearing, check for availability.
- Type FS bearings are a metric series which follows proposed International Standards Organization (ISO) standards. Metric-Inch conversions given are for the convenience of the user. The controlling dimensions are in millimeters.

- For tolerances of nominal dimensions see the tables 1 and 2 on page B411. Dimensions listed are before coating with molybdenum disulphide. The axial internal clearance is approximately three times the radial internal clearance.
- $\alpha$  is the maximum tilting angle for sealed radial bearings. To utilize the maximum tilting angle for unsealed radial bearings the suggested shaft shoulder diameter  $d_{a1}$  shown in the drawing on facing page must not be exceeded.
- Dimensions and locations of lubrication holes and grooves may be obtained from your Timken representative.



### DIMENSIONS - LOAD RATINGS

| Bearing Number | Bore d |         | Outside Diameter D |         | Inner Ring Width B <sub>1</sub> |       | Outer ring Width B |       | Spherical Diameter d <sub>1</sub> |        | Radial Clearance* (unmounted) |      |      |      | Radial Load Rating | Dynamic Radial Load Rating |         |        |
|----------------|--------|---------|--------------------|---------|---------------------------------|-------|--------------------|-------|-----------------------------------|--------|-------------------------------|------|------|------|--------------------|----------------------------|---------|--------|
|                | mm     | in.     | mm                 | in.     | mm                              | in.   | mm                 | in.   | mm                                | in.    | mm                            | in.  | min. | max. | min.               | max.                       | lbf.    | lbf.   |
| 12FS22         | 12     | .4724   | 22                 | 0.8661  | 10                              | .394  | 7                  | .276  | 19                                | .748   | 0.10                          | 0.22 | .004 | .009 |                    |                            | 8630    | 2290   |
| 14FS26         | 14     | .5512   | 26                 | 1.0236  | 12                              | .472  | 9                  | .354  | 22                                | .866   | 0.10                          | 0.22 | .004 | .009 |                    |                            | 11600   | 3210   |
| 16FS30         | 16     | .6300   | 30                 | 1.1811  | 14                              | .551  | 10                 | .394  | 25                                | .984   | 0.10                          | 0.22 | .004 | .009 |                    |                            | 14400   | 4280   |
| 20FS35         | 20     | .7874   | 35                 | 1.3780  | 16                              | .630  | 12                 | .472  | 30                                | 1.181  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 21500   | 6110   |
| 24FS42         | 24     | .9449   | 42                 | 1.6142  | 20                              | .787  | 16                 | .630  | 36                                | 1.417  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 31000   | 9170   |
| 30FS47         | 30     | 1.1811  | 47                 | 1.8504  | 22                              | .866  | 18                 | .709  | 41                                | 1.614  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 40200   | 12600  |
| 35FS55         | 35     | 1.3780  | 55                 | 2.1654  | 25                              | .984  | 20                 | .787  | 48                                | 1.890  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 55100   | 16700  |
| 40FS62         | 40     | 1.5748  | 62                 | 2.4409  | 28                              | 1.102 | 22                 | .866  | 55                                | 2.165  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 72300   | 21400  |
| 45FS68         | 45     | 1.7717  | 68                 | 2.6772  | 32                              | 1.260 | 25                 | .984  | 60                                | 2.362  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 86100   | 27500  |
| 50FS75         | 50     | 1.9685  | 79                 | 2.9528  | 35                              | 1.378 | 28                 | 1.102 | 67                                | 2.638  | 0.12                          | 0.24 | .005 | .010 |                    |                            | 107000  | 33400  |
| 60FS90         | 60     | 2.3622  | 90                 | 3.5433  | 44                              | 1.732 | 36                 | 1.417 | 81                                | 3.150  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 157000  | 50400  |
| 70FS105        | 70     | 2.7559  | 105                | 4.1339  | 49                              | 1.929 | 40                 | 1.575 | 94                                | 3.701  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 211000  | 65500  |
| 80FS120        | 80     | 3.1496  | 120                | 4.7244  | 55                              | 2.165 | 45                 | 1.772 | 107                               | 4.213  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 274000  | 84100  |
| 90FS130        | 90     | 3.5433  | 130                | 5.1181  | 60                              | 2.362 | 50                 | 1.968 | 117                               | 4.606  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 327000  | 103000 |
| 100FS150       | 100    | 3.9370  | 150                | 5.9055  | 70                              | 2.756 | 55                 | 2.165 | 134                               | 5.276  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 429000  | 134000 |
| 110FS160       | 110    | 4.3307  | 160                | 6.2992  | 70                              | 2.756 | 55                 | 2.165 | 143                               | 5.630  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 489000  | 147000 |
| 120FS180       | 120    | 4.7244  | 180                | 7.0866  | 85                              | 3.346 | 70                 | 2.756 | 160                               | 6.299  | 0.14                          | 0.26 | .006 | .011 |                    |                            | 612000  | 195000 |
| 140FS210       | 140    | 5.5118  | 210                | 8.2677  | 90                              | 3.543 | 70                 | 2.756 | 187                               | 7.362  | 0.16                          | 0.28 | .006 | .011 |                    |                            | 836000  | 241000 |
| 160FS230       | 160    | 6.2992  | 230                | 9.0551  | 105                             | 4.134 | 80                 | 3.150 | 206                               | 8.110  | 0.16                          | 0.28 | .006 | .011 |                    |                            | 1020000 | 321000 |
| 180FS260       | 180    | 7.0866  | 260                | 10.2362 | 105                             | 4.134 | 80                 | 3.150 | 234                               | 9.213  | 0.16                          | 0.28 | .006 | .011 |                    |                            | 1300000 | 361000 |
| 200FS290       | 200    | 7.8740  | 290                | 11.4173 | 130                             | 5.118 | 100                | 3.937 | 265                               | 10.433 | 0.18                          | 0.30 | .007 | .012 |                    |                            | 1680000 | 497000 |
| 220FS320       | 220    | 8.6614  | 320                | 12.5984 | 135                             | 5.315 | 100                | 3.937 | 286                               | 11.260 | 0.18                          | 0.30 | .007 | .012 |                    |                            | 1960000 | 568000 |
| 240FS340       | 240    | 9.4488  | 340                | 13.3858 | 140                             | 5.512 | 100                | 3.937 | 306                               | 12.047 | 0.18                          | 0.30 | .007 | .012 |                    |                            | 2240000 | 642000 |
| 260FS370       | 260    | 10.2362 | 370                | 14.5669 | 150                             | 5.906 | 110                | 4.331 | 333                               | 13.110 | 0.20                          | 0.32 | .008 | .013 |                    |                            | 2650000 | 745000 |
| 280FS400       | 280    | 11.0236 | 400                | 15.7480 | 155                             | 6.102 | 120                | 4.724 | 360                               | 14.173 | 0.20                          | 0.32 | .008 | .013 |                    |                            | 3100000 | 829000 |
| 300FS430       | 300    | 11.8110 | 430                | 16.9291 | 165                             | 6.496 | 120                | 4.724 | 386                               | 15.197 | 0.20                          | 0.32 | .008 | .013 |                    |                            | 3560000 | 946000 |

\* Prior to fracturing outer ring.

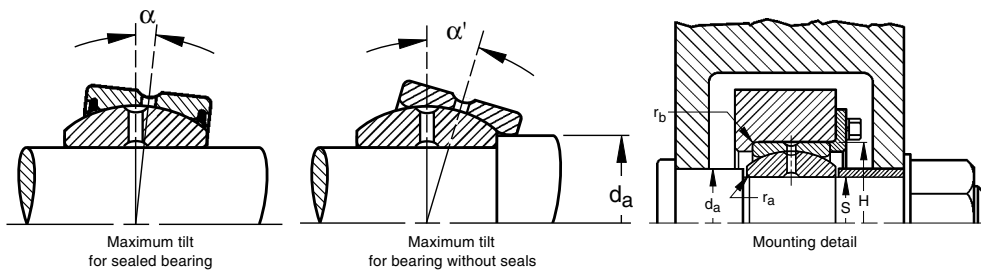
**MOUNTING**

- Due to fracturing, the outer ring may be slightly out-of-round. Roundness will be restored, however, when the bearing is mounted in a housing of sufficient cross section.
- The preferred shaft tolerance is f6 as listed below per ANSI B4.2. To obtain a shaft interference fit, refer to the m6 tolerance limits listed in the Shaft Diameter Tolerance table on page B410.

**LOAD RATING**

- The “dynamic load rating” is the maximum load suggested for extended life with periodic lubrication. It is based upon the radially projected area of the inner ring bore and an allowable stress level of 85 megapascals (approximately 12,300 psi).

- For intermittent loading and intermittent operation, the applied radial load should not exceed the dynamic load rating. For constant loading and continuous operation, the applied radial load should not exceed 75 percent of the dynamic load rating. For dynamic or static thrust loading, use 25 percent of respective radial load values. For combined radial and thrust loading, consult your Timken representative.
- The “limit load rating” is the maximum static load that can be applied to a Timken spherical plain bearing. Shaft and housing stresses should be checked when the load approaches the limit load rating since the shaft or housing may then become the critical member. The ultimate, or static fracture, rating of the bearing is at least 1.5 times the limit load rating.
- Load ratings are given in pounds-force:  
1 lbf = 0.454kgf = 4.448 N.



**MOUNTING DIMENSIONS**

| Weight    |      | Tilting Angle |           | Shaft Shoulder Diameter |       | Shaft Fillet Radius* |     | Housing Fillet Radius |     | Shaft Diameter S |         |         |         | Housing Bore H |         |         |         |
|-----------|------|---------------|-----------|-------------------------|-------|----------------------|-----|-----------------------|-----|------------------|---------|---------|---------|----------------|---------|---------|---------|
| (Approx.) |      | $\alpha$      | $\alpha'$ | $d_a$                   |       | $r_a^\dagger$ (Max.) |     | $r_b^\ddagger$ (Max.) |     | mm               |         | in.     |         | mm             |         | in.     |         |
| kg        | lbs. | deg.          | deg.      | mm                      | in.   | mm                   | in. | mm                    | in. | max.             | min.    | max.    | min.    | max.           | min.    | min.    | max.    |
| .038      |      | 10.0          | 11.5      | 16                      | .63   | 0.5                  | .02 | 0.5                   | .02 | 11.984           | 11.973  | .4718   | .4714   | 21.977         | 21.995  | .8650   | .8658   |
| .065      |      | 8.5           | 14.5      | 18                      | .71   | 0.5                  | .02 | 0.5                   | .02 | 13.984           | 13.973  | .5506   | .5502   | 25.972         | 25.993  | 1.0225  | 1.0233  |
| .115      |      | 10.0          | 16.0      | 20                      | .79   | 0.5                  | .02 | 0.5                   | .02 | 15.984           | 15.973  | .6293   | .6289   | 29.972         | 29.993  | 1.1800  | 1.1808  |
| .149      |      | 8.5           | 14.0      | 25                      | .98   | 0.5                  | .02 | 0.6                   | .02 | 19.980           | 19.967  | .7866   | .7861   | 34.967         | 34.992  | 1.3767  | 1.3777  |
| .257      |      | 7.0           | 12.5      | 29                      | 1.14  | 0.5                  | .02 | 0.6                   | .02 | 23.980           | 23.967  | .9441   | .9436   | 41.967         | 41.992  | 1.6522  | 1.6532  |
| .337      |      | 6.0           | 10.5      | 34                      | 1.38  | 0.5                  | .02 | 0.6                   | .02 | 29.980           | 29.967  | 1.1803  | 1.1798  | 46.967         | 46.992  | 1.8491  | 1.8501  |
| .523      |      | 6.5           | 10.5      | 40                      | 1.61  | 0.6                  | .02 | 0.8                   | .03 | 34.975           | 34.959  | 1.3770  | 1.3764  | 54.961         | 54.991  | 2.1638  | 2.1650  |
| .729      |      | 7.0           | 10.5      | 47                      | 1.85  | 0.6                  | .02 | 0.8                   | .03 | 39.975           | 39.959  | 1.5738  | 1.5732  | 61.961         | 61.991  | 2.4394  | 2.4406  |
| .948      |      | 7.5           | 10.5      | 50                      | 2.01  | 0.6                  | .02 | 0.8                   | .03 | 44.975           | 44.959  | 1.7707  | 1.7701  | 67.961         | 67.991  | 2.6756  | 2.6768  |
| 1.27      |      | 6.5           | 10.0      | 56                      | 2.24  | 0.6                  | .02 | 0.8                   | .03 | 49.975           | 49.959  | 1.9675  | 1.9669  | 74.961         | 74.991  | 2.9512  | 2.9524  |
| 2.32      |      | 6.5           | 11.0      | 66                      | 2.64  | 0.8                  | .03 | 1.0                   | .04 | 59.970           | 59.951  | 2.3610  | 2.3603  | 89.955         | 89.990  | 3.5415  | 3.5429  |
| 3.53      |      | 6.0           | 9.5       | 80                      | 3.15  | 0.8                  | .03 | 1.0                   | .04 | 69.970           | 69.951  | 2.7547  | 2.7540  | 104.955        | 104.990 | 4.1321  | 4.1335  |
| 5.20      |      | 6.0           | 7.5       | 92                      | 3.62  | 0.8                  | .03 | 1.0                   | .04 | 79.970           | 79.951  | 3.1484  | 3.1477  | 119.955        | 119.990 | 4.7226  | 4.7240  |
| 6.28      |      | 5.5           | 7.5       | 100                     | 3.94  | 1.0                  | .04 | 1.0                   | .04 | 89.964           | 89.942  | 3.5419  | 3.5410  | 129.948        | 129.988 | 5.1161  | 5.1177  |
| 10.1      |      | 7.0           | 8.5       | 114                     | 4.49  | 1.0                  | .04 | 1.0                   | .04 | 99.964           | 99.942  | 3.9356  | 3.9347  | 149.948        | 149.988 | 5.9035  | 5.9051  |
| 10.9      |      | 6.0           | 7.5       | 125                     | 4.92  | 1.0                  | .04 | 1.0                   | .04 | 109.964          | 109.942 | 4.3293  | 4.3284  | 159.948        | 159.988 | 6.2972  | 6.2988  |
| 18.1      |      | 6.0           | 7.5       | 136                     | 5.35  | 1.0                  | .04 | 1.0                   | .04 | 119.964          | 119.942 | 4.7230  | 4.7221  | 179.948        | 179.988 | 7.0846  | 7.0862  |
| 25.6      |      | 6.5           | 7.0       | 164                     | 6.46  | 1.0                  | .04 | 1.0                   | .04 | 139.957          | 139.932 | 5.5101  | 5.5091  | 209.940        | 209.986 | 8.2654  | 8.2674  |
| 32.3      |      | 7.5           | 9.0       | 177                     | 6.97  | 1.0                  | .04 | 1.0                   | .04 | 159.957          | 159.932 | 6.2975  | 6.2965  | 229.940        | 229.986 | 9.0528  | 9.0548  |
| 42.8      |      | 6.5           | 7.0       | 209                     | 8.23  | 1.0                  | .04 | 1.0                   | .04 | 179.957          | 179.932 | 7.0849  | 7.0839  | 259.934        | 259.986 | 10.2336 | 10.2356 |
| 66.5      |      | 7.0           | 7.5       | 231                     | 9.09  | 1.0                  | .04 | 1.0                   | .04 | 199.950          | 199.921 | 7.8720  | 7.8709  | 289.934        | 289.986 | 11.4147 | 11.4167 |
| 82.3      |      | 7.5           | 8.0       | 252                     | 9.92  | 1.0                  | .04 | 1.0                   | .04 | 219.950          | 219.921 | 8.6594  | 8.6583  | 319.927        | 319.984 | 12.5956 | 12.5978 |
| 90.1      |      | 8.0           | 9.0       | 272                     | 10.70 | 1.0                  | .04 | 1.0                   | .04 | 239.950          | 239.921 | 9.4468  | 9.4457  | 339.927        | 339.984 | 13.3830 | 13.3852 |
| 17        |      | 7.0           | 8.5       | 297                     | 11.69 | 1.0                  | .04 | 1.0                   | .04 | 259.944          | 259.912 | 10.2340 | 10.2327 | 369.927        | 369.984 | 14.5641 | 14.5663 |
| 47        |      | 6.0           | 7.0       | 325                     | 12.80 | 1.0                  | .04 | 1.0                   | .04 | 279.944          | 279.912 | 11.0214 | 11.0201 | 399.927        | 399.984 | 15.7452 | 15.7474 |
| 77        |      | 7.0           | 9.0       | 349                     | 13.74 | 1.0                  | .04 | 1.0                   | .04 | 299.944          | 299.912 | 11.8088 | 11.8075 | 429.920        | 429.983 | 16.9260 | 16.9285 |

\* For bearing sizes 5SF8 through 25SF40, shaft and shoulder should be undercut to eliminate fillet.  
 † Equal to minimum inner ring bore chamfer.  
 ‡ Equal to minimum outer ring O.D. chamfer.



# SPHERICAL PLAIN BEARINGS

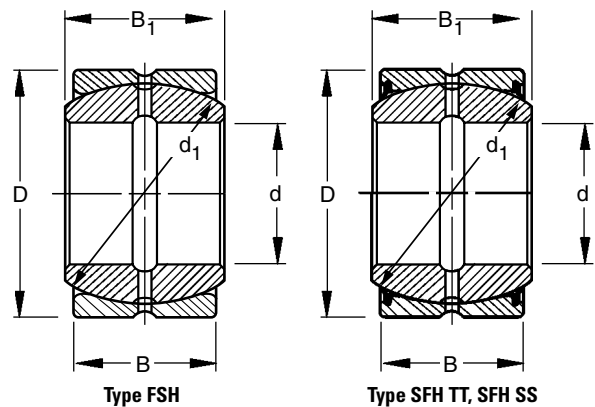
## RADIAL BEARINGS TYPE FSH

- The FSH spherical plain radial bearing is a unit assembly consisting of a solid spherical O.D. inner ring and a spherical I.D. outer ring.
- The outer ring has a single fracture to permit assembly. Both inner and outer rings are phosphate treated and then coated with molybdenum disulphide (MoS<sub>2</sub>). The type FSH bearing is similar to type FS, but the inner ring bore diameter has been reduced and the width made greater to increase the spherical surface. This permits greater misalignment while maintaining full bearing contact.
- Bearings 14FSH30 through 50FSH90 are available with reinforced rubber seals. To order, add suffix "TT" to bearing designation - Example: 14FSH30-TT.
- Bearings 60FSH105 through 280FSH430 are available with synthetic resin seals. To order, add suffix "SS" to bearing designation - Example: 60FSH105-SS.
- Before ordering any bearing, check for availability.

### DIMENSIONS

- Type FSH bearings are a metric series which follows proposed International Standards Organization (ISO) standards. Metric Inch conversions given are for the convenience of the user. The controlling dimensions are in millimeters.

- For tolerances of nominal dimensions, see Tables 1 and 2 on page B411. Dimensions listed are before coating with molybdenum disulphide. The axial internal clearance is approximately three times the radial internal clearance.
- $\alpha$  is the maximum tilting angle for sealed radial bearings. To utilize the maximum tilting angle for unsealed radial bearings, the suggested shaft shoulder diameter  $d_{a1}$  shown in the drawing on facing page must not be exceeded.
- Dimensions and locations of lubrication holes and grooves may be obtained from your Timken representative.



### DIMENSIONS - LOAD RATINGS

| Bearing Number | Bore d |         | Outside Diameter D |         | Inner Ring Width B <sub>1</sub> |       | Outer ring Width B |       | Spherical Diameter d <sub>1</sub><br>(Ref.) | Radial Clearance* (unmounted) |      |      |      | Load Ratings |         |                                  |
|----------------|--------|---------|--------------------|---------|---------------------------------|-------|--------------------|-------|---------------------------------------------|-------------------------------|------|------|------|--------------|---------|----------------------------------|
|                | mm     | in.     | mm                 | in.     | mm                              | in.   | mm                 | in.   |                                             | mm                            | in.  | min. | max. | min.         | max.    | Radial Limit Load Rating<br>lbf. |
| 12FSH26        | 12     | .4724   | 26                 | 1.0236  | 15                              | .591  | 9                  | .354  | 22                                          | .866                          | 0.10 | 0.22 | .004 | .009         | 11600   | 3440                             |
| 14FSH30        | 14     | .5512   | 30                 | 1.1811  | 16                              | .630  | 10                 | .394  | 25                                          | .984                          | 0.10 | 0.22 | .004 | .009         | 14400   | 4280                             |
| 16FSH35        | 16     | .6300   | 35                 | 1.3780  | 20                              | .787  | 12                 | .472  | 30                                          | 1.181                         | 0.12 | 0.24 | .005 | .010         | 21500   | 6110                             |
| 20FSH42        | 20     | .7874   | 42                 | 1.6142  | 25                              | .984  | 16                 | .630  | 36                                          | 1.417                         | 0.12 | 0.24 | .005 | .010         | 31000   | 9550                             |
| 24FSH47        | 24     | .9449   | 47                 | 1.8504  | 28                              | 1.102 | 18                 | .709  | 41                                          | 1.614                         | 0.12 | 0.24 | .005 | .010         | 40200   | 12800                            |
| 30FSH55        | 30     | 1.1811  | 55                 | 2.1654  | 32                              | 1.260 | 20                 | .787  | 48                                          | 1.890                         | 0.12 | 0.24 | .005 | .010         | 55100   | 18300                            |
| 35FSH62        | 35     | 1.3780  | 62                 | 2.4409  | 35                              | 1.378 | 22                 | .866  | 55                                          | 2.165                         | 0.12 | 0.24 | .005 | .010         | 72300   | 23400                            |
| 40FSH68        | 40     | 1.5748  | 68                 | 2.6772  | 40                              | 1.575 | 25                 | .984  | 60                                          | 2.362                         | 0.12 | 0.24 | .005 | .010         | 86100   | 30600                            |
| 45FSH75        | 45     | 1.7717  | 75                 | 2.9528  | 43                              | 1.693 | 28                 | 1.102 | 67                                          | 2.638                         | 0.12 | 0.24 | .005 | .010         | 107000  | 37000                            |
| 50FSH90        | 50     | 1.9685  | 90                 | 3.5433  | 56                              | 2.205 | 36                 | 1.417 | 81                                          | 3.150                         | 0.14 | 0.26 | .006 | .011         | 157000  | 53500                            |
| 60FSH105       | 60     | 2.3622  | 105                | 4.1339  | 63                              | 2.480 | 40                 | 1.575 | 94                                          | 3.701                         | 0.14 | 0.26 | .006 | .011         | 211000  | 72200                            |
| 70FSH120       | 70     | 2.7559  | 120                | 4.7244  | 70                              | 2.756 | 45                 | 1.772 | 107                                         | 4.213                         | 0.14 | 0.26 | .006 | .011         | 274000  | 93600                            |
| 80FSH130       | 80     | 3.1496  | 130                | 5.1181  | 75                              | 2.953 | 50                 | 1.968 | 117                                         | 4.606                         | 0.14 | 0.26 | .006 | .011         | 327000  | 115000                           |
| 90FSH150       | 90     | 3.5433  | 150                | 5.9055  | 85                              | 3.346 | 55                 | 2.165 | 134                                         | 5.276                         | 0.14 | 0.26 | .006 | .011         | 429000  | 146000                           |
| 100FSH160      | 100    | 3.9370  | 160                | 6.2992  | 85                              | 3.346 | 55                 | 2.165 | 143                                         | 5.630                         | 0.14 | 0.26 | .006 | .011         | 489000  | 162000                           |
| 110FSH180      | 110    | 4.3307  | 180                | 7.0866  | 100                             | 3.937 | 70                 | 2.756 | 160                                         | 6.299                         | 0.14 | 0.26 | .006 | .011         | 612000  | 210000                           |
| 120FSH210      | 120    | 4.7244  | 210                | 8.2677  | 115                             | 4.528 | 70                 | 2.756 | 187                                         | 7.362                         | 0.16 | 0.28 | .006 | .011         | 836000  | 264000                           |
| 140FSH230      | 140    | 5.5118  | 230                | 9.0551  | 130                             | 5.118 | 80                 | 3.150 | 206                                         | 8.110                         | 0.16 | 0.28 | .006 | .011         | 1020000 | 348000                           |
| 160FSH260      | 160    | 6.2992  | 260                | 10.2362 | 135                             | 5.315 | 80                 | 3.150 | 234                                         | 9.213                         | 0.16 | 0.28 | .006 | .011         | 1300000 | 413000                           |
| 180FSH290      | 180    | 7.0866  | 290                | 11.4173 | 155                             | 6.102 | 100                | 3.937 | 265                                         | 10.433                        | 0.18 | 0.30 | .007 | .012         | 1680000 | 533000                           |
| 200FSH320      | 200    | 7.8740  | 320                | 12.5984 | 165                             | 6.496 | 100                | 3.937 | 286                                         | 11.260                        | 0.18 | 0.30 | .007 | .012         | 1960000 | 631000                           |
| 220FSH340      | 220    | 8.6614  | 340                | 13.3858 | 175                             | 6.890 | 100                | 3.937 | 306                                         | 12.047                        | 0.18 | 0.30 | .007 | .012         | 2240000 | 736000                           |
| 240FSH370      | 240    | 9.4488  | 370                | 14.5669 | 190                             | 7.480 | 110                | 4.331 | 333                                         | 13.110                        | 0.20 | 0.32 | .008 | .013         | 2650000 | 871000                           |
| 260FSH400      | 260    | 10.2362 | 400                | 15.7480 | 205                             | 8.071 | 120                | 4.724 | 360                                         | 14.173                        | 0.20 | 0.32 | .008 | .013         | 3100000 | 1020000                          |
| 280FSH430      | 280    | 11.0236 | 430                | 16.9291 | 210                             | 8.268 | 120                | 4.724 | 386                                         | 15.197                        | 0.20 | 0.32 | .008 | .013         | 3560000 | 1120000                          |

\* Prior to fracturing outer ring.

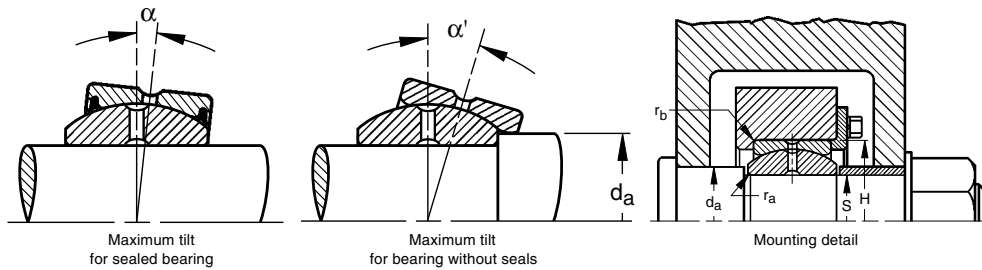
**MOUNTING**

- The housing bore dimensions given below are applicable to bearings mounted in steel.
- Due to fracturing, the outer ring may be slightly out-of-round. Roundness will be restored, however, when the bearing is mounted in a housing of sufficient cross section.
- The preferred shaft tolerance is f6 as listed below per ANSI B4.2. To obtain a shaft interference fit, refer to the m6 tolerance limits listed in the Shaft Diameter Tolerance table on page B410.

**LOAD RATING**

- The “dynamic load rating” is the maximum load suggested for extended life with periodic lubrication. It is based upon the radially projected area of the inner ring bore and allowable stress level of 85 megapascals (approximately 12,300 psi).

- For intermittent loading and intermittent operation, the applied radial load should not exceed the dynamic load rating for constant loading and continuous operation, the applied radial load should not exceed 75 percent of the dynamic load rating. For dynamic or static thrust loading, use 25 percent of respective radial load rating values. For combined radial and thrust loading, consult your Timken representative.
- The “limit load rating” is the maximum static load that can be applied to a Timken spherical plain bearing. Shaft and housing stresses should be checked when the load approaches the limit load rating since the shaft or housing may then become the critical member. The ultimate or static fracture rating of the bearing is at least 1.5 times the limit load rating.
- Load ratings are given in pounds force:  
1 lbf = 0.454 kgf = 4.448N.



**MOUNTING DIMENSIONS**

| Weight<br>(Approx.)<br>lbs. | Tilting Angle |      | Shaft Shoulder Diameter da |       | Shaft Fillet Radius* ra† (Max.) |     | Housing Fillet Radius rb‡ (Max.) |     | Shaft Diameter S |         |         |         | Housing Bore H |         |         |         |
|-----------------------------|---------------|------|----------------------------|-------|---------------------------------|-----|----------------------------------|-----|------------------|---------|---------|---------|----------------|---------|---------|---------|
|                             | α             | α'   | da                         |       | ra† (Max.)                      |     | rb‡ (Max.)                       |     | mm               |         | in.     |         | mm             |         | in.     |         |
|                             | deg.          | deg. | mm                         | in.   | mm                              | in. | mm                               | in. | max.             | min.    | max.    | min.    | max.           | min.    | min.    | max.    |
| .069                        | 18.5          | 25.0 | 16                         | .63   | 0.5                             | .02 | 0.5                              | .02 | 11.984           | 11.973  | .4718   | .4714   | 25.972         | 25.993  | 1.0225  | 1.0233  |
| .130                        | 16.0          | 22.0 | 19                         | .75   | 0.5                             | .02 | 0.5                              | .02 | 13.984           | 13.973  | .5506   | .5502   | 29.972         | 29.993  | 1.1800  | 1.1808  |
| .171                        | 18.0          | 27.0 | 21                         | .83   | 0.5                             | .02 | 0.6                              | .02 | 15.984           | 15.973  | .6293   | .6289   | 34.967         | 34.992  | 1.3767  | 1.3777  |
| .298                        | 17.5          | 26.5 | 24                         | .94   | 0.5                             | .02 | 0.6                              | .02 | 19.980           | 19.967  | .7866   | .7861   | 41.967         | 41.992  | 1.6522  | 1.6532  |
| .397                        | 17.0          | 23.0 | 29                         | 1.14  | 0.5                             | .02 | 0.6                              | .02 | 23.980           | 23.963  | .9441   | .9436   | 46.967         | 46.992  | 1.8491  | 1.8501  |
| .574                        | 17.0          | 24.0 | 34                         | 1.34  | 0.5                             | .02 | 0.8                              | .03 | 29.980           | 29.967  | 1.1803  | 1.1798  | 54.961         | 54.991  | 2.1638  | 2.1650  |
| .794                        | 15.5          | 24.5 | 39                         | 1.54  | 0.6                             | .02 | 0.8                              | .03 | 34.975           | 34.959  | 1.3770  | 1.3764  | 61.961         | 61.991  | 2.4394  | 2.4406  |
| .982                        | 17.0          | 21.0 | 44                         | 1.73  | 0.6                             | .02 | 0.8                              | .03 | 39.975           | 39.959  | 1.5738  | 1.5732  | 67.961         | 67.991  | 2.6756  | 2.6768  |
| 1.31                        | 15.0          | 20.0 | 50                         | 1.97  | 0.6                             | .02 | 0.8                              | .03 | 44.975           | 44.959  | 1.7707  | 1.7701  | 74.961         | 74.991  | 2.9512  | 2.9524  |
| 2.63                        | 17.0          | 23.5 | 57                         | 2.24  | 0.6                             | .02 | 1.0                              | .04 | 49.975           | 49.959  | 1.9675  | 1.9669  | 89.955         | 89.990  | 3.5415  | 3.5429  |
| 3.91                        | 16.5          | 22.5 | 67                         | 2.64  | 0.8                             | .03 | 1.0                              | .04 | 59.970           | 59.951  | 2.3610  | 2.3603  | 104.955        | 104.990 | 4.1321  | 4.1335  |
| 5.62                        | 15.5          | 20.5 | 77                         | 3.03  | 0.8                             | .03 | 1.0                              | .04 | 69.970           | 69.951  | 2.7547  | 2.7540  | 119.955        | 119.990 | 4.7226  | 4.7240  |
| 6.66                        | 14.5          | 18.5 | 87                         | 3.43  | 0.8                             | .03 | 1.0                              | .04 | 79.970           | 79.951  | 3.1484  | 3.1477  | 129.948        | 129.988 | 5.1161  | 5.1177  |
| 10.4                        | 15.0          | 19.5 | 98                         | 3.86  | 1.0                             | .04 | 1.0                              | .04 | 89.964           | 89.942  | 3.5419  | 3.5410  | 149.948        | 149.988 | 5.9035  | 5.9051  |
| 11.5                        | 13.5          | 18.0 | 110                        | 4.33  | 1.0                             | .04 | 1.0                              | .04 | 99.964           | 99.942  | 3.9356  | 3.9347  | 159.948        | 159.988 | 6.2972  | 6.2988  |
| 17.9                        | 12.5          | 15.5 | 122                        | 4.80  | 1.0                             | .04 | 1.0                              | .04 | 109.964          | 109.942 | 4.3293  | 4.3284  | 179.948        | 179.988 | 7.0846  | 7.0862  |
| 29.7                        | 15.5          | 23.5 | 132                        | 5.20  | 1.0                             | .04 | 1.0                              | .04 | 119.964          | 119.942 | 4.7230  | 4.7221  | 209.940        | 209.986 | 8.2654  | 8.2674  |
| 35.8                        | 16.0          | 20.5 | 152                        | 5.98  | 1.0                             | .04 | 1.0                              | .04 | 139.957          | 139.932 | 5.5101  | 5.5091  | 229.940        | 229.986 | 9.0528  | 9.0548  |
| 48.9                        | 15.0          | 21.0 | 176                        | 6.93  | 1.0                             | .04 | 1.0                              | .04 | 159.957          | 159.932 | 6.2975  | 6.2965  | 259.934        | 259.986 | 10.2336 | 10.2356 |
| 71.5                        | 13.0          | 20.5 | 196                        | 7.72  | 1.0                             | .04 | 1.0                              | .04 | 179.957          | 179.932 | 7.0849  | 7.0839  | 289.934        | 289.986 | 11.4147 | 11.4167 |
| 88.2                        | 14.5          | 19.5 | 220                        | 8.66  | 1.0                             | .04 | 1.0                              | .04 | 199.950          | 199.921 | 7.8720  | 7.8709  | 319.927        | 319.984 | 12.5956 | 12.5978 |
| 96.4                        | 15.5          | 19.0 | 243                        | 9.57  | 1.0                             | .04 | 1.0                              | .04 | 219.950          | 219.921 | 8.6594  | 8.6583  | 339.927        | 339.984 | 13.3830 | 13.3852 |
| 124                         | 15.5          | 19.5 | 263                        | 10.35 | 1.0                             | .04 | 1.0                              | .04 | 239.950          | 239.921 | 9.4468  | 9.4457  | 369.927        | 369.984 | 14.5641 | 14.5663 |
| 157                         | 15.0          | 19.5 | 283                        | 11.14 | 1.0                             | .04 | 1.0                              | .04 | 259.944          | 259.912 | 10.2340 | 10.2327 | 399.927        | 399.984 | 15.7452 | 15.7474 |
| 188                         | 14.5          | 20.0 | 310                        | 12.20 | 1.0                             | .04 | 1.0                              | .04 | 279.944          | 279.912 | 11.0214 | 11.0201 | 429.920        | 429.983 | 16.9260 | 16.9285 |

\* For bearing sizes 5SF8 through 25SF40, shaft and shoulder should be undercut to eliminate fillet.

† Equal to minimum inner ring bore chamfer.

‡ Equal to minimum outer ring O.D. chamfer.



# SPHERICAL PLAIN BEARINGS

## RADIAL BEARINGS TYPE SFH

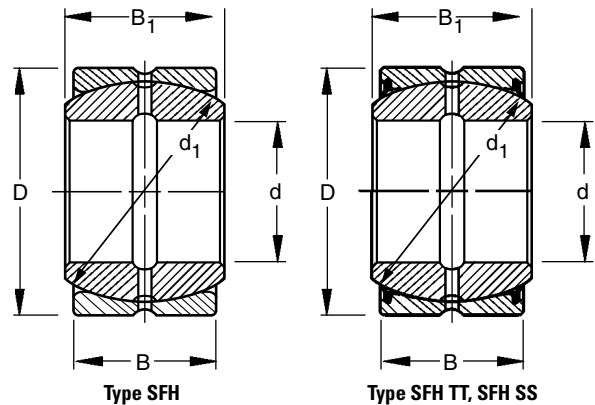
- The SFH spherical plain radial bearing is a unit assembly consisting of a solid spherical O.D. inner ring and a spherical I.D. outer ring. The outer ring has a single fracture to permit assembly. Both inner and outer rings are phosphate treated and then coated with molybdenum disulphide (MoS<sub>2</sub>).
- The type SFH bearing is similar to type SF, but the inner ring bore diameter has been reduced and the width made greater to increase the spherical surface. This permits greater misalignment yet maintains full bearing contact.
- Bearings 12SFH24 through 22SFH40 are available with reinforced rubber seals. To order, add suffix "TT" to bearing designation - Example: 22SFH40-TT.
- Bearings 25SFH44 through 55SFH96 are available with synthetic resin seals. To order, add suffix "SS" to bearing designation - Example: 25SFH44-SS.
- Before ordering any bearing, check for availability.

### DIMENSIONS

- Inch-metric conversions given are for the convenience of the user. The controlling dimensions are in inches.
- For tolerances of nominal dimensions, see Tables 2 and 2A on page B411. Dimensions listed are after coating with

MoS<sub>2</sub> except outer ring O.D. and internal clearance are before coating and fracturing. The axial internal clearance is approximately three times the radial internal clearance.

- $\alpha$  is the maximum tilting angle for sealed radial bearings. To utilize the maximum tilting angle for unsealed radial bearings, the suggested shaft shoulder diameter  $d_a$ , shown in the drawing on facing page must not be exceeded.
- Dimensions and locations of lubrication holes and grooves may be obtained from your Timken representative.



### DIMENSIONS - LOAD RATINGS

| Bearing Number | Bore $d$ |        | Outside Diameter $D$ |        | Inner Ring Width $B_1$ |       | Outer ring Width $B$ |       | Spherical Diameter $d_1$ |       | Radial Clearance* (unmounted) |      |      |      | Load Ratings |      |                          |                            |
|----------------|----------|--------|----------------------|--------|------------------------|-------|----------------------|-------|--------------------------|-------|-------------------------------|------|------|------|--------------|------|--------------------------|----------------------------|
|                | mm       | in.    | mm                   | in.    | mm                     | in.   | mm                   | in.   | mm                       | in.   | mm                            | in.  | min. | max. | min.         | max. | Radial Limit Load Rating | Dynamic Radial Load Rating |
| 12SFH24        | 31.750   | 1.2500 | 61.912               | 2.4375 | 35.31                  | 1.390 | 28.58                | 1.125 | 54.74                    | 2.155 | 0.13                          | 0.23 | .005 | .009 |              |      | 75000                    | 21400                      |
| 15SFH28        | 38.100   | 1.5000 | 71.438               | 2.8125 | 40.13                  | 1.580 | 33.32                | 1.312 | 63.88                    | 2.515 | 0.13                          | 0.23 | .005 | .009 |              |      | 102000                   | 29200                      |
| 17SFH32        | 44.450   | 1.7500 | 80.962               | 3.1875 | 46.23                  | 1.820 | 38.10                | 1.500 | 73.02                    | 2.875 | 0.13                          | 0.23 | .005 | .009 |              |      | 133000                   | 39300                      |
| 20SFH36        | 50.800   | 2.0000 | 90.488               | 3.5625 | 52.58                  | 2.070 | 42.85                | 1.687 | 82.17                    | 3.235 | 0.15                          | 0.25 | .006 | .010 |              |      | 169000                   | 51000                      |
| 22SFH40        | 57.150   | 2.2500 | 100.012              | 3.9375 | 58.88                  | 2.318 | 47.62                | 1.875 | 91.19                    | 3.590 | 0.15                          | 0.25 | .006 | .010 |              |      | 208000                   | 64000                      |
| 25SFH44        | 63.500   | 2.5000 | 111.125              | 4.3750 | 64.64                  | 2.545 | 52.37                | 2.062 | 100.33                   | 3.950 | 0.15                          | 0.25 | .006 | .010 |              |      | 252000                   | 78400                      |
| 27SFH48        | 69.850   | 2.7500 | 120.650              | 4.7500 | 70.87                  | 2.790 | 57.15                | 2.250 | 109.52                   | 4.312 | 0.15                          | 0.25 | .006 | .010 |              |      | 300000                   | 94600                      |
| 30SFH52        | 76.200   | 3.0000 | 130.175              | 5.1250 | 76.76                  | 3.022 | 61.90                | 2.437 | 118.74                   | 4.675 | 0.18                          | 0.28 | .007 | .011 |              |      | 353000                   | 112000                     |
| 32SFH56        | 82.550   | 3.2500 | 139.700              | 5.5000 | 82.93                  | 3.265 | 66.68                | 2.625 | 128.02                   | 5.040 | 0.18                          | 0.28 | .007 | .011 |              |      | 410000                   | 131000                     |
| 35SFH60        | 88.900   | 3.5000 | 149.225              | 5.8750 | 90.42                  | 3.560 | 71.42                | 2.812 | 136.91                   | 5.390 | 0.18                          | 0.28 | .007 | .011 |              |      | 467000                   | 154000                     |
| 37SFH64        | 95.250   | 3.7500 | 158.750              | 6.2500 | 94.95                  | 3.738 | 76.20                | 3.000 | 146.05                   | 5.750 | 0.18                          | 0.28 | .007 | .011 |              |      | 533000                   | 173000                     |
| 40SFH72        | 101.600  | 4.0000 | 177.800              | 7.0000 | 107.32                 | 4.225 | 85.72                | 3.375 | 164.46                   | 6.475 | 0.18                          | 0.28 | .007 | .011 |              |      | 673000                   | 208000                     |
| 45SFH80        | 114.300  | 4.5000 | 196.850              | 7.7500 | 119.13                 | 4.690 | 95.25                | 3.750 | 182.63                   | 7.190 | 0.18                          | 0.28 | .007 | .011 |              |      | 833000                   | 260000                     |
| 55SFH96        | 139.700  | 5.5000 | 222.250              | 8.7500 | 125.73                 | 4.950 | 104.78               | 4.125 | 207.16                   | 8.156 | 0.18                          | 0.28 | .007 | .011 |              |      | 1050000                  | 336000                     |

\* Prior to fracturing outer ring.



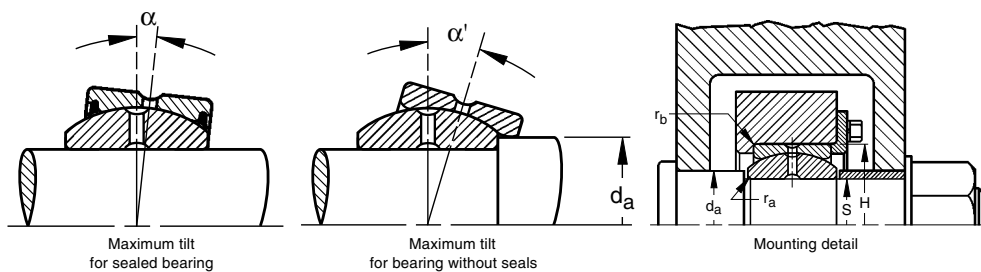
## MOUNTING

- The housing bore dimensions given below are applicable to bearings mounted in steel.
- Due to fracturing, the outer ring may be slightly out-of-round. Roundness will be restored, however, when the bearing is mounted in a housing of sufficient cross section.
- The preferred shaft tolerance is g6 as listed below per ANSI B4.1. To obtain a shaft interference fit, refer to the m6 tolerance limits listed in the Shaft Diameter Tolerance table on page B410.

## LOAD RATING

- The “dynamic load rating” is the maximum load suggested for extended life with periodic lubrication. It is based upon the radially projected area of the inner ring bore and an allowable stress level of 85 megapascals (approximately 12,300 psi).

- For intermittent loading and intermittent operation, the applied radial load should not exceed the dynamic load rating. For constant loading and continuous operation, the applied radial load should not exceed 75 percent of the dynamic load rating. For dynamic or static thrust loading, use 25 percent of respective radial load rating values. For combined radial and thrust loading, consult your Timken representative.
- The “limit load rating” is the maximum static load that can be applied to a Timken spherical plain bearing. Shaft and housing stresses should be checked when the load approaches the limit load rating since the shaft or housing may then become the critical member. The ultimate, or static fracture, rating of the bearing is at least 1.5 times the limit load rating.
- Load ratings are given in pounds force:  
 $1\text{ lbf} = 0.454\text{ kgf} = 4.448\text{ N}$ .



## MOUNTING DIMENSIONS

| Weight<br>(Approx.) | Tilting Angle |           | Shaft Shoulder Diameter $d_a$ |      | Shaft Fillet Radius* $r_a$ † (Max.) |      | Housing Fillet Radius $r_b$ ‡ (Max.) |      | Shaft Diameter S |         |        |        | Housing Bore H |         |        |        |
|---------------------|---------------|-----------|-------------------------------|------|-------------------------------------|------|--------------------------------------|------|------------------|---------|--------|--------|----------------|---------|--------|--------|
|                     | $\alpha$      | $\alpha'$ |                               |      |                                     |      |                                      |      | mm               |         | in.    |        | mm             |         | in.    |        |
|                     | deg.          | deg.      | mm                            | in.  | mm                                  | in.  | mm                                   | in.  | max.             | min.    | max.   | min.   | max.           | min.    | min.   | max.   |
| 1.00                | 8.5           | 16.5      | 41.9                          | 1.64 | 1.0                                 | .040 | 0.8                                  | .032 | 31.740           | 31.725  | 1.2496 | 1.2490 | 61.874         | 61.904  | 2.4360 | 2.4372 |
| 1.60                | 7.0           | 15.5      | 49.8                          | 1.95 | 1.0                                 | .040 | 0.8                                  | .032 | 38.090           | 38.075  | 1.4996 | 1.4990 | 71.399         | 71.429  | 2.8110 | 2.8122 |
| 2.50                | 7.5           | 16.0      | 56.6                          | 2.22 | 1.5                                 | .060 | 0.8                                  | .032 | 44.440           | 44.425  | 1.7496 | 1.7490 | 80.914         | 80.950  | 3.1856 | 3.1870 |
| 3.70                | 8.0           | 16.0      | 63.2                          | 2.48 | 1.5                                 | .060 | 0.8                                  | .032 | 50.790           | 50.772  | 1.9996 | 1.9989 | 90.439         | 90.475  | 3.5606 | 3.5620 |
| 4.40                | 8.5           | 16.5      | 69.6                          | 2.74 | 1.5                                 | .060 | 0.8                                  | .032 | 57.140           | 57.122  | 2.2496 | 2.2489 | 99.964         | 100.000 | 3.9356 | 3.9370 |
| 6.50                | 8.5           | 14.0      | 76.7                          | 3.02 | 2.0                                 | .080 | 0.8                                  | .032 | 63.490           | 63.472  | 2.4996 | 2.4989 | 111.077        | 111.113 | 4.3731 | 4.3745 |
| 8.00                | 8.5           | 14.0      | 83.6                          | 3.28 | 2.0                                 | .080 | 0.8                                  | .032 | 69.840           | 69.822  | 2.7496 | 2.7489 | 120.594        | 120.635 | 4.7478 | 4.7494 |
| 9.60                | 8.5           | 14.0      | 90.7                          | 3.56 | 2.0                                 | .080 | 0.8                                  | .032 | 76.190           | 76.172  | 2.9996 | 2.9989 | 130.119        | 130.160 | 5.1228 | 5.1244 |
| 11.7                | 8.5           | 14.0      | 97.5                          | 3.83 | 2.0                                 | .080 | 0.8                                  | .032 | 82.537           | 82.514  | 3.2495 | 3.2486 | 139.544        | 139.685 | 5.4978 | 5.4994 |
| 15.0                | 9.5           | 15.0      | 103                           | 4.04 | 2.0                                 | .080 | 0.8                                  | .032 | 88.887           | 88.864  | 3.4995 | 3.4986 | 149.169        | 149.210 | 5.8728 | 5.8744 |
| 19.5                | 9.0           | 14.5      | 111                           | 4.36 | 2.0                                 | .080 | 0.8                                  | .032 | 95.237           | 95.214  | 3.7495 | 3.7486 | 158.694        | 158.735 | 6.2478 | 6.2494 |
| 22.5                | 9.0           | 14.5      | 125                           | 4.90 | 2.0                                 | .080 | 1.1                                  | .044 | 101.587          | 101.564 | 3.9995 | 3.9986 | 177.744        | 177.785 | 6.9978 | 6.9994 |
| 30.0                | 9.0           | 14.5      | 138                           | 5.44 | 2.0                                 | .080 | 1.1                                  | .044 | 114.287          | 114.264 | 4.4995 | 4.4986 | 196.784        | 196.830 | 7.7474 | 7.7492 |
| 45.0                | 6.5           | 12.0      | 165                           | 6.48 | 2.0                                 | .080 | 1.1                                  | .044 | 139.685          | 139.660 | 5.4994 | 5.4984 | 222.184        | 222.230 | 8.7474 | 8.7492 |

\* For bearing sizes 5SF8 through 25SF40, shaft and shoulder should be undercut to eliminate fillet.

† Equal to minimum inner ring bore chamfer.

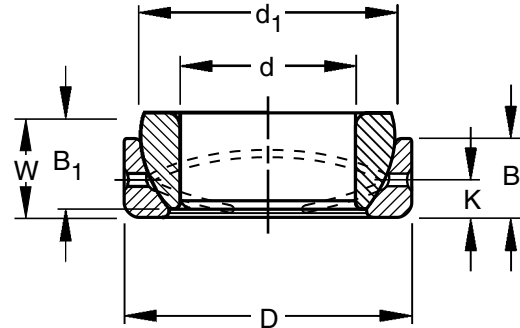
‡ Equal to minimum outer ring O.D. chamfer.



## SPHERICAL PLAIN BEARINGS

### ANGULAR CONTACT BEARINGS TYPE SBT

- Separable assembly consisting of an inner and outer ring with hemispherically shaped surfaces that mate with each other.
- Both inner and outer rings are phosphate-treated and coated with molybdenum disulphide (MoS<sub>2</sub>).
- If a Timken ring is assembled with a ring of another make, consult your Timken representative.
- To order inner and outer rings separately, specify by adding suffix "-OR" for outer ring or "-IR" for inner ring.
- Metric-inch conversions are provided for the convenience of the user. The controlling dimensions are in inches.
- See Table 2 and 3 for tolerances. Dimensions listed are after the bearing has been coated with molybdenum disulphide.
- $\alpha$  is the maximum tilting angle through the shaft. A stub shaft can be used to obtain a larger angle.
- Dimensions and locations of lubrication holes and grooves may be obtained from your Timken representative.

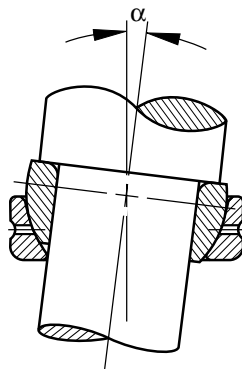


### DIMENSIONS - LOAD RATINGS

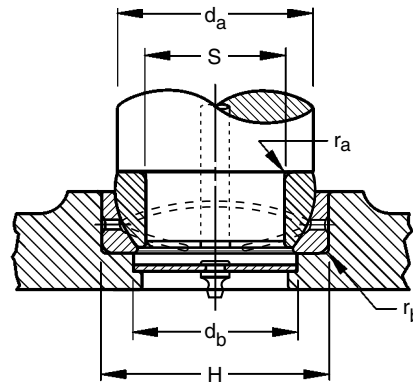
| Bearing Number | Bore d |         | Outside Diameter D |         | Inner Ring Width B <sub>1</sub> |       | Outer ring Width B |       | Spherical Diameter d <sub>1</sub> |       | Radial Clearance* (unmounted) |       |       |        | Load Ratings             |                            |
|----------------|--------|---------|--------------------|---------|---------------------------------|-------|--------------------|-------|-----------------------------------|-------|-------------------------------|-------|-------|--------|--------------------------|----------------------------|
|                | mm     | in.     | mm                 | in.     | mm                              | in.   | mm                 | in.   | mm                                | in.   | min.                          | max.  | min.  | max.   | Radial Limit Load Rating | Dynamic Radial Load Rating |
| 5SBT80         | 0.5000 | 12.700  | 0.8750             | 22.225  | 0.270                           | 6.86  | 0.190              | 4.83  | 0.300                             | 7.62  | 0.094                         | 2.39  | 0.719 | 18.26  | 4600                     | 1860                       |
| 6SBT10         | 0.6250 | 15.875  | 1.0625             | 26.988  | 0.340                           | 8.64  | 0.250              | 6.35  | 0.370                             | 9.40  | 0.109                         | 2.77  | 0.899 | 22.83  | 7600                     | 3080                       |
| 7SBT12         | 0.7500 | 19.050  | 1.2500             | 31.750  | 0.410                           | 10.41 | 0.310              | 7.87  | 0.440                             | 11.18 | 0.125                         | 3.18  | 1.080 | 27.43  | 11100                    | 4500                       |
| 8SBT14         | 0.8750 | 22.225  | 1.4375             | 36.512  | 0.480                           | 12.19 | 0.380              | 9.65  | 0.520                             | 13.21 | 0.172                         | 4.37  | 1.258 | 31.95  | 15400                    | 6210                       |
| 10SBT16        | 1.0000 | 25.400  | 1.6250             | 41.275  | 0.550                           | 13.97 | 0.440              | 11.18 | 0.600                             | 15.24 | 0.203                         | 5.16  | 1.437 | 36.50  | 19400                    | 7860                       |
| 12SBT20        | 1.2500 | 31.750  | 2.0000             | 50.800  | 0.700                           | 17.78 | 0.550              | 13.97 | 0.740                             | 18.80 | 0.234                         | 5.94  | 1.795 | 45.59  | 31000                    | 12500                      |
| 13SBT22        | 1.3750 | 34.925  | 2.1875             | 55.562  | 0.770                           | 19.56 | 0.600              | 15.24 | 0.840                             | 21.34 | 0.281                         | 7.14  | 1.937 | 49.20  | 37000                    | 15100                      |
| 15SBT24        | 1.5000 | 38.100  | 2.4375             | 61.912  | 0.840                           | 21.34 | 0.660              | 16.76 | 0.910                             | 23.11 | 0.312                         | 7.92  | 2.155 | 54.74  | 44500                    | 18300                      |
| 17SBT28        | 1.7500 | 44.450  | 2.8125             | 71.438  | 0.980                           | 24.89 | 0.790              | 20.07 | 1.070                             | 27.18 | 0.328                         | 8.33  | 2.515 | 63.88  | 60000                    | 24400                      |
| 20SBT32        | 2.0000 | 50.800  | 3.1875             | 80.962  | 1.130                           | 28.70 | 0.920              | 23.37 | 1.230                             | 31.24 | 0.375                         | 9.52  | 2.875 | 73.02  | 79000                    | 32300                      |
| 22SBT36        | 2.2500 | 57.150  | 3.5625             | 90.488  | 1.270                           | 32.26 | 1.050              | 26.67 | 1.390                             | 35.31 | 0.453                         | 11.51 | 3.235 | 82.17  | 100000                   | 40800                      |
| 25SBT40        | 2.5000 | 63.500  | 3.9375             | 100.012 | 1.420                           | 36.07 | 1.180              | 29.97 | 1.540                             | 39.12 | 0.500                         | 12.70 | 3.590 | 91.19  | 126000                   | 51500                      |
| 27SBT44        | 2.7500 | 69.850  | 4.3750             | 111.125 | 1.560                           | 39.62 | 1.275              | 32.38 | 1.700                             | 43.18 | 0.515                         | 13.08 | 3.950 | 100.33 | 154000                   | 62150                      |
| 30SBT48        | 3.0000 | 76.200  | 4.7500             | 120.650 | 1.710                           | 43.43 | 1.405              | 35.69 | 1.860                             | 47.24 | 0.578                         | 14.68 | 4.312 | 109.52 | 186000                   | 75000                      |
| 32SBT52        | 3.2500 | 82.550  | 5.1250             | 130.175 | 1.860                           | 47.24 | 1.545              | 39.24 | 2.030                             | 51.56 | 0.656                         | 16.66 | 4.675 | 118.74 | 218000                   | 87500                      |
| 35SBT56        | 3.5000 | 88.900  | 5.5000             | 139.700 | 2.000                           | 50.80 | 1.675              | 42.54 | 2.180                             | 55.37 | 0.703                         | 17.86 | 5.040 | 128.02 | 257000                   | 102400                     |
| 37SBT60        | 3.7500 | 95.250  | 5.8750             | 149.225 | 2.150                           | 54.61 | 1.805              | 45.85 | 2.340                             | 59.44 | 0.765                         | 19.43 | 5.390 | 136.91 | 295000                   | 118500                     |
| 40SBT64        | 4.0000 | 101.600 | 6.2500             | 158.750 | 2.300                           | 58.42 | 1.935              | 49.15 | 2.500                             | 63.50 | 0.781                         | 19.84 | 5.750 | 146.05 | 336000                   | 135000                     |
| 45SBT72        | 4.5000 | 114.300 | 7.0000             | 177.800 | 2.590                           | 65.79 | 2.195              | 55.75 | 2.800                             | 71.12 | 0.875                         | 22.22 | 6.475 | 164.46 | 432000                   | 173500                     |
| 50SBT80        | 5.0000 | 127.000 | 7.7500             | 196.850 | 2.880                           | 73.15 | 2.455              | 62.36 | 3.130                             | 79.50 | 1.000                         | 25.40 | 7.190 | 182.63 | 524000                   | 211000                     |
| 60SBT96        | 6.0000 | 152.400 | 8.7500             | 222.250 | 3.100                           | 78.74 | 2.615              | 66.42 | 3.375                             | 85.72 | 1.370                         | 34.80 | 8.156 | 207.16 | 585000                   | 235000                     |

**MOUNTING**

- Housing bore dimensions listed are appropriate for bearings mounted in steel.
- Suggested diameters of shoulder supports should be used to assure proper function of the bearing.
- Preferred shaft and housing bore dimensions are listed below per ANSI B4.1.
- Refer to the m6 tolerance limits listed in the Shaft Diameter Tolerance table on page B410 for shaft interference fit.
- Bearings are to be mounted with sufficient axial preload to ensure contact of the spherical surfaces under all load conditions.



Maximum tilt for bearing



Mounting detail

**MOUNTING DIMENSIONS**

| Weight    |        | Tilting Angle | Shaft Shoulder Diameter |       | Shaft Fillet Radius |            | Housing Shoulder Diameter |       | Housing Fillet Radius |            | Shaft Diameter S |        |         |         | Housing Bore H |        |         |         |
|-----------|--------|---------------|-------------------------|-------|---------------------|------------|---------------------------|-------|-----------------------|------------|------------------|--------|---------|---------|----------------|--------|---------|---------|
| (Approx.) |        |               | (Max.)                  | da    |                     | ra† (Max.) |                           | db    |                       | rb‡ (Max.) |                  | mm     |         | in.     |                | mm     |         | in.     |
| kg        | lbs.   | deg.          | mm                      | in.   | mm                  | in.        | mm                        | in.   | mm                    | in.        | max.             | min.   | max.    | min.    | min.           | max.   | min.    | max.    |
| 0.013     | 0.029  | 7             | 0.67                    | 17.0  | 0.020               | 0.5        | 0.57                      | 14.5  | 0.020                 | 0.5        | 0.4998           | 0.4994 | 12.695  | 12.685  | 0.8739         | 0.8747 | 22.197  | 22.217  |
| 0.025     | 0.056  | 6             | 0.84                    | 21.3  | 0.030               | 0.8        | 0.70                      | 17.8  | 0.030                 | 0.8        | 0.6248           | 0.6244 | 15.870  | 15.860  | 1.0614         | 1.0622 | 26.960  | 26.980  |
| 0.038     | 0.083  | 6             | 1.02                    | 25.9  | 0.040               | 1.0        | 0.84                      | 21.3  | 0.040                 | 1.0        | 0.7497           | 0.7492 | 19.042  | 19.029  | 1.2487         | 1.2497 | 31.717  | 31.742  |
| 0.050     | 0.110  | 5.5           | 1.23                    | 31.2  | 0.080               | 2.0        | 0.97                      | 24.6  | 0.080                 | 2.0        | 0.8747           | 0.8742 | 22.217  | 22.204  | 1.4362         | 1.4372 | 36.479  | 36.504  |
| 0.085     | 0.188  | 6             | 1.40                    | 35.6  | 0.080               | 2.0        | 1.12                      | 28.4  | 0.080                 | 2.0        | 0.9997           | 0.9992 | 25.392  | 25.379  | 1.6237         | 1.6247 | 41.242  | 41.267  |
| 0.159     | 0.351  | 6             | 1.71                    | 43.4  | 0.080               | 2.0        | 1.39                      | 35.3  | 0.080                 | 2.0        | 1.2496           | 1.2490 | 31.740  | 31.725  | 1.9985         | 1.9997 | 50.762  | 50.792  |
| 0.213     | 0.470  | 4             | 1.89                    | 48.0  | 0.100               | 2.5        | 1.48                      | 37.6  | 0.100                 | 2.5        | 1.3746           | 1.3740 | 34.915  | 34.900  | 2.1860         | 2.1872 | 55.524  | 55.554  |
| 0.300     | 0.662  | 5.5           | 2.05                    | 52.1  | 0.100               | 2.5        | 1.66                      | 42.2  | 0.100                 | 2.5        | 1.4996           | 1.4990 | 38.090  | 38.075  | 2.4360         | 2.4372 | 61.874  | 61.904  |
| 0.458     | 1.010  | 6             | 2.36                    | 59.9  | 0.100               | 2.5        | 1.95                      | 49.5  | 0.100                 | 2.5        | 1.7496           | 1.7490 | 44.440  | 44.425  | 2.8110         | 2.8122 | 71.399  | 71.429  |
| 0.671     | 1.480  | 5.5           | 2.75                    | 69.8  | 0.140               | 3.6        | 2.22                      | 56.4  | 0.140                 | 3.6        | 1.9996           | 1.9989 | 50.790  | 50.772  | 3.1856         | 3.1870 | 80.914  | 80.950  |
| 0.948     | 2.090  | 5.5           | 3.06                    | 77.7  | 0.140               | 3.6        | 2.50                      | 63.5  | 0.140                 | 3.6        | 2.2496           | 2.2489 | 57.140  | 57.122  | 3.5606         | 3.5620 | 90.439  | 90.475  |
| 1.129     | 2.490  | 5             | 3.37                    | 85.6  | 0.140               | 3.6        | 2.75                      | 69.9  | 0.140                 | 3.6        | 2.4996           | 2.4989 | 63.490  | 63.472  | 3.9356         | 3.9370 | 99.964  | 100.000 |
| 1.751     | 3.860  | 5             | 3.71                    | 94.2  | 0.180               | 4.6        | 3.03                      | 77.0  | 0.180                 | 4.6        | 2.7496           | 2.7489 | 69.840  | 69.822  | 4.3731         | 4.3745 | 111.077 | 111.113 |
| 2.277     | 5.020  | 5             | 4.07                    | 103.0 | 0.180               | 4.6        | 3.30                      | 83.8  | 0.180                 | 4.6        | 2.9996           | 2.9989 | 76.190  | 76.172  | 4.7478         | 4.7494 | 120.594 | 120.635 |
| 2.885     | 6.360  | 5             | 4.42                    | 112.0 | 0.180               | 4.6        | 3.58                      | 90.9  | 0.180                 | 4.6        | 3.2495           | 3.2486 | 82.537  | 82.514  | 5.1228         | 5.1244 | 130.119 | 130.160 |
| 3.570     | 7.870  | 5             | 4.77                    | 121.0 | 0.180               | 4.6        | 3.85                      | 97.8  | 0.180                 | 4.6        | 3.4995           | 3.4986 | 88.887  | 88.864  | 5.4978         | 5.4994 | 139.644 | 139.685 |
| 4.350     | 9.590  | 4.5           | 5.11                    | 130.0 | 0.180               | 4.6        | 4.10                      | 104.0 | 0.180                 | 4.6        | 3.7495           | 3.7486 | 95.237  | 95.214  | 5.8728         | 5.8744 | 149.169 | 149.210 |
| 5.262     | 11.600 | 4.5           | 5.43                    | 138.0 | 0.180               | 4.6        | 4.37                      | 111.0 | 0.180                 | 4.6        | 3.9995           | 3.9986 | 101.587 | 101.564 | 6.2478         | 6.2494 | 158.694 | 158.735 |
| 7.756     | 17.100 | 4.5           | 6.14                    | 156.0 | 0.180               | 4.6        | 4.90                      | 125.0 | 0.180                 | 4.6        | 4.4995           | 4.4986 | 114.287 | 114.264 | 6.9978         | 6.9994 | 177.744 | 177.785 |
| 11.068    | 24.400 | 4.5           | 6.83                    | 174.0 | 0.180               | 4.6        | 5.47                      | 139.0 | 0.180                 | 4.6        | 4.9994           | 4.9984 | 126.984 | 126.959 | 7.7474         | 7.7492 | 196.784 | 196.830 |
| 17.373    | 38.300 | 4.5           | 7.75                    | 197.0 | 0.180               | 4.6        | 6.50                      | 165.0 | 0.180                 | 4.6        | 5.9994           | 5.9984 | 152.385 | 152.360 | 8.7474         | 8.7492 | 222.184 | 222.230 |

† Equal to minimum inner ring bore chamfer.

‡ Equal to minimum outer ring O.D. chamfer.



## ***SPHERICAL PLAIN BEARINGS***



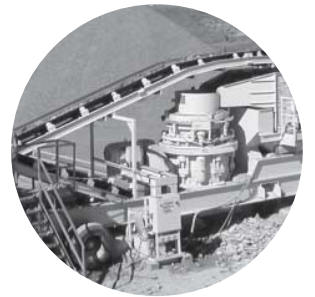
**B**



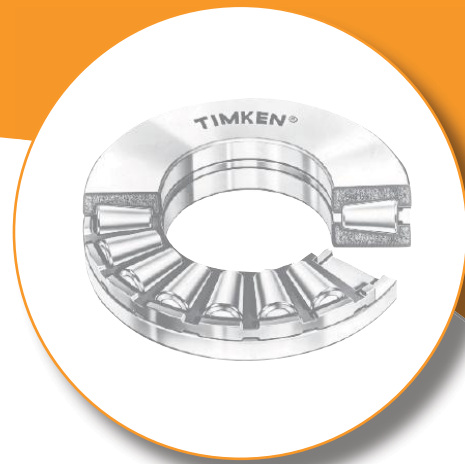
## THRUST BEARINGS

**Overview:** Timken thrust bearings are designed specifically to manage thrust loads and provide high-shock-load resistance in industrial and automotive applications. We manufacture seven basic designs of thrust bearings that include ball, crossed roller, cylindrical, machined tapered (TTHD, V-Flat, screwdown), stamped tapered, spherical and needle.

- **Sizes:** 35 mm - 2940 mm (1.375 in. - 115.75 in.).
- **Markets:** Aggregate, Machine Tool, Metals, Oil, Power Generation.
- **Applications:** Cone crushers, crane hooks, oil well swivels, extruders, pulverizer drives, rolling mills, machine tool spindles & tables, drilling rig hydraulic heads, gear boxes, pre-heater fans.
- **Benefits:** High performance and application flexibility. Large range of product offering.



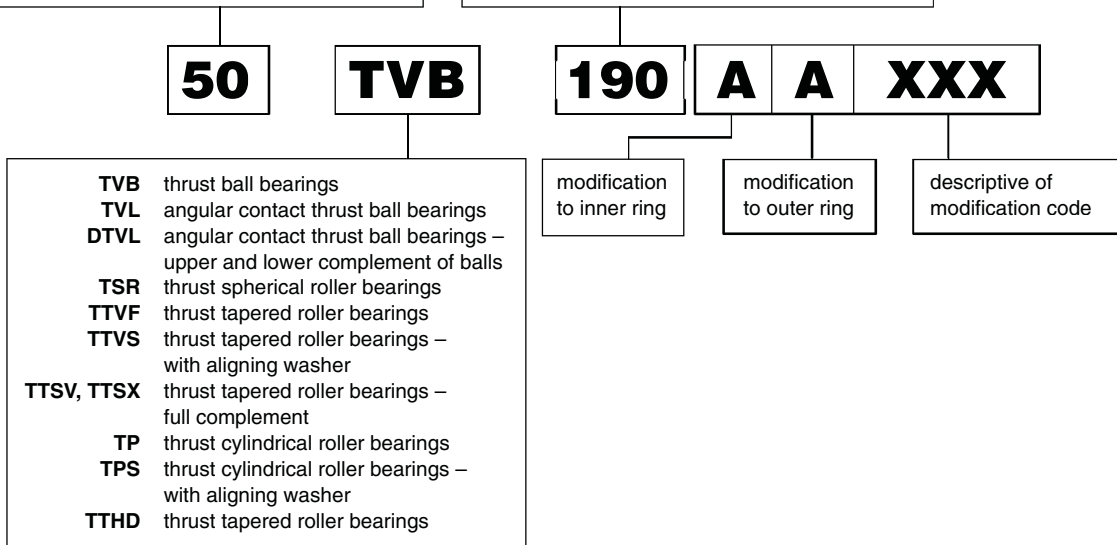
B



### Ball and Roller Thrust Bearings

From the three-digit "Series" number, it is known this is an inch size bearing. "50" is read as "5.0" and represents approximate or actual bore.

The series number (always three numerals) represents a specific size cage assembly.



# ***Ball and Roller Thrust Bearings***

|                                                | <i>Page</i> |
|------------------------------------------------|-------------|
| Introduction . . . . .                         | B438        |
| Ball and Roller Thrust Bearing Types . . . . . | B438        |

## ***DIMENSIONS – LOAD RATINGS***

|                                                          |      |
|----------------------------------------------------------|------|
| Ball Thrust Bearing Type TVB . . . . .                   | B442 |
| Angular Contact Ball Thrust Bearing Type TVL . . . . .   | B443 |
| Angular Contact Ball Thrust Bearing Type DTVL . . . . .  | B444 |
| Spherical Roller Thrust Bearing Type TSR . . . . .       | B445 |
| Cylindrical Roller Thrust Bearing Type TP . . . . .      | B447 |
| Cylindrical Roller Thrust Bearing Type TPS . . . . .     | B449 |
| Crossed Roller Thrust Bearing Type XR and JXR . . . . .  | B451 |
| Tapered Roller Thrust Bearing Type TTHD . . . . .        | B452 |
| Tapered Roller Thrust Bearing Type TTVF . . . . .        | B457 |
| Tapered Roller Thrust Bearing Type TTVS . . . . .        | B458 |
| Tapered Roller Thrust Bearing Type TTSX . . . . .        | B459 |
| Tapered Roller Thrust Bearing Type TTSV . . . . .        | B460 |
| Stamped Roller Thrust Bearing Type TTSP . . . . .        | B461 |
| Stamped Tapered Roller Thrust Bearing Type TTC, TTCS . . | B463 |





## INTRODUCTION

Six basic designs of ball and roller thrust bearings are available: ball, cross roller, cylindrical, machine tapered (TTHD, V-Flat, Screwdown), stamped tapered and spherical tapered roller. Dimensional data for all styles are presented in order by bore size.

Engineering data such as tolerances, shaft and housing fits, and life and load rating calculations are found in the engineering section of this catalog.

B

## BEARING TYPES

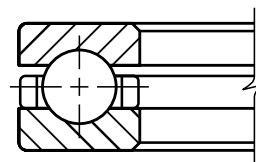
### BALL THRUST BEARINGS

Ball thrust bearings provide optimum performance in high-speed installations, particularly where loads are generally lighter. Two types including axial (TVB), and angular contact (TVL) are available. The DTVL Type is offered with both an upper and lower complement of angular contact balls and three race elements. The standard tolerances for ball thrust bearings (both types) are equivalent to ABEC 1 where applicable. Higher precision tolerances are available. Consult your Timken representative for information on such installations.

#### TVB

TVB Types are separable, consisting of two hardened and ground steel washers. Precision ground and lapped balls run in a grooved raceway separated by a bronze cage. Other materials may be specified for the cage, depending on the application.

Most TVB bearings include washers of the same bore and outside diameter. Housings should be designed to clear the O.D. of rotating races, with shafts stepped to clear the bore of stationary washers. Provides axial rigidity, but are not suggested if radial load is expected. The TVB is exceptionally easy to mount with the rotating washer usually shaft mounted. The stationary washer should be housed with an outside diameter clearance that allows the bearing to assume a normal operating position.



TVB

#### TVL

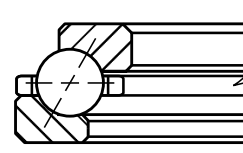
TVL Types provide exceptionally low friction, are cool running and have quiet operation when operated at high speeds. They are also less sensitive to misalignment. Consult your Timken representative for assistance in determining limits of such loading for specific applications.

Although ball thrust bearings have been designed exclusively for thrust loads, the TVL bearing will accommodate some radial loading. Consult your Timken representative for assistance in determining the limits of such loading for specific applications.

Hardened and ground steel races of TVL bearings enclose a complement of precision ground and lapped steel balls, separated by a bronze cage. Other material may be specified as required.

Not strictly an annular ball bearing, the larger ring is identified as the outer ring; the smaller as the inner. Inner ring is usually the rotating element and is shaft mounted. Outer ring is normally stationary and should be mounted with an outside diameter clearance that allows the bearing to assume a normal operating position. If combined loads are expected, the outer ring must be radially located in the housing.

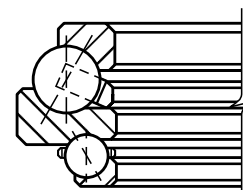
TVL bearings should always be operated under thrust loading. If a constant thrust load is not normally present, it should be imposed by springs or other devices.



TVL

#### DTVL

The DTVL has an upper and lower complement of angular contact balls and three race elements. It is capable of carrying thrust in one direction, comparable to the TVL Series and lighter thrust in the opposite direction.



DTVL

## SPHERICAL ROLLER THRUST BEARINGS

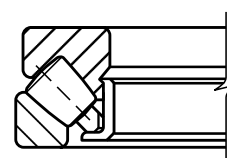
### TSR

A combination radial and thrust bearing designed to operate even if shaft and housing are, or become, misaligned under load. A favored bearing when conditions include heavy loads, difficulties in establishing or maintaining housing alignment or when shaft deflection can be expected.

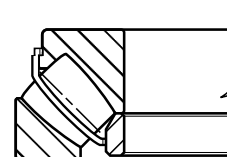
Shaft deflections and housing distortions caused by shock or heavy loads (which lead to misalignment) are compensated for by the internal self-alignment of the bearing elements during operation. Corner loading of rollers, a condition that limits service life on other types of bearings, cannot develop in spherical roller thrust bearings.

The TSR achieves high thrust capacity and allows axial misalignment between the inner ring and the outer ring of up to  $\pm 2.5^\circ$ . Spherically contoured rollers, arranged in a steep angular position, not only accept high axial loads, but also moderate radial loads. "E" styles, (EM-machined bronze cage, EJ- stamped steel cage) have increased capacity. Should extreme conditions of loading and/or speed under misalignment be anticipated, contact your Timken representative before ordering.

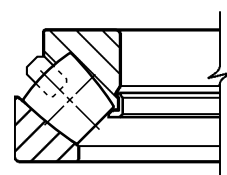
The inherent compensation for misalignment, provided by the spherical roller bearings, offers the designer the opportunity to use weldments for housing frames instead of complex castings. This eliminates high-cost machining operations. When castings are preferred, bore alignment is less critical if spherical roller bearings are specified.



TSR



TSR-EJ



TSR-EM

## CYLINDRICAL ROLLER THRUST BEARINGS

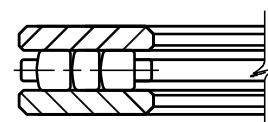
Timken's cylindrical roller thrust bearings are designed to operate under heavy loads at moderate speeds. Standard versions can be operated at peripheral speeds (bearing O.D.) of up to 3000 feet per minute. Special design features are available for both the bearing and mounting permitting even higher rotational speeds for this type of bearing. Two types of cylindrical roller thrust bearings, TP and TPS, are available.

### TP

Type TP bearings include two flat hardened and ground steel washers with a cage retainer holding one or more controlled contour rollers in each pocket. If specifications call for two or more rollers per pocket, they are manufactured to different lengths. The longer rollers are placed in alternate positions in adjacent pockets. Overlapping roller paths prevent "grooving" of the races and prolong bearing life. Due to the simplicity of design, standard TP thrust bearings are among the most economical to buy and install.

Minor radial displacement of the races does not affect the operation of the TP bearing, resulting in manufacturing economies and simplified installation.

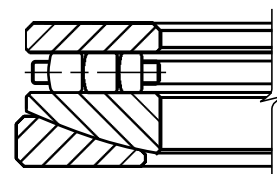
Shaft and housing seats must be square to the axis of rotation to prevent initial misalignment problems.



TP

### TPS

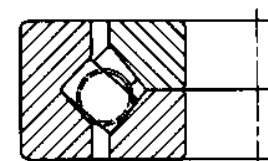
The TPS design is similar to the TP style, except the bottom washer assembly is comprised of two races, with the contacting faces spherically ground. The TPS bearing is self-adjusting to initial misalignment. It is not suggested for installations where alignment may be continuously changing (dynamic misalignment).



TPS

### TXR

The crossed roller bearing is ideal for machine tool applications such as vertical boring mills, vertical grinding machines and other similar applications. A crossed roller bearing is comprised of two sets of bearing races and rollers brought together at right angles to each other – with alternate rollers facing in opposite directions – and within a section height not much greater than that of a single bearing housing.



TXR



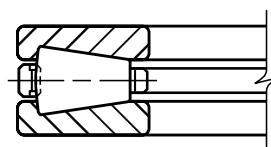
## ROLLER BEARINGS

### TAPERED ROLLER THRUST BEARINGS

Timken true rolling tapered roller thrust bearings include rollers that have conical sections. These bearings have been engineered so that the rollers and raceways form a cone in which the vertex is on the center line of the bearing. This bearing geometry assures a true rolling motion. In addition, the large end of each tapered roller is spherically ground so that its curvature conforms with the concave face of the washer rib. Pressure between the rib and roller, under load, guides the rollers accurately. Timken manufactures five types of tapered roller thrust bearings: standard (TTHD), V-Flat (TTVF) self-aligning V-Flat (TTVS), concave washer (TTSV), and convex washer (TTSX).

#### TTHD

The TTHD design has an identical pair of hardened and ground steel washers with tapered raceways. Both washers have the same bore and O.D., therefore housings should be designed to clear the O.D. of rotating washers and shafts stepped to clear the bore of stationary washers. Controlled contour tapered rollers are equally spaced by a cage. The TTHD bearing is well-suited for applications where extremely high thrust loads and heavy shock may be encountered as in crane hooks. For very low speed applications with unusually high loading, TTHD bearings can be supplied with a full complement of rollers. These bearings are identified in the tables by suffix 00278 following the bearing number. Applications for full-complement bearings should be reviewed by your Timken representative to ensure selection of the proper bearing.



TTHD

#### TTVF, TTVS, TTSV, TTSX

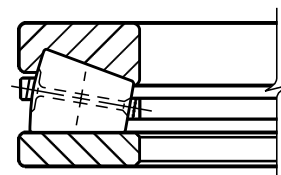
V-Flat Tapered Roller thrust bearings (TTVF and TTVS) combine the outstanding features of tapered thrust and cylindrical roller bearings, offering the highest possible capacity of any thrust bearing of its size. The V-Flat design includes one flat washer and one with a tapered raceway matching the rollers. The design was originally developed for screwdown applications in metal rolling mills where thrust loads exceeding one million pounds are common. The V-Flat bearings have exceptional dynamic capacity within a given envelope and provides static capacity. They have been highly successful in heavily loaded extruders, in cone crushers and other applications where a wide range of operating conditions are found. Most sizes utilize cages with hardened pins through the center of the rollers, allowing closer spacing of the rollers to maximize capacity.

Smaller sizes have brass cages, designed for unidirectional retention of rollers.

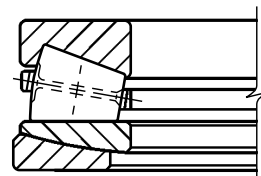
Both the pin type and brass cage are designed to permit a full flow of lubricant to all critical surfaces, providing cooler operation.

Self-aligning V-Flat bearings (TTVS) employ the same basic roller and raceway design, except the lower washer is in two pieces, with the contacting faces spherically ground permitting self-alignment under conditions of initial misalignment. TTVS bearings should not be used if dynamic misalignment (changing under load) is expected.

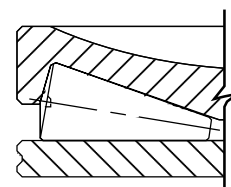
- The contact surface of each roller of the V-Flat bearings has a controlled contour wherein the ends are slightly relieved. This optimizes stress distribution by avoiding concentration of stress in the raceways at the ends of the rollers.
- Conformity between roller end and the rib is controlled to enhance the flow of lubricant between these surfaces, allowing the development of a hydrodynamic oil film between the end of the roller and the guiding surface of the rib.
- Full roller complement designs (TTSV and TTSX) do not have conventional bores, but are provided with center inserts for attachment purposes as well as for lifting.
- The TTSV and TTSX designs offer the highest capacity but at a somewhat reduced speed capability as compared with other V-Flat types.
- The TTSV and TTSX bearings encompass tapered rollers between two raceways. One raceway is flat and the other raceway forms the surface of a cone. The conical raceway has a washer with a rib to resist the radial component of the thrust force caused by the inclined plane and to guide the rollers.



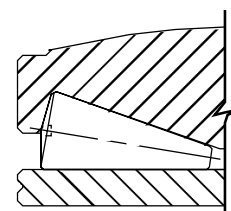
TTVF



TTVS



TTSV



TTSX

B

- Lines extended from the TTSV and TTSX roller-to-raceway contact surfaces converge to form a cone. The vertex of this cone is common with the centerline of the bearing and the plane of the raceway surface of the flat washer.
- The TTSV and TTSX design achieves true rolling motion between the tapered rollers and both raceways with no sliding or skidding at any point on the rolling surfaces. The flat raceway permits radial displacement without affecting the operation of the bearing.

### TTSP

The types TTSP and TTSPS (not shown) thrust bearings are made up of two tapered thrust races, rollers, cage and outside retainer which holds the components together during shipping and installation. The types TTSP and TTSPS thrust bearings are employed extensively in the steering pivot positions of automotive and industrial applications.

### TTC, TTCS

The types TTC, TTCS and TTCL (not shown) thrust bearings consist of two tapered thrust races, rollers and an outside retainer and are cageless. The outside retainer holds the assembly together for shipping and installation. Types TTC, TTCS and TTCL bearings are thrust bearings specifically designed for oscillating applications. These types are identical with the exception of the retainer construction.



B

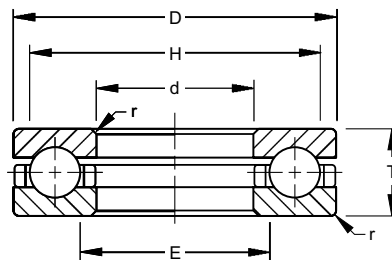


# ROLLER BEARINGS

## BALL THRUST BEARINGS

### TYPE TVB

- Designed for optimum performance in high speed installations.
- Provide axial rigidity, but are not suggested if radial loading is expected.
- Exceptionally easy to mount, with the rotating washer usually shaft-mounted.



### DIMENSIONS – LOAD RATINGS

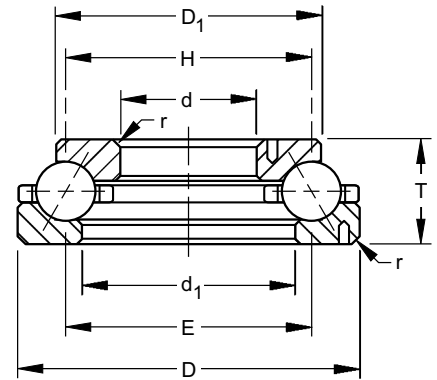
| Bearing Number | Bore<br>d          | O.D.<br>D          | Height<br>T<br>(min.) | Shoulder Diameter    |                        | Fillet Radius <sup>(1)</sup><br>r<br>(max.) | Wt.          | Load Rating                              |                                          |
|----------------|--------------------|--------------------|-----------------------|----------------------|------------------------|---------------------------------------------|--------------|------------------------------------------|------------------------------------------|
|                |                    |                    |                       | Shaft<br>H<br>(min.) | Housing<br>E<br>(max.) |                                             |              | Static Load<br>Rating<br>C <sub>0a</sub> | Dynamic Load<br>Rating<br>C <sub>t</sub> |
|                | mm<br>in.          | mm<br>in.          | mm<br>in.             | mm<br>in.            | mm<br>in.              | mm<br>in.                                   | kg<br>lbs.   | kN<br>lbs.                               | kN<br>lbs.                               |
| 50TVB190       | 127.000<br>5.0000  | 184.150<br>7.2500  | 41.275<br>1.6250      | 170.7<br>6.72        | 140.5<br>5.53          | 2.4<br>0.09                                 | 3.4<br>7.2   | 583.0<br>131000                          | 169.0<br>38000                           |
| 52TVB253       | 133.350<br>5.2500  | 203.200<br>8.0000  | 50.800<br>2.0000      | 185.7<br>7.31        | 150.8<br>5.94          | 2.4<br>0.09                                 | 5.5<br>12.2  | 756.0<br>170000                          | 223.0<br>50200                           |
| 55TVB245       | 139.700<br>5.5000  | 209.550<br>8.2500  | 47.625<br>1.8750      | 192.1<br>7.56        | 157.2<br>6.19          | 2.4<br>0.09                                 | 5.1<br>11.3  | 770.0<br>173000                          | 231.0<br>52000                           |
| 57TVB248       | 146.050<br>5.7500  | 215.900<br>8.5000  | 47.625<br>1.8750      | 198.4<br>7.81        | 163.5<br>6.44          | 2.4<br>0.09                                 | 5.3<br>11.7  | 810.0<br>182000                          | 239.0<br>53800                           |
| 60TVB252       | 152.400<br>6.0000  | 222.250<br>8.7500  | 47.625<br>1.8750      | 204.8<br>8.06        | 169.9<br>6.69          | 2.4<br>0.09                                 | 5.6<br>12.4  | 832.0<br>187000                          | 238.0<br>53500                           |
| 62TVB291       | 158.750<br>6.2500  | 228.600<br>9.0000  | 47.625<br>1.8750      | 215.1<br>8.47        | 172.2<br>6.78          | 2.4<br>0.09                                 | 5.8<br>12.8  | 867.0<br>195000                          | 245.0<br>55100                           |
| 65TVB293       | 165.100<br>6.5000  | 241.300<br>9.5000  | 57.150<br>2.2500      | 224.6<br>8.84        | 181.8<br>7.16          | 3.2<br>0.12                                 | 7.7<br>17.0  | 1060.0<br>238000                         | 317.0<br>71300                           |
| 67TVB296       | 171.450<br>6.7500  | 247.650<br>9.7500  | 57.150<br>2.2500      | 229.4<br>9.03        | 189.7<br>7.47          | 3.2<br>0.12                                 | 7.9<br>17.5  | 1110.0<br>251000                         | 328.0<br>73800                           |
| 70TVB298       | 177.800<br>7.0000  | 254.000<br>10.0000 | 57.150<br>2.2500      | 235.7<br>9.28        | 196.1<br>7.72          | 3.2<br>0.12                                 | 8.2<br>18.1  | 1170.0<br>263000                         | 339.0<br>76300                           |
| 75TVB343       | 190.500<br>7.5000  | 266.700<br>10.5000 | 57.150<br>2.2500      | 250<br>9.84          | 207.2<br>8.16          | 3.2<br>0.12                                 | 9.1<br>20.0  | 1140.0<br>255000                         | 321.0<br>72300                           |
| 75TVB344       | 190.500<br>7.5000  | 276.225<br>10.8750 | 69.850<br>2.7500      | 258.8<br>10.19       | 208<br>8.19            | 3.2<br>0.12                                 | 12.7<br>27.9 | 1390.0<br>313000                         | 407.0<br>91400                           |
| 80TVB346       | 203.200<br>8.0000  | 279.400<br>11.0000 | 57.150<br>2.2500      | 262.7<br>10.34       | 219.9<br>8.66          | 3.2<br>0.12                                 | 8.8<br>19.3  | 1370.0<br>309000                         | 395.0<br>88900                           |
| 80TVB347       | 203.200<br>8.0000  | 295.275<br>11.6250 | 76.200<br>3.0000      | 273.1<br>10.75       | 222.2<br>8.75          | 6.4<br>0.25                                 | 15.6<br>34.5 | 1700.0<br>382000                         | 504.0<br>113000                          |
| 85TVB391       | 215.900<br>8.5000  | 292.100<br>11.5000 | 57.150<br>2.2500      | 275.4<br>10.84       | 232.6<br>9.16          | 3.2<br>0.12                                 | 10.1<br>22.2 | 1280.0<br>289000                         | 349.0<br>78400                           |
| 90TVB393       | 228.600<br>9.0000  | 304.800<br>12.0000 | 57.150<br>2.2500      | 288.1<br>11.34       | 245.3<br>9.66          | 3.2<br>0.12                                 | 9.7<br>21.3  | 1620.0<br>365000                         | 442.0<br>99400                           |
| 95TVB431       | 241.300<br>9.5000  | 317.500<br>12.5000 | 57.150<br>2.2500      | 300.8<br>11.84       | 258<br>10.16           | 3.2<br>0.12                                 | 11.1<br>24.4 | 1380.0<br>311000                         | 366.0<br>82400                           |
| 100TVB433      | 254.000<br>10.0000 | 342.900<br>13.5000 | 57.150<br>2.2500      | 324.6<br>12.78       | 272.3<br>10.72         | 6.4<br>0.25                                 | 13.4<br>29.5 | 1560.0<br>351000                         | 431.0<br>96800                           |
| 105TVB471      | 266.700<br>10.5000 | 355.600<br>14.0000 | 57.150<br>2.2500      | 337.3<br>13.28       | 285.0<br>11.22         | 6.4<br>0.25                                 | 13.9<br>30.7 | 1810.0<br>407000                         | 476.0<br>107000                          |
| 110TVB472      | 279.400<br>11.0000 | 368.300<br>14.5000 | 57.150<br>2.2500      | 350<br>13.78         | 297.7<br>11.72         | 6.4<br>0.25                                 | 14.5<br>31.9 | 1870.0<br>421000                         | 486.0<br>109000                          |
| 120TVB511      | 304.800<br>12.0000 | 393.700<br>15.5000 | 57.150<br>2.2500      | 375.4<br>14.78       | 323.1<br>12.72         | 6.4<br>0.25                                 | 15.6<br>34.5 | 2000.0<br>450000                         | 507.0<br>114000                          |
| 130TVB551      | 330.200<br>13.0000 | 419.100<br>16.5000 | 63.500<br>2.5000      | 400.8<br>15.78       | 348.5<br>13.72         | 6.4<br>0.25                                 | 18<br>39.6   | 2470.0<br>555000                         | 627.0<br>141000                          |
| 140TVB581      | 355.600<br>14.0000 | 444.500<br>17.5000 | 63.500<br>2.5000      | 426.2<br>16.78       | 373.9<br>14.72         | 6.4<br>0.25                                 | 19.2<br>42.3 | 2620.0<br>590000                         | 649.0<br>146000                          |
| 150TVB610      | 381.000<br>15.0000 | 482.600<br>19.0000 | 63.500<br>2.5000      | 460.4<br>18.12       | 403.6<br>15.89         | 6.4<br>0.25                                 | 24.8<br>54.7 | 2620.0<br>590000                         | 649.0<br>146000                          |
| 160TVB640      | 406.400<br>16.0000 | 508.000<br>20.0000 | 63.500<br>2.5000      | 482.6<br>19.00       | 431.8<br>17.00         | 6.4<br>0.25                                 | 26.3<br>57.9 | 2780.0<br>624000                         | 677.0<br>152000                          |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

## ANGULAR CONTACT BALL THRUST BEARINGS

### TYPE TVL

- Provides exceptionally low friction, cool running and quiet operation when run at high speeds.
- Although designed exclusively for thrust loads, will accommodate some radial loading.



### DIMENSIONS – LOAD RATINGS<sup>(2)</sup>

| Bearing Number | Bore d              | O.D. D              | Height T          | Washers                            |                                | Shoulder Diam.  |                 | Dowel Pin (one per Washer) |                               |                   | Fillet <sup>(1)</sup> Radius r | Weight          | Load Rating        |                  |
|----------------|---------------------|---------------------|-------------------|------------------------------------|--------------------------------|-----------------|-----------------|----------------------------|-------------------------------|-------------------|--------------------------------|-----------------|--------------------|------------------|
|                |                     |                     |                   | Small Diameter O.D. D <sub>1</sub> | Large Bore I.D. d <sub>1</sub> | Shaft H         | Housing E       | Pin Diameter               | Hole Location from Centerline |                   |                                |                 | C <sub>0a</sub>    | C <sub>t</sub>   |
|                |                     |                     |                   |                                    |                                |                 |                 |                            | Small Bore Washer             | Large Bore Washer |                                |                 |                    |                  |
|                | mm in.              | mm in.              | mm in.            | mm in.                             | mm in.                         | mm in.          | mm in.          | mm in.                     | mm in.                        | mm in.            | mm in.                         | kg lbs.         | kN lbs.            | kN lbs.          |
| 90TVL710       | 228.600<br>9.0000   | 295.275<br>11.6250  | 38.100<br>1.5000  | 277.81<br>10.938                   | 246.06<br>9.688                | 261.9<br>10.31  | 261.9<br>10.31  | —                          | —                             | —                 | 3.2<br>0.12                    | 6.2<br>13.6     | 636.0<br>143000    | 164.0<br>36900   |
| 120TVL700      | 304.800<br>12.0000  | 406.400<br>16.0000  | 57.150<br>2.2500  | 368.30<br>14.500                   | 342.90<br>13.500               | 355.6<br>14.00  | 355.6<br>14.00  | 9.52<br>0.375              | 165.1<br>6.50                 | 190.5<br>7.50     | 3.2<br>0.12                    | 18.5<br>40.8    | 1600.0<br>359000   | 429.0<br>96400   |
| 150TVL701      | 381.000<br>15.0000  | 520.700<br>20.5000  | 84.125<br>3.3120  | 482.60<br>19.000                   | 419.10<br>16.500               | 450.8<br>17.75  | 450.8<br>17.75  | 12.70<br>0.500             | 206.4<br>8.12                 | 244.5<br>9.62     | 4.8<br>0.19                    | 50.2<br>110.7   | 2700.0<br>606000   | 721.0<br>162000  |
| 170TVL500      | 431.800<br>17.0000  | 635.000<br>25.0000  | 88.900<br>3.5000  | 565.15<br>22.250                   | 488.95<br>19.250               | 533.4<br>21.00  | 533.4<br>21.00  | 12.70<br>0.500             | 235<br>9.25                   | 298.4<br>11.75    | 7.9<br>0.31                    | 89.6<br>197.5   | 4390.0<br>986000   | 1130.0<br>254000 |
| 180TVL605      | 457.200<br>18.0000  | 625.475<br>24.6250  | 92.075<br>3.6250  | 549.28<br>21.625                   | 508<br>20.000                  | 541.3<br>21.31  | 541.3<br>21.31  | 15.88<br>0.625             | 247.6<br>9.75                 | 285.8<br>11.25    | 3.2<br>0.12                    | 78.4<br>172.9   | 4790.0<br>1076000  | 1280.0<br>288000 |
| 195TVL470      | 495.300<br>19.5000  | 584.200<br>23.0000  | 57.150<br>2.2500  | 571.50<br>22.500                   | 508<br>20.000                  | 539.8<br>21.25  | 539.8<br>21.25  | 9.52<br>0.375              | 258.8<br>10.19                | 281<br>11.06      | 3.2<br>0.12                    | 28.4<br>62.7    | 2600.0<br>585000   | 596.0<br>134000  |
| 200TVL850      | 508.000<br>20.0000  | 704.850<br>27.7500  | 117.475<br>4.6250 | 628.68<br>24.750                   | 565.15<br>22.250               | 606.4<br>23.88  | 606.4<br>23.88  | 15.88<br>0.625             | 276.2<br>10.88                | 330.2<br>13.00    | 6.4<br>0.25                    | 127.3<br>280.7  | 5160.0<br>1160000  | 1350.0<br>303000 |
| 201TVL615      | 511.175<br>20.1250  | 628.650<br>24.7500  | 66.675<br>2.6250  | 590.55<br>23.250                   | 549.28<br>21.625               | 569.9<br>22.44  | 569.9<br>22.44  | 12.70<br>0.500             | 268.3<br>10.56                | 300<br>11.81      | 3.2<br>0.12                    | 41.9<br>92.3    | 3320.0<br>746000   | 787.0<br>177000  |
| 202TVL620      | 514.350<br>20.5000  | 704.850<br>27.7500  | 114.300<br>4.5000 | 622.30<br>24.500                   | 571.50<br>22.500               | 609.6<br>24.00  | 609.6<br>24.00  | 20.64<br>0.812             | 279.4<br>11.00                | 327<br>12.88      | 6.4<br>0.25                    | 122.3<br>269.7  | 5910.0<br>1330000  | 1560.0<br>351000 |
| 227TVL302      | 577.850<br>22.7500  | 774.700<br>30.5000  | 117.475<br>4.6250 | 704.85<br>27.750                   | 622.30<br>24.500               | 676.3<br>26.62  | 676.3<br>26.62  | 20.64<br>0.812             | 311.2<br>12.25                | 365.1<br>14.38    | 6.4<br>0.25                    | 149.8<br>330.2  | 6620.0<br>1490000  | 1690.0<br>379000 |
| 233TVL303      | 593.725<br>23.3750  | 790.575<br>31.1250  | 117.475<br>4.6250 | 720.72<br>28.375                   | 650.88<br>25.625               | 692.2<br>27.25  | 692.2<br>27.25  | 22.22<br>0.875             | 320.7<br>12.62                | 369.9<br>14.56    | 6.4<br>0.25                    | 150.7<br>332.2  | 6850.0<br>1540000  | 1730.0<br>388000 |
| 238TVL304      | 606.425<br>23.8750  | 847.725<br>33.3750  | 133.350<br>5.2500 | 739.78<br>29.125                   | 688.98<br>27.125               | 727.1<br>28.62  | 727.1<br>28.62  | 22.22<br>0.875             | 327<br>12.88                  | 396.9<br>15.62    | 6.4<br>0.25                    | 212.6<br>468.7  | 8510.0<br>1910000  | 2200.0<br>494000 |
| 245TVL716      | 622.300<br>24.5000  | 768.350<br>30.2500  | 82.550<br>3.2500  | 733.42<br>28.875                   | 680.47<br>26.790               | 695.3<br>27.38  | 695.3<br>27.38  | 12.70<br>0.500             | 323.8<br>12.75                | 371.5<br>14.62    | 3.2<br>0.12                    | 76.2<br>168.0   | 3830.0<br>861000   | 863.0<br>194000  |
| 245TVL612      | 622.300<br>24.5000  | 831.850<br>32.7500  | 117.475<br>4.6250 | 742.95<br>29.250                   | 679.45<br>26.750               | 727.1<br>28.62  | 727.1<br>28.62  | 15.88<br>0.625             | 330.2<br>13.00                | 396.9<br>15.62    | 6.4<br>0.25                    | 164.5<br>362.7  | 7070.0<br>1590000  | 1770.0<br>397000 |
| 252TVL505      | 341.350<br>25.2500  | 793.750<br>31.2500  | 88.900<br>3.5000  | 746.12<br>29.375                   | 708.02<br>27.875               | 717.6<br>28.25  | 717.6<br>28.25  | 12.70<br>0.500             | 342.9<br>13.50                | 376.2<br>14.81    | 6.4<br>0.25                    | 89.3<br>197.0   | 5430.0<br>1220000  | 1300.0<br>293000 |
| 260TVL635      | 660.400<br>26.0000  | 893.350<br>35.2500  | 133.350<br>5.2500 | 790.58<br>31.125                   | 727.08<br>28.625               | 777.9<br>30.62  | 777.9<br>30.62  | 20.64<br>0.812             | 355.6<br>14.00                | 422.3<br>16.62    | 6.4<br>0.25                    | 226.9<br>500.4  | 9520.0<br>2140000  | 2370.0<br>533000 |
| 302TVL510      | 768.350<br>30.2500  | 920.750<br>36.2500  | 88.900<br>3.5000  | 873.12<br>34.375                   | 835.02<br>32.875               | 844.6<br>33.25  | 844.6<br>33.25  | 12.70<br>0.500             | 408<br>16.06                  | 439.7<br>17.31    | 6.4<br>0.25                    | 105.2<br>231.9  | 6360.0<br>1430000  | 1450.0<br>325000 |
| 302TVL624      | 768.350<br>30.2500  | 1006.475<br>39.6250 | 139.700<br>5.5000 | 901.7<br>35.500                    | 838.2<br>33.000                | 887.4<br>34.94  | 887.4<br>34.94  | 22.22<br>0.875             | 409.6<br>16.12                | 476.2<br>18.75    | 6.4<br>0.25                    | 271.1<br>597.8  | 10600.0<br>2370000 | 2540.0<br>570000 |
| 303TVL706      | 771.525<br>30.3750  | 898.525<br>35.3750  | 63.500<br>2.5000  | 860.42<br>33.875                   | 809.62<br>31.875               | 835<br>32.88    | 835<br>32.88    | 12.70<br>0.500             | 403.2<br>15.88                | 431.8<br>17.00    | 6.4<br>0.25                    | 58<br>128.0     | 3900.0<br>877000   | 778.0<br>175000  |
| 309TVL707      | 785.812<br>30.9375  | 952.500<br>37.5000  | 95.250<br>3.7500  | 882.65<br>34.750                   | 857.25<br>33.750               | 870<br>34.25    | 870<br>34.25    | 15.88<br>0.625             | 415.9<br>16.38                | 454<br>17.88      | 6.4<br>0.25                    | 117.9<br>260.0  | 4230.0<br>952000   | 1100.0<br>248000 |
| 310TVL625      | 787.400<br>31.0000  | 1025.525<br>40.3750 | 139.700<br>5.5000 | 917.58<br>36.125                   | 893.76<br>35.188               | 906.5<br>35.69  | 906.5<br>35.69  | 22.22<br>0.875             | 422.3<br>16.62                | 485.8<br>19.12    | 6.4<br>0.25                    | 263.5<br>581.0  | 10900.0<br>2450000 | 2590.0<br>582000 |
| 317TVL307      | 806.450<br>31.7500  | 1025.525<br>40.3750 | 127.000<br>5.0000 | 933.45<br>36.750                   | 873.12<br>34.375               | 914.4<br>36.00  | 914.4<br>36.00  | 22.22<br>0.875             | 427<br>16.81                  | 476.2<br>18.75    | 6.4<br>0.25                    | 240.6<br>530.6  | 10900.0<br>2450000 | 2590.0<br>582000 |
| 402TVL717      | 1022.350<br>40.2500 | 1181.100<br>46.5000 | 88.900<br>3.5000  | 1133.48<br>44.625                  | 1069.98<br>42.125              | 1101.7<br>43.38 | 1101.7<br>43.38 | 19.05<br>0.750             | 530.2<br>20.88                | 571.5<br>22.50    | 6.4<br>0.25                    | 147.8<br>326.0  | 8180.0<br>1840000  | 1710.0<br>384000 |
| 410TVL718      | 1041.400<br>41.0000 | 1260.475<br>49.6250 | 127.000<br>5.0000 | 1189.04<br>46.812                  | 1112.84<br>43.812              | 1150.9<br>45.31 | 1150.9<br>45.31 | 19.05<br>0.750             | 544.5<br>21.44                | 606.4<br>23.88    | 6.4<br>0.25                    | 308.8<br>681.0  | 14000.0<br>3140000 | 3060.0<br>687000 |
| 420TVL721      | 1066.800<br>42.0000 | 1285.875<br>50.6250 | 127.000<br>5.0000 | 1214.44<br>47.812                  | 1138.24<br>44.812              | 1176.3<br>46.31 | 1176.3<br>46.31 | 22.22<br>0.875             | 560.4<br>22.06                | 616<br>24.25      | 6.4<br>0.25                    | 315.2<br>695.0  | 14000.0<br>3140000 | 3060.0<br>687000 |
| 530TVL719      | 1346.200<br>53.0000 | 1517.650<br>59.7500 | 104.775<br>4.1250 | 1457.32<br>57.375                  | 1406.52<br>55.375              | 1431.9<br>56.38 | 1431.9<br>56.38 | 22.22<br>0.875             | 695.3<br>27.38                | 733.4<br>28.88    | 6.4<br>0.25                    | 229.99<br>507.0 | 9080.0<br>2040000  | 1830.0<br>412000 |
| 540TVL720      | 1371.600<br>54.0000 | 1619.250<br>63.7500 | 139.700<br>5.5000 | 1533.52<br>60.375                  | 1457.32<br>57.375              | 1495.4<br>58.88 | 1495.4<br>58.88 | 22.22<br>0.875             | 714.4<br>28.12                | 781<br>30.75      | 6.4<br>0.25                    | 480.3<br>1059.0 | 18000.0<br>4060000 | 3630.0<br>815000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> See engineering section for application of Equivalent Thrust Load Factors: X = 0.76, Y = 1.00,  $\frac{T}{R}$  (min) = 1.56.  $\left[\frac{T}{R}\right]$  is Thrust Load ÷ Radial Load

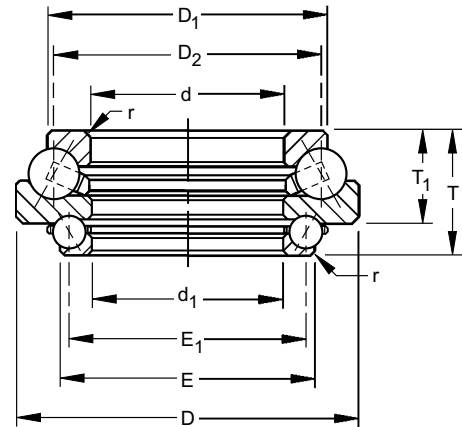


# ROLLER BEARINGS

## ANGULAR CONTACT BALL THRUST BEARINGS

### TYPE DTVL

- Capable of carrying thrust in one direction, plus a lighter thrust in the opposite direction.
- Designed with an upper and lower complement of angular contact balls and three race elements.



B

### DIMENSIONS – LOAD RATINGS<sup>(2)</sup>

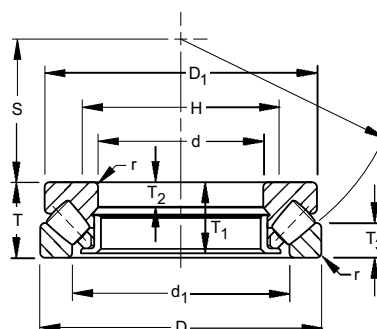
| Bearing Number | Bore     |                      | O.D. D   | Height T | Upper Race          |                         | Lower Race |                         | T <sub>1</sub> | Fillet <sup>(1)</sup> Radius r (Max.) | Weight | Load Rating                        |                                    |                                    |
|----------------|----------|----------------------|----------|----------|---------------------|-------------------------|------------|-------------------------|----------------|---------------------------------------|--------|------------------------------------|------------------------------------|------------------------------------|
|                | Upper d  | Lower d <sub>1</sub> |          |          | O.D. D <sub>1</sub> | Shoulder D <sub>2</sub> | O.D. E     | Shoulder E <sub>1</sub> |                |                                       |        | Upper                              |                                    | Lower                              |
|                | mm in.   | mm in.               |          |          | mm in.              | mm in.                  | mm in.     | mm in.                  |                |                                       |        | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>r</sub> | Static Load Rating C <sub>0a</sub> |
| 200DTV1722     | 508.000  | 508.000              | 742.95   | 171.45   | 679.45              | 616                     | 587.38     | 558.8                   | 127.000        | 6.4                                   | 177.3  | 5340                               | 1560                               | 2310                               |
|                | 20.0000  | 20.0000              | 29.2500  | 6.7500   | 26.7500             | 24.2500                 | 23.125     | 22.00                   | 5.0000         | 0.25                                  | 391.0  | 1200000                            | 351000                             | 519000                             |
| 202DTV1723     | 514.350  | 511.175              | 704.85   | 158.75   | 622.30              | 609.60                  | 590.55     | 569.9                   | 114.3          | 6.4                                   | 133.3  | 5430                               | 1480                               | 3750                               |
|                | 20.2500  | 20.1250              | 27.7500  | 6.2500   | 24.5000             | 24.0000                 | 23.2500    | 22.44                   | 4.50           | 0.25                                  | 294.0  | 1220000                            | 332000                             | 844000                             |
| 235DTV1724     | 596.900  | 590.550              | 838.2    | 184.15   | 774.70              | 711.20                  | 676.28     | 647.7                   | 139.7          | 6.4                                   | 246.2  | 7560                               | 1970                               | 3660                               |
|                | 23.5000  | 23.2500              | 33.0000  | 7.2500   | 30.5000             | 28.0000                 | 26.625     | 25.50                   | 5.50           | 0.25                                  | 543.0  | 1700000                            | 443000                             | 822000                             |
| 245DTV1725     | 622.300  | 619.125              | 815.975  | 158.75   | 730.25              | 717.60                  | 698.50     | 677.9                   | 114.3          | 6.4                                   | 157.4  | 6410                               | 1640                               | 4430                               |
|                | 24.5000  | 24.3750              | 32.1250  | 6.2500   | 28.7500             | 28.2500                 | 27.5000    | 26.68                   | 4.50           | 0.25                                  | 347.0  | 1440000                            | 369000                             | 995000                             |
| 266DTV1726     | 676.275  | 673.100              | 914.4    | 193.675  | 876.30              | 787.40                  | 787.4      | 743                     | 142.88         | 6.4                                   | 296.6  | 8510                               | 2480                               | 6320                               |
|                | 26.6250  | 26.5000              | 36.0000  | 7.6250   | 34.5000             | 31.0000                 | 31.00      | 29.25                   | 5.625          | 0.25                                  | 654.0  | 1910000                            | 558000                             | 1420000                            |
| 305DTV1727     | 774.700  | 768.35               | 971.55   | 158.75   | 885.82              | 873.10                  | 847.72     | 827.1                   | 114.3          | 6.4                                   | 194.6  | 7780                               | 1880                               | 5390                               |
|                | 30.5000  | 30.2500              | 38.2500  | 6.2500   | 34.875              | 34.380                  | 33.38      | 32.56                   | 4.50           | 0.25                                  | 429.0  | 1750000                            | 423000                             | 1210000                            |
| 312DTV1728     | 793.750  | 787.400              | 1006.475 | 200.025  | 1000.12             | 895.40                  | 901.7      | 863.6                   | 139.7          | 6.4                                   | 325.2  | 10200                              | 2480                               | 7200                               |
|                | 31.2500  | 31.0000              | 39.6250  | 7.8750   | 39.375              | 35.250                  | 35.50      | 34.00                   | 5.50           | 0.25                                  | 717.0  | 2300000                            | 557000                             | 1620000                            |
| 405DTV1729     | 1028.700 | 1025.525             | 1231.9   | 158.75   | 1143                | 1130.30                 | 1104.9     | 1084.3                  | 114.3          | 6.4                                   | 254.4  | 10200                              | 2240                               | 6540                               |
|                | 40.5000  | 40.3750              | 48.5000  | 6.2500   | 45.0000             | 44.5000                 | 43.50      | 42.69                   | 4.50           | 0.25                                  | 561.0  | 2280000                            | 504000                             | 1470000                            |
| 412DTV1730     | 1047.750 | 1041.400             | 1260.475 | 200.025  | 1254.12             | 1149.40                 | 1155.7     | 1117.6                  | 139.7          | 6.4                                   | 417.2  | 12300                              | 2780                               | 8230                               |
|                | 41.2500  | 41.0000              | 49.6250  | 7.8750   | 49.375              | 45.250                  | 45.50      | 44.00                   | 5.50           | 0.25                                  | 920.0  | 2760000                            | 625000                             | 1850000                            |
| 541DTV1731     | 1374.775 | 1371.600             | 1597.025 | 247.65   | 1536.70             | 1481.10                 | 1489.08    | 1447.8                  | 168.28         | 6.4                                   | 654.4  | 17700                              | 3580                               | 11100                              |
|                | 54.1250  | 54.0000              | 62.8750  | 9.7500   | 60.5000             | 58.310                  | 58.625     | 57.00                   | 6.625          | 0.25                                  | 1443.0 | 3980000                            | 804000                             | 2500000                            |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> See engineering section for application of Equivalent Thrust Load Factors:  $X = 0.76, Y = 1.00, \frac{T}{R} (\min) = 1.56, \left[ \frac{T}{R} \right]$  is Thrust Load ÷ Radial Load



## SPHERICAL ROLLER THRUST BEARINGS



### TYPE TSR

- Design achieves a high thrust capacity with low friction and continuous roller alignment.
- Spherically contoured rollers, arranged in steep angular position, not only accommodates high thrust loads, but supports moderate radial loads as well.
- Low friction of the bearing results from a combination of bearing geometry and manufacturing technology.

### TYPE TSR-EM

- Utilize bronze retainers and enhanced internal geometry allowing for higher dynamic load ratings and improved lubrication characteristics.
- Utilizes spherically contoured rollers arranged in a steep angular configuration to accommodate high thrust load alone or in combination with moderate radial loads.
- Possesses inherent dynamic misalignment capabilities.

### DIMENSIONS – LOAD RATINGS

| Bearing Number | Bore d        | O.D. D         | Height T      | Shoulder Diameter             |                | Inner Ring          |                                |                             | Outer Ring Height T <sub>3</sub> | S             | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.           | Load Rating                        |                                    | Approx. Limiting Speed (for Oil Bath Only) | k <sup>(2)</sup> |
|----------------|---------------|----------------|---------------|-------------------------------|----------------|---------------------|--------------------------------|-----------------------------|----------------------------------|---------------|---------------------------------------|---------------|------------------------------------|------------------------------------|--------------------------------------------|------------------|
|                |               |                |               | d <sub>1</sub> Housing (Min.) | H Shaft (Max.) | O.D. D <sub>1</sub> | Assembly Height T <sub>1</sub> | Pilot Height T <sub>2</sub> |                                  |               |                                       |               | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>t</sub> |                                            |                  |
|                | mm in.        | mm in.         | mm in.        | mm in.                        | mm in.         | mm in.              | mm in.                         | mm in.                      | mm in.                           | mm in.        | mm in.                                | kg. lbs.      | kN lbs.                            | kN lbs.                            | RPM                                        |                  |
| 29422          | 110<br>4.3307 | 230<br>9.0551  | 73<br>2.8740  | 162<br>6.378                  | 165<br>6.496   | 220<br>8.661        | 69<br>2.717                    | 26<br>1.024                 | 35<br>1.378                      | 69<br>2.717   | 2.5<br>0.10                           | 33.4<br>33.4  | 1150<br>260000                     | 800<br>176000                      | 1500                                       | 30               |
| 29424          | 120<br>4.7244 | 250<br>9.8425  | 78<br>3.0709  | 174<br>6.850                  | 180<br>7.087   | 236<br>9.291        | 74<br>2.913                    | 29<br>1.142                 | 37<br>1.476                      | 74<br>2.933   | 3.0<br>0.12                           | 18.5<br>40.7  | 1180<br>256000                     | 965<br>216000                      | 1350                                       | 40               |
| 29326          | 130<br>5.1181 | 225<br>8.8583  | 58<br>2.2835  | 171<br>6.744                  | 177<br>6.963   | 215<br>8.465        | 55<br>2.165                    | 19<br>0.748                 | 29<br>1.130                      | 75<br>2.972   | 2.0<br>0.08                           | 9.8<br>21.6   | 880<br>197000                      | 600<br>132000                      | 1700                                       | 22               |
| 29426          | 130<br>5.1181 | 270<br>10.6299 | 85<br>3.3464  | 187<br>7.375                  | 195<br>7.677   | 255<br>10.039       | 81<br>3.189                    | 31<br>1.22                  | 42<br>1.669                      | 81<br>3.189   | 3.0<br>0.12                           | 23.9<br>52.6  | 1730<br>388000                     | 1120<br>253000                     | 1250                                       | 60               |
| 29330          | 150<br>5.9055 | 250<br>9.8425  | 60<br>2.3622  | 194<br>7.638                  | 195<br>7.677   | 240<br>9.449        | 57<br>2.244                    | 20<br>0.787                 | 29<br>1.142                      | 87<br>3.425   | 2.0<br>0.08                           | 12.5<br>27.5  | 1140<br>255000                     | 670<br>150000                      | 1550                                       | 30               |
| 29430          | 150<br>5.9055 | 300<br>11.8110 | 90<br>3.5433  | 213<br>8.405                  | 220<br>8.661   | 285<br>11.220       | 86<br>3.386                    | 32<br>1.260                 | 44<br>1.732                      | 92<br>3.622   | 3.0<br>0.12                           | 29.3<br>64.5  | 1930<br>440000                     | 1220<br>275000                     | 1100                                       | 80               |
| 29334          | 170<br>6.6929 | 280<br>11.0236 | 67<br>2.6378  | 216<br>8.504                  | 220<br>8.661   | 270<br>10.630       | 64<br>2.520                    | 23<br>0.906                 | 32<br>1.280                      | 96<br>3.780   | 2.5<br>0.10                           | 16.5<br>36.3  | 1500<br>340000                     | 880<br>196000                      | 1350                                       | 50               |
| 29434          | 170<br>6.6929 | 340<br>13.3858 | 103<br>4.0551 | 243<br>9.567                  | 245<br>9.646   | 324<br>12.756       | 99<br>3.898                    | 37<br>1.457                 | 50<br>1.968                      | 104<br>4.094  | 4.0<br>0.16                           | 42.4<br>93.5  | 2650<br>600000                     | 1630<br>365000                     | 950                                        | 140              |
| 29338EJ        | 190<br>7.4803 | 320<br>12.5984 | 78<br>3.0709  | 246<br>9.685                  | 250<br>9.843   | 308<br>12.126       | 74<br>2.913                    | 27<br>1.063                 | 38<br>1.496                      | 110<br>4.331  | 3.0<br>0.12                           | 25.6<br>56.5  | 2442<br>549000                     | 1481<br>333000                     | 1150                                       | 80               |
| 29438EJ        | 190<br>7.4803 | 380<br>14.9606 | 115<br>4.5276 | 271<br>10.669                 | 275<br>10.827  | 360<br>14.173       | 111<br>4.370                   | 41<br>1.614                 | 55<br>2.185                      | 117<br>4.606  | 4.0<br>0.16                           | 60.3<br>133.0 | 4168<br>937000                     | 2482<br>558000                     | 850                                        | 210              |
| 29340          | 200<br>7.8740 | 340<br>13.3858 | 85<br>3.3465  | 264<br>10.3937                | 265<br>10.4331 | 325<br>12.7953      | 81<br>3.4252                   | 29<br>1.1417                | 40<br>1.5748                     | 114<br>4.4882 | 3.0<br>0.12                           | 29<br>63      | 2157<br>485000                     | 1236<br>278000                     | 950                                        | 100              |
| 29440          | 200<br>7.8740 | 400<br>15.7480 | 122<br>4.8031 | 286<br>11.254                 | 290<br>11.417  | 380<br>14.961       | 117<br>4.606                   | 43<br>1.693                 | 59<br>2.323                      | 122<br>4.803  | 4.0<br>0.16                           | 69.8<br>154.0 | 3625<br>815000                     | 2135<br>480000                     | 800                                        | 260              |
| 29344          | 220<br>8.6614 | 360<br>14.1732 | 85<br>3.3464  | 280<br>11.024                 | 285<br>11.220  | 345<br>13.583       | 81<br>3.189                    | 29<br>1.142                 | 41<br>1.614                      | 125<br>4.921  | 3.0<br>0.12                           | 33.9<br>74.8  | 2500<br>550000                     | 1340<br>300000                     | 1000                                       | 120              |
| 29444          | 220<br>8.6614 | 420<br>16.5354 | 122<br>4.8031 | 307<br>12.106                 | 310<br>12.205  | 400<br>15.748       | 117<br>4.606                   | 43<br>1.693                 | 59<br>2.323                      | 133<br>5.236  | 5.1<br>0.20                           | 73.9<br>163.0 | 3800<br>865000                     | 2200<br>500000                     | 750                                        | 300              |
| 29348          | 240<br>9.4488 | 380<br>14.9606 | 85<br>3.3464  | 300<br>11.811                 | 300<br>11.811  | 365<br>14.370       | 81<br>3.189                    | 29<br>1.142                 | 41<br>1.614                      | 135<br>5.315  | 3.0<br>0.12                           | 41.9<br>92.4  | 2650<br>600000                     | 1400<br>315000                     | 950                                        | 140              |
| 29448EM        | 240<br>9.4488 | 440<br>17.3228 | 122<br>4.8031 | 315<br>12.4016                | 322<br>12.6772 | 385<br>15.1575      | 87<br>3.4252                   | 46<br>1.8110                | 61<br>2.4016                     | 142<br>5.5906 | 6.1<br>0.24                           | 78<br>171     | 4884<br>1098000                    | 2736<br>615000                     | 750                                        | 350              |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

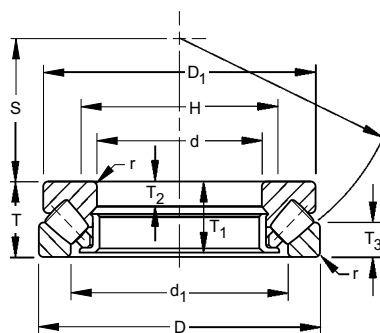
<sup>(2)</sup> Centrifugal force constant. See engineering section for calculations using this factor.



# ROLLER BEARINGS

## SPHERICAL ROLLER THRUST BEARINGS

TYPE TSR, TSR-EM – *continued*



### DIMENSIONS – LOAD RATINGS - *continued*

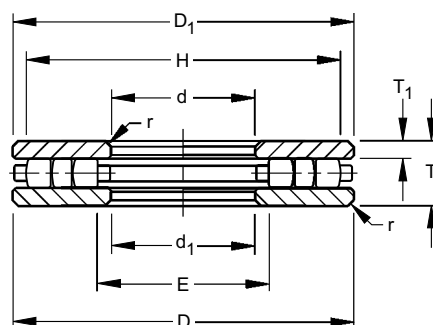
| Bearing Number | Bore d         | O.D. D          | Height T       | Shoulder Diameter             |                | Inner Ring          |                                |                             | Outer Ring Height T <sub>3</sub> | S              | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.            | Load Rating                        |                                    | Approx. Limiting Speed (for Oil Bath Only) | k <sup>(2)</sup> |
|----------------|----------------|-----------------|----------------|-------------------------------|----------------|---------------------|--------------------------------|-----------------------------|----------------------------------|----------------|---------------------------------------|----------------|------------------------------------|------------------------------------|--------------------------------------------|------------------|
|                |                |                 |                | d <sub>1</sub> Housing (Min.) | H Shaft (Max.) | O.D. D <sub>1</sub> | Assembly Height T <sub>1</sub> | Pilot Height T <sub>2</sub> |                                  |                |                                       |                | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>t</sub> |                                            |                  |
|                | mm in.         | mm in.          | mm in.         | mm in.                        | mm in.         | mm in.              | mm in.                         | mm in.                      | mm in.                           | mm in.         | mm in.                                | kg. lbs.       | kN lbs.                            | kN lbs.                            | RPM                                        |                  |
| 29352          | 260<br>10.2362 | 420<br>16.5354  | 95<br>3.7402   | 329<br>12.953                 | 330<br>12.992  | 405<br>15.945       | 91<br>3.583                    | 32<br>1.260                 | 45<br>1.791                      | 148<br>5.827   | 4.0<br>0.16                           | 51.2<br>113.0  | 3350<br>750000                     | 1800<br>400000                     | 850                                        | 230              |
| 29452          | 260<br>10.2362 | 480<br>18.8976  | 132<br>5.1968  | 357<br>14.055                 | 360<br>14.173  | 460<br>18.110       | 127<br>5.000                   | 48<br>1.890                 | 64<br>2.520                      | 154<br>6.063   | 5.1<br>0.20                           | 103<br>227.0   | 4900<br>1120000                    | 1800<br>620000                     | 650                                        | 500              |
| 29360          | 300<br>11.8110 | 480<br>18.8976  | 109<br>4.2913  | 379<br>14.921                 | 380<br>14.961  | 460<br>18.110       | 105<br>4.134                   | 37<br>1.457                 | 50<br>1.988                      | 168<br>6.614   | 4.0<br>0.16                           | 76.6<br>169.0  | 4150<br>930000                     | 2160<br>490000                     | 700                                        | 350              |
| 29460          | 300<br>11.8110 | 540<br>21.2598  | 145<br>5.7086  | 402<br>15.827                 | 410<br>16.142  | 515<br>20.276       | 140<br>5.512                   | 52<br>2.047                 | 70<br>2.776                      | 175<br>6.890   | 5.1<br>0.20                           | 136<br>301.0   | 6400<br>1430000                    | 3450<br>3450                       | 550                                        | 780              |
| 29364          | 320<br>12.5984 | 500<br>19.6850  | 109<br>4.2913  | 399<br>15.709                 | 400<br>15.748  | 482<br>18.976       | 105<br>4.134                   | 37<br>1.457                 | 53<br>2.087                      | 180<br>7.087   | 4.0<br>0.16                           | 79.8<br>176.0  | 4300<br>980000                     | 2240<br>500000                     | 650                                        | 380              |
| 29468          | 340<br>13.3858 | 620<br>24.4094  | 170<br>6.6929  | 462<br>18.189                 | 465<br>18.307  | 590<br>23.228       | 164<br>6.457                   | 61<br>2.402                 | 82<br>3.248                      | 201<br>7.913   | 6.1<br>0.24                           | 220<br>486.0   | 8500<br>1900000                    | 4500<br>1020000                    | 450                                        | 1350             |
| 29372          | 360<br>14.1732 | 560<br>22.0472  | 122<br>4.8031  | 448<br>17.638                 | 450<br>17.717  | 540<br>21.260       | 117<br>4.606                   | 41<br>1.614                 | 59<br>2.343                      | 202<br>7.953   | 4.0<br>0.16                           | 113<br>249.0   | 5600<br>1250000                    | 2800<br>620000                     | 550                                        | 640              |
| 29476          | 380<br>14.9606 | 670<br>26.3780  | 175<br>6.8898  | 504<br>19.842                 | 510<br>20.079  | 640<br>25.197       | 168<br>6.614                   | 63<br>2.480                 | 85<br>3.331                      | 220<br>8.740   | 6.1<br>0.24                           | 261<br>575.0   | 9000<br>2040000                    | 4750<br>1060000                    | 410                                        | 1700             |
| 29576          | 380<br>14.9606 | 820<br>32.2835  | 265<br>10.4330 | 570<br>22.441                 | 578<br>22.756  | 780<br>30.709       | 226<br>10.078                  | 100<br>3.927                | 128<br>5.062                     | 241<br>9.488   | 9.1<br>0.36                           | 824<br>1816.0  | 17300<br>3900000                   | 9500<br>2120000                    | 280                                        | 5550             |
| 29380          | 400<br>15.748  | 620<br>24.4094  | 132<br>5.1968  | 494<br>19.449                 | 500<br>19.685  | 596<br>23.465       | 127<br>5.000                   | 44<br>1.732                 | 64<br>2.520                      | 225<br>8.858   | 5.1<br>0.20                           | 165<br>363.0   | 7100<br>1600000                    | 3450<br>780000                     | 500                                        | 970              |
| 29284EM        | 420<br>16.5354 | 580<br>22.8346  | 95<br>3.7402   | 479<br>18.8583                | 500<br>19.685  | 542<br>21.339       | 70<br>2.7559                   | 41<br>1.6142                | 50<br>1.9685                     | 228<br>8.9764  | 5.1<br>0.20                           | 70<br>154.0    | 5329<br>1198000                    | 2624<br>590000                     | 630                                        | 300              |
| 29388          | 440<br>17.3228 | 680<br>26.7717  | 145<br>5.7089  | 548<br>21.5748                | 563<br>22.1654 | 657<br>25.866       | 140<br>5.5118                  | 49<br>1.9291                | 69<br>2.7165                     | 246<br>9.6850  | 5.1<br>0.20                           | 180<br>397.0   | 7588<br>1706000                    | 3647<br>820000                     | 480                                        | 1400             |
| 29488          | 440<br>17.3228 | 780<br>30.7087  | 206<br>8.1102  | 588<br>23.150                 | 595<br>23.425  | 745<br>29.331       | 199<br>7.835                   | 74<br>2.913                 | 99<br>3.917                      | 257<br>10.118  | 7.1<br>0.28                           | 411<br>906.0   | 13200<br>2900000                   | 6700<br>1500000                    | 320                                        | 3400             |
| 29392          | 460<br>18.1102 | 710<br>27.9528  | 150<br>5.9055  | 566<br>22.293                 | 575<br>22.638  | 685<br>26.969       | 144<br>5.669                   | 51<br>2.008                 | 72<br>2.857                      | 257<br>10.118  | 5.1<br>0.20                           | 220<br>486.0   | 9300<br>2100000                    | 4400<br>1000000                    | 400                                        | 1700             |
| 29496EM        | 480<br>18.8976 | 850<br>33.4646  | 224<br>8.8189  | 626<br>24.6457                | 658<br>25.9055 | 770<br>30.315       | 159<br>6.2598                  | 93<br>3.6614                | 110<br>4.3307                    | 279<br>10.9843 | 9.7<br>0.38                           | 550<br>1212.0  | 22458<br>5049000                   | 11342<br>2550000                   | 290                                        | 4700             |
| 294/500        | 500<br>19.6850 | 870<br>34.2520  | 224<br>8.8189  | 661<br>26.024                 | 670<br>26.378  | 830<br>32.677       | 216<br>8.504                   | 81<br>3.189                 | 107<br>4.213                     | 290<br>11.417  | 7.1<br>0.28                           | 560<br>1235.0  | 16000<br>3600000                   | 8000<br>1800000                    | 270                                        | 4800             |
| 293/530        | 530<br>20.8661 | 800<br>31.4961  | 160<br>6.2992  | 648<br>25.512                 | 650<br>25.591  | 772<br>30.394       | 154<br>6.063                   | 54<br>2.126                 | 76<br>2.992                      | 295<br>11.614  | 6.1<br>0.24                           | 288<br>634.0   | 11000<br>2450000                   | 5100<br>1140000                    | 350                                        | 2500             |
| 293/600        | 600<br>23.6220 | 900<br>35.4331  | 180<br>7.0866  | 727<br>28.6220                | 730<br>28.7402 | 868<br>34.173       | 173<br>6.8110                  | 61<br>2.4016                | 87<br>3.4252                     | 333<br>13.1102 | 5.1<br>0.20                           | 635<br>1400.0  | 16770<br>3770000                   | 7619<br>1713000                    | 320                                        | 4200             |
| 294/630        | 630<br>24.8031 | 1090<br>42.9134 | 280<br>11.0236 | 831<br>32.707                 | 850<br>33.465  | 1044<br>41.102      | 271<br>10.669                  | 101<br>3.976                | 133<br>5.236                     | 365<br>14.393  | 9.1<br>0.36                           | 1170<br>2580.0 | 23000<br>5200000                   | 11400<br>2550000                   | 250                                        | 12200            |

(1) Maximum shaft or housing fillet radius that bearing corners will clear.  
 (2) Centrifugal force constant. See engineering section for calculations using this factor.

## CYLINDRICAL ROLLER THRUST BEARINGS

### TYPE TP

- Most economical to buy and install because of design simplicity.
- Minor radial displacement of the races does not affect its operation, resulting in manufacturing economies and simplified installation.



### DIMENSIONS – LOAD RATINGS

| Bearing Number | Bore d            | O.D. D             | Height T         | Washers                  |                                    |                                | Shoulder Diameter |                  | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.             | Load Rating                        |                                    |
|----------------|-------------------|--------------------|------------------|--------------------------|------------------------------------|--------------------------------|-------------------|------------------|---------------------------------------|-----------------|------------------------------------|------------------------------------|
|                |                   |                    |                  | Thickness T <sub>1</sub> | Small Diameter O.D. D <sub>1</sub> | Large Bore I.D. d <sub>1</sub> | Shaft H (Min.)    | Housing E (Max.) |                                       |                 | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>1</sub> |
|                | mm in.            | mm in.             | mm in.           | mm in.                   | mm in.                             | mm in.                         | mm in.            | mm in.           | kg lbs.                               | kN lbs.         | kN lbs.                            |                                    |
| 20TP103        | 50.800<br>2.0000  | 152.400<br>6.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 150.81<br>5.938                    | 52.39<br>2.062                 | 141.3<br>5.56     | 61.9<br>2.44     | 3.7<br>8.1                            | 814<br>183000   | 331<br>74500                       |                                    |
| 20TP104        | 50.800<br>2.0000  | 177.800<br>7.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 176.21<br>6.938                    | 52.39<br>2.062                 | 163.5<br>6.44     | 65.1<br>2.56     | 5.1<br>11.3                           | 1010<br>227000  | 398<br>89500                       |                                    |
| 30TP106        | 76.200<br>3.0000  | 152.400<br>6.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 150.81<br>5.938                    | 77.79<br>3.062                 | 142.9<br>5.62     | 85.7<br>3.38     | 3.2<br>7.0                            | 747<br>168000   | 340<br>76500                       |                                    |
| 30TP107        | 76.200<br>3.0000  | 177.800<br>7.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 176.21<br>6.938                    | 77.79<br>3.062                 | 166.7<br>6.56     | 87.3<br>3.44     | 4.6<br>10.2                           | 1040<br>234000  | 414<br>93200                       |                                    |
| 30TP108        | 76.200<br>3.0000  | 203.200<br>8.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 201.61<br>7.938                    | 77.79<br>3.062                 | 188.9<br>7.44     | 90.5<br>3.56     | 6.3<br>13.9                           | 1380<br>311000  | 520<br>117000                      |                                    |
| 30TP109        | 76.200<br>3.0000  | 228.600<br>9.0000  | 34.925<br>1.3750 | 9.52<br>0.375            | 227.01<br>8.938                    | 77.79<br>3.062                 | 212.7<br>8.38     | 92.1<br>3.62     | 8.2<br>18.1                           | 1800<br>405000  | 636<br>143000                      |                                    |
| 35TP113        | 88.900<br>3.5000  | 132.558<br>5.2188  | 25.400<br>1.0000 | 7.14<br>0.281            | 130.97<br>5.156                    | 90.49<br>3.562                 | 123.8<br>4.88     | 97.6<br>3.84     | 1.4<br>3.0                            | 381<br>85600    | 180<br>40400                       |                                    |
| 40TP114        | 101.600<br>4.0000 | 177.800<br>7.0000  | 44.450<br>1.7500 | 12.7<br>0.500            | 176.21<br>6.938                    | 103.19<br>4.062                | 168.3<br>6.62     | 111.1<br>4.38    | 5<br>11.0                             | 1030<br>231000  | 503<br>113000                      |                                    |
| 40TP115        | 101.600<br>4.0000 | 203.200<br>8.0000  | 44.450<br>1.7500 | 12.7<br>0.500            | 201.61<br>7.938                    | 103.19<br>4.062                | 190.5<br>7.50     | 114.3<br>4.50    | 7.1<br>15.6                           | 1370<br>308000  | 589<br>132000                      |                                    |
| 40TP116        | 101.600<br>4.0000 | 228.600<br>9.0000  | 44.450<br>1.7500 | 12.7<br>0.500            | 227.01<br>8.938                    | 103.19<br>4.062                | 214.3<br>8.44     | 115.9<br>4.56    | 9.5<br>21.0                           | 1770<br>397000  | 676<br>152000                      |                                    |
| 40TP117        | 101.600<br>4.0000 | 254<br>10.0000     | 44.450<br>1.7500 | 12.7<br>0.500            | 252.41<br>9.938                    | 103.19<br>4.062                | 238.1<br>9.38     | 117.5<br>4.62    | 11.6<br>25.6                          | 2220<br>498000  | 896<br>202000                      |                                    |
| 50TP119        | 127<br>5.0000     | 203.200<br>8.0000  | 44.450<br>1.7500 | 12.7<br>0.500            | 201.61<br>7.938                    | 128.59<br>5.062                | 190.5<br>7.50     | 139.7<br>5.50    | 5.9<br>13.1                           | 1280<br>288000  | 593<br>133000                      |                                    |
| 50TP120        | 127<br>5.0000     | 228.600<br>9.0000  | 44.450<br>1.7500 | 12.7<br>0.500            | 227.01<br>8.938                    | 128.59<br>5.062                | 215.9<br>8.50     | 139.7<br>5.50    | 8.3<br>18.4                           | 1710<br>385000  | 716<br>161000                      |                                    |
| 50TP121        | 127<br>5.0000     | 254<br>10.0000     | 50.800<br>2.0000 | 14.29<br>0.562           | 252.41<br>9.938                    | 128.59<br>5.062                | 239.7<br>9.44     | 141.3<br>5.56    | 12.4<br>27.4                          | 2180<br>491000  | 841<br>189000                      |                                    |
| 50TP122        | 127<br>5.0000     | 279.400<br>11.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 277.81<br>10.938                   | 128.59<br>5.062                | 261.9<br>10.31    | 144.5<br>5.69    | 15.8<br>34.8                          | 2760<br>620000  | 996<br>224000                      |                                    |
| 50TP123        | 127<br>5.0000     | 304.800<br>12.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 303.21<br>11.938                   | 128.59<br>5.062                | 288.9<br>11.38    | 146<br>5.75      | 19.4<br>42.8                          | 3290<br>789000  | 1170<br>262000                     |                                    |
| 60TP124        | 152.400<br>6.0000 | 228.600<br>9.0000  | 50.800<br>2.0000 | 14.29<br>0.562           | 227.01<br>8.938                    | 153.99<br>6.062                | 217.5<br>8.56     | 163.5<br>6.44    | 7.6<br>16.8                           | 1410<br>317000  | 600<br>135000                      |                                    |
| 60TP125        | 152.400<br>6.0000 | 254<br>10.0000     | 50.800<br>2.0000 | 14.29<br>0.562           | 252.41<br>9.938                    | 153.99<br>6.062                | 241.3<br>9.50     | 165.1<br>6.50    | 10.7<br>23.7                          | 2000<br>449000  | 845<br>190000                      |                                    |
| 60TP126        | 152.400<br>6.0000 | 279.400<br>11.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 277.81<br>10.938                   | 153.99<br>6.062                | 265.1<br>10.44    | 166.7<br>6.56    | 14.2<br>31.4                          | 2700<br>608000  | 1000<br>226000                     |                                    |
| 60TP127        | 152.400<br>6.0000 | 304.800<br>12.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 303.31<br>11.938                   | 153.99<br>6.062                | 287.3<br>11.31    | 169.9<br>6.69    | 17.7<br>39.4                          | 3220<br>725000  | 1110<br>250000                     |                                    |
| 70TP129        | 177.800<br>7.0000 | 254<br>10.0000     | 50.800<br>2.0000 | 14.29<br>0.562           | 251.62<br>9.906                    | 180.18<br>7.094                | 242.9<br>9.56     | 188.9<br>7.44    | 9.2<br>20.2                           | 1620<br>365000  | 663<br>149000                      |                                    |
| 70TP130        | 177.800<br>7.0000 | 279.400<br>11.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 277.02<br>10.906                   | 180.18<br>7.094                | 266.7<br>10.50    | 190.5<br>7.50    | 12.8<br>28.3                          | 2400<br>540000  | 930<br>209000                      |                                    |
| 70TP131        | 177.800<br>7.0000 | 304.800<br>12.0000 | 50.800<br>2.0000 | 14.29<br>0.562           | 302.42<br>11.906                   | 180.18<br>7.094                | 288.9<br>11.38    | 193.7<br>7.62    | 16.8<br>37.0                          | 3090<br>695000  | 1080<br>242000                     |                                    |
| 70TP132        | 177.800<br>7.0000 | 355.600<br>14.0000 | 76.200<br>3.0000 | 20.64<br>0.812           | 353.22<br>13.906                   | 180.18<br>7.094                | 335<br>13.19      | 198.4<br>7.81    | 36.3<br>80.1                          | 4490<br>1010000 | 1750<br>394000                     |                                    |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.



**CYLINDRICAL ROLLER THRUST BEARINGS**

TYPE TP – *continued*

B

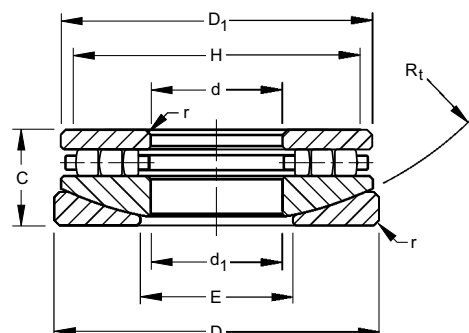
| Bearing Number | Bore d           | O.D. D           | Height T        | Washers                  |                                    |                                | Shoulder Diameter |                  | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.            | Load Rating                        |                                    |
|----------------|------------------|------------------|-----------------|--------------------------|------------------------------------|--------------------------------|-------------------|------------------|---------------------------------------|----------------|------------------------------------|------------------------------------|
|                |                  |                  |                 | Thickness T <sub>1</sub> | Small Diameter O.D. D <sub>1</sub> | Large Bore I.D. d <sub>1</sub> | Shaft H (Min.)    | Housing E (Max.) |                                       |                | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>t</sub> |
|                | mm in.           | mm in.           | mm in.          | mm in.                   | mm in.                             | mm in.                         | mm in.            | mm in.           | kg lbs.                               | kN lbs.        | kN lbs.                            |                                    |
| 80TP134        | 203.2<br>8.0000  | 304.8<br>12.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 302.42<br>11.906                   | 205.58<br>8.094                | 292.1<br>11.50    | 215.9<br>8.50    | 6.4<br>0.25                           | 20.5<br>45.1   | 2660<br>599000                     | 1150<br>258000                     |
| 80TP135        | 203.2<br>8.0000  | 355.6<br>14.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 353.22<br>13.906                   | 205.58<br>8.094                | 336.6<br>13.25    | 222.2<br>8.75    | 6.4<br>0.25                           | 33<br>72.8     | 4230<br>950000                     | 1730<br>389000                     |
| 80TP136        | 203.2<br>8.0000  | 406.4<br>16.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 404.02<br>15.906                   | 205.58<br>8.094                | 382.6<br>15.06    | 227.0<br>8.94    | 6.4<br>0.25                           | 44.5<br>98.1   | 5740<br>1290000                    | 2310<br>520000                     |
| 90TP139        | 228.6<br>9.0000  | 355.6<br>14.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 353.22<br>13.906                   | 230.98<br>9.094                | 339.7<br>13.38    | 244.5<br>9.62    | 6.4<br>0.25                           | 29.3<br>64.5   | 3910<br>879000                     | 1460<br>328000                     |
| 90TP140        | 228.6<br>9.0000  | 406.4<br>16.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 404.02<br>15.906                   | 230.98<br>9.094                | 385.8<br>15.19    | 249.2<br>9.81    | 6.4<br>0.25                           | 43.6<br>96.2   | 5560<br>1250000                    | 2140<br>482000                     |
| 100TP143       | 254<br>10.0000   | 406.4<br>16.0000 | 76.2<br>3.0000  | 20.64<br>0.812           | 404.02<br>15.906                   | 256.38<br>10.094               | 387.4<br>15.25    | 273.0<br>10.75   | 6.4<br>0.25                           | 39.5<br>86.6   | 5160<br>1160000                    | 1750<br>394000                     |
| 100TP144       | 254<br>10.0000   | 457.2<br>18.0000 | 95.25<br>3.7500 | 26.19<br>1.031           | 454.82<br>17.906                   | 256.38<br>10.094               | 435.0<br>17.12    | 276.2<br>10.88   | 6.4<br>0.25                           | 68.8<br>151.8  | 7210<br>1620000                    | 2690<br>604000                     |
| 100TP145       | 254<br>10.0000   | 508<br>20.0000   | 95.25<br>3.7500 | 26.19<br>1.031           | 505.62<br>19.906                   | 256.38<br>10.094               | 481.0<br>18.94    | 281.0<br>11.06   | 6.4<br>0.25                           | 91.7<br>202.2  | 9560<br>2150000                    | 3670<br>825000                     |
| 120TP151       | 304.8<br>12.0000 | 457.2<br>18.0000 | 95.25<br>3.7500 | 26.19<br>1.031           | 454.82<br>17.906                   | 307.18<br>12.094               | 438.2<br>17.25    | 323.8<br>12.75   | 6.4<br>0.25                           | 56.7<br>125.1  | 6340<br>1420000                    | 2300<br>518000                     |
| 120TP152       | 304.8<br>12.0000 | 508<br>20.0000   | 114.3<br>4.5000 | 31.75<br>1.250           | 505.62<br>19.906                   | 307.18<br>12.094               | 484.2<br>19.06    | 328.6<br>12.94   | 6.4<br>0.25                           | 104.5<br>230.5 | 7900<br>1780000                    | 3300<br>743000                     |
| 120TP153       | 304.8<br>12.0000 | 609.6<br>24.0000 | 114.3<br>4.5000 | 31.75<br>1.250           | 607.22<br>23.906                   | 307.18<br>12.094               | 584.2<br>23.00    | 330.2<br>13.00   | 6.4<br>0.25                           | 168.5<br>371.5 | 12900<br>2900000                   | 4680<br>1050000                    |
| 140TP158       | 355.6<br>14.0000 | 508<br>20.0000   | 95.25<br>3.7500 | 26.19<br>1.031           | 504.82<br>19.875                   | 358.78<br>14.125               | 489.0<br>19.25    | 374.6<br>14.75   | 6.4<br>0.25                           | 62.6<br>138.1  | 7200<br>1620000                    | 2610<br>588000                     |
| 140TP159       | 355.6<br>14.0000 | 558.8<br>22.0000 | 95.25<br>3.7500 | 26.19<br>1.031           | 555.62<br>21.875                   | 358.78<br>14.125               | 535.0<br>21.06    | 379.4<br>14.94   | 6.4<br>0.25                           | 89.6<br>197.5  | 10000<br>2250000                   | 3750<br>802000                     |
| 140TP160       | 355.6<br>14.0000 | 609.6<br>24.0000 | 95.25<br>3.7500 | 26.19<br>1.031           | 606.4<br>23.875                    | 358.78<br>14.125               | 581.0<br>22.88    | 384.2<br>15.12   | 6.4<br>0.25                           | 125.3<br>276.2 | 12600<br>2840000                   | 4040<br>908000                     |
| 160TP164       | 406.4<br>16.0000 | 558.8<br>22.0000 | 114.3<br>4.5000 | 31.75<br>1.250           | 555.6<br>21.875                    | 409.6<br>16.125                | 539.8<br>21.25    | 425.4<br>16.75   | 6.4<br>0.25                           | 85.9<br>189.4  | 7860<br>1770000                    | 3090<br>695000                     |
| 160TP165       | 406.4<br>16.0000 | 609.6<br>24.0000 | 114.3<br>4.5000 | 31.75<br>1.250           | 606.4<br>23.875                    | 409.6<br>16.125                | 585.8<br>23.06    | 430.2<br>16.94   | 6.4<br>0.25                           | 121.4<br>267.7 | 11200<br>2510000                   | 4170<br>937000                     |
| 160TP166       | 406.4<br>16.0000 | 660.4<br>26.0000 | 114.3<br>4.5000 | 31.75<br>1.250           | 657.2<br>25.875                    | 409.6<br>16.125                | 633.4<br>24.94    | 433.4<br>17.06   | 6.4<br>0.25                           | 168.8<br>372.1 | 13800<br>3090000                   | 4710<br>1060000                    |
| 180TP168       | 457.2<br>18.0000 | 660.4<br>26.0000 | 127<br>5.0000   | 34.92<br>1.375           | 657.2<br>25.875                    | 460.4<br>18.125                | 635<br>25.00      | 482.6<br>19.00   | 6.4<br>0.25                           | 148.8<br>328.1 | 11800<br>2650000                   | 4090<br>919000                     |
| 180TP169       | 457.2<br>18.0000 | 711.2<br>28.0000 | 127<br>5.0000   | 34.92<br>1.375           | 708.0<br>27.875                    | 460.4<br>18.125                | 684.2<br>26.94    | 484.2<br>19.06   | 6.4<br>0.25                           | 195.3<br>430.7 | 15500<br>3480000                   | 5480<br>1230000                    |
| 180TP170       | 457.2<br>18.0000 | 762<br>30.0000   | 139.7<br>5.5000 | 38.10<br>1.500           | 758.8<br>29.875                    | 460.4<br>18.125                | 735.0<br>28.94    | 484.2<br>19.06   | 6.4<br>0.25                           | 280.7<br>618.9 | 19700<br>4430000                   | 6840<br>1540000                    |
| 200TP171       | 508<br>20.0000   | 711.2<br>28.0000 | 139.7<br>5.5000 | 38.10<br>1.500           | 708.0<br>27.875                    | 511.2<br>20.125                | 685.8<br>27.00    | 533.4<br>21.00   | 6.4<br>0.25                           | 178<br>392.5   | 13100<br>2940000                   | 4710<br>1060000                    |
| 200TP172       | 508<br>20.0000   | 762<br>30.0000   | 139.7<br>5.5000 | 38.10<br>1.500           | 758.8<br>29.875                    | 511.2<br>20.125                | 736.6<br>29.00    | 533.4<br>21.00   | 6.4<br>0.25                           | 232.2<br>512.0 | 17500<br>3930000                   | 6370<br>1430000                    |
| 200TP173       | 508<br>20.0000   | 812.8<br>32.0000 | 152.4<br>6.0000 | 42.07<br>1.656           | 809.6<br>31.875                    | 511.2<br>20.125                | 787.4<br>31.00    | 533.4<br>21.00   | 6.4<br>0.25                           | 317<br>698.9   | 22400<br>5050000                   | 7610<br>1700000                    |
| 220TP174       | 558.8<br>22.0000 | 762<br>30.0000   | 139.7<br>5.5000 | 38.10<br>1.500           | 758.8<br>29.875                    | 562<br>22.125                  | 736.6<br>29.00    | 584.2<br>23.00   | 6.4<br>0.25                           | 192.7<br>425.0 | 14200<br>3200000                   | 5070<br>1140000                    |
| 220TP175       | 558.8<br>22.0000 | 812.8<br>32.0000 | 139.7<br>5.5000 | 38.10<br>1.500           | 809.6<br>31.875                    | 562.0<br>22.125                | 782.6<br>30.81    | 589.0<br>23.19   | 6.4<br>0.25                           | 250.6<br>552.6 | 19000<br>4270000                   | 6570<br>1480000                    |
| 220TP176       | 558.8<br>22.0000 | 863.6<br>34.0000 | 152.4<br>6.0000 | 42.07<br>1.656           | 860.4<br>33.875                    | 562.0<br>22.125                | 838.2<br>33.00    | 584.2<br>23.00   | 6.4<br>0.25                           | 340.9<br>751.6 | 24500<br>5500000                   | 8200<br>1840000                    |
| 240TP177       | 609.6<br>24.0000 | 812.8<br>32.0000 | 139.7<br>5.5000 | 38.10<br>1.500           | 809.6<br>31.875                    | 612.8<br>24.125                | 790.6<br>31.12    | 631.8<br>24.88   | 9.5<br>0.38                           | 206.5<br>455.4 | 16000<br>3600000                   | 5650<br>1270000                    |
| 240TP178       | 609.6<br>24.0000 | 863.6<br>34.0000 | 139.7<br>5.5000 | 38.10<br>1.500           | 860.4<br>33.875                    | 612.8<br>24.125                | 838.2<br>33.00    | 635.0<br>25.00   | 9.5<br>0.38                           | 269<br>593.2   | 20500<br>4610000                   | 6880<br>1550000                    |
| 240TP179       | 609.6<br>24.0000 | 914.4<br>36.0000 | 152.4<br>6.0000 | 42.07<br>1.656           | 911.2<br>35.875                    | 612.8<br>24.125                | 889.0<br>35.00    | 635.0<br>25.00   | 9.5<br>0.38                           | 364.7<br>804.2 | 25200<br>5670000                   | 8450<br>1900000                    |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

## CYLINDRICAL ROLLER THRUST BEARINGS

### TYPE TPS

- Similar to Type TP except one washer is spherically ground to seat against an aligning washer. This makes it adaptable to initial misalignment.
- Not suggested for operating conditions where alignment is constantly changing.



### DIMENSIONS – LOAD RATINGS

| Bearing Number | Bore<br>d         | O.D.<br>D          | Height<br>C      | Aligning Washer<br>radius<br>R <sub>t</sub> | Washers                                     |                                         | Shoulder Diameter    |                        | Fillet <sup>(1)</sup><br>Radius<br>r<br>(Max.) | Wt.          | Load Rating                                 |                                             |
|----------------|-------------------|--------------------|------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------|----------------------|------------------------|------------------------------------------------|--------------|---------------------------------------------|---------------------------------------------|
|                |                   |                    |                  |                                             | Small<br>Diameter<br>O.D.<br>D <sub>1</sub> | Large<br>Bore<br>I.D.<br>d <sub>1</sub> | Shaft<br>H<br>(Min.) | Housing<br>E<br>(Max.) |                                                |              | Static<br>Load<br>Rating<br>C <sub>0a</sub> | Dynamic<br>Load<br>Rating<br>C <sub>1</sub> |
|                | mm<br>in.         | mm<br>in.          | mm<br>in.        | mm<br>in.                                   | mm<br>in.                                   | mm<br>in.                               | mm<br>in.            | mm<br>in.              | mm<br>in.                                      | kg<br>lbs.   | kN<br>lbs.                                  | kN<br>lbs.                                  |
| 20TPS103       | 50.800<br>2.0000  | 160.325<br>6.3120  | 46.038<br>1.8125 | 190.50<br>7.500                             | 150.81<br>5.938                             | 52.39<br>2.062                          | 141.3<br>5.56        | 85.7<br>3.38           | 1.6<br>0.06                                    | 5.2<br>11.4  | 814<br>183000                               | 331<br>74500                                |
| 20TPS104       | 50.800<br>2.0000  | 185.725<br>7.3120  | 46.038<br>1.8125 | 241.30<br>9.500                             | 176.21<br>6.938                             | 52.39<br>2.062                          | 163.5<br>6.44        | 108.0<br>4.25          | 1.6<br>0.06                                    | 7.12<br>15.7 | 1010<br>227000                              | 398<br>89500                                |
| 30TPS106       | 76.200<br>3.0000  | 160.325<br>6.3120  | 46.038<br>1.8125 | 152.40<br>6.000                             | 150.81<br>5.938                             | 77.79<br>3.062                          | 142.9<br>5.62        | 101.6<br>4.00          | 1.6<br>0.06                                    | 4.5<br>9.9   | 747<br>168000                               | 340<br>76500                                |
| 30TPS107       | 76.200<br>3.0000  | 185.725<br>7.3120  | 46.038<br>1.8125 | 241.30<br>9.500                             | 176.21<br>6.938                             | 77.79<br>3.062                          | 166.7<br>6.56        | 111.1<br>4.38          | 1.6<br>0.06                                    | 6.4<br>14.2  | 1040<br>234000                              | 414<br>93200                                |
| 30TPS108       | 76.200<br>3.0000  | 211.125<br>8.3120  | 46.038<br>1.8125 | 304.80<br>12.000                            | 201.61<br>7.938                             | 77.79<br>3.062                          | 188.9<br>7.44        | 133.4<br>5.25          | 1.6<br>0.06                                    | 8.7<br>19.2  | 1380<br>311000                              | 520<br>117000                               |
| 35TPS113       | 88.900<br>3.5000  | 138.908<br>5.4688  | 33.338<br>1.3125 | 127.00<br>5.000                             | 130.97<br>5.156                             | 91.28<br>3.594                          | 123.8<br>4.88        | 103.2<br>4.06          | 1.6<br>0.06                                    | 1.9<br>4.1   | 381<br>85600                                | 180<br>40400                                |
| 40TPS114       | 101.600<br>4.0000 | 187.327<br>7.3750  | 58.738<br>2.3125 | 161.93<br>6.375                             | 176.21<br>6.938                             | 103.98<br>4.094                         | 168.3<br>6.62        | 127<br>5.00            | 1.6<br>0.06                                    | 7.0<br>15.4  | 1030<br>231000                              | 503<br>113000                               |
| 40TPS115       | 101.600<br>4.0000 | 212.725<br>8.3750  | 58.738<br>2.3125 | 215.90<br>8.500                             | 201.61<br>7.938                             | 103.98<br>4.094                         | 190.5<br>7.50        | 133.4<br>5.25          | 1.6<br>0.06                                    | 10.0<br>22.1 | 1370<br>308000                              | 589<br>132000                               |
| 40TPS116       | 101.600<br>4.0000 | 238.125<br>9.3750  | 58.738<br>2.3125 | 254.00<br>10.000                            | 227.01<br>8.938                             | 103.98<br>4.094                         | 214.3<br>8.44        | 149.2<br>5.88          | 1.6<br>0.06                                    | 13.4<br>29.5 | 1770<br>397000                              | 676<br>152000                               |
| 40TPS117       | 101.600<br>4.0000 | 266.7<br>10.5000   | 58.738<br>2.3125 | 355.60<br>14.000                            | 252.41<br>9.938                             | 103.98<br>4.094                         | 238.1<br>9.38        | 165.1<br>6.50          | 1.6<br>0.06                                    | 17.1<br>37.7 | 2220<br>498000                              | 896<br>202000                               |
| 50TPS119       | 127<br>5.0000     | 215.9<br>8.5000    | 58.738<br>2.3125 | 187.33<br>7.375                             | 201.61<br>7.938                             | 130.18<br>5.125                         | 190.5<br>7.50        | 152.4<br>6.00          | 1.6<br>0.06                                    | 8.4<br>18.5  | 1280<br>288000                              | 592<br>133000                               |
| 50TPS120       | 127<br>5.0000     | 241.3<br>9.5000    | 58.738<br>2.3125 | 266.70<br>10.500                            | 227.01<br>8.938                             | 130.18<br>5.125                         | 215.9<br>8.50        | 155.6<br>6.12          | 1.6<br>0.06                                    | 11.8<br>26.1 | 1710<br>385000                              | 716<br>161000                               |
| 50TPS121       | 127<br>5.0000     | 266.7<br>10.5000   | 66.675<br>2.6250 | 323.85<br>12.750                            | 252.41<br>9.938                             | 130.18<br>5.125                         | 239.7<br>9.44        | 158.8<br>6.25          | 3.2<br>0.12                                    | 17.6<br>38.7 | 2180<br>491000                              | 841<br>189000                               |
| 50TPS122       | 127<br>5.0000     | 292.1<br>11.5000   | 66.675<br>2.6250 | 406.40<br>16.000                            | 277.81<br>10.938                            | 130.18<br>5.125                         | 261.9<br>10.31       | 177.8<br>7.00          | 3.2<br>0.12                                    | 22.1<br>48.8 | 2760<br>620000                              | 996<br>224000                               |
| 50TPS123       | 127.000<br>5.0000 | 317.5<br>12.5000   | 66.675<br>2.6250 | 501.65<br>19.750                            | 303.21<br>11.938                            | 130.18<br>5.125                         | 288.9<br>11.38       | 184.1<br>7.25          | 3.2<br>0.12                                    | 27.2<br>60.0 | 3290<br>739000                              | 1170<br>262000                              |
| 60TPS124       | 152.400<br>6.0000 | 241.3<br>9.5000    | 66.675<br>2.6250 | 171.45<br>6.750                             | 227.01<br>8.938                             | 155.58<br>6.125                         | 217.5<br>8.56        | 184.1<br>7.25          | 3.2<br>0.12                                    | 10.8<br>23.8 | 1410<br>317000                              | 600<br>135000                               |
| 60TPS125       | 152.400<br>6.0000 | 266.7<br>10.5000   | 66.675<br>2.6250 | 241.30<br>9.500                             | 252.46<br>9.938                             | 155.58<br>6.125                         | 241.3<br>9.50        | 187.3<br>7.38          | 3.2<br>0.12                                    | 15.2<br>33.5 | 2000<br>449000                              | 845<br>190000                               |
| 60TPS126       | 152.400<br>6.0000 | 292.1<br>11.5000   | 66.675<br>2.6250 | 342.90<br>13.500                            | 277.81<br>10.938                            | 155.58<br>6.125                         | 265.1<br>10.44       | 187.3<br>7.38          | 3.2<br>0.12                                    | 20.1<br>44.3 | 2700<br>607000                              | 1000<br>225000                              |
| 60TPS127       | 152.400<br>6.0000 | 317.5<br>12.5000   | 66.675<br>2.6250 | 431.80<br>17.000                            | 303.21<br>11.938                            | 155.58<br>6.125                         | 287.3<br>11.31       | 190.5<br>7.50          | 3.2<br>0.12                                    | 25.2<br>55.6 | 3220<br>725000                              | 1110<br>250000                              |
| 70TPS129       | 177.800<br>7.0000 | 266.7<br>10.5000   | 66.675<br>2.6250 | 206.38<br>8.125                             | 251.62<br>9.906                             | 180.8<br>7.125                          | 242.9<br>9.56        | 206.4<br>8.12          | 3.2<br>0.12                                    | 12.7<br>27.9 | 1620<br>365000                              | 663<br>149000                               |
| 70TPS130       | 177.800<br>7.0000 | 292.100<br>11.5000 | 66.675<br>2.6250 | 292.10<br>11.500                            | 277.02<br>10.906                            | 180.98<br>7.125                         | 266.7<br>10.50       | 209.6<br>8.25          | 3.2<br>0.12                                    | 17.7<br>39.1 | 2400<br>540000                              | 930<br>209000                               |
| 70TPS131       | 177.800<br>7.0000 | 317.500<br>12.5000 | 66.675<br>2.6250 | 390.53<br>15.375                            | 302.42<br>11.906                            | 180.98<br>7.125                         | 288.9<br>11.38       | 209.6<br>8.25          | 3.2<br>0.12                                    | 23.3<br>51.3 | 3090<br>695000                              | 1080<br>242000                              |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.



# ROLLER BEARINGS

## CYLINDRICAL ROLLER THRUST BEARINGS

TYPE TPS – *continued*

B

### DIMENSIONS – LOAD RATINGS - *continued*

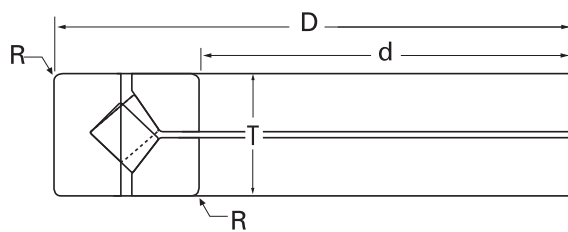
| Bearing Number | Bore d             | O.D. D             | Height C          | Aligning Washer radius R <sub>t</sub> | Washers                            |                                | Shoulder Diameter |                  | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.            | Load Rating                        |                                    |
|----------------|--------------------|--------------------|-------------------|---------------------------------------|------------------------------------|--------------------------------|-------------------|------------------|---------------------------------------|----------------|------------------------------------|------------------------------------|
|                |                    |                    |                   |                                       | Small Diameter O.D. D <sub>1</sub> | Large Bore I.D. d <sub>1</sub> | Shaft H (Min.)    | Housing E (Max.) |                                       |                | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>1</sub> |
|                | mm in.             | mm in.             | mm in.            | mm in.                                | mm in.                             | mm in.                         | mm in.            | mm in.           | mm in.                                | kg lbs.        | kN lbs.                            | kN lbs.                            |
| 70TPS132       | 177.800<br>7.0000  | 374.650<br>14.7500 | 101.600<br>4.0000 | 390.53<br>15.375                      | 353.22<br>13.906                   | 180.98<br>7.125                | 335.0<br>13.19    | 228.6<br>9.00    | 6.4<br>0.25                           | 52.6<br>115.9  | 4490<br>1010000                    | 1750<br>394000                     |
| 80TPS134       | 203.200<br>8.0000  | 323.850<br>12.7500 | 101.600<br>4.0000 | 215.90<br>8.500                       | 302.42<br>11.906                   | 207.96<br>8.188                | 292.1<br>11.50    | 238.1<br>9.38    | 6.4<br>0.25                           | 29.8<br>65.8   | 2660<br>599000                     | 1150<br>258000                     |
| 80TPS135       | 203.200<br>8.0000  | 374.650<br>14.7500 | 101.600<br>4.0000 | 304.80<br>12.000                      | 353.22<br>13.906                   | 207.96<br>8.188                | 336.6<br>13.25    | 263.5<br>10.38   | 6.4<br>0.25                           | 47.7<br>105.2  | 4230<br>950000                     | 1730<br>389000                     |
| 80TPS136       | 203.200<br>8.0000  | 428.625<br>16.8750 | 101.600<br>4.0000 | 495.30<br>19.500                      | 404.02<br>15.906                   | 209.55<br>8.250                | 382.6<br>15.06    | 266.7<br>10.50   | 6.4<br>0.25                           | 68.2<br>150.4  | 5740<br>1290000                    | 2310<br>520000                     |
| 90TPS139       | 228.600<br>9.0000  | 374.650<br>14.7500 | 101.600<br>4.0000 | 304.80<br>12.000                      | 353.22<br>13.906                   | 234.95<br>9.250                | 339.7<br>13.38    | 263.5<br>10.38   | 6.4<br>0.25                           | 42.2<br>93.1   | 3910<br>879000                     | 1460<br>328000                     |
| 90TPS140       | 228.600<br>9.0000  | 428.625<br>16.8750 | 101.600<br>4.0000 | 495.30<br>19.500                      | 404.02<br>15.906                   | 234.95<br>9.250                | 385.8<br>15.19    | 266.7<br>10.50   | 6.4<br>0.25                           | 63.3<br>139.5  | 5560<br>1250000                    | 2140<br>482000                     |
| 100TPS143      | 254.000<br>10.0000 | 428.625<br>16.8750 | 101.600<br>4.0000 | 425.45<br>16.750                      | 404.02<br>15.906                   | 260.36<br>10.250               | 387.4<br>15.25    | 292.1<br>11.50   | 6.4<br>0.25                           | 56.2<br>124.0  | 5160<br>1160000                    | 1750<br>394000                     |
| 100TPS144      | 254.000<br>10.0000 | 479.425<br>18.8750 | 127.000<br>5.0000 | 508.00<br>20.000                      | 454.82<br>17.906                   | 260.36<br>10.250               | 435.0<br>17.12    | 304.8<br>12.00   | 6.4<br>0.25                           | 99.5<br>219.5  | 7210<br>1620000                    | 2690<br>604000                     |
| 100TPS145      | 254.000<br>10.0000 | 530.225<br>20.8750 | 127.000<br>5.0000 | 609.6<br>24.000                       | 505.62<br>19.906                   | 260.36<br>10.250               | 481.0<br>18.94    | 336.6<br>13.25   | 6.4<br>0.25                           | 131.8<br>290.6 | 9560<br>2150000                    | 3670<br>825000                     |
| 120TPS151      | 304.800<br>12.0000 | 479.425<br>18.8750 | 127.000<br>5.0000 | 390.53<br>15.375                      | 454.82<br>17.906                   | 311.15<br>12.250               | 438.2<br>17.25    | 346.1<br>13.62   | 6.4<br>0.25                           | 82.1<br>181.0  | 6340<br>1420000                    | 2300<br>518000                     |
| 120TPS152      | 304.800<br>12.0000 | 530.225<br>20.8750 | 152.400<br>6.0000 | 619.13<br>24.375                      | 505.62<br>19.906                   | 311.15<br>12.250               | 484.2<br>19.06    | 352.4<br>13.88   | 6.4<br>0.25                           | 139.4<br>307.4 | 7900<br>1780000                    | 3300<br>743000                     |
| 120TPS153      | 304.800<br>12.0000 | 631.825<br>24.8750 | 152.400<br>6.0000 | 723.90<br>28.500                      | 607.22<br>23.906                   | 311.15<br>12.250               | 584.2<br>23.00    | 406.4<br>16.00   | 6.4<br>0.25                           | 236.9<br>522.4 | 12900<br>2900000                   | 4680<br>1050000                    |
| 140TPS158      | 355.600<br>14.0000 | 530.225<br>20.8750 | 123.825<br>4.8750 | 495.30<br>19.500                      | 504.82<br>19.875                   | 361.95<br>14.250               | 489.0<br>19.25    | 393.7<br>15.50   | 6.4<br>0.25                           | 89.2<br>196.6  | 7200<br>1620000                    | 2610<br>588000                     |
| 140TPS159      | 355.600<br>14.0000 | 581.025<br>22.8750 | 123.825<br>4.8750 | 723.90<br>28.500                      | 555.62<br>21.875                   | 361.95<br>14.250               | 535.0<br>21.06    | 393.7<br>15.50   | 6.4<br>0.25                           | 125.0<br>275.6 | 10000<br>2250000                   | 3570<br>802000                     |
| 140TPS160      | 355.600<br>14.0000 | 631.825<br>24.8750 | 123.825<br>4.8750 | 917.58<br>36.125                      | 606.62<br>23.875                   | 361.95<br>14.250               | 581.0<br>22.88    | 415.9<br>16.38   | 6.4<br>0.25                           | 170.9<br>376.9 | 12600<br>2840000                   | 4040<br>908000                     |
| 160TPS164      | 406.400<br>16.0000 | 581.025<br>22.8750 | 152.400<br>6.0000 | 444.50<br>17.500                      | 555.62<br>21.875                   | 412.75<br>16.250               | 539.8<br>21.25    | 444.5<br>17.50   | 6.4<br>0.25                           | 123.9<br>273.2 | 7860<br>1770000                    | 3090<br>695000                     |
| 160TPS165      | 406.400<br>16.0000 | 635.000<br>25.0000 | 152.400<br>6.0000 | 596.90<br>23.500                      | 606.42<br>23.875                   | 412.75<br>16.250               | 585.8<br>23.06    | 457.2<br>18.00   | 6.4<br>0.25                           | 174.4<br>384.6 | 11200<br>2510000                   | 4170<br>937000                     |
| 160TPS166      | 406.400<br>16.0000 | 685.800<br>27.0000 | 152.400<br>6.0000 | 752.48<br>29.625                      | 657.22<br>25.875                   | 412.75<br>16.250               | 633.4<br>24.94    | 469.9<br>18.50   | 6.4<br>0.25                           | 229.8<br>506.7 | 13800<br>3090000                   | 4710<br>1060000                    |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

## CROSSED ROLLER THRUST BEARINGS

### TYPE XR AND JXR

- Withstands high overturning moments.
- Applications include machine tool table bearing for vertical boring and grinding machines. Other applications include various pivot and pedestal applications.
- Dimensions given in the following table relate to bearing type TXRDO, which is the most common form of crossed roller bearing.
- TXRDO bearing has a double outer race and two inner races with rollers spaced by separators.
- Other mounting configurations and sizes of crossed roller bearing can be supplied to meet particular assembly or setting requirements.
- Contact your Timken representative for more information.



### DIMENSIONS – LOAD RATINGS

| Bearing Number | Dimensions          |                     |                   |                           | Load Ratings     |                  | Factor $k^{(2)}$ |
|----------------|---------------------|---------------------|-------------------|---------------------------|------------------|------------------|------------------|
|                | Bore $d$            | O.D. $D$            | Height $T$        | Radius <sup>(1)</sup> $R$ | Two-Row radial   | Thrust           |                  |
|                | mm<br>in.           | mm<br>in.           | mm<br>in.         | mm<br>in.                 | kN<br>lbs.       | kN<br>lbs.       |                  |
| XR496051       | 203.200<br>8.0000   | 279.400<br>11.0000  | 31.750<br>1.2500  | 1.5<br>0.06               | 51300<br>11500   | 61600<br>13800   | 0.48             |
| JXR637050      | 300.000<br>11.8110  | 400.000<br>15.7480  | 37.000<br>1.4567  | 1.5<br>0.06               | 63000<br>14200   | 80100<br>18000   | 0.45             |
| JXR652050      | 310.000<br>12.2047  | 425.000<br>16.7323  | 45.000<br>1.7717  | 2.5<br>0.10               | 82200<br>18500   | 102000<br>23000  | 0.46             |
| XR678052       | 330.200<br>13.0000  | 457.200<br>18.0000  | 63.500<br>2.50000 | 3.3<br>0.13               | 100000<br>22500  | 123000<br>27600  | 0.47             |
| JXR699050      | 370.000<br>14.5669  | 495.000<br>19.4882  | 50.000<br>1.9685  | 3.0<br>0.12               | 93600<br>21000   | 119000<br>26700  | 0.45             |
| XR766051       | 457.200<br>18.0000  | 609.600<br>24.0000  | 63.500<br>2.5000  | 3.3<br>0.13               | 141000<br>31600  | 178000<br>40100  | 0.45             |
| XR820060       | 580.000<br>22.8346  | 760.000<br>29.9213  | 80.000<br>3.1496  | 6.4<br>0.25               | 240000<br>53900  | 299000<br>67200  | 0.46             |
| XR855053       | 685.800<br>27.0000  | 914.400<br>36.0000  | 79.375<br>3.1250  | 3.3<br>0.13               | 270000<br>60700  | 344000<br>77200  | 0.45             |
| XR882055       | 901.700<br>35.50000 | 1117.600<br>44.0000 | 82.550<br>3.2500  | 3.3<br>0.13               | 300000<br>67400  | 396000<br>88900  | 0.44             |
| XR889058       | 1028.700<br>40.5000 | 1327.150<br>52.2500 | 114.300<br>4.5000 | 3.3<br>0.13               | 405000<br>91000  | 534000<br>120000 | 0.44             |
| XR897051       | 1549.400<br>61.0000 | 1828.800<br>72.0000 | 101.600<br>4.0000 | 3.3<br>0.13               | 518000<br>116000 | 699000<br>157000 | 0.43             |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Centrifugal force constant. See engineering section for calculations using this factor.



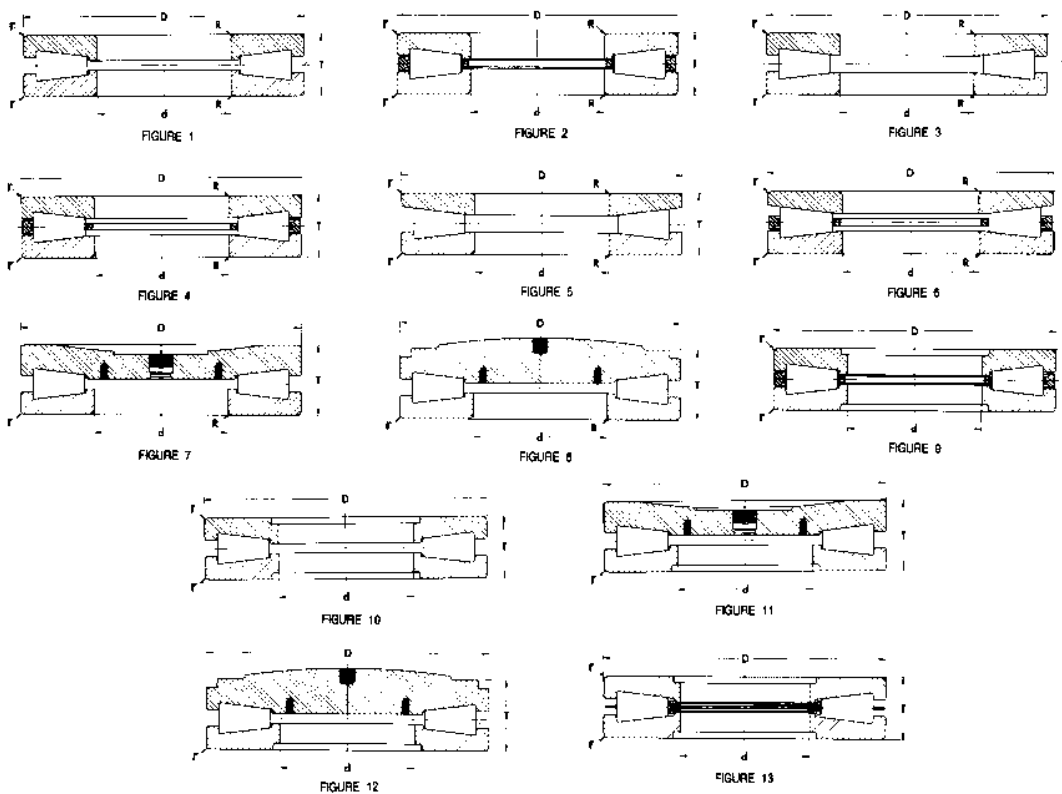


# ROLLER BEARINGS

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTHD

- Consists of two tapered thrust races, rollers and cage.
- All components are separable.
- Generally a heavy-duty bearing and can operate at a relatively high speed.
- Extensively used in numerous applications including oil well swivels, pulp refiners, extruders and piercing mill thrust blocks.



| Bearing Number  | Fig No. | Bore    |         | Outside Diameter |      | Width |        | Shaft Fillet Radius |        | Housing Fille Radius |  | Mass | Remarks                                             |
|-----------------|---------|---------|---------|------------------|------|-------|--------|---------------------|--------|----------------------|--|------|-----------------------------------------------------|
|                 |         | d       | D       | T                | R    | r     | mm in. | mm in.              | mm in. | mm in.               |  |      |                                                     |
| T135            | 2       | 34.925  | 76.200  | 15.875           | 1.5  | 1.5   | 0.4    |                     |        |                      |  |      |                                                     |
|                 | 2       | 1.3750  | 3.0000  | 0.6250           | 0.06 | 0.06  | 0.88   |                     |        |                      |  |      |                                                     |
| T135F           | 1       | 34.925  | 76.200  | 15.875           | 1.5  | 1.5   | 0.4    |                     |        |                      |  |      |                                                     |
|                 | 1       | 1.3750  | 3.0000  | 0.6250           | 0.06 | 0.06  | 0.88   |                     |        |                      |  |      |                                                     |
| T200A           | 2       | 50.800  | 109.538 | 22.225           | 2.3  | 2.3   | 1.1    |                     |        |                      |  |      |                                                     |
|                 | 2       | 2.0000  | 4.3125  | 0.8750           | 0.09 | 0.09  | 2.40   |                     |        |                      |  |      |                                                     |
| T311            | 2       | 76.200  | 161.925 | 33.338           | 3.3  | 3.3   | 3.6    |                     |        |                      |  |      |                                                     |
|                 | 2       | 3.0000  | 6.3750  | 1.3215           | 0.13 | 0.13  | 8.02   |                     |        |                      |  |      |                                                     |
| T311F           | 1       | 76.200  | 161.925 | 33.338           | 3.3  | 3.3   | 3.6    |                     |        |                      |  |      |                                                     |
|                 | 1       | 3.0000  | 6.3750  | 1.3215           | 0.13 | 0.13  | 8.02   |                     |        |                      |  |      |                                                     |
| *T311FS - T311S | 8       | 76.200  | 161.925 | 49.212           | 3.3  | 3.3   | —      |                     |        |                      |  |      | T311FS - T311S, SPHERICAL RADIUS = 457.200 mm (18") |
|                 | 8       | 3.0000  | 6.3750  | 1.9375           | 0.13 | 0.13  | —      |                     |        |                      |  |      |                                                     |
| T411            | 2       | 101.600 | 215.900 | 46.038           | 3.3  | 3.3   | 8.9    |                     |        |                      |  |      |                                                     |
|                 | 2       | 4.0000  | 8.5000  | 1.8125           | 0.13 | 0.13  | 19.60  |                     |        |                      |  |      |                                                     |

| Bearing Number    | Fig No. | Bore              | Outside Diameter   | Width             | Shaft Fillet Radius | Housing Fillet Radius | Mass           | Remarks                                                                                           |
|-------------------|---------|-------------------|--------------------|-------------------|---------------------|-----------------------|----------------|---------------------------------------------------------------------------------------------------|
|                   |         | d                 | D                  | T                 | R                   | r                     |                |                                                                                                   |
|                   |         | mm<br>in.         | mm<br>in.          | mm<br>in.         | mm<br>in.           | mm<br>in.             | kg<br>lbs.     |                                                                                                   |
| T411F             | 1<br>1  | 101.600<br>4.0000 | 215.900<br>8.5000  | 46.038<br>1.8125  | 3.3<br>0.13         | 3.3<br>0.13           | 8.9<br>19.60   |                                                                                                   |
| *T411FAS - T411S  | 8<br>8  | 76.200<br>3.0000  | 215.900<br>8.5000  | 65.088<br>2.5625  | 3.3<br>0.13         | 3.3<br>0.13           | –<br>–         | T411FAS - T411S, SPHERICAL RADIUS =<br>508.000 mm (20")                                           |
| T441              | 2<br>2  | 111.760<br>4.4000 | 223.520<br>8.8000  | 55.880<br>2.2000  | 3.3<br>0.13         | 3.3<br>0.13           | 11.4<br>25.13  |                                                                                                   |
| T441F             | 1<br>1  | 111.760<br>4.4000 | 223.520<br>8.8000  | 55.880<br>2.2000  | 3.3<br>0.13         | 3.3<br>0.13           | 11.4<br>25.13  |                                                                                                   |
| T451              | 2<br>2  | 114.300<br>4.5000 | 250.825<br>9.8750  | 53.975<br>2.1250  | 4.0<br>0.16         | 4.0<br>0.16           | 15.0<br>33.07  |                                                                                                   |
| T511              | 2<br>2  | 127.000<br>5.0000 | 266.700<br>10.5000 | 58.738<br>2.3125  | 4.8<br>0.19         | 4.8<br>0.19           | 17.8<br>39.24  |                                                                                                   |
| T511A             | 2<br>2  | 128.588<br>5.0625 | 266.700<br>10.5000 | 58.738<br>2.3125  | 4.8<br>0.19         | 4.8<br>0.19           | 17.8<br>39.24  |                                                                                                   |
| T511F             | 1<br>1  | 127.000<br>5.0000 | 266.700<br>10.5000 | 58.738<br>2.3125  | 4.8<br>0.19         | 4.8<br>0.19           | 17.8<br>39.24  |                                                                                                   |
| *T511FS - T511S   | 8<br>8  | 127.000<br>5.0000 | 266.700<br>10.5000 | 79.375<br>3.1250  | 4.8<br>0.19         | 4.8<br>0.19           | –<br>–         | T511FS - T511S, SPHERICAL RADIUS =<br>609.600 mm (24")                                            |
| *T511FSA - T511S  | 8<br>8  | 101.600<br>4.0000 | 266.700<br>10.5000 | 79.375<br>3.1250  | 4.8<br>0.19         | 4.8<br>0.19           | –<br>–         | T511FSA - T511S, SPHERICAL RADIUS =<br>609.600 mm (24")                                           |
| *T511FSA - T511SA | 7<br>7  | 101.600<br>4.0000 | 266.700<br>10.5000 | 79.375<br>3.1250  | 4.8<br>0.19         | 4.8<br>0.19           | –<br>–         | T511FSA - T511SA, SPHERICAL RADIUS =<br>609.600 mm (24")                                          |
| T520              | 2<br>2  | 127.000<br>5.0000 | 250.825<br>9.8750  | 55.563<br>2.1875  | 4.8<br>0.19         | 4.8<br>0.19           | 13.9<br>30.64  |                                                                                                   |
| T611              | 2<br>2  | 152.400<br>6.0000 | 317.500<br>12.5000 | 69.850<br>2.7500  | 6.4<br>0.25         | 6.4<br>0.25           | 29.3<br>64.60  |                                                                                                   |
| T611F             | 1<br>1  | 152.400<br>6.0000 | 317.500<br>12.5000 | 69.850<br>2.7500  | 6.4<br>0.25         | 6.4<br>0.25           | 29.3<br>64.60  |                                                                                                   |
| *T611FS - T611S   | 8<br>8  | 152.400<br>6.0000 | 317.500<br>12.5000 | 87.313<br>3.4375  | 6.4<br>0.25         | 6.4<br>0.25           | –<br>–         | T611FS - T611S, SPHERICAL RADIUS =<br>711.200 mm (28")                                            |
| *T611FS - T611SA  | 8<br>8  | 152.400<br>6.0000 | 317.500<br>12.5000 | 87.313<br>3.4375  | 6.4<br>0.25         | 6.4<br>0.25           | –<br>–         | T611FS - T611SA, SPHERICAL RADIUS =<br>762.000 mm (30")                                           |
| *T611FSA - T611SA | 7<br>7  | SOLID             | 317.500<br>12.5000 | 87.313<br>3.4375  | N/A<br>N/A          | 6.4<br>0.25           | –<br>–         | T611FSA - T611SA, SPHERICAL RADIUS =<br>762.000 mm (30")                                          |
| *T611FS - T611SB  | 8<br>8  | 152.400<br>6.0000 | 317.500<br>12.5000 | 87.313<br>3.4375  | 6.4<br>0.25         | 6.4<br>0.25           | –<br>–         | T611FS - T611SB, SPHERICAL RADIUS =<br>755.700 mm (29.75")                                        |
| T651              | 2<br>2  | 165.100<br>6.5000 | 311.150<br>12.2500 | 88.900<br>3.5000  | 6.4<br>0.25         | 6.4<br>0.25           | 38.3<br>84.44  |                                                                                                   |
| T661              | 2<br>2  | 168.275<br>6.6250 | 304.800<br>12.0000 | 69.850<br>2.7500  | 6.4<br>0.25         | 6.4<br>0.25           | 27.8<br>61.29  |                                                                                                   |
| T691              | 2<br>2  | 174.625<br>6.8750 | 358.775<br>14.1250 | 82.550<br>3.2500  | 6.4<br>0.25         | 6.4<br>0.25           | 45.3<br>99.87  |                                                                                                   |
| T709              | 4<br>4  | 177.800<br>7.0000 | 431.800<br>17.0000 | 101.600<br>4.0000 | 6.4<br>0.25         | 6.4<br>0.25           | 86.3<br>190.26 |                                                                                                   |
| T711              | 2<br>2  | 177.800<br>7.0000 | 368.300<br>14.5000 | 82.550<br>3.2500  | 8.0<br>0.31         | 8.0<br>0.31           | 48.4<br>106.70 |                                                                                                   |
| T711F             | 1<br>1  | 177.800<br>7.0000 | 368.300<br>14.5000 | 82.550<br>3.2500  | 8.0<br>0.31         | 8.0<br>0.31           | 48.4<br>106.70 |                                                                                                   |
| T711FS - T711S    | 7<br>7  | 177.800<br>7.0000 | 368.300<br>14.5000 | 104.775<br>4.1250 | 8.0<br>0.31         | 8.0<br>0.31           | –<br>–         |                                                                                                   |
| *T711FS - T711SA  | 8<br>8  | 177.800<br>7.0000 | 368.300<br>14.5000 | 101.600<br>4.0000 | 8.0<br>0.31         | 8.0<br>0.31           | –<br>–         | T711FS - T711SA, SPHERICAL RADIUS =<br>762.000 mm (30")                                           |
| *T711FSS - T711S  | 7<br>7  | SOLID             | 368.300<br>14.5000 | 104.775<br>4.1250 | N/A<br>N/A          | 8.0<br>0.31           | –<br>–         | T711FSS - T711S, SPHERICAL RADIUS =<br>622.300 mm (24.5")                                         |
| T811              | 2<br>2  | 203.200<br>8.0000 | 419.100<br>16.5000 | 92.075<br>3.6250  | 9.7<br>0.38         | 9.7<br>0.38           | 69.3<br>152.78 |                                                                                                   |
| T811F             | 1<br>1  | 203.200<br>8.0000 | 419.100<br>16.5000 | 92.075<br>3.6250  | 9.7<br>0.38         | 9.7<br>0.38           | 69.3<br>152.78 |                                                                                                   |
| *T811FS - T811S   | 7<br>7  | 203.200<br>8.0000 | 419.100<br>16.5000 | 123.825<br>4.8750 | 9.7<br>0.38         | 9.7<br>0.38           | –<br>–         | T811FS - T811S, SPHERICAL RADIUS =<br>508.000 mm (20")                                            |
| *T811FS - T811SA  | 8<br>8  | 203.200<br>8.0000 | 422.275<br>16.6250 | 115.880<br>4.5625 | 9.7<br>0.38         | 9.7<br>0.38           | –<br>–         | T811FS - T811SA, SPHERICAL RADIUS =<br>838.200 mm (33"), LOWER RACE OD =<br>419.100 mm (16.5000") |

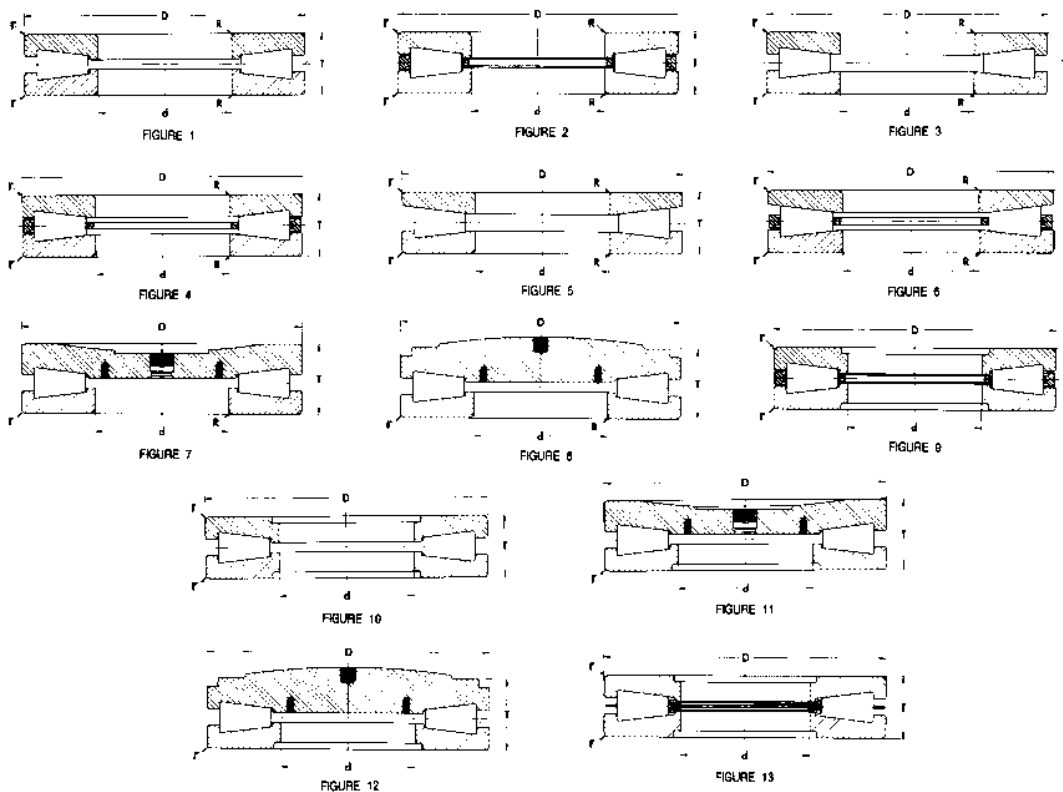




**THRUST BEARINGS**

TYPE TTHD - *continued*

B



| Bearing Number    | Fig No.  | Bore              |                    | Outside Diameter  | Width       | Shaft Fillet Radius |              | Housing Fillet Radius |     | Mass | Remarks                                                                                      |
|-------------------|----------|-------------------|--------------------|-------------------|-------------|---------------------|--------------|-----------------------|-----|------|----------------------------------------------------------------------------------------------|
|                   |          | d                 | D                  |                   |             | R                   | r            |                       |     |      |                                                                                              |
|                   |          | mm                | mm                 | mm                | mm          | mm                  | mm           | mm                    | mm  | kg   |                                                                                              |
|                   |          | in.               | in.                | in.               | in.         | in.                 | in.          | in.                   | in. | lbs. |                                                                                              |
| *T811FSA - T811SB | 7<br>7   | SOLID             | 422.275<br>16.6250 | 120.650<br>4.7500 | N/A<br>N/A  | 9.7<br>0.38         | 9.7<br>0.38  | 92.7<br>204.37        |     |      | T811FSA - T811SB, SPHERICAL RADIUS = 506.000 mm (20"), LOWER RACE OD = 419.100 mm (16.5000") |
| T811X             | 2<br>2   | 203.200<br>8.0000 | 419.100<br>16.5000 | 120.650<br>4.7500 | 9.7<br>0.38 | 9.7<br>0.38         | 9.7<br>0.38  | 92.7<br>204.37        |     |      |                                                                                              |
| *T811 - T811XA    | 2<br>2   | 203.200<br>8.0000 | 419.100<br>16.5000 | 106.363<br>4.1875 | 9.7<br>0.38 | 9.7<br>0.38         | 9.7<br>0.38  |                       |     |      | T811 - T811XA, 2 BORES, OTHER BORE = 201.613 mm (7.9375")                                    |
| T911              | 9<br>9   | 228.600<br>9.0000 | 482.600<br>19.0000 | 104.775<br>4.1250 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 | 105.0<br>231.49       |     |      |                                                                                              |
| T911A             | 9<br>9   | 234.950<br>9.2500 | 482.600<br>19.0000 | 104.775<br>4.1250 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 | 103.0<br>227.08       |     |      |                                                                                              |
| T911F             | 10<br>10 | 228.600<br>9.0000 | 482.600<br>19.0000 | 104.775<br>4.1250 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 |                       |     |      |                                                                                              |
| *T911 - T911A     | 9<br>9   | 228.600<br>9.0000 | 482.600<br>19.0000 | 104.775<br>4.1250 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 |                       |     |      | T911 - T911A, 2 BORES, OTHER BORE = 234.950 mm (9.2500")                                     |
| *T911FS - T911S   | 11<br>11 | 228.600<br>9.0000 | 482.600<br>19.0000 | 146.050<br>5.7500 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 |                       |     |      | T911FS - T911S, SPHERICAL RADIUS = 635.000 mm (25")                                          |
| *T911FS - T911SA  | 12<br>12 | 228.600<br>9.0000 | 482.600<br>19.0000 | 131.763<br>5.1875 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 |                       |     |      | T911FS - T911SA, SPHERICAL RADIUS = 1295.400 mm (51")                                        |
| *T911FS - T911SB  | 12<br>12 | 228.600<br>9.0000 | 482.600<br>19.0000 | 114.300<br>4.5000 | N/A<br>N/A  | 11.2<br>0.44        | 11.2<br>0.44 |                       |     |      | T911FS - T911SB, SPHERICAL RADIUS = 895.350 mm (35.25")                                      |
| T921              | 9<br>9   | 234.950<br>9.2500 | 546.100<br>21.5000 | 127.000<br>5.0000 | N/A<br>N/A  | 16.0<br>0.63        | 16.0<br>0.63 | 171.0<br>376.99       |     |      |                                                                                              |

| Bearing Number      | Fig No.  | Bore               | Outside Diameter    | Width              | Shaft Fillet Radius | Housing Fillet Radius | Mass            | Remarks                                                                                                   |
|---------------------|----------|--------------------|---------------------|--------------------|---------------------|-----------------------|-----------------|-----------------------------------------------------------------------------------------------------------|
|                     |          | d                  | D                   | T                  | R                   | r                     |                 |                                                                                                           |
|                     |          | mm in.             | mm in.              | mm in.             | mm in.              | mm in.                | kg lbs.         |                                                                                                           |
| T921F               | 10<br>10 | 234.950<br>9.2500  | 546.100<br>21.5000  | 127.000<br>5.0000  | N/A<br>N/A          | 16.0<br>0.63          | 171.0<br>376.99 |                                                                                                           |
| T1011               | 9<br>9   | 254.000<br>10.0000 | 539.750<br>21.2500  | 117.475<br>4.6250  | N/A<br>N/A          | 11.2<br>0.44          | 147.0<br>324.08 |                                                                                                           |
| *T1011FS - T1011S   | 12<br>12 | 254.000<br>10.0000 | 539.750<br>21.2500  | 149.225<br>5.8750  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T1011FS - T1011S, SPHERICAL RADIUS =<br>1066.8 mm (42")                                                   |
| *T1011FS - T1011SA  | 11<br>11 | 254.000<br>10.0000 | 539.750<br>21.2500  | 158.750<br>6.2500  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T1011FS - T1011SA, SPHERICAL RADIUS =<br>635.000 mm (25")                                                 |
| *T1011FS - T1011SC  | 11<br>11 | 254.000<br>10.0000 | 539.750<br>21.2500  | 158.750<br>6.2500  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T1011FS - T1011SC, SPHERICAL RADIUS =<br>635.000 mm (25")                                                 |
| T1115               | 9<br>9   | 279.400<br>11.0000 | 495.300<br>19.5000  | 133.350<br>5.2500  | N/A<br>N/A          | 6.4<br>0.25           | 125.0<br>275.58 |                                                                                                           |
| T1120               | 9<br>9   | 279.400<br>11.0000 | 603.250<br>23.7500  | 136.525<br>5.3750  | N/A<br>N/A          | 11.2<br>0.44          | 212.0<br>467.38 |                                                                                                           |
| T1120F              | 10<br>10 | 279.400<br>11.0000 | 603.250<br>23.7500  | 136.525<br>5.3750  | N/A<br>N/A          | 11.2<br>0.44          | 212.0<br>467.38 |                                                                                                           |
| *T1120FS - T1120S   | 12<br>12 | 279.400<br>11.0000 | 603.250<br>23.7500  | 136.525<br>5.3750  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T1120FS - T1120S, SPHERICAL RADIUS =<br>1308.1 mm (51.5")                                                 |
| T1421               | 9<br>9   | 355.600<br>14.0000 | 533.400<br>21.0000  | 101.600<br>4.0000  | N/A<br>N/A          | 6.4<br>0.25           | 84.1<br>185.41  |                                                                                                           |
| T1421F              | 10<br>10 | 355.600<br>14.0000 | 533.400<br>21.0000  | 101.600<br>4.0000  | N/A<br>N/A          | 6.4<br>0.25           | 84.1<br>185.41  |                                                                                                           |
| T1750               | 2<br>2   | 44.450<br>1.7500   | 84.734<br>3.3360    | 18.258<br>0.7188   | 2.3<br>0.09         | 2.3<br>0.09           | 0.5<br>1.08     |                                                                                                           |
| T2520               | 2<br>2   | 63.500<br>2.5000   | 117.475<br>4.6250   | 25.400<br>1.0000   | 2.3<br>0.09         | 2.3<br>0.09           | 1.3<br>2.95     |                                                                                                           |
| *T3004W             | 1<br>1   | 76.454<br>3.0100   | 167.081<br>6.5780   | 44.450<br>1.7500   | 3.3<br>0.13         | N/A<br>N/A            | –<br>–          | T3004W, RETAINER ON OD                                                                                    |
| T7519               | 2<br>2   | 190.000<br>7.4803  | 355.600<br>14.0000  | 74.219<br>2.9220   | 6.4<br>0.25         | 6.4<br>0.25           | 35.9<br>79.15   |                                                                                                           |
| *T8920FA - T8920FB  | 11<br>11 | 168.275<br>6.6250  | 638.175<br>25.1250  | 152.400<br>6.0000  | N/A<br>N/A          | 11.0<br>0.43          | –<br>–          | NO SPHERICAL RADIUS                                                                                       |
| T9020               | 9<br>9   | 228.600<br>9.0000  | 431.800<br>17.0000  | 88.773<br>3.4950   | N/A<br>N/A          | 9.7<br>0.38           | 65.7<br>144.84  |                                                                                                           |
| *T9030FS - T9030S   | 7<br>7   | SOLID              | 482.600<br>19.0000  | 165.000<br>6.5354  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T9030FS - T9030S, SPHERICAL RADIUS =<br>635.000 mm (25")                                                  |
| *T9030FS - T9030SA  | 8<br>8   | SOLID              | 482.600<br>19.0000  | 150.622<br>5.9300  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T9030FS - T9030SA, SPHERICAL RADIUS =<br>1295.400 mm (51")                                                |
| *T9030FSA - T9030SA | 12<br>12 | 168.275<br>6.6250  | 482.600<br>19.0000  | 131.763<br>5.1875  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T9030FSA - T9030SA, SPHERICAL RADIUS =<br>1295.400 mm (51")                                               |
| *T9030FSA - T9030SB | 12<br>12 | 168.275<br>6.6250  | 482.600<br>19.0000  | 131.763<br>5.1875  | N/A<br>N/A          | 11.2<br>0.44          | –<br>–          | T9030FSA - T9030SB, SPHERICAL RADIUS =<br>1066.800 mm (42")                                               |
| T9250F              | 10<br>10 | 234.950<br>9.2500  | 546.100<br>21.5000  | 127.000<br>5.0000  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          |                                                                                                           |
| T9250FA             | 10<br>10 | 139.700<br>5.5000  | 546.100<br>21.5000  | 127.000<br>5.0000  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          |                                                                                                           |
| *T9250FAS - T9250SA | 12<br>12 | 139.700<br>5.5000  | 549.275<br>21.6250  | 155.575<br>6.1250  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          | T9250FAS - T9250SA, SPHERICAL RADIUS =<br>1295.400 mm (51")                                               |
| *T9250FAS - T9250SC | 12<br>12 | 139.700<br>5.5000  | 549.275<br>21.6250  | 155.575<br>6.1250  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          | T9250FAS - T9250SC, SPHERICAL RADIUS =<br>1295.400 mm (51")                                               |
| *T9250FS - T9250S   | 11<br>11 | 234.950<br>9.2500  | 546.100<br>21.5000  | 168.275<br>6.6250  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          | T9250FS - T9250S, SPHERICAL RADIUS =<br>641.350 mm (25.25")                                               |
| *T9250FS - T9250SA  | 12<br>12 | 234.950<br>9.2500  | 549.275<br>21.6250  | 155.575<br>6.1250  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          | T9250FS - T9250SA, SPHERICAL RADIUS =<br>1295.400 mm (51")                                                |
| *T9250FS - T9250SB  | 11<br>11 | 234.950<br>9.2500  | 546.100<br>21.5000  | 171.450<br>6.7500  | N/A<br>N/A          | 16.0<br>0.63          | –<br>–          | T9250FS - T9250SB, SPHERICAL RADIUS =<br>558.800 mm (22")                                                 |
| *T12040FS - T12040S | 12<br>12 | 304.800<br>12.0000 | 1146.175<br>45.1250 | 317.500<br>12.5000 | N/A<br>N/A          | 19.0<br>0.75          | –<br>–          | T12040FS - T12040S, SPHERICAL RADIUS =<br>2000.250 mm (78.75"), LOWER RACE OD =<br>1143.000 mm (45.0000") |
| *T14214             | 13<br>13 | 355.600<br>14.0000 | 533.400<br>21.0000  | 101.600<br>4.0000  | N/A<br>N/A          | 6.4<br>0.25           | –<br>–          | T14214, 2 BORES, OTHER BORE =<br>355.961 mm (14.0150")                                                    |
| T14520              | 9<br>9   | 368.300<br>14.5000 | 603.300<br>23.7500  | 120.650<br>4.7500  | N/A<br>N/A          | 9.7<br>0.38           | 144.0<br>317.47 |                                                                                                           |

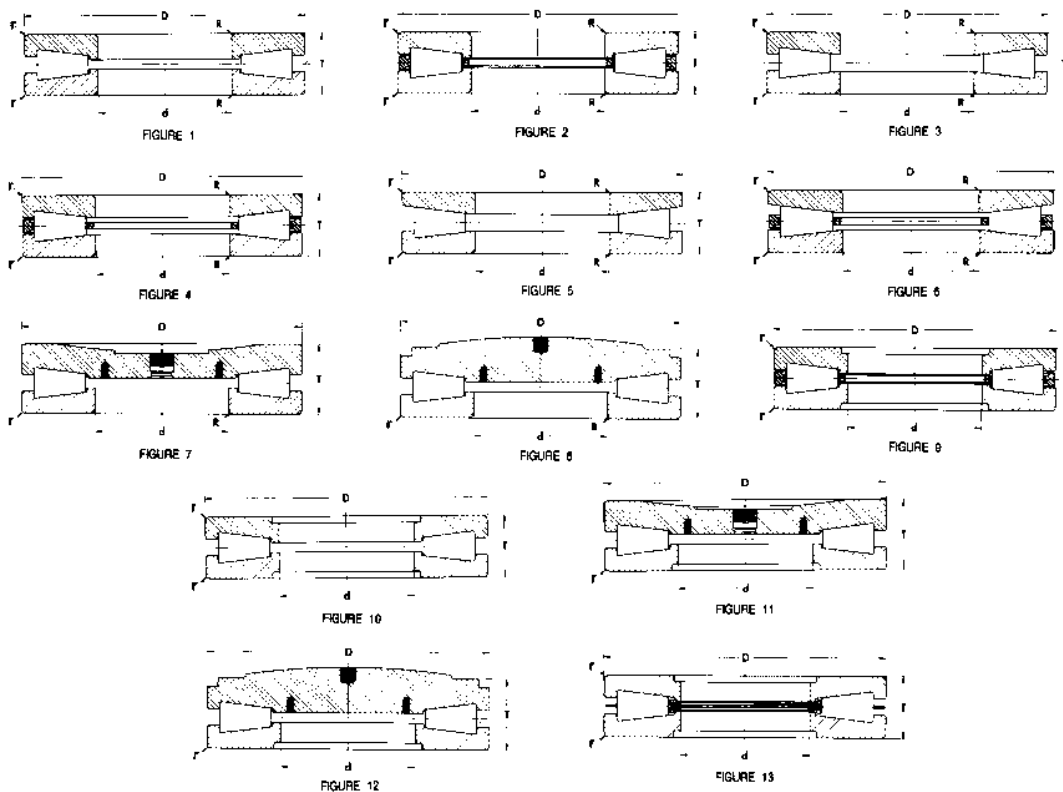




**THRUST BEARINGS**

TYPE TTHD - *continued*

B

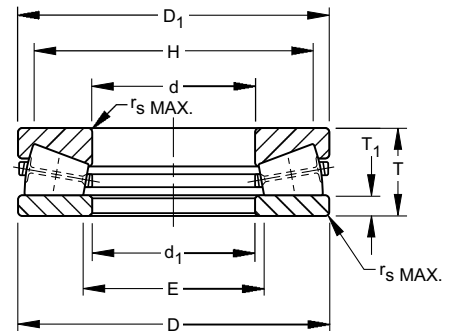


| Bearing Number     | Fig No. | Bore     |          | Width   | Shaft Fillet Radius | Housing Fillet Radius | Mass    | Remarks |
|--------------------|---------|----------|----------|---------|---------------------|-----------------------|---------|---------|
|                    |         | d        | D        |         |                     |                       |         |         |
|                    |         | mm       | mm       | mm      | mm                  | mm                    | kg      |         |
|                    |         | in.      | in.      | in.     | in.                 | in.                   | lbs.    |         |
| T16021             | 9       | 406.400  | 711.200  | 146.050 | N/A                 | 9.7                   | 264.0   |         |
|                    | 9       | 16.0000  | 28.0000  | 5.7500  | N/A                 | 0.38                  | 582.02  |         |
| T16021F            | 10      | 406.400  | 711.200  | 146.050 | N/A                 | 9.7                   | 264.0   |         |
|                    | 10      | 16.0000  | 28.0000  | 5.7500  | N/A                 | 0.38                  | 582.02  |         |
| T16050             | 9       | 406.400  | 838.200  | 177.800 | N/A                 | 12.7                  | 517.0   |         |
|                    | 9       | 16.0000  | 33.0000  | 7.0000  | N/A                 | 0.5                   | 1139.79 |         |
| T17010FS - T17020S | 12      | 431.800  | 942.975  | 260.350 | N/A                 | 12.7                  | -       |         |
|                    | 12      | 17.0000  | 37.1250  | 10.2500 | N/A                 | 0.5                   | -       |         |
| T48000             | 9       | 1219.200 | 1524.000 | 136.525 | N/A                 | 9.7                   | 596.0   |         |
|                    | 9       | 48.0000  | 60.0000  | 5.3750  | N/A                 | 0.38                  | 1313.95 |         |

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTVF

- Combines the outstanding features of tapered thrust and cylindrical roller bearings to offer the highest possible capacity of any thrust bearing of its size.
- One washer is perfectly flat, while the second includes a tapered raceway matching the rollers.
- Originally developed for screwdown applications in metal rolling mills where thrust loads exceeding one million pounds are common.



### DIMENSIONS – LOAD RATINGS

| Bearing Number | Bore d              | O.D. D              | Height T           | Washers                  |                                    |                                | Shoulder Diameter |                  | Fillet <sup>(1)</sup> Radius r (Max.) | Wt.              | Load Rating                        |                                    | Approx. Limiting Speed (for Oil Bath Only) |
|----------------|---------------------|---------------------|--------------------|--------------------------|------------------------------------|--------------------------------|-------------------|------------------|---------------------------------------|------------------|------------------------------------|------------------------------------|--------------------------------------------|
|                |                     |                     |                    | Thickness T <sub>1</sub> | Small Diameter O.D. D <sub>1</sub> | Large Bore I.D. d <sub>1</sub> | Shaft H (Min.)    | Housing E (Max.) |                                       |                  | Static Load Rating C <sub>0a</sub> | Dynamic Load Rating C <sub>1</sub> |                                            |
|                | mm in.              | mm in.              | mm in.             | mm in.                   | mm in.                             | mm in.                         | mm in.            | mm in.           | kg lbs.                               | kN lbs.          | kN lbs.                            | RPM                                |                                            |
| F-3167-B       | 101.575<br>3.9990   | 215.875<br>8.4990   | 46.038<br>1.8125   | 9.53<br>0.375            | 215.14<br>8.470                    | 102.59<br>4.039                | 193.7<br>7.62     | 108<br>4.25      | 2.5<br>0.10                           | 9.3<br>20.5      | 1570.0<br>353000                   | 880.0<br>198000                    | 1350                                       |
| W-3217-B       | 127.000<br>5.0000   | 266.700<br>10.5000  | 58.738<br>2.3125   | 12.70<br>0.500           | 265.94<br>10.470                   | 127.51<br>5.020                | 238.1<br>9.38     | 149.2<br>5.88    | 3.6<br>0.14                           | 18.6<br>41.0     | 2570.0<br>578000                   | 1350.0<br>304000                   | 1090                                       |
| S-4055-C       | 149.974<br>5.9045   | 299.720<br>11.8000  | 89.692<br>3.5312   | 25.40<br>1.000           | 298.45<br>11.750                   | 154<br>6.063                   | 267.5<br>10.53    | 174.6<br>6.88    | 3<br>0.12                             | 35.8<br>79.0     | 3350.0<br>754000                   | 1850.0<br>416000                   | 970                                        |
| G-3304-B       | 168.275<br>6.6250   | 304.800<br>12.0000  | 69.850<br>2.7500   | 14.29<br>0.562           | 303.21<br>11.938                   | 171.45<br>6.750                | 277.8<br>10.94    | 188.9<br>7.44    | 6.4<br>0.25                           | 25.9<br>57.0     | 3730.0<br>839000                   | 1910.0<br>429000                   | 950                                        |
| W-3218-B       | 177.800<br>7.0000   | 368.300<br>14.5000  | 82.550<br>3.2500   | 17.46<br>0.688           | 366.71<br>14.438                   | 180.98<br>7.125                | 336.6<br>13.25    | 203.2<br>8.00    | 6.1<br>0.24                           | 49.4<br>109.0    | 6270.0<br>1410000                  | 2940.0<br>660000                   | 790                                        |
| F-3094-C       | 228.575<br>8.9990   | 431.749<br>16.9980  | 88.900<br>3.5000   | 15.88<br>0.625           | 430.99<br>16.968                   | 231.78<br>9.125                | 396.9<br>15.62    | 257.2<br>10.12   | 5.1<br>0.20                           | 71.7<br>158.0    | 7120.0<br>1600000                  | 3420.0<br>769000                   | 670                                        |
| I-2077-C       | 253.975<br>9.9990   | 508.000<br>20.0000  | 95.250<br>3.7500   | 19.05<br>0.750           | 507.19<br>19.968                   | 256.38<br>10.094               | 468.3<br>18.44    | 282.6<br>11.12   | 6.4<br>0.25                           | 110.2<br>243.0   | 10000.0<br>2260000                 | 4530.0<br>1020000                  | 570                                        |
| R-2927-C       | 254.000<br>10.0000  | 508.000<br>20.0000  | 107.950<br>4.2500  | 21.43<br>0.844           | 506.41<br>19.938                   | 257.18<br>10.125               | 466.7<br>18.38    | 285.8<br>11.25   | 4.8<br>0.19                           | 123.4<br>272.0   | 12100.0<br>2720000                 | 5550.0<br>1250000                  | 570                                        |
| G-3224-C       | 256.540<br>10.1000  | 546.100<br>21.5000  | 165.100<br>6.5000  | 34.92<br>1.375           | 542.92<br>21.375                   | 258.76<br>10.188               | 515.9<br>20.31    | 301.6<br>11.88   | 6.1<br>0.24                           | 227.2<br>501.0   | 14900.0<br>3350000                 | 7900.0<br>1780000                  | 530                                        |
| S-4077-C       | 259.999<br>10.2362  | 479.948<br>18.8956  | 132.080<br>5.2000  | 26.99<br>1.062           | 478.36<br>18.833                   | 263.17<br>10.361               | 427<br>16.81      | 300<br>11.81     | 4.8<br>0.19                           | 126.5<br>279.0   | 8980.0<br>2020000                  | 4720.0<br>1060000                  | 610                                        |
| C-8091-C       | 279.400<br>11.0000  | 603.250<br>23.7500  | 136.525<br>5.3750  | 30.16<br>1.188           | 601.66<br>23.688                   | 282.58<br>11.125               | 552.4<br>21.75    | 317.5<br>12.50   | 4.8<br>0.19                           | 230.4<br>508.0   | 1770.0<br>3980000                  | 7890.0<br>1770000                  | 480                                        |
| G-3272-C       | 304.775<br>11.9990  | 609.600<br>24.0000  | 114.300<br>4.5000  | 28.58<br>1.125           | 606.81<br>23.890                   | 307.18<br>12.094               | 565.2<br>22.25    | 342.9<br>13.50   | 6.4<br>0.25                           | 190.9<br>421.0   | 17800.0<br>3990000                 | 7380.0<br>1660000                  | 480                                        |
| E-1994-C       | 304.800<br>12.0000  | 673.100<br>26.5000  | 171.450<br>6.7500  | 37.31<br>1.469           | 671.51<br>26.438                   | 307.98<br>12.125               | 608<br>23.94      | 352.4<br>13.88   | 7.6<br>0.30                           | 347.8<br>767.0   | 22700.0<br>5100000                 | 11000.0<br>2470000                 | 430                                        |
| F-3090-A       | 304.800<br>12.0000  | 736.600<br>29.0000  | 279.400<br>11.0000 | 44.45<br>1.750           | 735.01<br>28.938                   | 307.98<br>12.125               | 614.4<br>24.19    | 385.8<br>15.19   | 9.1<br>0.36                           | 732<br>1614.0    | 28000.0<br>6300000                 | 17100.0<br>3850000                 | 400                                        |
| I-2060-C       | 368.541<br>14.5095  | 609.156<br>23.9825  | 120.650<br>4.7500  | 25.40<br>1.000           | 604.84<br>23.812                   | 371.48<br>14.625               | 565.2<br>22.25    | 401.6<br>15.81   | 9.7<br>0.38                           | 176<br>388.0     | 11800.0<br>2640000                 | 5840.0<br>1310000                  | 480                                        |
| B-8350-C       | 406.400<br>16.0000  | 711.200<br>28.0000  | 167.084<br>6.5781  | 36.91<br>1.453           | 709.61<br>27.938                   | 409.58<br>16.125               | 654<br>25.75      | 450.8<br>17.75   | 9.1<br>0.36                           | 356.5<br>786.0   | 19900.0<br>4480000                 | 10300.0<br>2310000                 | 410                                        |
| F-3163-C       | 406.400<br>16.0000  | 712.394<br>28.0470  | 146.050<br>5.7500  | 30.96<br>1.219           | 711.28<br>28.003                   | 409.58<br>16.125               | 650.9<br>25.62    | 455.6<br>17.94   | 7.6<br>0.30                           | 303.4<br>669.0   | 19300.0<br>4350000                 | 9190.0<br>2070000                  | 410                                        |
| F-3131-G       | 431.800<br>17.0000  | 863.600<br>34.0000  | 228.600<br>9.0000  | 44.45<br>1.750           | 862.01<br>33.938                   | 434.98<br>17.125               | 787.4<br>31.00    | 489<br>19.25     | 10.2<br>0.40                          | 774.6<br>1708.0  | 37700.0<br>8480000                 | 18800.0<br>4230000                 | 340                                        |
| A-6096-C       | 508.000<br>20.0000  | 990.600<br>39.0000  | 196.850<br>7.7500  | 67.47<br>2.656           | 990.60<br>39.000                   | 508.58<br>20.062               | 927.1<br>36.50    | 563.6<br>22.19   | 12.7<br>0.50                          | 882.5<br>1946.0  | 41500.0<br>9320000                 | 16700.0<br>3760000                 | 290                                        |
| F-3093-A       | 558.800<br>22.0000  | 1066.800<br>42.0000 | 285.750<br>11.2500 | 57.15<br>2.250           | 1065.21<br>41.938                  | 561.98<br>22.125               | 952.5<br>37.50    | 639.8<br>25.19   | 10.2<br>0.40                          | 1401.4<br>3090.0 | 49400.0<br>11100000                | 28000.0<br>6300000                 | 270                                        |
| F-3172-C       | 711.200<br>28.0000  | 965.200<br>38.0000  | 127.000<br>5.0000  | 30.16<br>1.188           | 963.61<br>37.938                   | 714.38<br>28.125               | 917.6<br>36.12    | 762<br>30.00     | 4.8<br>0.19                           | 354.2<br>781.0   | 19600.0<br>4400000                 | 8670.0<br>1950000                  | 300                                        |
| H-2054-G       | 711.200<br>28.0000  | 990.600<br>39.0000  | 190.500<br>7.5000  | 44.45<br>1.750           | 989.01<br>38.938                   | 712.79<br>28.062               | 936.6<br>36.88    | 755.6<br>29.75   | 10.2<br>0.40                          | 572.3<br>1262.0  | 28000.0<br>6300000                 | 14200.0<br>3200000                 | 290                                        |
| D-2864-C       | 825.424<br>32.4970  | 1168.400<br>46.0000 | 127.000<br>5.0000  | 31.75<br>1.250           | 1168.40<br>46.000                  | 825.50<br>32.500               | 1130.3<br>44.50   | 860.4<br>33.88   | 14.2<br>0.56                          | 549.7<br>1212.0  | 44100.0<br>9920000                 | 15600.0<br>3500000                 | 250                                        |
| F-3067-C       | 1219.998<br>48.0314 | 1574.869<br>62.0027 | 177.800<br>7.0000  | 44.45<br>1.750           | 1575<br>62.008                     | 1219.99<br>48.031              | 1498.6<br>59.00   | 1266.8<br>49.88  | 6.4<br>0.25                           | 1173.2<br>2587.0 | 49900.0<br>11200000                | 21900.0<br>4930000                 | 180                                        |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

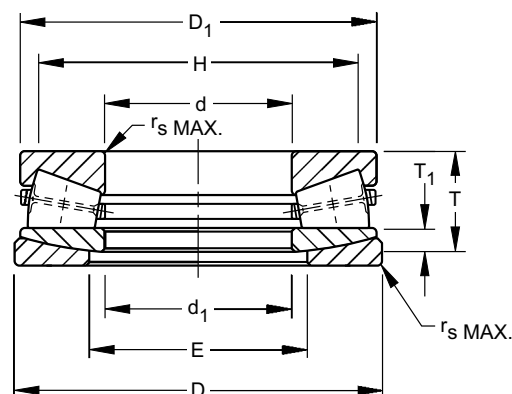


# ROLLER BEARINGS

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTVS

- Same basic roller and raceway design as the TTVF except that the lower washer is two pieces to permit self-alignment under conditions of initial misalignment.



### DIMENSIONS – LOAD RATINGS

| Bearing Number  | Bore d            | O.D. D             | Height T          | Washers         |                           |                       | Shoulder Diameter |                  | Fillet <sup>(1)</sup> Radius $r_s$ (Max.) | Wt.            | Load Rating                 |                           | Approx. Limiting Speed (for Oil Bath Only) |
|-----------------|-------------------|--------------------|-------------------|-----------------|---------------------------|-----------------------|-------------------|------------------|-------------------------------------------|----------------|-----------------------------|---------------------------|--------------------------------------------|
|                 |                   |                    |                   | Thickness $T_1$ | Small Diameter O.D. $D_1$ | Large Bore I.D. $d_1$ | Shaft H (Min.)    | Housing E (Max.) |                                           |                | Static Load Rating $C_{0a}$ | Dynamic Load Rating $C_1$ |                                            |
|                 | mm in.            | mm in.             | mm in.            | mm in.          | mm in.                    | mm in.                | mm in.            | mm in.           | kg lbs.                                   | kN lbs.        | kN lbs.                     | RPM                       |                                            |
| <b>B-7976-C</b> | 184.15<br>7.2500  | 406.4<br>16.0000   | 203.2<br>8.0000   | 66.68<br>2.625  | 404.81<br>15.938          | 187.32<br>7.375       | 346.1<br>13.62    | 228.6<br>9.00    | 6.1<br>0.24                               | 157.4<br>347.0 | 7650.0<br>1720000           | 4540.0<br>1020000         | 720                                        |
| <b>B-8824-C</b> | 199.374<br>7.8730 | 399.948<br>15.7460 | 121.841<br>4.7969 | 36.4<br>1.433   | 396.88<br>15.625          | 203.2<br>8.000        | 358.8<br>14.12    | 240.5<br>9.47    | 4.1<br>0.16                               | 86.2<br>190.0  | 7020.0<br>1580000           | 3590.0<br>807000          | 730                                        |
| <b>E-2004-C</b> | 228.6<br>9.0000   | 482.549<br>18.9980 | 158.75<br>6.2500  | 44.91<br>1.768  | 479.55<br>18.880          | 231.78<br>9.125       | 419.1<br>16.50    | 282.6<br>11.12   | 4.8<br>0.19                               | 170.1<br>375.0 | 10900.0<br>2440000          | 5870.0<br>1320000         | 600                                        |
| <b>H-1685-C</b> | 241.3<br>9.5000   | 488.899<br>19.2480 | 152.4<br>6.0000   | 57.15<br>2.250  | 482.6<br>19.000           | 242.09<br>9.531       | 431.8<br>17.00    | 279.4<br>11.00   | 6.1<br>0.24                               | 162.8<br>359.0 | 9940.0<br>2240000           | 4980.0<br>1120000         | 600                                        |
| <b>W-3120-C</b> | 253.975<br>9.9990 | 508<br>20.0000     | 215.9<br>8.5000   | 61.91<br>2.437  | 504.82<br>19.875          | 285.75<br>11.250      | 425.4<br>16.75    | 317.5<br>12.50   | 10.2<br>0.40                              | 250.8<br>553.0 | 9770.0<br>2200000           | 6020.0<br>1350000         | 580                                        |
| <b>P-1739-C</b> | 304.8<br>12.0000  | 609.6<br>24.0000   | 215.9<br>8.5000   | 61.91<br>2.437  | 608.01<br>23.938          | 307.98<br>12.125      | 536.6<br>21.12    | 349.2<br>13.75   | 7.6<br>0.30                               | 359.6<br>793.0 | 17800.0<br>4010000          | 10000.0<br>2260000        | 480                                        |
| <b>N-2827-G</b> | 355.6<br>14.0000  | 660.4<br>26.0000   | 254<br>10.0000    | 76.2<br>3.000   | 657.22<br>25.875          | 358.78<br>14.125      | 577.8<br>22.75    | 412.8<br>16.25   | 10.2<br>0.40                              | 483<br>1065.0  | 18600.0<br>4180000          | 11100.0<br>2490000        | 440                                        |
| <b>B-8424-C</b> | 406.4<br>16.0000  | 869.95<br>34.2500  | 241.3<br>9.5000   | 82.55<br>3.250  | 887.41<br>34.938          | 438.15<br>17.250      | 803.3<br>31.62    | 463.6<br>18.25   | 16.5<br>0.65                              | 858<br>1892.0  | 39000.0<br>8770000          | 17700.0<br>3980000        | 330                                        |

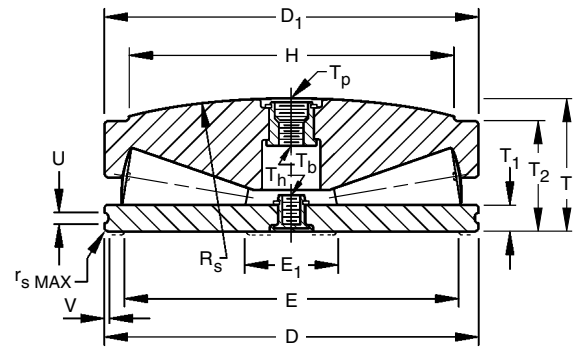
<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.



## TAPERED ROLLER THRUST BEARINGS

### TYPE TTSX

- A full roller complement design without a conventional bore.
- Supplied with center inserts for attachment purposes as well as for lifting.
- Offers the highest capacity but at a somewhat reduced speed capability, as compared with other V-Flat types.



| Bearing Number      | Screw Extension Dia. min. H | O.D. D | Overall Height T | Height T <sub>2</sub> | Spherical Radius R <sub>s</sub> | Washer Thickness T <sub>1</sub> | max. r <sub>s</sub> | Top Washer O.D. D <sub>1</sub> | Hsg. Shldr. Dia. E | Hsg. Shldr. Dia. E <sub>1</sub> | Groove  |         | Eyebolt Threads |                | T <sub>p</sub> Taper Plug Thread | Basic Static Thrust Capacity BSTC |
|---------------------|-----------------------------|--------|------------------|-----------------------|---------------------------------|---------------------------------|---------------------|--------------------------------|--------------------|---------------------------------|---------|---------|-----------------|----------------|----------------------------------|-----------------------------------|
|                     |                             |        |                  |                       |                                 |                                 |                     |                                |                    |                                 | Width U | Depth V | T <sub>b</sub>  | T <sub>h</sub> |                                  |                                   |
|                     | inch                        | inch   | inch             | inch                  | inch                            | inch                            | inch                | inch                           | inch               | inch                            | inch    | inch    | inch            | inch           | inch                             | lbs.                              |
| 58 TTSX 908         | 5.000                       | 5.875  | 2.164            | 1.875                 | 18.000                          | 0.500                           | 1/16                | 5.782                          | 5 3/8              | 2                               | 0.187   | 0.046   | 1/2-13          | 3/8-16         | 3/8                              | 299000                            |
| 68 TTSX 910         | 6.000                       | 6.875  | 2.417            | 2.062                 | 18.000                          | 0.500                           | 1/16                | 6.782                          | 6 3/8              | 2 7/8                           | 0.187   | 0.046   | 1/2-13          | 3/8-16         | 3/8                              | 400000                            |
| 80 TTSX 914         | 7.000                       | 8.000  | 2.977            | 2.562                 | 20.000                          | 0.625                           | 1/16                | 7.907                          | 7 3/8              | 2 7/8                           | 0.250   | 0.046   | 1/2-13          | 3/8-16         | 3/8                              | 565000                            |
| 105 TTSX 918        | 9.000                       | 10.500 | 3.717            | 3.187                 | 24.000                          | 0.750                           | 1/16                | 10.407                         | 9 3/8              | 3 1/8                           | 0.312   | 0.078   | 3/4-10          | 1/2-13         | 3/4                              | 985000                            |
| 126 TTSX 922        | 11.000                      | 12.625 | 4.369            | 3.750                 | 30.000                          | 0.875                           | 1/16                | 12.532                         | 11 1/2             | 3 5/8                           | 0.406   | 0.094   | 3/4-10          | 1/2-13         | 3/4                              | 1515000                           |
| 148 TTSX 926        | 13.000                      | 14.875 | 5.079            | 4.375                 | 36.000                          | 1.000                           | 1/16                | 14.782                         | 13 5/8             | 4 5/8                           | 0.406   | 0.094   | 1 1/4-7         | 1/2-13         | 1 1/4                            | 2050000                           |
| 172 TTSX 934 OG778  | 13.500                      | 17.252 | 6.495            | 5.500                 | 33.000                          | 1.250                           | 5/32                | 17.152                         | 15 5/8             | 4 9/16                          | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 2815000                           |
| 161 TTSX 930        | 14.000                      | 16.125 | 5.542            | 4.812                 | 40.000                          | 1.125                           | 1/8                 | 16.032                         | 14 5/8             | 4 9/16                          | 0.406   | 0.094   | 1 1/4-7         | 1/2-13         | 1 1/4                            | 2430000                           |
| 161 TTSX 930 AA678  | 14.000                      | 16.125 | 6.730            | 5.616                 | 54.000                          | 1.750                           | 1/16                | 16.032                         | 14 5/8             | 4 9/16                          | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 2430000                           |
| 172 TTSX 934        | 15.000                      | 17.250 | 5.932            | 5.125                 | 40.000                          | 1.250                           | 1/8                 | 17.157                         | 15 5/8             | 4 9/16                          | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 2800000                           |
| 202 TTSX 942 EE2000 | 15.875                      | 20.250 | 7.430            | 6.125                 | 25.000                          | 1.375                           | 1/16                | 20.532                         | 19                 | 5                               | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4190000                           |
| 190 TTSX 940        | 16.500                      | 19.000 | 5.730            | 5.125                 | 75.000                          | 1.500                           | 1/16                | 18.906                         | 18 1/4             | 7 3/16                          | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3460000                           |
| 190 TTSX 940 OA617  | 16.500                      | 19.000 | 6.015            | 5.125                 | 42.000                          | 1.500                           | 1/16                | 18.905                         | 18 1/4             | 5 3/16                          | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3620000                           |
| 190 TTSX 938 B0563  | 17.000                      | 19.250 | 6.717            | 5.750                 | 42.000                          | 1.375                           | 1/8                 | 19.407                         | 17 5/8             | 4 5/8                           | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3680000                           |
| 195 TTSX 938 OD452  | 17.000                      | 19.500 | 6.635            | 5.750                 | 46.500                          | 1.375                           | 1/8                 | 12.407                         | 17 5/8             | 4 5/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3680000                           |
| 195 TTSX 938        | 17.000                      | 19.500 | 6.717            | 5.750                 | 42.000                          | 1.375                           | 1/8                 | 19.407                         | 17 5/8             | 4 5/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3680000                           |
| 195 TTSX 938 D0574  | 17.000                      | 19.560 | 6.717            | 5.750                 | 42.000                          | 1.375                           | 1/8                 | 19.407                         | 17 5/8             | 4 5/8                           | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 3680000                           |
| 206TTSX 942         | 18.000                      | 20.625 | 6.920            | 6.000                 | 50.000                          | 1.375                           | 1/8                 | 20.532                         | 19                 | 5 1/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4190000                           |
| 206 TTSX 942 AB551  | 18.000                      | 20.625 | 7.937            | 6.878                 | 42.000                          | 2.238                           | 1/8                 | 20.532                         | 19                 | 5                               | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4190000                           |
| 210 TTSX 944 AO574  | 18.000                      | 21.000 | 7.000            | 6.375                 | 78.000                          | 1.250                           | -                   | 20.906                         | 19 1/2             | 5                               | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4232000                           |
| 210 TTSX 944        | 18.000                      | 21.000 | 7.000            | 6.375                 | 78.000                          | 1.250                           | 1/16                | 20.906                         | 19 1/2             | 5                               | 0.375   | 0.375   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4232000                           |
| 210 TTSX 944 BA1479 | 18.000                      | 21.000 | 7.023            | -                     | 78.000                          | 1.250                           | -                   | 21.000                         | 19 1/2             | 5                               | -       | -       | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4232000                           |
| 218 TTSX 946        | 19.000                      | 21.875 | 7.514            | 6.500                 | 50.000                          | 1.500                           | 1/8                 | 21.782                         | 19 7/8             | 6                               | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 4550000                           |
| 228 TTSX 950        | 20.000                      | 22.875 | 7.629            | 6.625                 | 56.000                          | 1.500                           | 1/8                 | 22.782                         | 20 3/4             | 5 1/4                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 5130000                           |
| 228 TTSX 950 AO2017 | 20.000                      | 22.875 | 7.629            | 6.625                 | 56.000                          | 1.500                           | 1/8                 | 22.782                         | 20 3/4             | 5 1/4                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 5130000                           |
| 228 TTSX 950 OA452  | 20.000                      | 22.875 | 7.708            | 6.625                 | 51.500                          | 1.500                           | 1/8                 | 22.782                         | 20 3/4             | 5 1/4                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 5130000                           |
| 240 TTSX 954 OC1185 | 21.000                      | 24.000 | 8.032            | 7.000                 | 60.000                          | 1.500                           | 1/8                 | 23.907                         | 22                 | 4 5/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 5700000                           |
| 240 TTSX 954        | 21.000                      | 24.000 | 8.032            | 7.000                 | 60.000                          | 1.500                           | 1/8                 | 23.907                         | 22                 | 5 5/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 5700000                           |
| 252 TTSX 958 00149  | 22.000                      | 25.250 | 8.373            | 7.250                 | 60.000                          | 1.500                           | 1/8                 | 25.157                         | 23 1/8             | 5 3/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 6290000                           |
| 252 TTSX 958        | 22.000                      | 25.250 | 8.373            | 7.250                 | 60.000                          | 1.500                           | 1/8                 | 25.157                         | 23 1/8             | 5 3/8                           | 0.531   | 0.125   | 1 1/4-7         | 1 - 8          | 1 1/4                            | 6290000                           |



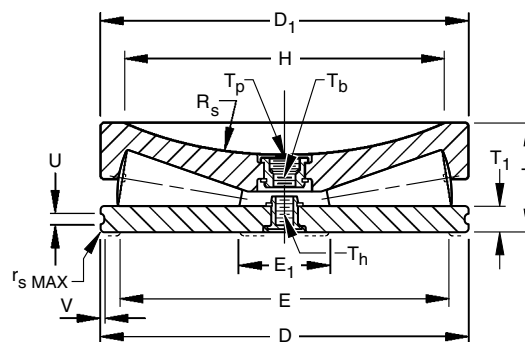


# ROLLER BEARINGS

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTSV

- Designed with a full complement of controlled contour rollers without a conventional bore.
- Supplied with center inserts for attachment purposes as well as for lifting.
- Offers the highest capacity but at a somewhat reduced speed capability, as compared with other V-Flat types.



| Bearing Number       | Screw Extension |           | Height<br>T | Spherical Radius<br>R <sub>s</sub> | Washer Thickness<br>T <sub>1</sub> | max.<br>r <sub>s</sub> | Top Washer<br>O.D.<br>D <sub>1</sub> | Hsg. Shldr.<br>Dia.<br>E | Hsg. Shldr.<br>Dia.<br>E <sub>1</sub> | Groove     |            | Eyebolt Threads |                | T <sub>p</sub><br>Taper<br>Pipe<br>Plug<br>Thread | Basic<br>Static<br>Thrust<br>Capacity<br>BSTC |
|----------------------|-----------------|-----------|-------------|------------------------------------|------------------------------------|------------------------|--------------------------------------|--------------------------|---------------------------------------|------------|------------|-----------------|----------------|---------------------------------------------------|-----------------------------------------------|
|                      | min.<br>H       | O.D.<br>D |             |                                    |                                    |                        |                                      |                          |                                       | Width<br>U | Depth<br>V | T <sub>b</sub>  | T <sub>h</sub> |                                                   |                                               |
|                      | inch            | inch      | inch        | inch                               | inch                               | inch                   | inch                                 | inch                     | inch                                  | inch       | inch       | inch            | inch           | inch                                              | lbs.                                          |
| 58 TTSV 908          | 5.000           | 5.875     | 1.875       | 9.000                              | 0.500                              | 1/16                   | 5.782                                | 5 3/8                    | 2                                     | 0.187      | 0.046      | 5/8-11          | 3/8-16         | —                                                 | 299000                                        |
| 80 TTSV 914 AA508    | 5.500           | 8.000     | 2.563       | 24.000                             | 0.625                              | —                      | 7.907                                | 7 3/8                    | 2 7/8                                 | —          | —          | 5/8-11          | 3/8-16         | —                                                 | 565000                                        |
| 68 TTSV 910          | 6.000           | 6.875     | 2.062       | 9.000                              | 0.500                              | 1/16                   | 6.782                                | 6 3/8                    | 2 7/8                                 | 0.187      | 0.046      | 5/8-11          | 3/8-16         | —                                                 | 400000                                        |
| 80 TTSV 914          | 7.000           | 8.000     | 2.562       | 10.000                             | 0.625                              | 1/16                   | 7.907                                | 7 3/8                    | 2 7/8                                 | 0.250      | 0.046      | 5/8-11          | 3/8-16         | —                                                 | 565000                                        |
| 105 TTSV 918         | 9.000           | 10.500    | 3.187       | 12.000                             | 0.750                              | 1/16                   | 10.407                               | 9 3/8                    | 3 3/8                                 | 0.312      | 0.078      | 3/4-10          | 1/2-13         | —                                                 | 985000                                        |
| 105 TTSV 918 OC1150  | 9.000           | 10.500    | 3.187       | 14.000                             | 0.750                              | 1/16                   | 10.407                               | 9 3/8                    | 3 1/8                                 | 0.312      | 0.078      | 3/4-10          | 1/2-13         | —                                                 | 985000                                        |
| 126 TTSV 922         | 11.000          | 12.625    | 3.750       | 15.000                             | 0.875                              | 1/16                   | 12.532                               | 11 1/2                   | 3 3/8                                 | 0.406      | 0.094      | 3/4-10          | 1/2-13         | —                                                 | 1515000                                       |
| 148 TTSV 926         | 13.000          | 14.875    | 4.375       | 18.000                             | 1.000                              | 1/16                   | 14.782                               | 13 5/8                   | 4 5/8                                 | 0.406      | 0.094      | 3/4-10          | 1/2-13         | 3/4                                               | 2050000                                       |
| 148 TTSV 926 AO529   | 13.000          | 14.875    | 4.375       | 18.000                             | 1.000                              | 1/16                   | 14.782                               | 13 5/8                   | 4 5/8                                 | 0.406      | 0.094      | 3/4-10          | 1/2-13         | —                                                 | 2050000                                       |
| 161 TTSV 930 OA534   | 13.000          | 16.125    | 5.500       | 20.000                             | 1.125                              | 1/8                    | 16.032                               | 14 5/8                   | 4 9/16                                | 0.406      | 0.094      | 3/4-10          | 1/2-13         | 3/4                                               | 2430000                                       |
| 161 TTSV 930         | 14.000          | 16.125    | 4.812       | 20.000                             | 1.125                              | 1/8                    | 16.032                               | 14 5/8                   | 4 9/16                                | 0.406      | 0.094      | 3/4-10          | 1/2-13         | 3/4                                               | 2430000                                       |
| 172 TTSV 934         | 15.000          | 17.250    | 5.125       | 20.000                             | 1.250                              | 1/8                    | 17.157                               | 15 5/8                   | 4 9/16                                | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 2800000                                       |
| 172 TTSV 934 BA528   | 15.000          | 17.250    | 5.875       | 50.000                             | 2.000                              | —                      | 17.157                               | 15 5/8                   | 4 9/16                                | —          | —          | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 2800000                                       |
| 195 TTSV 938 OA452   | 17.000          | 19.500    | 5.750       | 25.000                             | 1.375                              | 1/8                    | 19.407                               | 17 5/8                   | 4 5/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 3680000                                       |
| 195 TTSV 938         | 17.000          | 19.500    | 5.750       | 22.000                             | 1.375                              | 1/8                    | 19.407                               | 17 5/8                   | 4 5/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 3680000                                       |
| 195 TTSV 938 OC902   | 17.000          | 19.500    | 5.750       | 25.000                             | 1.375                              | 1/8                    | 19.250                               | 17 5/8                   | 4 5/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 3610000                                       |
| 195 TTSV 938 LE1722  | 17.000          | 19.500    | 5.750       | 36.000                             | 1.375                              | 1/4                    | 19.407                               | 17 5/8                   | 4 5/8                                 | 0.953      | 0.130      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 3680000                                       |
| 195 TTSV 938 DB508   | 17.000          | 19.500    | 5.750       | 50.000                             | 1.383                              | —                      | 19.407                               | 17 5/8                   | 4 5/8                                 | —          | —          | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 3680000                                       |
| 206 TTSV 942         | 18.000          | 20.625    | 6.000       | 25.000                             | 1.375                              | 1/8                    | 20.532                               | 19                       | 5 1/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 4190000                                       |
| 210 TTSV 944 CA1481  | 18.000          | 21.000    | 7.000       | 50.000                             | 1.125                              | —                      | 21.000                               | 19 1/2                   | 5                                     | —          | —          | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 4232000                                       |
| 210 TTSV 944 DA 1708 | 18.000          | 21.000    | 7.500       | 50.000                             | 1.750                              | —                      | 21.000                               | 19 1/2                   | 5                                     | —          | —          | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 4232000                                       |
| 212 TTSV 942 EA1740  | 18.000          | 21.250    | 6.250       | 25.000                             | 1.625                              | 7/16                   | 21.250                               | 19                       | 5                                     | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 4190000                                       |
| 218 TTSV 946         | 19.000          | 21.875    | 6.500       | 25.000                             | 1.500                              | 1/8                    | 21.782                               | 19 7/8                   | 6                                     | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 4550000                                       |
| 228 TTSV 950         | 20.000          | 22.875    | 6.625       | 28.000                             | 1.500                              | 1/8                    | 22.782                               | 20 3/4                   | 5 1/4                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 5130000                                       |
| 240 TTSV 954         | 21.000          | 24.000    | 7.000       | 30.000                             | 1.500                              | 1/8                    | 23.907                               | 22                       | 5 3/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 5700000                                       |
| 252 TTSV 958         | 22.000          | 25.250    | 7.250       | 30.000                             | 1.500                              | 1/8                    | 25.157                               | 23 1/8                   | 5 3/8                                 | 0.531      | 0.125      | 1 1/4-7         | 1 - 8          | 1 1/4                                             | 6290000                                       |

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTSP

- The types TTSP and TTSPS (not shown) thrust bearings are made up of two tapered thrust races, rollers, cage and outside retainer which holds the components together during shipping and installation.
- These bearings are employed extensively in the steering pivot positions of automotive and industrial applications.



FIGURE 1

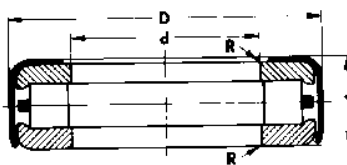


FIGURE 2

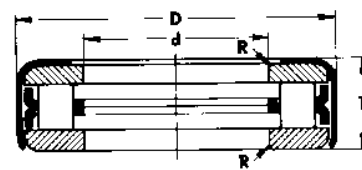


FIGURE 3

| Bearing Number           |                       | Fig No. | Bore<br>d        | Outside Diameter<br>D | Width<br>T       | Shaft Fillet Radius<br>R | Mass         | Remarks                                                                                                                  |
|--------------------------|-----------------------|---------|------------------|-----------------------|------------------|--------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------|
| No Oil Holes In Retainer | Oil Holes In Retainer |         |                  |                       |                  |                          |              |                                                                                                                          |
|                          |                       |         | mm in.           | mm in.                | mm in.           | mm in.                   | kg lbs.      |                                                                                                                          |
| T63                      | T63W                  | 1<br>1  | 16.129<br>0.6350 | 41.275<br>1.6250      | 12.700<br>0.5000 | 0.8<br>0.03              | 0.08<br>0.18 |                                                                                                                          |
| T76                      | T76W                  | 1<br>1  | 19.304<br>0.7600 | 41.275<br>1.6250      | 13.487<br>0.5310 | 0.8<br>0.03              | 0.08<br>0.18 |                                                                                                                          |
| T77                      | T77W                  | 1<br>1  | 19.304<br>0.7600 | 41.275<br>1.6250      | 12.700<br>0.5000 | 0.8<br>0.03              | 0.07<br>0.15 |                                                                                                                          |
| T82                      | T82W                  | 1<br>1  | 20.879<br>0.8220 | 41.275<br>1.6250      | 13.487<br>0.5310 | 0.8<br>0.03              | 0.07<br>0.15 |                                                                                                                          |
| T86                      |                       | 1<br>1  | 20.257<br>0.7975 | 39.688<br>1.5625      | 14.288<br>0.5625 | 1.3<br>0.05              | 0.07<br>0.15 |                                                                                                                          |
| T88                      | T88W                  | 1<br>1  | 22.479<br>0.8850 | 48.021<br>1.8906      | 15.088<br>0.5940 | 0.8<br>0.03              | 0.11<br>0.24 |                                                                                                                          |
| T89                      |                       | 1<br>1  | 22.479<br>0.8850 | 48.021<br>1.8906      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.12<br>0.26 |                                                                                                                          |
| *T92                     |                       | 2<br>2  | 23.825<br>0.9380 | 44.958<br>1.7700      | 13.487<br>0.5310 | 0.8<br>0.03              | –<br>–       | T92 HAS 2 BORES, OTHER BORE =24.054 mm (.9470"), R = .08 mm (.03").                                                      |
| T93                      |                       | 2<br>2  | 24.054<br>0.9470 | 44.958<br>1.7700      | 13.487<br>0.5310 | 0.8<br>0.03              | 0.09<br>0.20 |                                                                                                                          |
| T94                      | T94W                  | 1<br>1  | 24.054<br>0.9470 | 48.021<br>1.8906      | 15.088<br>0.5940 | 0.8<br>0.03              | 0.11<br>0.24 |                                                                                                                          |
| T95                      | T95W                  | 1<br>1  | 24.130<br>0.9500 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.13<br>0.29 |                                                                                                                          |
| T101                     | T101W                 | 1<br>1  | 25.654<br>1.0100 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.13<br>0.29 |                                                                                                                          |
| *T101X                   |                       | 1<br>1  | 25.146<br>0.9900 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | –<br>–       | T101X HAS 2 BORES, OTHER BORE =24.654 mm (1.0100").                                                                      |
| *T102                    |                       | 1<br>1  | 25.654<br>1.0100 | 50.800<br>2.0000      | 16.916<br>0.6660 | 0.8<br>0.03              | –<br>–       | T102 HAS EXTENDED RETAINER, RETAINER "C" DIMENSION - 20.384 mm (.8025"). EXTENSION INSIDE DIAMETER = 35.052 mm (1.3800") |
| T104                     | T104W                 | 1<br>1  | 26.289<br>1.0350 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.13<br>0.29 |                                                                                                                          |
| *T105                    |                       | 1<br>1  | 25.654<br>1.0100 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | –<br>–       | T105 HAS 2 BORES, OTHER BORE = 27.299 mm (1.0720").                                                                      |
| T107                     | T107W                 | 1<br>1  | 27.299<br>1.0720 | 50.800<br>2.0000      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.12<br>0.26 |                                                                                                                          |
| T110                     | T110W                 | 1<br>1  | 28.829<br>1.1350 | 53.188<br>2.0940      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.14<br>0.31 |                                                                                                                          |
| T113                     | T113W                 | 1<br>1  | 28.829<br>1.1350 | 55.562<br>2.1875      | 15.875<br>0.6250 | 0.8<br>0.03              | 0.15<br>0.33 |                                                                                                                          |

\* See remarks column.



# ROLLER BEARINGS

## TAPERED ROLLER THRUST BEARINGS

TYPE TTSP – *continued*

B

| Bearing Number           |                       | Fig No. | Bore<br>d<br>mm<br>in. | Outside Diameter<br>D<br>mm<br>in. | Width<br>T<br>mm<br>in. | Shaft Fillet Radius<br>R<br>mm<br>in. | Mass<br>kg<br>lbs. | Remarks                                                          |
|--------------------------|-----------------------|---------|------------------------|------------------------------------|-------------------------|---------------------------------------|--------------------|------------------------------------------------------------------|
| No Oil Holes In Retainer | Oil Holes In Retainer |         |                        |                                    |                         |                                       |                    |                                                                  |
| *T114                    | *T114W                |         |                        |                                    |                         |                                       |                    |                                                                  |
| *T114X                   |                       | 2<br>2  | 28.829<br>1.1350       | 50.800<br>2.0000                   | 15.875<br>0.6250        | 0.8<br>0.03                           | –<br>–             | T114X HAS 2 CAGES AND 2 BORES, OTHER BORE = 29.261 mm (1.1520"). |
| T119                     | T119W                 | 1<br>1  | 30.416<br>1.1975       | 55.562<br>2.1875                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.15<br>0.33       |                                                                  |
| T120                     |                       | 2<br>2  | 30.416<br>1.1975       | 54.745<br>2.1553                   | 11.430<br>0.4500        | 0.8<br>0.03                           | 0.11<br>0.24       |                                                                  |
| T121                     |                       | 1<br>1  | 30.716<br>1.2093       | 55.562<br>2.1875                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.16<br>0.35       |                                                                  |
| T126                     | T126W                 | 1<br>1  | 32.004<br>1.2600       | 55.562<br>2.1875                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.14<br>0.31       |                                                                  |
| *T126A                   | T126AW                | 1<br>1  | 32.004<br>1.2600       | 55.562<br>2.1875                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.14<br>0.31       | T126A - 2 CAGES                                                  |
| T139                     | T139W                 | 1<br>1  | 35.179<br>1.3850       | 58.738<br>2.3125                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.15<br>0.33       |                                                                  |
| *T139KP                  |                       | 1<br>1  | 35.179<br>1.3850       | 58.738<br>2.3125                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.15<br>0.33       | RACES ARE CADMIUM PLATED.                                        |
| T142                     | T142W                 | 1<br>1  | 35.179<br>1.3850       | 62.708<br>2.4688                   | 19.431<br>0.7650        | 0.8<br>0.03                           | 0.23<br>0.51       |                                                                  |
| T149                     | T149W                 | 1<br>1  | 38.303<br>1.5080       | 65.883<br>2.5838                   | 19.431<br>0.7650        | 0.8<br>0.03                           | 0.24<br>0.53       |                                                                  |
| T158                     |                       | 1<br>1  | 40.234<br>1.5840       | 65.883<br>2.5838                   | 19.431<br>0.7650        | 0.8<br>0.03                           | 0.23<br>0.51       |                                                                  |
| T199                     | T199W                 | 1<br>1  | 51.054<br>2.0100       | 74.612<br>2.9375                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.20<br>0.44       |                                                                  |
| T309                     | T309W                 | 1<br>1  | 78.583<br>3.0938       | 102.395<br>4.0313                  | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.29<br>0.64       |                                                                  |
| T387                     | T387W                 | 1<br>1  | 96.425<br>3.8750       | 127.000<br>5.0000                  | 17.463<br>0.7650        | 0.8<br>0.03                           | 0.50<br>1.10       |                                                                  |
| T484                     |                       | 1<br>1  | 123.012<br>4.8430      | 152.400<br>6.0000                  | 17.463<br>0.6875        | 0.8<br>0.03                           | 0.63<br>1.39       |                                                                  |
| T581                     |                       | 1<br>1  | 147.638<br>5.8125      | 177.800<br>7.0000                  | 17.463<br>0.6875        | 0.8<br>0.03                           | 0.89<br>1.96       |                                                                  |
| T1760                    |                       | 3<br>3  | 44.623<br>1.7568       | 76.200<br>3.0000                   | 10.922<br>0.4300        | 0.8<br>0.03                           | 0.18<br>0.4        |                                                                  |

\* See remarks column.

## TAPERED ROLLER THRUST BEARINGS

### TYPE TTC-TTCS

- The types TTC, TTCS and TTCL (not shown) thrust bearings consist of two tapered thrust races, rollers and an outside retainer and are cageless.
- The outside retainer holds the assembly together for shipping and installation.
- These thrust bearings are specifically designed for oscillating applications.
- These types are identical with the exception of the retainer construction.

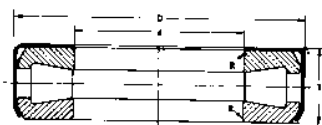


FIGURE 1

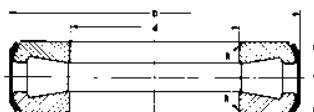


FIGURE 2

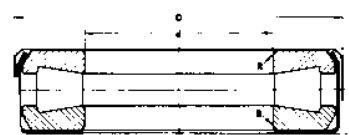


FIGURE 3

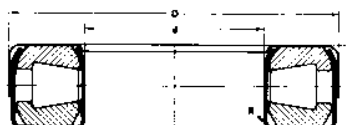


FIGURE 4

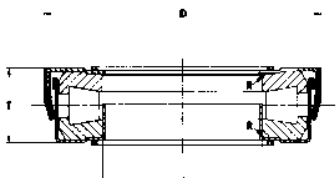


FIGURE 5

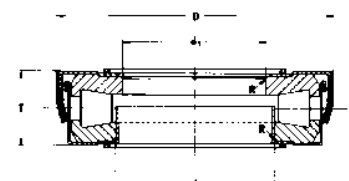


FIGURE 6

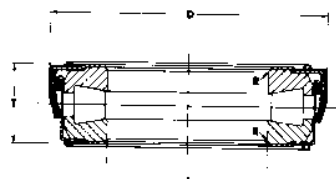


FIGURE 7

| Bearing Number           |                       | Fig No. | Bore<br>d<br>mm<br>in. | Outside Diameter<br>D<br>mm<br>in. | Width<br>T<br>mm<br>in. | Shaft Fillet Radius<br>R<br>mm<br>in. | Mass<br>kg<br>lbs. | Remarks                                              |
|--------------------------|-----------------------|---------|------------------------|------------------------------------|-------------------------|---------------------------------------|--------------------|------------------------------------------------------|
| No Oil Holes In Retainer | Oil Holes In Retainer |         |                        |                                    |                         |                                       |                    |                                                      |
| T127                     | T127W                 | 1<br>1  | 32.004<br>1.2600       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 0.8<br>0.03                           | 0.31<br>0.68       |                                                      |
| T128                     |                       | 2<br>2  | 32.004<br>1.2600       | 66.675<br>2.6250                   | 18.654<br>0.7344        | 0.8<br>0.03                           | 0.29<br>0.64       |                                                      |
| T130                     |                       | 1<br>1  | 27.102<br>1.0670       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 0.8<br>0.03                           | 0.34<br>0.75       |                                                      |
| T136                     |                       | 2<br>2  | 35.179<br>1.3850       | 66.675<br>2.6250                   | 18.654<br>0.7344        | 0.8<br>0.03                           | 0.28<br>0.62       |                                                      |
| T138                     | T138W                 | 1<br>1  | 35.179<br>1.3850       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 0.8<br>0.03                           | 0.30<br>0.66       |                                                      |
| *T138XS                  |                       | SPCL    | 35.179<br>1.3850       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 0.8<br>0.03                           | –<br>–             | T138XS HAS 2 BORES, OTHER BORE = 35.387 mm (1.3972") |
| T144                     | T144W                 | 1<br>1  | 36.754<br>1.4470       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 1.5<br>0.06                           | 0.29<br>0.64       |                                                      |
| *T144XA                  |                       | SPCL    | 36.754<br>1.4470       | 66.675<br>2.6250                   | 19.446<br>0.7656        | 1.5<br>0.06                           | –<br>–             | T144XA HAS 2 BORES, OTHER BORE = 37.137 mm (1.4621") |
| T151                     | T151W                 | 1<br>1  | 38.354<br>1.5100       | 72.619<br>2.8590                   | 21.433<br>0.8438        | 0.8<br>0.03                           | 0.37<br>0.82       |                                                      |
| T151X                    |                       | 1<br>1  | 38.354<br>1.5100       | 69.444<br>2.7340                   | 20.726<br>0.8160        | 0.8<br>0.03                           | 0.37<br>0.82       |                                                      |

\* See remarks column.



**TAPERED ROLLER THRUST BEARINGS**

TYPE TTC-TTCS – *continued*

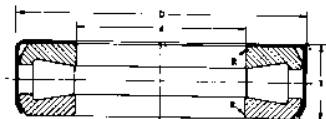


FIGURE 1



FIGURE 2

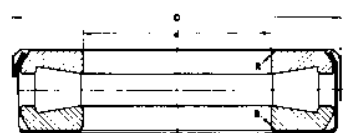


FIGURE 3

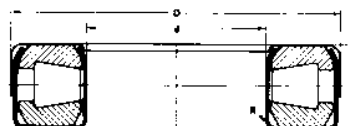


FIGURE 4

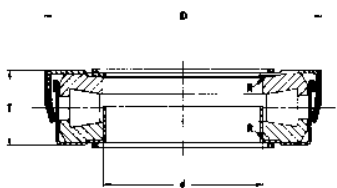


FIGURE 5

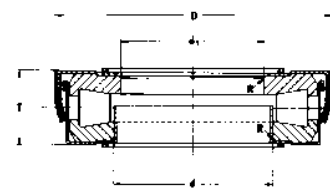


FIGURE 6

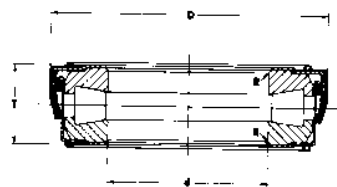


FIGURE 7

| Bearing Number           |                       | Fig No. | Bore             | Outside Diameter | Width            | Shaft Fillet Radius | Mass         | Remarks                                             |
|--------------------------|-----------------------|---------|------------------|------------------|------------------|---------------------|--------------|-----------------------------------------------------|
| No Oil Holes In Retainer | Oil Holes In Retainer |         | d                | D                | T                | R                   |              |                                                     |
|                          |                       | mm in.  |                  | mm in.           | mm in.           | mm in.              | kg lbs.      |                                                     |
| T152                     |                       | 2<br>2  | 38.354<br>1.5100 | 72.619<br>2.8590 | 20.638<br>0.8125 | 0.8<br>0.03         | 0.35<br>0.77 |                                                     |
| T157                     | T157W                 | 1<br>1  | 39.954<br>1.5730 | 72.619<br>2.8590 | 21.433<br>0.8438 | 0.8<br>0.03         | 0.37<br>0.82 |                                                     |
| T163                     | T163W                 | 1<br>1  | 41.529<br>1.6350 | 72.619<br>2.8590 | 21.433<br>0.8438 | 0.8<br>0.03         | 0.35<br>0.77 |                                                     |
| T163X                    | T163XW                | 1<br>1  | 41.529<br>1.6350 | 72.619<br>2.8590 | 21.433<br>0.8438 | 2.0<br>0.80         | 0.35<br>0.77 |                                                     |
| T169                     | T169W                 | 1<br>1  | 43.104<br>1.6970 | 82.956<br>3.2660 | 23.812<br>0.9375 | 0.8<br>0.03         | 0.55<br>1.21 |                                                     |
| T176                     | T176W                 | 1<br>1  | 44.704<br>1.7600 | 82.956<br>3.2660 | 23.812<br>0.9375 | 0.8<br>0.03         | 0.54<br>1.19 |                                                     |
| T177                     |                       | 1<br>1  | 45.000<br>1.7717 | 73.000<br>2.8740 | 20.000<br>0.7874 | 0.8<br>0.03         | 0.32<br>0.71 |                                                     |
| T177A                    |                       | 1<br>1  | 45.484<br>1.7907 | 73.000<br>2.8740 | 20.000<br>0.7874 | 0.8<br>0.03         | 0.33<br>0.73 |                                                     |
| *T177XA                  |                       | SPCL    | 45.000<br>1.7717 | 73.127<br>2.8790 | 20.000<br>0.7874 | 0.8<br>0.03         | –<br>–       | T177XA HAS 2 BORES, OTHER BORE = 45.484mm (1.7907") |
| T177S                    |                       | 5<br>5  | 45.000<br>1.7717 | 74.500<br>2.9331 | 20.221<br>0.7961 | 0.8<br>0.03         | 0.35<br>0.77 |                                                     |
| T178                     |                       | 1<br>1  | 40.401<br>1.5906 | 73.000<br>2.8740 | 19.000<br>0.7480 | 0.8<br>0.03         | –<br>–       |                                                     |
| T182                     | T182W                 | 1<br>1  | 46.279<br>1.8220 | 82.956<br>3.2660 | 23.812<br>0.9375 | 0.8<br>0.03         | 0.52<br>1.15 |                                                     |
| T188                     | T188W                 | 1<br>1  | 47.879<br>1.8850 | 82.956<br>3.2660 | 23.812<br>0.9375 | 0.8<br>0.03         | 0.52<br>1.15 |                                                     |
| T188X                    |                       | 4<br>4  | 47.879<br>1.8850 | 83.774<br>3.2970 | 24.130<br>0.9500 | 2.3<br>0.09         | –<br>–       |                                                     |
| T189                     | T189W                 | 2<br>2  | 47.879<br>1.8850 | 82.956<br>3.2660 | 23.020<br>0.9063 | 0.8<br>0.03         | 0.50<br>1.10 |                                                     |

\* See remarks column.

| Bearing Number           |                       | Fig No.      | Bore<br>d<br>mm<br>in. | Outside Diameter<br>D<br>mm<br>in. | Width<br>T<br>mm<br>in. | Shaft Fillet Radius<br>R<br>mm<br>in. | Mass<br>kg<br>lbs. | Remarks      |
|--------------------------|-----------------------|--------------|------------------------|------------------------------------|-------------------------|---------------------------------------|--------------------|--------------|
| No Oil Holes In Retainer | Oil Holes In Retainer |              |                        |                                    |                         |                                       |                    |              |
|                          |                       |              |                        |                                    |                         |                                       |                    |              |
| T193                     | T193W                 | 2<br>2       | 49.454<br>1.9470       | 93.269<br>3.6720                   | 26.187<br>1.0310        | 0.8<br>0.03                           | 0.80<br>1.76       |              |
| T194                     | T194W                 | 1<br>1       | 49.454<br>1.9470       | 93.269<br>3.6720                   | 26.975<br>1.0620        | 0.8<br>0.03                           | 0.81<br>1.79       |              |
| T201                     | T201W                 | 2<br>2       | 51.054<br>2.0100       | 93.269<br>3.6720                   | 26.187<br>1.0310        | 3.3<br>0.13                           | 0.77<br>1.70       |              |
| T202                     | T202W                 | 1<br>1       | 51.054<br>2.0100       | 93.269<br>3.6720                   | 26.975<br>1.0620        | 3.3<br>0.13                           | 0.80<br>1.76       |              |
| T208                     | T208W                 | 1<br>1       | 52.629<br>2.0720       | 93.269<br>3.6720                   | 26.975<br>1.0620        | 0.8<br>0.03                           | 0.79<br>1.74       |              |
| T209                     | T209W                 | 2<br>2       | 52.629<br>2.0720       | 93.269<br>3.6720                   | 26.187<br>1.0310        | 0.8<br>0.03                           | 0.75<br>1.65       |              |
| T251                     | T251W                 | 1<br>1       | 63.754<br>2.5100       | 111.125<br>4.3750                  | 26.988<br>1.0625        | 0.8<br>0.03                           | 1.07<br>2.36       |              |
| T252                     | T252W                 | 2<br>2       | 63.754<br>2.5100       | 111.125<br>4.3750                  | 25.796<br>1.0156        | 0.8<br>0.03                           | 1.07<br>2.23       |              |
| T301                     | T301W                 | 2<br>2       | 76.454<br>3.0100       | 133.350<br>5.2500                  | 33.338<br>1.3125        | 2.3<br>0.09                           | 1.87<br>4.12       |              |
|                          | T301X                 | 2<br>2       | 76.454<br>3.0100       | 133.350<br>5.2500                  | 33.338<br>1.3125        | 2.3<br>0.09                           | -<br>-             |              |
| T302                     | T302W                 | 1<br>1       | 76.454<br>3.0100       | 133.350<br>5.2500                  | 34.925<br>1.3750        | 2.3<br>0.09                           | 1.99<br>4.39       |              |
| T350                     |                       | 2<br>2       | 88.900<br>3.5000       | 133.350<br>5.2500                  | 33.335<br>1.3124        | 2.8<br>0.11                           | 1.41<br>3.11       |              |
| T402                     | T402W                 | 2<br>2       | 102.108<br>4.0200      | 179.619<br>7.0716                  | 44.450<br>1.7500        | 1.5<br>0.06                           | 4.84<br>10.67      |              |
| T600                     | T600W                 | 1<br>1       | 152.400<br>8.0000      | 241.300<br>9.5000                  | 76.200<br>3.0000        | 3.3<br>0.13                           | 14.10<br>31.09     |              |
| T1260                    | T1260W                | 1<br>1       | 32.004<br>1.2600       | 55.562<br>2.1875                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.17<br>0.37       |              |
| *T1380                   |                       | SPCL<br>SPCL | 35.179<br>1.3850       | 59.400<br>2.3386                   | 15.875<br>0.6250        | 0.8<br>0.03                           | 0.35<br>0.77       | 2 PIECE SEAL |
| T1921                    |                       | 1<br>1       | 46.279<br>1.8220       | 80.010<br>3.1500                   | 15.977<br>0.6290        | 0.8<br>0.03                           | 0.34<br>0.75       |              |
| T4020                    |                       | 2<br>2       | 102.108<br>4.0200      | 179.619<br>7.0716                  | 31.750<br>1.2500        | 1.5<br>0.06                           | 3.7<br>8.16        |              |

\* See remarks column.







## **ROLLER BEARINGS**



### **NOTES**

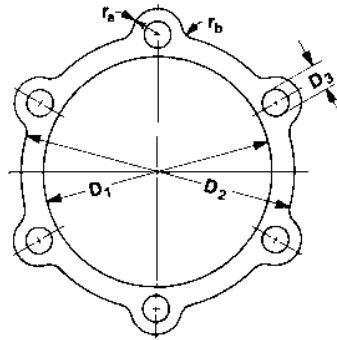
**B**



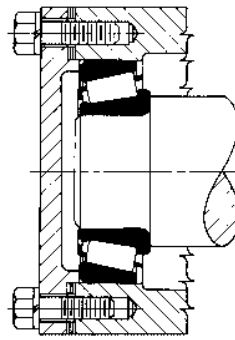
# AUXILIARY PARTS

## CUP SHIMS

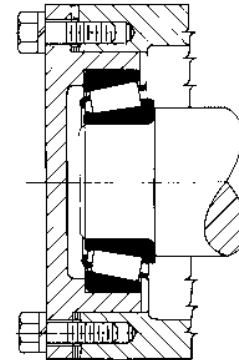
### STANDARD METAL SHIMS FOR CUP ADJUSTMENT BEARINGS



Shims 0.13 mm (0.005 in.), 0.18 mm (0.007 in.) and 0.51 mm (0.020 in.) thick.



Without carrier



With carrier  
Carrier section should be equal to average cup wall section.

Suggested shim sets consist of three 0.13 mm (0.005 in.), three 0.18 mm (0.007 in.), and one 0.51 mm (0.020 in.) thick shims. When ordering, specify the exact quantity for each part number. Shims shown in this table are made from aluminum, brass, or steel shim stock.

|    |      |    |                                                |
|----|------|----|------------------------------------------------|
|    |      |    | Cup Shims                                      |
|    |      |    | part number identifies the following:          |
|    | Shim |    | size                                           |
|    | K2   |    | thickness(inches)                              |
|    |      |    | example                                        |
| K2 | 06   | 05 | covers number 6 shim 0.13 mm (0.005 in.) thick |
| K2 | 06   | 07 | covers number 6 shim 0.18 mm (0.007 in.) thick |
| K2 | 06   | 20 | covers number 6 shim 0.51 mm (0.020 in.) thick |

DIMENSIONS ARE IN MILLIMETERS / INCHES

| Shim Part Numbers      |                        |                        | Cap Screws |      | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | r <sub>a</sub> | r <sub>b</sub> |
|------------------------|------------------------|------------------------|------------|------|----------------|----------------|----------------|----------------|----------------|
| 0.13<br>0.005<br>Thick | 0.18<br>0.007<br>Thick | 0.51<br>0.020<br>Thick | No.        | Size |                |                |                |                |                |
| K20605                 | K20607                 | K20620                 | 4          | 6.4  | 35.8           | 47.8           | 7.1            | 6.4            | 3.0            |
|                        |                        |                        |            | 0.25 | 1.41           | 1.88           | 0.28           | 0.25           | 0.12           |
| K20705                 | K20707                 | K20720                 | 4          | 6.4  | 45.2           | 57.2           | 7.1            | 6.4            | 3.0            |
|                        |                        |                        |            | 0.25 | 1.78           | 2.25           | 0.28           | 0.25           | 0.12           |
| K20805                 | K20807                 | K20820                 | 4          | 9.7  | 51.6           | 69.8           | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 2.03           | 2.75           | 0.41           | 0.38           | 0.19           |
| K20905                 | K20907                 | K20920                 | 4          | 9.7  | 59.4           | 76.2           | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 2.34           | 3.00           | 0.41           | 0.38           | 0.19           |
| K21005                 | K21007                 | K21020                 | 4          | 9.7  | 65.8           | 82.6           | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 2.59           | 3.25           | 0.41           | 0.38           | 0.19           |
| K21105                 | K21107                 | K21120                 | 4          | 9.7  | 70.6           | 88.9           | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 2.78           | 3.50           | 0.41           | 0.38           | 0.19           |
| K21205                 | K21207                 | K21220                 | 4          | 9.7  | 77.0           | 95.2           | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 3.03           | 3.75           | 0.41           | 0.38           | 0.19           |
| K21405                 | K21407                 | K21420                 | 4          | 9.7  | 89.7           | 108.0          | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 3.53           | 4.25           | 0.41           | 0.38           | 0.19           |

DIMENSIONS ARE IN MILLIMETERS / INCHES

| Shim Part Numbers      |                        |                        | Cap Screws |      | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | r <sub>a</sub> | r <sub>b</sub> |
|------------------------|------------------------|------------------------|------------|------|----------------|----------------|----------------|----------------|----------------|
| 0.13<br>0.005<br>Thick | 0.18<br>0.007<br>Thick | 0.51<br>0.020<br>Thick | No.        | Size |                |                |                |                |                |
| K21505                 | K21507                 | K21520                 | 4          | 9.7  | 96.0           | 114.3          | 10.4           | 9.7            | 4.8            |
|                        |                        |                        |            | 0.38 | 3.78           | 4.50           | 0.41           | 0.38           | 0.19           |
| K21605                 | K21607                 | K21620                 | 4          | 12.7 | 102.4          | 127.0          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 4.03           | 5.00           | 0.53           | 0.50           | 0.25           |
| K21705                 | K21707                 | K21720                 | 4          | 12.7 | 108.7          | 133.4          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 4.28           | 5.25           | 0.53           | 0.50           | 0.25           |
| K21805                 | K21807                 | K21820                 | 4          | 12.7 | 115.1          | 139.7          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 4.53           | 5.50           | 0.53           | 0.50           | 0.25           |
| K21905                 | K21907                 | K21920                 | 6          | 12.7 | 121.4          | 146.0          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 4.78           | 5.75           | 0.53           | 0.50           | 0.25           |
| K22005                 | K22007                 | K22020                 | 6          | 12.7 | 127.8          | 152.4          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 5.03           | 6.00           | 0.53           | 0.50           | 0.25           |
| K22205                 | K22207                 | K22220                 | 6          | 12.7 | 140.5          | 165.1          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 5.53           | 6.50           | 0.53           | 0.50           | 0.25           |
| K22405                 | K22407                 | K22420                 | 6          | 12.7 | 153.2          | 177.8          | 13.5           | 12.7           | 6.4            |
|                        |                        |                        |            | 0.50 | 6.03           | 7.00           | 0.53           | 0.50           | 0.25           |

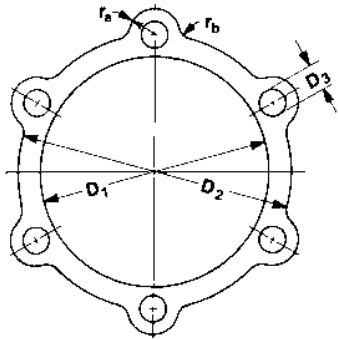
THESE PARTS HAVE BEEN DESIGNED AND DEVELOPED FOR USE WITH TIMKEN BEARINGS ONLY.

# AUXILIARY PARTS

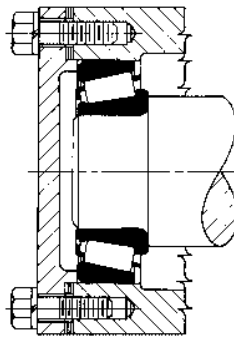
## CUP SHIMS

### STANDARD METAL SHIMS FOR CUP ADJUSTMENT BEARINGS

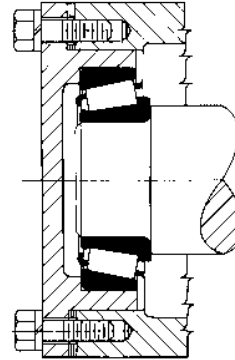
B



Shims 0.13 mm (0.005 in.), 0.18 mm (0.007 in.) and 0.51 mm (0.020 in.) thick.



Without carrier



With carrier  
Carrier section should be equal to average cup wall section.

Suggested shim sets consist of three 0.13 mm (0.005 in.), three 0.18 mm (0.007 in.), and one 0.51 mm (0.020 in.) thick shims. When ordering, specify the exact quantity for each part number. Shims shown in this table are made from aluminum, brass, or steel shim stock.

|    |      |    |                                                |
|----|------|----|------------------------------------------------|
|    | Shim |    | Cup Shims                                      |
|    | K2   |    | part number identifies the following:          |
|    |      |    | size thickness(inches)                         |
|    |      |    | 00 00                                          |
|    |      |    | example                                        |
| K2 | 06   | 05 | covers number 6 shim 0.13 mm (0.005 in.) thick |
| K2 | 06   | 07 | covers number 6 shim 0.18 mm (0.007 in.) thick |
| K2 | 06   | 20 | covers number 6 shim 0.51 mm (0.020 in.) thick |

DIMENSIONS ARE IN MILLIMETERS / INCHES

| Shim Part Numbers      |                        |                        | Cap Screws |      | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | r <sub>a</sub> | r <sub>b</sub> |
|------------------------|------------------------|------------------------|------------|------|----------------|----------------|----------------|----------------|----------------|
| 0.13<br>0.005<br>Thick | 0.18<br>0.007<br>Thick | 0.51<br>0.020<br>Thick | No.        | Size |                |                |                |                |                |
| K22505                 | K22507                 | K22520                 | 6          | 15.7 | 159.5<br>0.62  | 190.5<br>6.28  | 16.8<br>7.50   | 15.7<br>0.66   | 7.9<br>0.31    |
| K22605                 | K22607                 | K22620                 | 6          | 15.7 | 165.9<br>0.62  | 196.8<br>6.53  | 16.8<br>7.75   | 15.7<br>0.66   | 7.9<br>0.31    |
| K22705                 | K22707                 | K22720                 | 6          | 15.7 | 172.2<br>0.62  | 203.2<br>6.78  | 16.8<br>8.00   | 15.7<br>0.66   | 7.9<br>0.31    |
| K22905                 | K22907                 | K22920                 | 6          | 15.7 | 184.9<br>0.62  | 215.9<br>7.28  | 16.8<br>8.50   | 15.7<br>0.66   | 7.9<br>0.31    |
| K23005                 | K23007                 | K23020                 | 6          | 15.7 | 191.3<br>0.62  | 222.2<br>7.53  | 16.8<br>8.75   | 15.7<br>0.66   | 7.9<br>0.31    |
| K23205                 | K23207                 | K23220                 | 6          | 15.7 | 204.0<br>0.62  | 235.0<br>8.03  | 16.8<br>9.25   | 15.7<br>0.66   | 7.9<br>0.31    |
| K23405                 | K23407                 | K23420                 | 6          | 15.7 | 216.7<br>0.62  | 247.6<br>8.53  | 16.8<br>9.75   | 15.7<br>0.66   | 7.9<br>0.31    |
| K23605                 | K23607                 | K23620                 | 6          | 15.7 | 229.4<br>0.62  | 260.4<br>9.03  | 16.8<br>10.25  | 15.7<br>0.66   | 7.9<br>0.31    |

DIMENSIONS ARE IN MILLIMETERS / INCHES

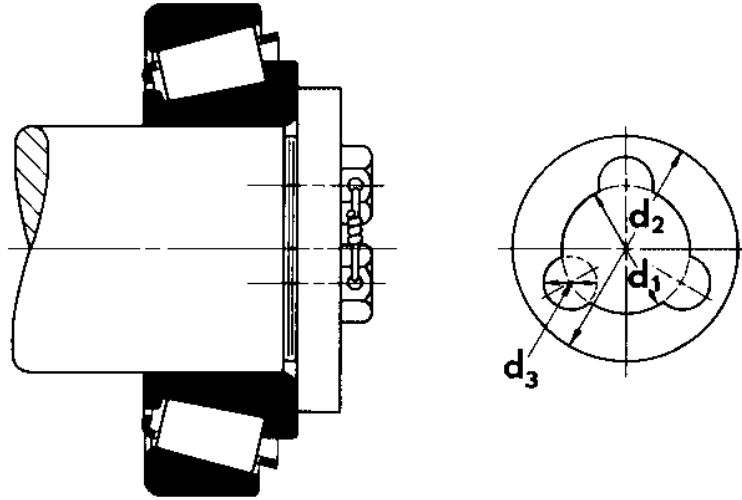
| Shim Part Numbers      |                        |                        | Cap Screws |      | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | r <sub>a</sub> | r <sub>b</sub> |
|------------------------|------------------------|------------------------|------------|------|----------------|----------------|----------------|----------------|----------------|
| 0.13<br>0.005<br>Thick | 0.18<br>0.007<br>Thick | 0.51<br>0.020<br>Thick | No.        | Size |                |                |                |                |                |
| K23805                 | K23807                 | K23820                 | 8          | 15.7 | 242.1<br>0.62  | 273.0<br>9.53  | 16.8<br>10.75  | 15.7<br>0.66   | 7.9<br>0.31    |
| K24005                 | K24007                 | K24020                 | 8          | 19.0 | 254.8<br>0.75  | 292.1<br>10.03 | 19.8<br>11.50  | 19.0<br>0.78   | 9.7<br>0.38    |
| K24105                 | K24107                 | K24120                 | 8          | 19.0 | 267.5<br>0.75  | 304.8<br>10.53 | 19.8<br>12.00  | 19.0<br>0.78   | 9.7<br>0.38    |
| K24205                 | K24207                 | K24220                 | 8          | 19.0 | 296.2<br>0.75  | 333.2<br>11.66 | 19.8<br>13.12  | 19.0<br>0.78   | 9.7<br>0.38    |
| K24405                 | K24407                 | K24420                 | 8          | 19.0 | 318.3<br>0.75  | 355.6<br>12.53 | 19.8<br>14.00  | 19.0<br>0.78   | 9.7<br>0.38    |
| K24605                 | K24607                 | K24620                 | 8          | 22.4 | 343.7<br>0.88  | 387.4<br>13.53 | 23.9<br>15.25  | 22.4<br>0.94   | 11.2<br>0.44   |
| K24805                 | K24807                 | K24820                 | 8          | 22.4 | 369.1<br>0.88  | 412.8<br>14.53 | 23.9<br>16.25  | 22.4<br>0.94   | 11.2<br>0.44   |
| K25005                 | K25007                 | K25020                 | 8          | 25.4 | 394.5<br>1.00  | 444.5<br>15.53 | 26.9<br>17.50  | 25.4<br>1.06   | 12.7<br>0.50   |
| K25205                 | K25207                 | K25220                 | 8          | 25.4 | 419.9<br>1.00  | 469.9<br>18.50 | 26.9<br>1.06   | 25.4<br>1.00   | 12.7<br>0.50   |

THESE PARTS HAVE BEEN DESIGNED AND DEVELOPED FOR USE WITH TIMKEN BEARINGS ONLY.

# AUXILIARY PARTS

## CONE SHIMS

### STANDARD METAL SHIMS FOR CONE ADJUSTED BEARINGS



Suggested shim sets consist of three 0.13 mm (0.005 in.), three 0.18 mm (0.007 in.), and one 0.51 mm (0.020 in.) thick shims. When ordering, specify the exact quantity for each part number.

Shims shown in this table are made from aluminum, brass, or steel shim stock.

| Shims       |               | Shaft Size    | Cap Screws |              | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | Shims       |               | Shaft Size    | Cap Screws |              | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> |
|-------------|---------------|---------------|------------|--------------|----------------|----------------|----------------|-------------|---------------|---------------|------------|--------------|----------------|----------------|----------------|
| Part Number | Thickness     |               | No.        | Size         |                |                |                | Part Number | Thickness     |               | No.        | Size         |                |                |                |
| T50605      | 0.13<br>0.005 | 63.5<br>2.50  | 3          | 12.7<br>0.50 | 35.1<br>1.38   | 60.5<br>2.38   | 14.2<br>0.56   | T50614      | 0.13<br>0.005 | 127.0<br>5.00 | 4          | 19.0<br>0.75 | 88.9<br>3.50   | 124.0<br>4.88  | 20.6<br>0.81   |
| T50606      | 0.18<br>0.007 |               |            |              |                |                |                | T50615      | 0.18<br>0.007 |               |            |              |                |                |                |
| T50607      | 0.51<br>0.020 |               |            |              |                |                |                | T50616      | 0.51<br>0.020 |               |            |              |                |                |                |
| T50608      | 0.13<br>0.005 | 76.2<br>3.00  | 3          | 12.7<br>0.50 | 44.4<br>1.75   | 73.2<br>2.88   | 14.2<br>0.56   | T50617      | 0.13<br>0.005 | 139.7<br>5.50 | 4          | 19.0<br>0.75 | 88.9<br>3.50   | 136.7<br>5.38  | 20.6<br>0.81   |
| T50609      | 0.18<br>0.007 |               |            |              |                |                |                | T50618      | 0.18<br>0.007 |               |            |              |                |                |                |
| T50610      | 0.51<br>0.020 |               |            |              |                |                |                | T50619      | 0.51<br>0.020 |               |            |              |                |                |                |
| T50611      | 0.13<br>0.005 | 88.9<br>3.50  | 3          | 12.7<br>0.50 | 57.2<br>2.25   | 85.9<br>3.38   | 14.2<br>0.56   | T50620      | 0.13<br>0.005 | 152.4<br>6.00 | 6          | 19.0<br>0.75 | 101.6<br>4.00  | 149.4<br>5.88  | 20.6<br>0.81   |
| T50612      | 0.18<br>0.007 |               |            |              |                |                |                | T50621      | 0.18<br>0.007 |               |            |              |                |                |                |
| T50613      | 0.51<br>0.020 |               |            |              |                |                |                | T50622      | 0.51<br>0.020 |               |            |              |                |                |                |
| T45882      | 0.13<br>0.005 | 108.0<br>4.25 | 3          | 15.7<br>0.62 | 76.2<br>3.00   | 103.1<br>4.06  | 17.5<br>0.69   | T50623      | 0.13<br>0.005 | 177.8<br>7.00 | 6          | 25.4<br>1.00 | 127.0<br>5.00  | 174.8<br>6.88  | 26.9<br>1.06   |
| T50633      | 0.18<br>0.007 |               |            |              |                |                |                | T50624      | 0.18<br>0.007 |               |            |              |                |                |                |
| T45884      | 0.51<br>0.020 |               |            |              |                |                |                | T50625      | 0.51<br>0.020 |               |            |              |                |                |                |
| T45885      | 0.13<br>0.005 | 120.6<br>4.75 | 3          | 15.7<br>0.62 | 88.9<br>3.50   | 117.3<br>4.62  | 17.5<br>0.69   | T50626      | 0.13<br>0.005 | 203.2<br>8.00 | 6          | 31.8<br>1.25 | 152.4<br>6.00  | 200.2<br>7.88  | 33.3<br>1.31   |
| T50634      | 0.18<br>0.007 |               |            |              |                |                |                | T50627      | 0.18<br>0.007 |               |            |              |                |                |                |
| T45887      | 0.51<br>0.020 |               |            |              |                |                |                | T50628      | 0.51<br>0.020 |               |            |              |                |                |                |

THESE PARTS HAVE BEEN DESIGNED AND DEVELOPED FOR USE WITH TIMKEN BEARINGS ONLY.

### LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS

#### STANDARD LOCKNUTS, LOCKWASHERS AND TONGUED WASHER ASSEMBLIES

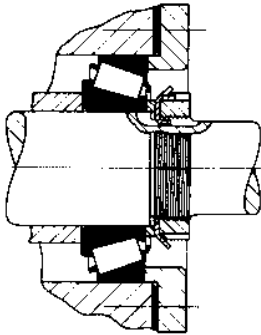


Figure 1

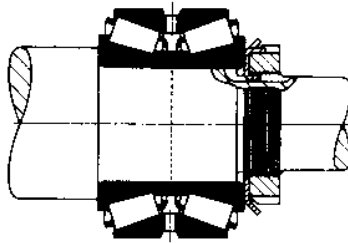


Figure 2

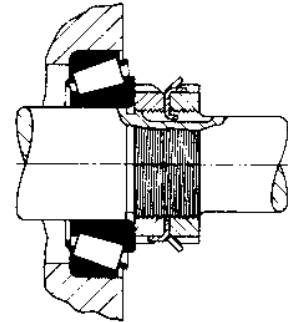


Figure 3

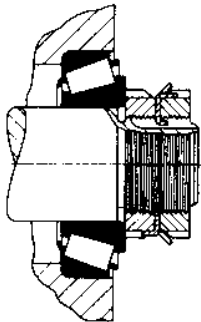


Figure 4

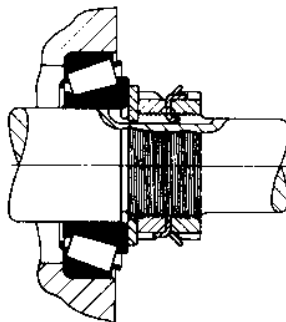


Figure 5

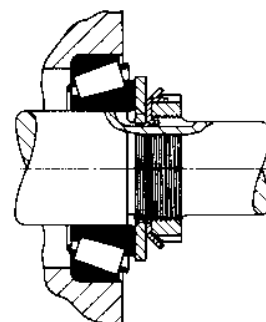


Figure 6

The designs shown in figures 1 to 6 show various methods of using standard locknuts, lockwashers, and tongued washers. A single locknut and lockwasher can be used to clamp the cone against a sleeve, shown in figure 1, or directly against a shaft shoulder. A narrow spacer is applied between the front face of the cone and the lockwasher so that the lockwasher will clear the bearing cage by a minimum of 3 mm (0.12 in.). The spacer outside diameter should be made a minimum of 6 mm (0.24 in.) smaller than the cage inside diameter, but must still provide the suggested cone backing diameter. Figure 2 shows another clamped design using a single locknut and lockwasher with a two-row bearing of either type TD0 with cone spacer or type TNA. Since no cage clearance problem is present, the narrow spacer shown in figure 1 is unnecessary.

Figures 3, 4, and 5 indicate an adjustable bearing arrangement using two locknuts and a lockwasher. These may be used with either single or two-row bearing of the types permitting a cone adjusted arrangement. The design in figure 3 allows the maximum shaft extension diameter that can be used with a shaft thread

outside diameter, which will be less than the cone bore. Figure 4 shows an alternate design with smaller thread diameter and corresponding smaller locknuts and lockwasher. The locknut outside diameter, minus 2 times "r", must not be less than the suggested cone backing diameter. Figure 5 indicates the use of a tongued washer located between the inner locknut and cone. This is intended for applications where the cones are applied with loose fits on hardened stationary shafts as found in many automotive applications. The hardened tongued washers are not sold by The Timken Company.

When space does not permit the use of two locknuts and a lockwasher in an adjustable arrangement, and a single locknut and a lockwasher is used, then a tongued washer must be placed between the cone and lockwasher as illustrated in figure 6. This is necessary to provide adequate backing for the cone, in most cases, and to prevent damage to the lockwasher if the cone should creep on the shaft. The tongued washers are available from The Timken Company.

# AUXILIARY PARTS

## LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS - METRIC

### STANDARD LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS FOR TAPERED ROLLER BEARINGS

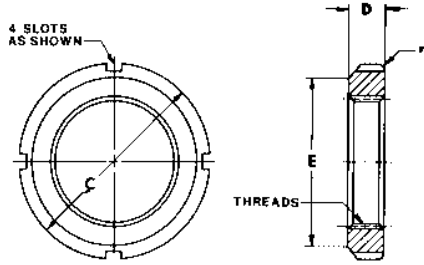


Figure 1 - LOCKNUTS

Threads are ISO 965/1, Class 5H

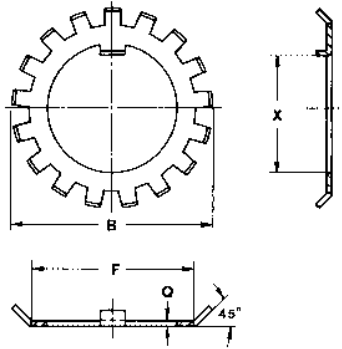


Figure 2 - LOCKWASHERS

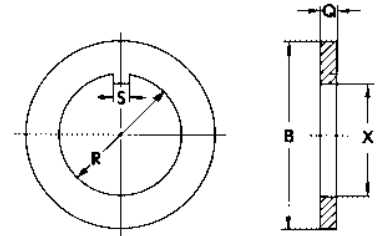


Figure 3 - TONGUED WASHERS

DIMENSIONS ARE IN MILLIMETERS

| ABMA Locknut Number | Locknut Dimensions              |               |                       |                |                            |      | Lockwasher Dimensions  |                                  |                    |                |                 | Tongued Washer Dimensions |         |         |                       |                |        |         |
|---------------------|---------------------------------|---------------|-----------------------|----------------|----------------------------|------|------------------------|----------------------------------|--------------------|----------------|-----------------|---------------------------|---------|---------|-----------------------|----------------|--------|---------|
|                     | Threads                         |               | Outside Diameter<br>C | Thickness<br>D | Face Outside Diameter<br>E | r    | ABMA Lockwasher Number | Maximum Diameter Over Tangs<br>B | Face Diameter<br>F | Thickness<br>Q | Number of Tangs | Tongued Washer Number     | Bore R  |         | Outside Diameter<br>B | Thickness<br>Q | Key    |         |
|                     | Minimum Value of Major Diameter | Thread Series |                       |                |                            |      |                        |                                  |                    |                |                 |                           | Min.    | Max.    |                       |                | S Max. | X Min.  |
| KMH2                | 15.000                          | M15X1         | 25.000                | 8.000          | 21.000                     | 1.17 | MBB2                   | 28.000                           | 21.000             | 1.41           | 11              | MW2                       | 15.095  | 15.205  | 22.000                | 3.25           | 4.0    | 12.195  |
| KMH3                | 17.000                          | M17X1         | 28.000                | 8.000          | 24.000                     | 1.17 | MBB3                   | 32.000                           | 24.000             | 1.41           | 11              | MW3                       | 17.095  | 17.205  | 24.000                | 3.25           | 4.0    | 14.195  |
| KMH4                | 20.000                          | M20X1         | 32.000                | 9.000          | 26.000                     | 1.17 | MBB4                   | 36.000                           | 26.000             | 1.41           | 11              | MW4                       | 20.110  | 20.240  | 29.000                | 3.25           | 4.0    | 17.295  |
| KMH4.4              | 22.000                          | M22X1         | 34.000                | 9.000          | 28.000                     | 1.17 | MBB4.4                 | 38.000                           | 28.000             | 1.41           | 11              | MW4.4                     | 22.110  | 22.240  | 31.000                | 3.25           | 4.0    | 19.710  |
| KMH5                | 25.000                          | M25X1.5       | 38.000                | 10.000         | 32.000                     | 1.17 | MBB5                   | 42.000                           | 32.000             | 1.41           | 13              | MW5                       | 25.110  | 25.240  | 40.000                | 3.25           | 5.0    | 21.910  |
| KMH5.6              | 28.000                          | M28X1.5       | 42.000                | 10.000         | 36.000                     | 1.17 | MBB5.6                 | 46.000                           | 36.000             | 1.41           | 13              | MW5.6                     | 28.110  | 28.240  | 40.000                | 3.25           | 5.0    | 24.910  |
| KMH6                | 30.000                          | M30X1.5       | 45.000                | 10.000         | 38.000                     | 1.17 | MBB6                   | 49.000                           | 38.000             | 1.41           | 13              | MW6                       | 30.110  | 30.240  | 45.000                | 3.25           | 5.0    | 26.910  |
| KMH6.4              | 32.000                          | M32X1.5       | 48.000                | 11.000         | 40.000                     | 1.59 | MBB6.4                 | 52.000                           | 40.000             | 1.41           | 13              | MW6.4                     | 32.120  | 32.280  | 50.000                | 3.25           | 5.0    | 29.010  |
| KMH7                | 35.000                          | M35X1.5       | 52.000                | 11.000         | 44.000                     | 1.59 | MBB7                   | 57.000                           | 44.000             | 1.41           | 13              | MW7                       | 35.120  | 35.280  | 52.000                | 3.25           | 6.0    | 31.820  |
| KMH8                | 40.000                          | M40X1.5       | 58.000                | 11.000         | 50.000                     | 1.59 | MBB8                   | 62.000                           | 50.000             | 1.78           | 13              | MW8                       | 40.120  | 40.280  | 57.000                | 4.20           | 6.0    | 36.520  |
| KMH9                | 45.000                          | M45X1.5       | 65.000                | 12.000         | 56.000                     | 1.59 | MBB9                   | 69.000                           | 56.000             | 1.78           | 13              | MW9                       | 45.130  | 45.290  | 68.000                | 4.20           | 6.0    | 41.530  |
| KMH10               | 50.000                          | M50X1.5       | 70.000                | 13.000         | 61.000                     | 1.59 | MBB10                  | 74.000                           | 61.000             | 1.78           | 13              | MW10                      | 50.130  | 50.290  | 76.000                | 4.20           | 6.0    | 46.530  |
| KMH11               | 55.000                          | M55X2         | 75.000                | 13.000         | 67.000                     | 1.59 | MBB11                  | 81.000                           | 67.000             | 1.78           | 17              | MW11                      | 55.140  | 55.330  | 79.000                | 4.20           | 8.0    | 51.140  |
| KMH12               | 60.000                          | M60X2         | 80.000                | 14.000         | 73.000                     | 1.59 | MBB12                  | 86.000                           | 73.000             | 1.78           | 17              | MW12                      | 60.140  | 60.330  | 88.000                | 4.70           | 8.0    | 55.940  |
| KMH13               | 65.000                          | M65X2         | 85.000                | 14.000         | 79.000                     | 2.38 | MBB13                  | 92.000                           | 79.000             | 1.78           | 17              | MW13                      | 65.140  | 65.330  | 90.000                | 4.70           | 8.0    | 60.940  |
| KMH14               | 70.000                          | M70X2         | 92.000                | 14.000         | 85.000                     | 2.38 | MBB14                  | 98.000                           | 85.000             | 1.78           | 17              | MW14                      | 70.150  | 70.340  | 103.000               | 4.70           | 8.0    | 65.950  |
| KMH15               | 75.000                          | M75X2         | 98.000                | 15.000         | 90.000                     | 2.38 | MBB15                  | 104.000                          | 90.000             | 2.24           | 17              | MW15                      | 75.150  | 75.340  | 103.000               | 5.70           | 8.0    | 70.550  |
| KM16                | 80.000                          | M80X2         | 105.000               | 15.000         | 95.000                     | 2.38 | MBB16                  | 112.000                          | 95.000             | 2.24           | 17              | MW16                      | 80.150  | 80.340  | 111.000               | 5.70           | 10.0   | 75.150  |
| KM17                | 85.000                          | M85X2         | 110.000               | 16.000         | 102.000                    | 2.38 | MBB17                  | 119.000                          | 102.000            | 2.24           | 17              | MW17                      | 85.170  | 85.390  | 116.000               | 5.70           | 10.0   | 80.150  |
| KM18                | 90.000                          | M90X2         | 120.000               | 16.000         | 108.000                    | 2.38 | MBB18                  | 126.000                          | 108.000            | 2.73           | 17              | MW18                      | 90.170  | 90.390  | 121.000               | 7.62           | 10.0   | 84.670  |
| KM19                | 95.000                          | M95X2         | 125.000               | 17.000         | 113.000                    | 3.18 | MBB19                  | 133.000                          | 113.000            | 2.73           | 17              | MW19                      | 95.170  | 95.390  | 126.000               | 7.62           | 10.0   | 89.670  |
| KM20                | 100.000                         | M100X2        | 130.000               | 18.000         | 120.000                    | 3.18 | MBB20                  | 142.000                          | 120.000            | 2.73           | 17              | MW20                      | 100.170 | 100.390 | 131.000               | 7.62           | 12.0   | 94.670  |
| KM21                | 105.000                         | M105X2        | 140.000               | 18.000         | 126.000                    | 3.18 | MBB21                  | 145.000                          | 126.000            | 2.73           | 17              | MW21                      | 105.180 | 105.400 | 125.000               | 7.62           | 12.0   | 99.670  |
| KM22                | 110.000                         | M110X2        | 145.000               | 19.000         | 133.000                    | 3.18 | MBB22                  | 154.000                          | 133.000            | 3.25           | 17              | MW22                      | 110.180 | 110.400 | 136.000               | 7.62           | 12.0   | 104.180 |
| KM23                | 115.000                         | M115X2        | 150.000               | 19.000         | 137.000                    | 3.18 | MBB23                  | 159.000                          | 137.000            | 3.25           | 17              | MW23                      | 115.180 | 115.400 | 144.000               | 7.62           | 12.0   | 109.180 |
| KM24                | 120.000                         | M120X2        | 155.000               | 20.000         | 138.000                    | 3.18 | MBB24                  | 164.000                          | 138.000            | 3.72           | 17              | MW24                      | 120.180 | 120.400 | 150.000               | 9.57           | 14.0   | 113.180 |
| KM25                | 125.000                         | M125X2        | 160.000               | 21.000         | 148.000                    | 3.18 | MBB25                  | 170.000                          | 148.000            | 3.72           | 17              | MW25                      | 125.200 | 125.450 | 138.000               | 9.57           | 14.0   | 118.180 |
| KM26                | 130.000                         | M130X2        | 165.000               | 21.000         | 149.000                    | 3.18 | MBB26                  | 175.000                          | 149.000            | 3.72           | 17              | MW26                      | 130.200 | 130.450 | 166.000               | 9.57           | 14.0   | 123.200 |

FOR AVAILABILITY OF METRIC LOCKNUTS, LOCKWASHERS, AND TONGUED WASHERS, CONSULT YOUR TIMKEN COMPANY REPRESENTATIVE.

# AUXILIARY PARTS

## LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS - INCHES

### STANDARD LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS FOR TAPERED ROLLER BEARINGS

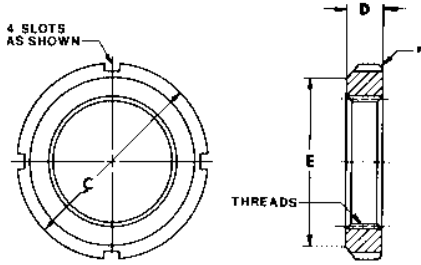


Figure 1 - LOCKNUTS

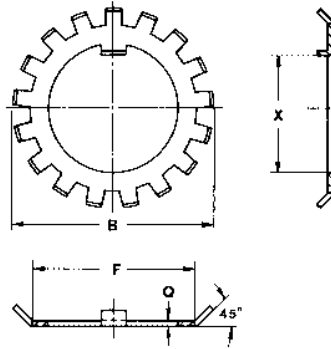


Figure 2 - LOCKWASHERS

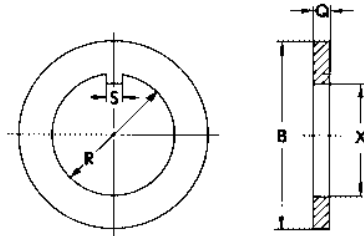


Figure 3 - TONGUED WASHERS

Threads are American National, Form NS, Class 3, with thread length based on 45° chamfer.

DIMENSIONS ARE IN INCHES

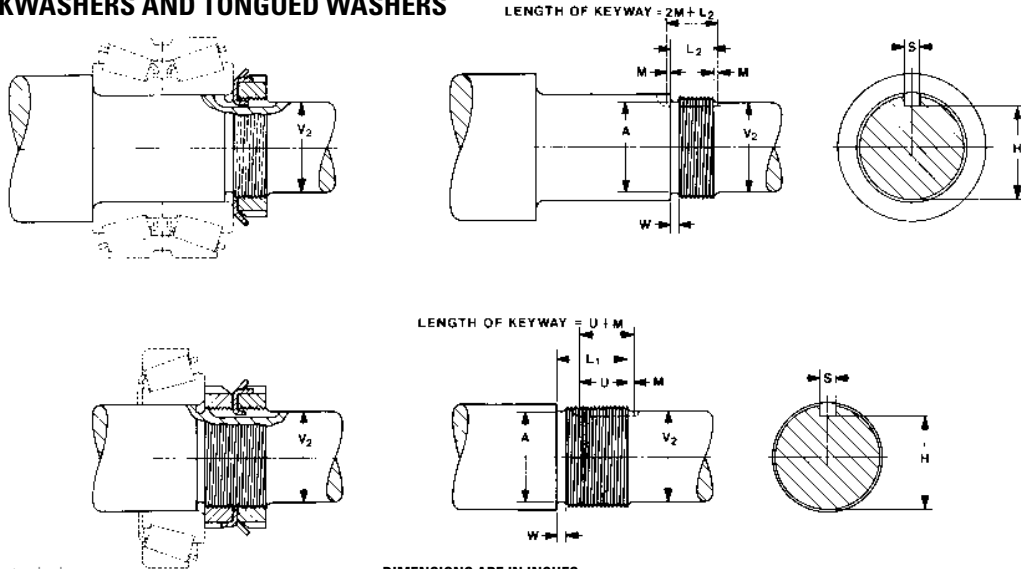
| ABMA Locknut Number | Locknut Dimensions              |               |                       |                |                            |       | Lockwasher Dimensions  |                                  |                    |                |                 | Tongued Washer Dimensions |           |       |                       |                |           |           |
|---------------------|---------------------------------|---------------|-----------------------|----------------|----------------------------|-------|------------------------|----------------------------------|--------------------|----------------|-----------------|---------------------------|-----------|-------|-----------------------|----------------|-----------|-----------|
|                     | Threads                         |               | Outside Diameter<br>C | Thickness<br>D | Face Outside Diameter<br>E | r     | ABMA Lockwasher Number | Maximum Diameter Over Tangs<br>B | Face Diameter<br>F | Thickness<br>Q | Number of Tangs | Tongued Washer Number     | Bore<br>R |       | Outside Diameter<br>B | Thickness<br>Q | Key       |           |
|                     | Minimum Value of Major Diameter | Thread Series |                       |                |                            |       |                        |                                  |                    |                |                 |                           | Min.      | Max.  |                       |                | S<br>Max. | X<br>Min. |
| N-00                | 0.391                           | 32            | 0.755                 | 0.229          | 0.625                      | 0.047 | TW100                  | 0.891                            | 0.625              | 0.032          | 9               | K91500                    | 0.406     | 0.421 | 0.798                 | 0.109          | 0.120     | 0.334     |
| N-01                | 0.469                           | 32            | 0.880                 | 0.323          | 0.719                      | 0.047 | TW101                  | 1.031                            | 0.719              | 0.032          | 9               | K91501                    | 0.484     | 0.499 | 0.923                 | 0.109          | 0.120     | 0.412     |
| N-02                | 0.586                           | 32            | 1.005                 | 0.323          | 0.813                      | 0.047 | TW102                  | 1.156                            | 0.813              | 0.048          | 11              | K91502                    | 0.601     | 0.616 | 1.173                 | 0.125          | 0.120     | 0.513     |
| N-03                | 0.664                           | 32            | 1.130                 | 0.354          | 0.938                      | 0.047 | TW103                  | 1.344                            | 0.938              | 0.048          | 11              | K91503                    | 0.679     | 0.694 | 1.173                 | 0.125          | 0.120     | 0.591     |
| N-04                | 0.781                           | 32            | 1.380                 | 0.385          | 1.125                      | 0.047 | TW104                  | 1.563                            | 1.125              | 0.052          | 11              | K91504                    | 0.801     | 0.816 | 1.423                 | 0.125          | 0.176     | 0.713     |
| N-05                | 0.969                           | 32            | 1.568                 | 0.416          | 1.281                      | 0.047 | TW105                  | 1.703                            | 1.281              | 0.052          | 13              | K91505                    | 0.989     | 1.009 | 1.860                 | 0.125          | 0.176     | 0.897     |
| N-06                | 1.173                           | 18            | 1.755                 | 0.416          | 1.500                      | 0.047 | TW106                  | 1.953                            | 1.500              | 0.052          | 13              | K91506                    | 1.193     | 1.213 | 1.860                 | 0.125          | 0.176     | 1.081     |
| TN-065              | 1.312                           | 18            | 2.068                 | 0.448          | 1.813                      | 0.063 | TW065                  | 2.234                            | 1.813              | 0.052          | 15              | K915065                   | 1.333     | 1.353 | 2.173                 | 0.125          | 0.176     | 1.221     |
| TN-07               | 1.376                           | 18            | 2.068                 | 0.448          | 1.813                      | 0.063 | TW107                  | 2.250                            | 1.813              | 0.052          | 15              | K91507                    | 1.396     | 1.416 | 2.173                 | 0.125          | 0.176     | 1.284     |
| TN-08               | 1.563                           | 18            | 2.255                 | 0.448          | 2.000                      | 0.063 | TW108                  | 2.484                            | 2.000              | 0.062          | 15              | K91508                    | 1.583     | 1.603 | 2.735                 | 0.156          | 0.290     | 1.461     |
| TN-09               | 1.767                           | 18            | 2.536                 | 0.448          | 2.281                      | 0.063 | TW109                  | 2.719                            | 2.281              | 0.062          | 17              | K91509                    | 1.792     | 1.817 | 2.735                 | 0.156          | 0.290     | 1.670     |
| TN-10               | 1.967                           | 18            | 2.693                 | 0.510          | 2.438                      | 0.063 | TW110                  | 2.922                            | 2.438              | 0.062          | 17              | K91510                    | 1.992     | 2.017 | 3.235                 | 0.156          | 0.290     | 1.870     |
| TN-11               | 2.157                           | 18            | 2.974                 | 0.510          | 2.656                      | 0.063 | TW111                  | 3.094                            | 2.656              | 0.062          | 17              | K91511                    | 2.182     | 2.207 | 3.235                 | 0.156          | 0.290     | 2.060     |
| TN-12               | 2.360                           | 18            | 3.161                 | 0.541          | 2.844                      | 0.063 | TW112                  | 3.328                            | 2.844              | 0.072          | 17              | K91512                    | 2.400     | 2.425 | 3.735                 | 0.187          | 0.290     | 2.248     |
| TN-13               | 2.548                           | 18            | 3.380                 | 0.573          | 3.063                      | 0.094 | TW113                  | 3.563                            | 3.063              | 0.072          | 19              | K91513                    | 2.588     | 2.613 | 3.735                 | 0.187          | 0.290     | 2.436     |
| TN-14               | 2.751                           | 18            | 3.360                 | 0.573          | 3.313                      | 0.094 | TW114                  | 3.813                            | 3.313              | 0.072          | 19              | K91514                    | 2.791     | 2.816 | 3.735                 | 0.187          | 0.290     | 2.639     |
| TAN-15              | 2.933                           | 12            | 3.880                 | 0.604          | 3.563                      | 0.094 | TW115                  | 4.047                            | 3.563              | 0.085          | 19              | K91515                    | 2.973     | 3.003 | 4.173                 | 0.218          | 0.290     | 2.808     |
| TAN-16              | 3.137                           | 12            | 4.161                 | 0.604          | 3.844                      | 0.094 | TW116                  | 4.391                            | 3.844              | 0.085          | 19              | K91516                    | 3.177     | 3.207 | 4.173                 | 0.218          | 0.353     | 3.012     |
| TAN-17              | 3.340                           | 12            | 4.411                 | 0.635          | 4.031                      | 0.094 | TW117                  | 4.625                            | 4.031              | 0.085          | 19              | K91517                    | 3.395     | 3.425 | 4.610                 | 0.218          | 0.353     | 3.230     |
| TAN-18              | 3.527                           | 12            | 4.661                 | 0.698          | 4.281                      | 0.094 | TW118                  | 4.953                            | 4.281              | 0.115          | 19              | K91518                    | 3.582     | 3.612 | 5.110                 | 0.250          | 0.353     | 3.387     |
| TAN-19              | 3.730                           | 12            | 4.943                 | 0.729          | 4.563                      | 0.125 | TW119                  | 5.234                            | 4.563              | 0.115          | 19              | K91519                    | 3.800     | 3.830 | 5.110                 | 0.250          | 0.353     | 3.605     |
| TAN-20              | 3.918                           | 12            | 5.193                 | 0.760          | 4.813                      | 0.125 | TW120                  | 5.484                            | 4.813              | 0.115          | 19              | K91520                    | 3.988     | 4.018 | 5.610                 | 0.250          | 0.353     | 3.778     |
| TAN-21              | 4.122                           | 12            | 5.443                 | 0.760          | 5.000                      | 0.125 | TW121                  | 5.703                            | 5.000              | 0.115          | 19              | K91521                    | 4.192     | 4.222 | 5.610                 | 0.250          | 0.353     | 3.982     |
| TAN-22              | 4.325                           | 12            | 5.724                 | 0.791          | 5.281                      | 0.125 | TW122                  | 6.000                            | 5.281              | 0.130          | 19              | K91522                    | 4.395     | 4.425 | 6.110                 | 0.281          | 0.353     | 4.170     |
| TAN-24              | 4.716                           | 12            | 6.130                 | 0.823          | 5.688                      | 0.125 | TW124                  | 6.531                            | 5.688              | 0.155          | 19              | K91524                    | 4.801     | 4.831 | 6.735                 | 0.375          | 0.353     | 4.551     |
| TAN-26              | 5.106                           | 12            | 6.755                 | 0.885          | 6.188                      | 0.125 | TW126                  | 7.047                            | 6.188              | 0.155          | 19              | K91526                    | 5.191     | 5.226 | 7.485                 | 0.375          | 0.435     | 4.921     |
| TAN-128             | 5.497                           | 12            | 7.099                 | 1.198          | 6.531                      | 0.125 | TW128                  | 7.438                            | 6.531              | 0.155          | 19              | K91528                    | 5.582     | 5.617 | 7.485                 | 0.375          | 0.590     | 5.312     |
| TAN-130             | 5.888                           | 12            | 7.693                 | 1.260          | 7.063                      | 0.125 | TW130                  | 8.063                            | 7.063              | 0.193          | 19              | K91530                    | 5.983     | 6.018 | 7.985                 | 0.375          | 0.590     | 5.675     |
| TAN-132             | 6.284                           | 8             | 8.068                 | 1.291          | 7.438                      | 0.156 | TW132                  | 8.453                            | 7.438              | 0.193          | 19              | K91532                    | 6.389     | 6.424 | 8.485                 | 0.375          | 0.590     | 6.081     |
| TAN-134             | 6.659                           | 8             | 8.661                 | 1.354          | 8.031                      | 0.156 | TW134                  | 9.078                            | 8.031              | 0.193          | 19              | K91534                    | 6.764     | 6.799 | 8.985                 | 0.375          | 0.715     | 6.456     |
| TAN-136             | 7.066                           | 8             | 9.068                 | 1.416          | 8.375                      | 0.156 | TW136                  | 9.438                            | 8.375              | 0.193          | 19              | K91536                    | 7.171     | 7.206 | 9.235                 | 0.375          | 0.715     | 6.863     |
| TAN-138             | 7.472                           | 8             | 9.474                 | 1.416          | 8.781                      | 0.156 | TW138                  | 9.859                            | 8.781              | 0.193          | 19              | K91538                    | 7.577     | 7.612 | 9.735                 | 0.375          | 0.715     | 7.269     |
| TAN-140             | 7.847                           | 8             | 9.849                 | 1.510          | 9.156                      | 0.156 | TW140                  | 10.406                           | 9.156              | 0.193          | 19              | K91540                    | 7.982     | 8.017 | 10.110                | 0.375          | 0.840     | 7.674     |



# AUXILIARY PARTS

## LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS

### SHAFT THREAD AND KEYWAY DIMENSIONS FOR STANDARD LOCKNUTS, LOCKWASHERS AND TONGUED WASHERS



These dimensions are ABMA standards.

DIMENSIONS ARE IN INCHES

| ABMA Locknut Number | Number Per Inch | threads        |         |        |                    |        |        |                  | Minor Dia.     | Relief Diameter A | Relief Width W +0.016 0.000 | Shaft Ext. Dia. V2 Max. | Thread Length    |              | Keyway                |                |                 |  |
|---------------------|-----------------|----------------|---------|--------|--------------------|--------|--------|------------------|----------------|-------------------|-----------------------------|-------------------------|------------------|--------------|-----------------------|----------------|-----------------|--|
|                     |                 | Major Fiameter |         |        | Pitch Diameter (1) |        |        | L1 +0.016 -0.000 |                |                   |                             |                         | L2 +0.016 -0.000 | Depth H Max. | Width S +0.016 -0.000 | M +0.016 0.000 | U +0.016 -0.000 |  |
|                     |                 | Max.           | Tol.    | Min.   | Max.               | Tol.   | Min.   |                  |                |                   |                             |                         |                  |              |                       |                |                 |  |
| N-00                | 32              | 0.391          | 0.0054  | 0.3856 | 0.3707             | 0.0026 | 0.3681 | 0.3257           | 0.3371 ± 0.005 | 0.062             | 0.312                       | 0.593                   | 0.375            | 0.287        | 0.125                 | 0.094          | 0.469           |  |
| N-01                | 32              | 0.469          | 0.0054  | 0.4636 | 0.4487             | 0.0026 | 0.4461 | 0.4307           | 0.4151 ± 0.005 | 0.062             | 0.406                       | 0.781                   | 0.468            | 0.366        | 0.125                 | 0.094          | 0.562           |  |
| N-02                | 32              | 0.586          | 0.0054  | 0.5806 | 0.5657             | 0.0030 | 0.5627 | 0.5477           | 0.5321 ± 0.005 | 0.062             | 0.500                       | 0.812                   | 0.500            | 0.485        | 0.125                 | 0.094          | 0.594           |  |
| N-03                | 32              | 0.664          | 0.0054  | 0.6586 | 0.6437             | 0.0030 | 0.6407 | 0.6257           | 0.6101 ± 0.005 | 0.062             | 0.562                       | 0.875                   | 0.531            | 0.564        | 0.125                 | 0.094          | 0.625           |  |
| N-04                | 32              | 0.781          | 0.0054  | 0.7756 | 0.7607             | 0.0034 | 0.7573 | 0.7427           | 0.7271 ± 0.005 | 0.062             | 0.703                       | 0.906                   | 0.531            | 0.676        | 0.188                 | 0.094          | 0.625           |  |
| N-05                | 32              | 0.969          | 0.0054  | 0.9636 | 0.9487             | 0.0034 | 0.9453 | 0.9307           | 0.9151 ± 0.005 | 0.062             | 0.875                       | 1.000                   | 0.593            | 0.835        | 0.188                 | 0.125          | 0.719           |  |
| N-06                | 18              | 1.173          | 0.0082  | 1.1648 | 1.1369             | 0.0040 | 1.1329 | 1.1048           | 1.0892 ± 0.005 | 0.093             | 1.062                       | 1.000                   | 0.593            | 1.040        | 0.188                 | 0.125          | 0.719           |  |
| TN-065              | 18              | 1.312          | 0.0082  | 1.3043 | 1.2764             | 0.0040 | 1.2724 | 1.2443           | 1.2287 ± 0.005 | 0.093             | 1.188                       | 1.062                   | 0.625            | 1.180        | 0.188                 | 0.125          | 0.750           |  |
| TN-07               | 18              | 1.376          | 0.0082  | 1.3678 | 1.3399             | 0.0040 | 1.3359 | 1.3078           | 1.2922 ± 0.005 | 0.093             | 1.250                       | 1.062                   | 0.625            | 1.244        | 0.188                 | 0.125          | 0.750           |  |
| TN-08               | 18              | 1.563          | 0.0082  | 1.5548 | 1.5269             | 0.0045 | 1.5224 | 1.4948           | 1.4792 ± 0.005 | 0.093             | 1.438                       | 1.062                   | 0.625            | 1.422        | 0.312                 | 0.125          | 0.750           |  |
| TN-09               | 18              | 1.767          | 0.0082  | 1.7588 | 1.7309             | 0.0045 | 1.7264 | 1.6988           | 1.6832 ± 0.005 | 0.125             | 1.656                       | 1.062                   | 0.625            | 1.628        | 0.312                 | 0.156          | 0.781           |  |
| TN-10               | 18              | 1.967          | 0.0082  | 1.9588 | 1.9309             | 0.0045 | 1.9264 | 1.8988           | 1.8832 ± 0.005 | 0.125             | 1.859                       | 1.187                   | 0.687            | 1.830        | 0.312                 | 0.156          | 0.844           |  |
| TN-11               | 18              | 2.157          | 0.0082  | 2.1488 | 2.1209             | 0.0051 | 2.1158 | 2.0888           | 2.0732 ± 0.005 | 0.125             | 2.047                       | 1.187                   | 0.687            | 2.021        | 0.312                 | 0.156          | 0.844           |  |
| TN-12               | 18              | 2.360          | 0.0082  | 2.3518 | 2.3239             | 0.0051 | 2.3188 | 2.2918           | 2.2762 ± 0.005 | 0.125             | 2.250                       | 1.281                   | 0.750            | 2.194        | 0.312                 | 0.156          | 0.906           |  |
| TN-13               | 18              | 2.548          | 0.0082  | 2.5398 | 2.5119             | 0.0051 | 2.5068 | 2.4798           | 2.4642 ± 0.005 | 0.125             | 2.422                       | 1.343                   | 0.781            | 2.382        | 0.312                 | 0.156          | 0.938           |  |
| TN-14               | 18              | 2.751          | 0.0082  | 2.7428 | 2.7149             | 0.0051 | 2.7098 | 2.6828           | 2.6672 ± 0.005 | 0.125             | 2.625                       | 1.343                   | 0.781            | 2.586        | 0.312                 | 0.250          | 1.000           |  |
| TAN-15              | 12              | 2.933          | 0.0112  | 2.9218 | 2.8789             | 0.0054 | 2.8735 | 2.8308           | 2.7995 ± 0.010 | 0.156             | 2.781                       | 1.406                   | 0.812            | 2.737        | 0.312                 | 0.250          | 1.031           |  |
| TAN-16              | 12              | 3.137          | 0.0112  | 3.1258 | 3.0829             | 0.0059 | 3.0770 | 3.0348           | 3.0035 ± 0.010 | 0.156             | 3.000                       | 1.406                   | 0.812            | 2.938        | 0.375                 | 0.250          | 1.031           |  |
| TAN-17              | 12              | 3.340          | 0.0112  | 3.3288 | 3.2859             | 0.0059 | 3.2800 | 3.2378           | 3.2065 ± 0.010 | 0.156             | 3.188                       | 1.468                   | 0.843            | 3.141        | 0.375                 | 0.250          | 1.062           |  |
| TAN-18              | 12              | 3.527          | 0.0112  | 3.5158 | 3.4729             | 0.0074 | 3.4655 | 3.4248           | 3.3935 ± 0.010 | 0.156             | 3.375                       | 1.625                   | 0.937            | 3.298        | 0.375                 | 0.250          | 1.156           |  |
| TAN-19              | 12              | 3.730          | 0.0112  | 3.7188 | 3.6759             | 0.0074 | 3.6685 | 3.6278           | 3.5965 ± 0.010 | 0.156             | 3.562                       | 1.687                   | 0.968            | 3.502        | 0.375                 | 0.250          | 1.188           |  |
| TAN-20              | 12              | 3.918          | 0.0112  | 3.9068 | 3.8639             | 0.0074 | 3.8565 | 3.8158           | 3.7845 ± 0.010 | 0.156             | 3.766                       | 1.750                   | 1.000            | 3.690        | 0.375                 | 0.312          | 1.281           |  |
| TAN-21              | 12              | 4.122          | 0.0112  | 4.1108 | 4.0679             | 0.0083 | 4.0596 | 4.0198           | 3.9885 ± 0.010 | 0.156             | 3.938                       | 1.750                   | 1.000            | 3.894        | 0.375                 | 0.312          | 1.281           |  |
| TAN-22              | 12              | 4.325          | 0.0112  | 4.3138 | 4.2709             | 0.0083 | 4.2626 | 4.2228           | 4.1915 ± 0.010 | 0.156             | 4.156                       | 1.812                   | 1.031            | 4.098        | 0.375                 | 0.312          | 1.312           |  |
| TAN-24              | 12              | 4.716          | 0.0112  | 4.7048 | 4.6619             | 0.0083 | 4.6536 | 4.6138           | 4.5825 ± 0.010 | 0.156             | 4.531                       | 1.906                   | 1.093            | 4.458        | 0.375                 | 0.312          | 1.375           |  |
| TAN-26              | 12              | 5.106          | 0.0112  | 5.0948 | 5.0519             | 0.0083 | 5.0436 | 5.0038           | 4.9725 ± 0.010 | 0.156             | 4.906                       | 2.031                   | 1.156            | 4.844        | 0.500                 | 0.312          | 1.438           |  |
| TAN-128             | 12              | 5.497          | 0.0112  | 5.4858 | 5.4429             | 0.0083 | 5.4346 | 5.3948           | 5.3635 ± 0.010 | 0.156             | 5.297                       | 2.666                   | 1.468            | 5.229        | 0.625                 | 0.312          | 1.750           |  |
| TAN-130             | 12              | 5.888          | 0.01125 | 5.8768 | 5.8339             | 0.0083 | 5.8256 | 5.7858           | 5.7545 ± 0.010 | 0.156             | 5.656                       | 2.812                   | 1.562            | 5.590        | 0.625                 | 0.375          | 1.906           |  |
| TAN-132             | 8               | 6.284          | 0.0152  | 6.2688 | 6.2028             | 0.0091 | 6.1937 | 6.1306           | 6.0993 ± 0.010 | 0.250             | 6.062                       | 2.875                   | 1.593            | 5.956        | 0.625                 | 0.375          | 1.938           |  |
| TAN-134             | 8               | 6.659          | 0.0152  | 6.6438 | 6.5778             | 0.0091 | 6.5687 | 6.5056           | 6.4743 ± 0.010 | 0.250             | 6.438                       | 3.000                   | 1.656            | 6.326        | 0.750                 | 0.375          | 2.000           |  |
| TAN-136             | 8               | 7.066          | 0.0152  | 7.0508 | 6.9848             | 0.0091 | 6.9757 | 6.9126           | 6.8813 ± 0.010 | 0.250             | 6.844                       | 3.125                   | 1.718            | 6.734        | 0.750                 | 0.375          | 2.062           |  |
| TAN-138             | 8               | 7.472          | 0.0152  | 7.4568 | 7.3908             | 0.0091 | 7.3817 | 7.3186           | 7.2873 ± 0.010 | 0.250             | 7.250                       | 3.125                   | 1.718            | 7.141        | 0.750                 | 0.375          | 2.062           |  |
| TAN-140             | 8               | 7.847          | 0.0152  | 7.8318 | 7.7658             | 0.0114 | 7.7544 | 7.6936           | 7.6623 ± 0.010 | 0.250             | 7.625                       | 3.312                   | 1.812            | 7.510        | 0.875                 | 0.375          | 2.125           |  |

## AUXILIARY PARTS

### NOTES

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**TIMKEN**

# NEEDLE ROLLER BEARINGS

# C

C

## **C** NEEDLE ROLLER BEARINGS

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## NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES

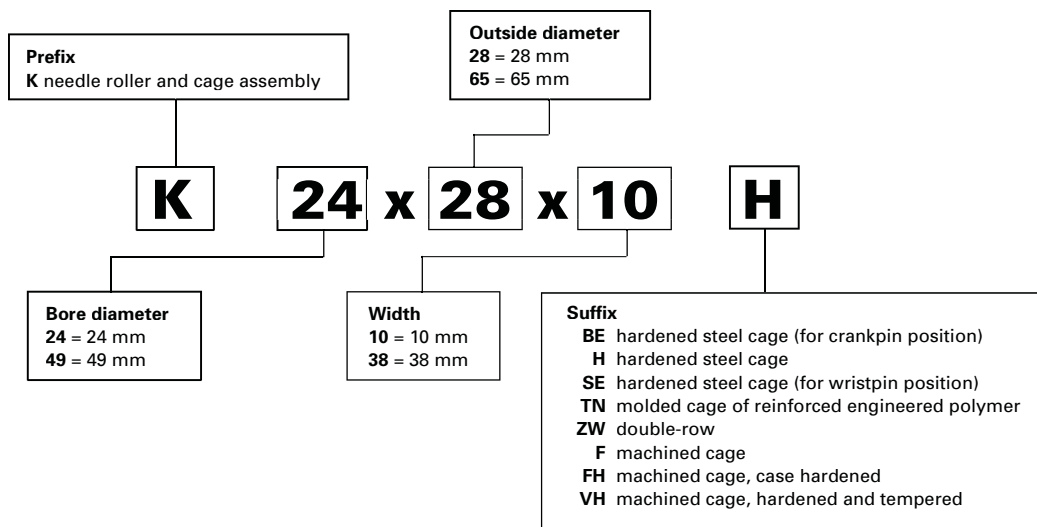
**Overview:** Needle roller and cage assemblies are a complement of needle rollers held in place by a cage. The mating shaft and housing are normally used as inner and outer raceways. The unitized design allows for easy handling and installation. Controlled-contour rollers reduce end stresses and permit operation under moderate misalignment. A variety of cage designs, styles and materials, as well as multiple roller paths and segmented constructions, meet broad application requirements.

- **Sizes:** 6 mm - 150 mm bore.
- **Markets:** Automotive and truck transmissions, agricultural and construction equipment, two-cycle engines, pumps and compressors.
- **Features:** Special coatings and platings; split and segmented designs for simplified mounting; engineered polymer cages.
- **Benefits:** High load capacity and high limiting speed within the smallest envelope.

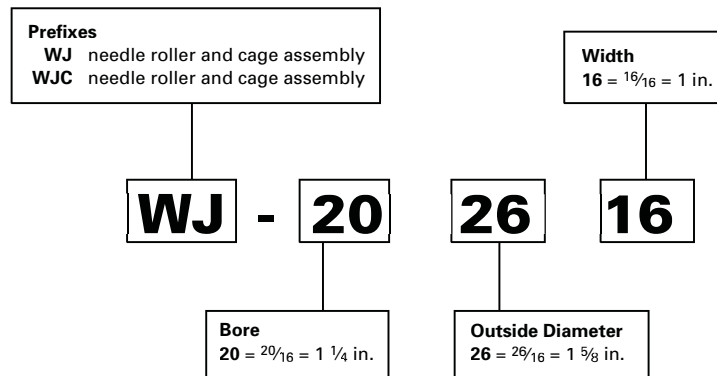




### Radial Needle Roller and Cage Assemblies – Metric Nominal Dimensions



### Radial Needle Roller and Cage Assemblies – Inch Nominal Dimensions



# ***Needle Roller Bearings and Cage Radial Assemblies***

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C







# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES

### METRIC SERIES

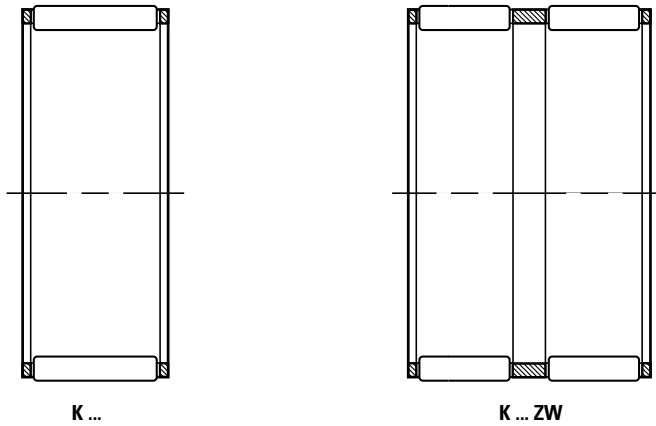
Timken® Torrington® metric series needle roller and cage radial assemblies are available in a variety of sizes and designs. This catalog includes the most popular, standardized and non-standard designs.

### REFERENCE STANDARDS ARE:

- **ISO 3030** – Needle roller bearings – Needle roller and cage radial assemblies – Boundary dimensions and tolerances
- **DIN 5405 Part 1** – Rolling bearings – needle bearings – Radial needle roller and cage assemblies.
- **ANSI/ABMA 18.1** – Needle roller bearings – Radial, metric design.

Before selecting specific metric series needle roller and cage radial assemblies, the engineering section of this catalog should be reviewed.

### Types of Metric Series Needle Roller and Cage Radial Assemblies



#### Suffixes

|             |                                                             |
|-------------|-------------------------------------------------------------|
| <b>TN</b>   | molded cage of reinforced engineered polymer                |
| <b>ZW</b>   | double - row                                                |
| <b>TNZW</b> | molded cage of reinforced engineered polymer – double - row |
| <b>H</b>    | hardened steel cage                                         |
| <b>F</b>    | machined cage                                               |
| <b>FH</b>   | machined cage, case hardened                                |
| <b>FV</b>   | machined cage, hardened and tempered                        |

### CONSTRUCTION

Needle roller and cage radial assemblies have a steel cage that provides both inward and outward retention for the needle rollers. The designs provide maximum cage strength consistent with the inherent high load ratings of needle roller bearings. Accurate guidance of the needle rollers by the cage bars allows for operation at high speeds. Needle roller and cage assemblies have either one or two rows of needle rollers.

Also listed are metric series needle roller and cage assemblies using molded, one piece glass reinforced engineered polymer cages (suffix TN). These operate well at temperatures up to

120° C over extended periods. However, care should be exercised when these assemblies are lubricated with oils containing additives as service life may be reduced if the operating temperature exceeds 100° C. At such high temperatures oil can deteriorate with time and it is suggested that oil change intervals are observed.

Needle rollers with relieved ends used in these assemblies are made of high carbon chrome steel, through-hardened, ground and lapped to close tolerances for diameter and roundness. See the engineering section of this catalog for further discussion of relieved end rollers.

## DIMENSIONAL ACCURACY

### NEEDLE ROLLER GROUPS (GAGES)

Metric series needle roller and cage radial assemblies are supplied with needle roller complements subdivided into groups (gages) shown in Table 1. The groups are at Timken's option if nothing to the contrary is agreed upon at the time of ordering. This is in accordance with Grade G2 specified in ISO 3096 standard (see needle rollers, page C326). The group limits of the needle rollers are indicated on the package. Labels of identifying colors show the group limits of the needle rollers. The needle roller and cage assemblies of one shipment usually contain needle rollers with group limits of between 0 to -2, and -5 to -7 mm (colors red, blue and white). Information on needle roller and cage assemblies with needle rollers of different group limits will be supplied on request.

TABLE 1 – NEEDLE ROLLER GROUP LIMITS (GRADE G2)

| Group | Tolerance<br>µm | Marking | Identifying color of label<br>or on package |
|-------|-----------------|---------|---------------------------------------------|
| 0     | -2              | P0M2    |                                             |
| -1    | -3              | M1M3    | red                                         |
| -2    | -4              | M2M4    |                                             |
| -3    | -5              | M3M5    | blue                                        |
| -4    | -6              | M4M6    |                                             |
| -5    | -7              | M5M7    | white (gray)                                |
| -6    | -8              | M6M8    |                                             |
| -7    | -9              | M7M9    | green                                       |
| -8    | -10             | M8M10   |                                             |
| -9    | -11             | M9M11   | yellow                                      |

In the marking of the gages, P identifies zero (0) or plus (+), M identifies minus (-).

## MOUNTING DIMENSIONS

### DESIGN OF RACEWAYS

Needle roller and cage radial assemblies use the housing bore as the outer raceway and the shaft as the inner raceway. In order to realize full bearing load rating and life the housing bore and the shaft raceways must have the correct geometric and metallurgical characteristics. The housing should be of sufficient cross section to maintain adequate roundness and running clearance under load. Additional design details for housings and shafts used as outer and inner raceway can be found in the engineering section of this catalog. The only limit to precision of the radial clearance of a mounted assembly is the capability of the user to hold close tolerances on the inner and outer raceways. The suggested shaft tolerances listed in Table 2 are based on housing bore tolerance G6 and apply to metric series radial needle roller and cage assemblies with needle rollers of group limits between P0M2 and M5M7.

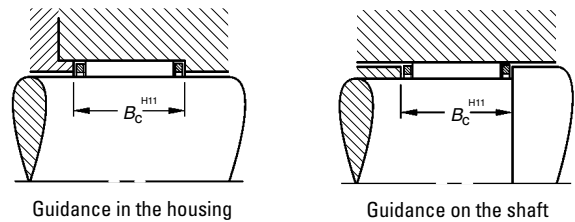
TABLE 2 – SUGGESTED SHAFT TOLERANCES FOR HOUSING BORES MACHINED TO G6

| Nominal shaft diameter in mm | ≤ 80            | > 80 |
|------------------------------|-----------------|------|
|                              | SHAFT TOLERANCE |      |
| smaller than normal          | j5              | h5   |
| normal                       | h5              | g5   |
| larger than normal           | g6              | f6   |

### AXIAL GUIDANCE REQUIREMENTS

Needle roller and cage radial assembly must be axially guided by shoulders or other suitable means. The end guiding surfaces should be hardened to minimize wear and must provide sufficient axial clearance to prevent end locking of the assembly. Length tolerance H11 is suggested.

If end guidance is provided by a housing shoulder at one end and by a shaft shoulder at the other end the shaft must be axially positioned to prevent end locking of needle roller and cage assembly. The housing and shaft shoulder heights should be 70 to 90 percent of the needle roller diameter to provide proper axial guidance.



### MOUNTING IN SETS

Needle roller and cage radial assemblies that are mounted side by side must have needle rollers of the same group limits to ensure uniform load distribution.

## LUBRICATION

Oil is the preferred lubricant for most applications. In critical applications involving high speeds, ample oil flow must be provided. Where assemblies are subjected to high centrifugal forces, such as in epicyclic gearing, or inertia forces as in the small end of a connecting rod, the contact pressure between the cage and the raceway guiding surface becomes critical. The allowable contact pressure depends on a combination of the induced force and the rubbing velocity between the cage and raceway and the rate of lubricant flow. Consult your Timken representative when cages will be subjected to high induced forces.

## SPECIAL DESIGNS

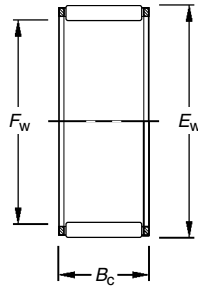
Needle roller and cage radial assemblies made to special dimensions or configurations, such as those which are split to assemble around a one piece crankshaft, can be made available on special order. Special coated or plated cages to enhance life under conditions of marginal lubrication and high induced forces can also be made available.



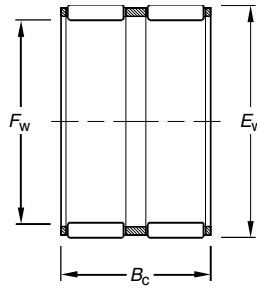
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES

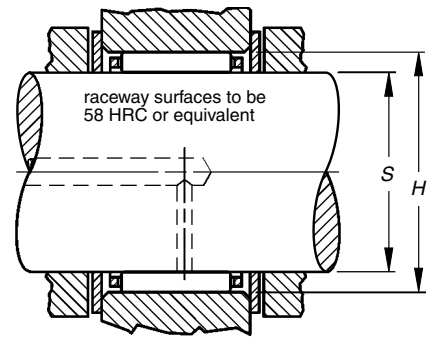
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |       |                | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|-------|----------------|----------------------------|--------|--------|--------|-------------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil   | C <sub>g</sub> | Max.                       | Min.   | Min.   | Max.   |             |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            |       | S              | H                          |        |        |        |             |
| 4          | 4                 | 7              | 7.0            | K4X7X7TN             | 1.83                 | 1.32           | 34000          | 52000 | —              | 4.000                      | 3.995  | 7.005  | 7.014  | 0.00        |
|            | 0.1575            | 0.2756         | 0.276          |                      | 411                  | 297            |                |       |                | 0.1575                     | 0.1573 | 0.2758 | 0.2761 |             |
| 5          | 5                 | 8              | 8.0            | K5X8X8TN             | 2.18                 | 1.71           | 31000          | 47000 | —              | 5.000                      | 4.995  | 8.005  | 8.014  | 0.001       |
|            | 0.1969            | 0.3150         | 0.315          |                      | 490                  | 384            |                |       |                | 0.1969                     | 0.1967 | 0.3152 | 0.3155 |             |
| 5          | 5                 | 8              | 10.0           | K5X8X10TN            | 3.04                 | 2.63           | 31000          | 47000 | —              | 5.000                      | 4.995  | 8.005  | 8.014  | 0.001       |
|            | 0.1969            | 0.3150         | 0.394          |                      | 683                  | 591            |                |       |                | 0.1969                     | 0.1967 | 0.3152 | 0.3155 |             |
| 5          | 5                 | 9              | 13.0           | K5X9X13TN            | 4.29                 | 3.55           | 26000          | 40000 | —              | 5.000                      | 4.995  | 9.005  | 9.014  | 0.002       |
|            | 0.1969            | 0.3543         | 0.512          |                      | 964                  | 798            |                |       |                | 0.1969                     | 0.1967 | 0.3545 | 0.3549 |             |
| 6          | 6                 | 9              | 8.0            | K6X9X8               | 3.19                 | 2.90           | 29000          | 44000 | 0.0116         | 6.000                      | 5.995  | 9.005  | 9.014  | 0.001       |
|            | 0.2362            | 0.3543         | 0.315          |                      | 717                  | 652            |                |       |                | 0.2362                     | 0.2360 | 0.3545 | 0.3549 |             |
| 6          | 6                 | 9              | 8.0            | K6X9X8TN             | 2.47                 | 2.07           | 29000          | 44000 | —              | 6.000                      | 5.995  | 9.005  | 9.014  | 0.001       |
|            | 0.2362            | 0.3543         | 0.315          |                      | 555                  | 465            |                |       |                | 0.2362                     | 0.2360 | 0.3545 | 0.3549 |             |
| 6          | 6                 | 9              | 10.0           | K6X9X10TN            | 3.07                 | 2.74           | 29000          | 44000 | —              | 6.000                      | 5.995  | 9.005  | 9.014  | 0.001       |
|            | 0.2362            | 0.3543         | 0.394          |                      | 690                  | 616            |                |       |                | 0.2362                     | 0.2360 | 0.3545 | 0.3549 |             |
| 7          | 7                 | 10             | 8.0            | K7X10X8TN            | 2.74                 | 2.44           | 28000          | 42000 | —              | 7.000                      | 6.994  | 10.005 | 10.014 | 0.001       |
|            | 0.2756            | 0.3937         | 0.315          |                      | 616                  | 549            |                |       |                | 0.2756                     | 0.2754 | 0.3939 | 0.3943 |             |
| 7          | 7                 | 10             | 10.0           | K7X10X10TN           | 3.40                 | 3.22           | 28000          | 42000 | —              | 7.000                      | 6.994  | 10.005 | 10.014 | 0.001       |
|            | 0.2756            | 0.3937         | 0.394          |                      | 764                  | 724            |                |       |                | 0.2756                     | 0.2754 | 0.3939 | 0.3943 |             |
| 7          | 7                 | 11             | 15.0           | K7X11X15TN           | 6.44                 | 6.24           | 23000          | 35000 | —              | 7.000                      | 6.994  | 11.006 | 11.017 | 0.000       |
|            | 0.2756            | 0.4331         | 0.591          |                      | 1450                 | 1400           |                |       |                | 0.2756                     | 0.2754 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 11             | 8.0            | K8X11X8FV            | 3.23                 | 3.11           | 26000          | 41000 | 0.0132         | 8.000                      | 7.994  | 11.006 | 11.017 | 0.002       |
|            | 0.3150            | 0.4331         | 0.315          |                      | 726                  | 699            |                |       |                | 0.3150                     | 0.3147 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 11             | 8.0            | K8X11X8TN            | 2.34                 | 2.05           | 26000          | 41000 | —              | 8.000                      | 7.994  | 11.006 | 11.017 | 0.002       |
|            | 0.3150            | 0.4331         | 0.315          |                      | 526                  | 461            |                |       |                | 0.3150                     | 0.3147 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 11             | 10.0           | K8X11X10             | 4.57                 | 4.89           | 26000          | 41000 | 0.0148         | 8.000                      | 7.994  | 11.006 | 11.017 | 0.002       |
|            | 0.3150            | 0.4331         | 0.394          |                      | 1030                 | 1100           |                |       |                | 0.3150                     | 0.3147 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 11             | 10.0           | K8X11X10FV           | 4.01                 | 4.11           | 26000          | 41000 | 0.0142         | 8.000                      | 7.994  | 11.006 | 11.017 | 0.002       |
|            | 0.3150            | 0.4331         | 0.394          |                      | 901                  | 924            |                |       |                | 0.3150                     | 0.3147 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 11             | 13.0           | K8X11X13H            | 5.22                 | 5.78           | 26000          | 41000 | 0.0154         | 8.000                      | 7.994  | 11.006 | 11.017 | 0.003       |
|            | 0.3150            | 0.4331         | 0.512          |                      | 1170                 | 1300           |                |       |                | 0.3150                     | 0.3147 | 0.4333 | 0.4337 |             |
| 8          | 8                 | 12             | 10.0           | K8X12X10F            | 5.05                 | 4.69           | 22000          | 33000 | 0.0143         | 8.000                      | 7.994  | 12.006 | 12.017 | 0.002       |
|            | 0.3150            | 0.4724         | 0.394          |                      | 1140                 | 1050           |                |       |                | 0.3150                     | 0.3147 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 12             | 10.0           | K9X12X10FH           | 4.27                 | 4.60           | 26000          | 40000 | 0.0153         | 9.000                      | 8.994  | 12.006 | 12.017 | 0.003       |
|            | 0.3543            | 0.4724         | 0.394          |                      | 960                  | 1030           |                |       |                | 0.3543                     | 0.3541 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 12             | 10.0           | K9X12X10FV           | 4.27                 | 4.60           | 26000          | 40000 | 0.0153         | 9.000                      | 8.994  | 12.006 | 12.017 | 0.002       |
|            | 0.3543            | 0.4724         | 0.394          |                      | 960                  | 1030           |                |       |                | 0.3543                     | 0.3541 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 12             | 13.0           | K9X12X13F            | 5.57                 | 6.47           | 26000          | 40000 | 0.0167         | 9.000                      | 8.994  | 12.006 | 12.017 | 0.003       |
|            | 0.3543            | 0.4724         | 0.512          |                      | 1250                 | 1450           |                |       |                | 0.3543                     | 0.3541 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 12             | 13.0           | K9X12X13FH           | 5.57                 | 6.47           | 26000          | 40000 | 0.0167         | 9.000                      | 8.994  | 12.006 | 12.017 | 0.003       |
|            | 0.3543            | 0.4724         | 0.512          |                      | 1250                 | 1450           |                |       |                | 0.3543                     | 0.3541 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 12             | 13.0           | K9X12X13FV           | 5.57                 | 6.47           | 26000          | 40000 | 0.0167         | 9.000                      | 8.994  | 12.006 | 12.017 | 0.003       |
|            | 0.3543            | 0.4724         | 0.512          |                      | 1250                 | 1450           |                |       |                | 0.3543                     | 0.3541 | 0.4727 | 0.4731 |             |
| 9          | 9                 | 13             | 8.0            | K9X13X8H             | 3.96                 | 3.50           | 21000          | 32000 | 0.0139         | 9.000                      | 8.994  | 13.006 | 13.017 | 0.003       |
|            | 0.3543            | 0.5118         | 0.315          |                      | 890                  | 787            |                |       |                | 0.3543                     | 0.3541 | 0.5120 | 0.5125 |             |
| 10         | 10                | 13             | 10.0           | K10X13X10            | 5.40                 | 6.43           | 25000          | 39000 | 0.0174         | 10.000                     | 9.994  | 13.006 | 13.017 | 0.002       |
|            | 0.3937            | 0.5118         | 0.394          |                      | 1210                 | 1450           |                |       |                | 0.3937                     | 0.3935 | 0.5120 | 0.5125 |             |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.           |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Mounting Dimensions mm/in. |                |        |        | Wt. kg/lbs. |      |      |
|------------|-----------------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|-------|----------------|----------------------------|----------------|--------|--------|-------------|------|------|
|            | -0.2 - .008<br>-0.55 - .022 |                |                |                      | C                    | C <sub>0</sub> | Grease         | Oil   |                | RPM                        | C <sub>g</sub> | Max.   | Min.   |             | Min. | Max. |
|            | mm                          | F <sub>w</sub> | E <sub>w</sub> |                      |                      |                |                |       |                |                            |                |        |        |             |      |      |
| 10         | 10                          | 13             | 10.0           | K10X13X10H           | 5.40                 | 6.43           | 25000          | 39000 | 0.0174         | 10.000                     | 9.994          | 13.006 | 13.017 | 0.002       |      |      |
|            | 0.3937                      | 0.5118         | 0.394          |                      | 1210                 | 1450           |                |       |                | 0.3937                     | 0.3935         | 0.5120 | 0.5125 | 0.004       |      |      |
| 10         | 10                          | 13             | 10.0           | K10X13X10TN          | 4.29                 | 4.77           | 25000          | 39000 | —              | 10.000                     | 9.994          | 13.006 | 13.017 | 0.002       |      |      |
|            | 0.3937                      | 0.5118         | 0.394          |                      | 964                  | 1070           |                |       |                | 0.3937                     | 0.3935         | 0.5120 | 0.5125 | 0.004       |      |      |
| 10         | 10                          | 13             | 13.0           | K10X13X13            | 5.90                 | 7.16           | 25000          | 39000 | 0.0178         | 10.000                     | 9.994          | 13.006 | 13.017 | 0.003       |      |      |
|            | 0.3937                      | 0.5118         | 0.512          |                      | 1330                 | 1610           |                |       |                | 0.3937                     | 0.3935         | 0.5120 | 0.5125 | 0.007       |      |      |
| 10         | 10                          | 13             | 16.0           | K10X13X16            | 7.43                 | 9.64           | 25000          | 39000 | 0.0192         | 10.000                     | 9.994          | 13.006 | 13.017 | 0.004       |      |      |
|            | 0.3937                      | 0.5118         | 0.630          |                      | 1670                 | 2170           |                |       |                | 0.3937                     | 0.3935         | 0.5120 | 0.5125 | 0.009       |      |      |
| 10         | 10                          | 14             | 10.0           | K10X14X10H           | 6.12                 | 6.29           | 20000          | 31000 | 0.0167         | 10.000                     | 9.994          | 14.006 | 14.017 | 0.003       |      |      |
|            | 0.3937                      | 0.5512         | 0.394          |                      | 1380                 | 1410           |                |       |                | 0.3937                     | 0.3935         | 0.5514 | 0.5519 | 0.007       |      |      |
| 10         | 10                          | 14             | 13.0           | K10X14X13H           | 7.88                 | 8.71           | 20000          | 31000 | 0.0181         | 10.000                     | 9.994          | 14.006 | 14.017 | 0.004       |      |      |
|            | 0.3937                      | 0.5512         | 0.512          |                      | 1770                 | 1960           |                |       |                | 0.3937                     | 0.3935         | 0.5514 | 0.5519 | 0.009       |      |      |
| 10         | 10                          | 16             | 12.0           | K10X16X12F           | 8.39                 | 7.47           | 15000          | 24000 | 0.0168         | 10.000                     | 9.994          | 16.006 | 16.017 | 0.006       |      |      |
|            | 0.3937                      | 0.6299         | 0.472          |                      | 1890                 | 1680           |                |       |                | 0.3937                     | 0.3935         | 0.6302 | 0.6306 | 0.013       |      |      |
| 10         | 10                          | 16             | 12.0           | K10X16X12TN          | 7.50                 | 6.40           | 15000          | 24000 | —              | 10.000                     | 9.994          | 16.006 | 16.017 | 0.005       |      |      |
|            | 0.3937                      | 0.6299         | 0.472          |                      | 1690                 | 1440           |                |       |                | 0.3937                     | 0.3935         | 0.6302 | 0.6306 | 0.011       |      |      |
| 12         | 12                          | 15             | 10.0           | K12X15X10H           | 5.85                 | 7.51           | 24000          | 37000 | 0.0195         | 12.000                     | 11.992         | 15.006 | 15.017 | 0.003       |      |      |
|            | 0.4724                      | 0.5906         | 0.394          |                      | 1320                 | 1690           |                |       |                | 0.4724                     | 0.4721         | 0.5908 | 0.5912 | 0.007       |      |      |
| 12         | 12                          | 15             | 13.0           | K12X15X13H           | 6.78                 | 9.03           | 24000          | 37000 | 0.0204         | 12.000                     | 11.992         | 15.006 | 15.017 | 0.004       |      |      |
|            | 0.4724                      | 0.5906         | 0.512          |                      | 1520                 | 2030           |                |       |                | 0.4724                     | 0.4721         | 0.5908 | 0.5912 | 0.009       |      |      |
| 12         | 12                          | 16             | 13.0           | K12X16X13            | 7.49                 | 8.51           | 19000          | 30000 | 0.0194         | 12.000                     | 11.992         | 16.006 | 16.017 | 0.000       |      |      |
|            | 0.4724                      | 0.6299         | 0.512          |                      | 1680                 | 1910           |                |       |                | 0.4724                     | 0.4721         | 0.6302 | 0.6306 | 0.013       |      |      |
| 12         | 12                          | 17             | 13.0           | K12X17X13            | 8.93                 | 9.29           | 16000          | 25000 | 0.0194         | 12.000                     | 11.992         | 17.006 | 17.017 | 0.008       |      |      |
|            | 0.4724                      | 0.6693         | 0.512          |                      | 2010                 | 2090           |                |       |                | 0.4724                     | 0.4721         | 0.6695 | 0.6700 | 0.018       |      |      |
| 12         | 12                          | 18             | 12.0           | K12X18X12H           | 9.76                 | 9.40           | 14000          | 22000 | 0.0191         | 12.000                     | 11.992         | 18.006 | 18.017 | 0.009       |      |      |
|            | 0.4724                      | 0.7087         | 0.472          |                      | 2190                 | 2110           |                |       |                | 0.4724                     | 0.4721         | 0.7089 | 0.7093 | 0.020       |      |      |
| 13         | 13                          | 17             | 10.0           | K13X17X10            | 7.22                 | 8.33           | 19000          | 29000 | 0.0199         | 13.000                     | 12.992         | 17.006 | 17.017 | 0.004       |      |      |
|            | 0.5118                      | 0.6693         | 0.394          |                      | 1620                 | 1870           |                |       |                | 0.5118                     | 0.5115         | 0.6695 | 0.6700 | 0.009       |      |      |
| 13         | 13                          | 18             | 15.0           | K13X18X15F           | 10.8                 | 12.1           | 16000          | 25000 | 0.0213         | 13.000                     | 12.992         | 18.006 | 18.017 | 0.008       |      |      |
|            | 0.5118                      | 0.7087         | 0.591          |                      | 2430                 | 2720           |                |       |                | 0.5118                     | 0.5115         | 0.7089 | 0.7093 | 0.01        |      |      |
| 14         | 14                          | 18             | 8.0            | K14X18X8             | 5.39                 | 5.82           | 19000          | 29000 | 0.0188         | 14.000                     | 13.992         | 18.006 | 18.017 | 0.004       |      |      |
|            | 0.5512                      | 0.7087         | 0.315          |                      | 1210                 | 1310           |                |       |                | 0.5512                     | 0.5509         | 0.7089 | 0.7093 | 0.009       |      |      |
| 14         | 14                          | 18             | 10.0           | K14X18X10            | 7.17                 | 8.41           | 19000          | 29000 | 0.0206         | 14.000                     | 13.992         | 18.006 | 18.017 | 0.005       |      |      |
|            | 0.5512                      | 0.7087         | 0.394          |                      | 1 610                | 1890           |                |       |                | 0.5512                     | 0.5509         | 0.7089 | 0.7093 | 0.011       |      |      |
| 14         | 14                          | 18             | 13.0           | K14X18X13            | 9.73                 | 12.5           | 19000          | 29000 | 0.0227         | 14.000                     | 13.992         | 18.006 | 18.017 | 0.006       |      |      |
|            | 0.5512                      | 0.7087         | 0.512          |                      | 2190                 | 2810           |                |       |                | 0.5512                     | 0.5509         | 0.7089 | 0.7093 | 0.013       |      |      |
| 14         | 14                          | 18             | 15.0           | K14X18X15            | 10.5                 | 13.8           | 19000          | 29000 | 0.0233         | 14.000                     | 13.992         | 18.006 | 18.017 | 0.007       |      |      |
|            | 0.5512                      | 0.7087         | 0.591          |                      | 2360                 | 3100           |                |       |                | 0.5512                     | 0.5509         | 0.7089 | 0.7093 | 0.015       |      |      |
| 14         | 14                          | 18             | 17.0           | K14X18X17H           | 12.4                 | 17.1           | 19000          | 29000 | 0.0246         | 14.000                     | 13.992         | 18.006 | 18.017 | 0.008       |      |      |
|            | 0.5512                      | 0.7087         | 0.669          |                      | 2790                 | 3840           |                |       |                | 0.5512                     | 0.5509         | 0.7089 | 0.7093 | 0.018       |      |      |
| 14         | 14                          | 19             | 13.0           | K14X19X13H           | 10.2                 | 11.4           | 16000          | 24000 | 0.0217         | 14.000                     | 13.992         | 19.007 | 19.020 | 0.008       |      |      |
|            | 0.5512                      | 0.7480         | 0.512          |                      | 2290                 | 2560           |                |       |                | 0.5512                     | 0.5509         | 0.7483 | 0.7488 | 0.018       |      |      |
| 14         | 14                          | 19             | 18.0           | K14X19X18F           | 13.2                 | 16.0           | 16000          | 24000 | 0.0236         | 14.000                     | 13.992         | 19.007 | 19.020 | 0.011       |      |      |
|            | 0.5512                      | 0.7480         | 0.709          |                      | 2970                 | 3600           |                |       |                | 0.5512                     | 0.5509         | 0.7483 | 0.7488 | 0.024       |      |      |
| 14         | 14                          | 20             | 12.0           | K14X20X12            | 10.5                 | 10.6           | 14000          | 21000 | 0.0209         | 14.000                     | 13.992         | 20.007 | 20.020 | 0.009       |      |      |
|            | 0.5512                      | 0.7874         | 0.472          |                      | 2360                 | 2380           |                |       |                | 0.5512                     | 0.5509         | 0.7877 | 0.7882 | 0.020       |      |      |
| 15         | 15                          | 18             | 14.0           | K15X18X14TN          | 7.92                 | 11.9           | 13000          | 23000 | —              | 15.000                     | 14.992         | 18.006 | 18.017 | 0.003       |      |      |
|            | 0.5906                      | 0.7087         | 0.551          |                      | 1780                 | 2680           |                |       |                | 0.5906                     | 0.5902         | 0.7089 | 0.7093 | 0.007       |      |      |
| 15         | 15                          | 18             | 16.0           | K15X18X16F           | 8.36                 | 12.6           | 13000          | 23000 | 0.0244         | 15.000                     | 14.992         | 18.006 | 18.017 | 0.005       |      |      |
|            | 0.5906                      | 0.7087         | 0.630          |                      | 1880                 | 2830           |                |       |                | 0.5906                     | 0.5902         | 0.7089 | 0.7093 | 0.011       |      |      |
| 15         | 15                          | 18             | 17.0           | K15X18X17            | 8.08                 | 12.1           | 23000          | 36000 | 0.0241         | 15.000                     | 14.992         | 18.006 | 18.017 | 0.005       |      |      |
|            | 0.5906                      | 0.7087         | 0.669          |                      | 1820                 | 2720           |                |       |                | 0.5906                     | 0.5902         | 0.7089 | 0.7093 | 0.011       |      |      |
| 15         | 15                          | 19             | 10.0           | K15X19X10            | 7.87                 | 9.69           | 18000          | 28000 | 0.0220         | 15.000                     | 14.992         | 19.007 | 19.020 | 0.005       |      |      |
|            | 0.5906                      | 0.7480         | 0.394          |                      | 1770                 | 2180           |                |       |                | 0.5906                     | 0.5902         | 0.7483 | 0.7488 | 0.011       |      |      |
| 15         | 15                          | 19             | 13.0           | K15X19X13            | 9.66                 | 12.6           | 18000          | 28000 | 0.0235         | 15.000                     | 14.992         | 19.007 | 19.020 | 0.007       |      |      |
|            | 0.5906                      | 0.7480         | 0.512          |                      | 2170                 | 2830           |                |       |                | 0.5906                     | 0.5902         | 0.7483 | 0.7488 | 0.015       |      |      |
| 15         | 15                          | 19             | 17.0           | K15X19X17            | 12.3                 | 17.2           | 18000          | 28000 | 0.0254         | 15.000                     | 14.992         | 19.007 | 19.020 | 0.009       |      |      |
|            | 0.5906                      | 0.7480         | 0.669          |                      | 2770                 | 3870           |                |       |                | 0.5906                     | 0.5902         | 0.7483 | 0.7488 | 0.020       |      |      |

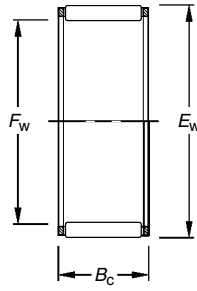
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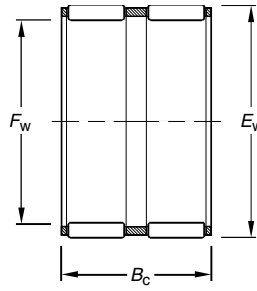
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — continued

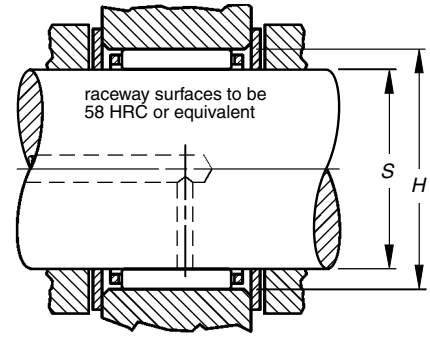
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |       |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------------------|--------|--------|--------|-------------|-------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil            | Max.                       | Min.   | Min.   | Max.   |             |       |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>0</sub> | S                          |        | H      |        |             |       |
|            | 15                | 19             | 17.0           | K15X19X17H           | 12.3                 | 17.2           | 18000          | 28000          | 0.0254                     | 15.000 | 14.992 | 19.007 | 19.020      | 0.009 |
|            | 0.5906            | 0.7480         | 0.669          |                      | 2770                 | 3870           |                |                |                            |        |        |        |             |       |
|            | 15                | 19             | 22.0           | K15X19X22ZW          | 12.2                 | 17.0           | 18000          | 28000          | 0.0253                     | 15.000 | 14.992 | 19.007 | 19.020      | 0.010 |
|            | 0.5906            | 0.7480         | 0.866          |                      | 2740                 | 3820           |                |                |                            |        |        |        |             |       |
|            | 15                | 20             | 13.0           | K15X20X13H           | 9.93                 | 11.3           | 16000          | 24000          | 0.0222                     | 15.000 | 14.992 | 20.007 | 20.020      | 0.008 |
|            | 0.5906            | 0.7874         | 0.512          |                      | 2230                 | 2540           |                |                |                            |        |        |        |             |       |
|            | 15                | 21             | 15.0           | K15X21X15            | 13.4                 | 14.8           | 14000          | 21000          | 0.0233                     | 15.000 | 14.992 | 21.007 | 21.020      | 0.013 |
|            | 0.5906            | 0.8268         | 0.591          |                      | 3010                 | 3330           |                |                |                            |        |        |        |             |       |
|            | 15                | 21             | 21.0           | K15X21X21H           | 18.0                 | 21.7           | 14000          | 21000          | 0.0256                     | 15.000 | 14.992 | 21.007 | 21.020      | 0.018 |
|            | 0.5906            | 0.8268         | 0.827          |                      | 4050                 | 4880           |                |                |                            |        |        |        |             |       |
| 16         | 16                | 20             | 8.0            | K16X20X8F            | 6.37                 | 7.51           | 18000          | 28000          | 0.0212                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.005 |
|            | 0.6299            | 0.7874         | 0.315          |                      | 1430                 | 1690           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 10.0           | K16X20X10            | 7.82                 | 9.76           | 18000          | 28000          | 0.0226                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.006 |
|            | 0.6299            | 0.7874         | 0.394          |                      | 1760                 | 2190           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 10.0           | K16X20X10H           | 7.82                 | 9.76           | 18000          | 28000          | 0.0226                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.006 |
|            | 0.6299            | 0.7874         | 0.394          |                      | 1760                 | 2190           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 10.6           | K16X20X10,6TN1       | 6.06                 | 7.01           | 18000          | 28000          | —                          | 16.000 | 15.992 | 20.007 | 20.020      | 0.003 |
|            | 0.6299            | 0.7874         | 0.417          |                      | 1360                 | 1580           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 13.0           | K16X20X13            | 10.1                 | 13.5           | 18000          | 28000          | 0.0245                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.007 |
|            | 0.6299            | 0.7874         | 0.512          |                      | 2270                 | 3030           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 14.0           | K16X20X14            | 10.8                 | 14.8           | 18000          | 28000          | 0.0251                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.007 |
|            | 0.6299            | 0.7874         | 0.551          |                      | 2430                 | 3330           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 17.0           | K16X20X17F           | 11.9                 | 16.8           | 18000          | 28000          | 0.0259                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.009 |
|            | 0.6299            | 0.7874         | 0.669          |                      | 2680                 | 3780           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 17.0           | K16X20X17H           | 12.9                 | 18.5           | 18000          | 28000          | 0.0265                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.008 |
|            | 0.6299            | 0.7874         | 0.669          |                      | 2900                 | 4160           |                |                |                            |        |        |        |             |       |
|            | 16                | 20             | 20.0           | K16X20X20            | 13.4                 | 19.5           | 18000          | 28000          | 0.0269                     | 16.000 | 15.992 | 20.007 | 20.020      | 0.011 |
|            | 0.6299            | 0.7874         | 0.787          |                      | 3010                 | 4380           |                |                |                            |        |        |        |             |       |
|            | 16                | 21             | 10.0           | K16X21X10HD          | 7.69                 | 8.22           | 18000          | 28000          | 0.0211                     | 16.000 | 15.992 | 21.007 | 21.020      | 0.007 |
|            | 0.6299            | 0.8268         | 0.394          |                      | 1730                 | 1850           |                |                |                            |        |        |        |             |       |
|            | 16                | 22             | 12.0           | K16X22X12            | 11.2                 | 11.9           | 19000          | 29000          | 0.0227                     | 16.000 | 15.992 | 22.007 | 22.020      | 0.010 |
|            | 0.6299            | 0.8661         | 0.472          |                      | 2520                 | 2680           |                |                |                            |        |        |        |             |       |
|            | 16                | 22             | 16.0           | K16X22X16            | 14.9                 | 17.2           | 19000          | 29000          | 0.0248                     | 16.000 | 15.992 | 22.007 | 22.020      | 0.014 |
|            | 0.6299            | 0.8661         | 0.630          |                      | 3350                 | 3870           |                |                |                            |        |        |        |             |       |
|            | 16                | 22             | 16.0           | K16X22X16H.ZB2       | 14.9                 | 17.2           | 19000          | 29000          | 0.0248                     | 16.000 | 15.992 | 22.007 | 22.020      | 0.014 |
|            | 0.6299            | 0.8661         | 0.630          |                      | 3350                 | 3870           |                |                |                            |        |        |        |             |       |
|            | 16                | 22             | 20.0           | K16X22X20            | 18.6                 | 22.9           | 19000          | 29000          | 0.0267                     | 16.000 | 15.992 | 22.007 | 22.020      | 0.017 |
|            | 0.6299            | 0.8661         | 0.787          |                      | 4180                 | 5150           |                |                |                            |        |        |        |             |       |
|            | 16                | 24             | 20.0           | K16X24X20            | 20.2                 | 21.4           | 20000          | 30000          | 0.0255                     | 16.000 | 15.992 | 24.007 | 24.020      | 0.025 |
|            | 0.6299            | 0.9449         | 0.787          |                      | 4540                 | 4810           |                |                |                            |        |        |        |             |       |
| 17         | 17                | 20             | 10.0           | K17X20X10            | 5.96                 | 8.53           | 16000          | 25000          | 0.0234                     | 17.000 | 16.992 | 20.007 | 20.020      | 0.004 |
|            | 0.6693            | 0.7874         | 0.394          |                      | 1340                 | 1920           |                |                |                            |        |        |        |             |       |
|            | 17                | 21             | 10.0           | K17X21X10            | 8.12                 | 10.4           | 17000          | 26000          | 0.0236                     | 17.000 | 16.992 | 21.007 | 21.020      | 0.006 |
|            | 0.6693            | 0.8268         | 0.394          |                      | 1830                 | 2340           |                |                |                            |        |        |        |             |       |
|            | 17                | 21             | 12.8           | K17X21X13H           | 10.5                 | 14.5           | 17000          | 26000          | 0.0256                     | 17.000 | 16.992 | 21.007 | 21.020      | 0.008 |
|            | 0.6693            | 0.8268         | 0.504          |                      | 2360                 | 3260           |                |                |                            |        |        |        |             |       |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.<br>-0.2-.008<br>-0.55-.022 |                |                | Assembly Designation | Load Ratings<br>kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt.<br>kg/lbs. |
|------------|----------------------------------------------|----------------|----------------|----------------------|-------------------------|----------------|----------------|-------|----------------|----------------------------|--------|--------|--------|----------------|
|            | F <sub>w</sub>                               | E <sub>w</sub> | B <sub>c</sub> |                      | C                       | C <sub>0</sub> | Grease         | Oil   |                | Max.                       | Min.   | Min.   | Max.   |                |
| mm         |                                              |                |                |                      |                         |                | RPM            |       | S              | H                          |        |        |        |                |
| 17         | 17                                           | 21             | 13.0           | K17X21X13            | 10.5                    | 14.5           | 17000          | 26000 | 0.0256         | 17.000                     | 16.992 | 21.007 | 21.020 | 0.008          |
|            | 0.6693                                       | 0.8268         | 0.512          |                      | 2360                    | 3260           |                |       |                | 0.6693                     | 0.6690 | 0.8270 | 0.8276 |                |
| 17         | 17                                           | 21             | 15.0           | K17X21X15            | 11.4                    | 16.1           | 17000          | 26000 | 0.0263         | 17.000                     | 16.992 | 21.007 | 21.020 | 0.008          |
|            | 0.6693                                       | 0.8268         | 0.591          |                      | 2560                    | 3620           |                |       |                | 0.6693                     | 0.6690 | 0.8270 | 0.8276 |                |
| 17         | 17                                           | 21             | 17.0           | K17X21X17H           | 13.4                    | 19.8           | 17000          | 26000 | 0.0277         | 17.000                     | 16.992 | 21.007 | 21.020 | 0.011          |
|            | 0.6693                                       | 0.8268         | 0.669          |                      | 3010                    | 4450           |                |       |                | 0.6693                     | 0.6690 | 0.8270 | 0.8276 |                |
| 17         | 17                                           | 22             | 20.0           | K17X22X20FH          | 17.0                    | 23.3           | 17000          | 27000 | 0.0280         | 17.000                     | 16.992 | 22.007 | 22.020 | 0.015          |
|            | 0.6693                                       | 0.8661         | 0.787          |                      | 3820                    | 5240           |                |       |                | 0.6693                     | 0.6690 | 0.8664 | 0.8669 |                |
| 17         | 17                                           | 23             | 15.0           | K17X23X15F           | 14.1                    | 16.3           | 18000          | 27000 | 0.0251         | 17.000                     | 16.992 | 23.007 | 23.020 | 0.010          |
|            | 0.6693                                       | 0.9055         | 0.591          |                      | 3170                    | 3660           |                |       |                | 0.6693                     | 0.6690 | 0.9058 | 0.9063 |                |
| 18         | 18                                           | 22             | 8.0            | K18X22X8F            | 6.32                    | 7.70           | 16000          | 24000 | 0.0224         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.005          |
|            | 0.7087                                       | 0.8661         | 0.315          |                      | 1420                    | 1730           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 10.0           | K18X22X10            | 8.41                    | 11.1           | 16000          | 24000 | 0.0246         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.006          |
|            | 0.7087                                       | 0.8661         | 0.394          |                      | 1890                    | 2500           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 10.0           | K18X22X10H           | 8.41                    | 11.1           | 16000          | 24000 | 0.0246         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.006          |
|            | 0.7087                                       | 0.8661         | 0.394          |                      | 1890                    | 2500           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 13.0           | K18X22X13H           | 10.8                    | 15.4           | 16000          | 24000 | 0.0266         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.008          |
|            | 0.7087                                       | 0.8661         | 0.512          |                      | 2430                    | 3460           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 14.0           | K18X22X14            | 11.6                    | 16.8           | 16000          | 24000 | 0.0272         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.009          |
|            | 0.7087                                       | 0.8661         | 0.551          |                      | 2610                    | 3780           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 14.0           | K18X22X14FV          | 11.3                    | 16.3           | 16000          | 24000 | 0.0270         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.009          |
|            | 0.7087                                       | 0.8661         | 0.551          |                      | 2540                    | 3660           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 17.0           | K18X22X17H           | 13.3                    | 19.9           | 16000          | 24000 | 0.0284         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.009          |
|            | 0.7087                                       | 0.8661         | 0.669          |                      | 2990                    | 4470           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 22             | 20.0           | K18X22X20F           | 15.0                    | 23.4           | 16000          | 24000 | 0.0296         | 18.000                     | 17.992 | 22.007 | 22.020 | 0.011          |
|            | 0.7087                                       | 0.8661         | 0.787          |                      | 3370                    | 5260           |                |       |                | 0.7087                     | 0.7083 | 0.8664 | 0.8669 |                |
| 18         | 18                                           | 24             | 12.0           | K18X24X12            | 11.8                    | 13.1           | 17000          | 25000 | 0.0243         | 18.000                     | 17.992 | 24.007 | 24.020 | 0.011          |
|            | 0.7087                                       | 0.9449         | 0.472          |                      | 2650                    | 2940           |                |       |                | 0.7087                     | 0.7083 | 0.9452 | 0.9457 |                |
| 18         | 18                                           | 24             | 20.0           | K18X24X20H           | 19.4                    | 24.9           | 16000          | 25000 | 0.0285         | 18.000                     | 17.992 | 24.007 | 24.020 | 0.019          |
|            | 0.7087                                       | 0.9449         | 0.787          |                      | 4360                    | 5600           |                |       |                | 0.7087                     | 0.7083 | 0.9452 | 0.9457 |                |
| 18         | 18                                           | 25             | 22.0           | K18X25X22H           | 23.3                    | 28.6           | 17000          | 26000 | 0.0291         | 18.000                     | 17.992 | 25.007 | 25.020 | 0.025          |
|            | 0.7087                                       | 0.9843         | 0.866          |                      | 5240                    | 6430           |                |       |                | 0.7087                     | 0.7083 | 0.9845 | 0.9850 |                |
| 18         | 18                                           | 26             | 12.0           | K18X26X12FV          | 13.8                    | 13.5           | 11000          | 17000 | 0.0238         | 18.000                     | 17.992 | 26.007 | 26.020 | 0.020          |
|            | 0.7087                                       | 1.0236         | 0.472          |                      | 3100                    | 3030           |                |       |                | 0.7087                     | 0.7083 | 1.0239 | 1.0244 |                |
| 18         | 18                                           | 26             | 20.0           | K18X26X20F.ZB2       | 21.7                    | 24.1           | 17000          | 26000 | 0.0275         | 18.000                     | 17.992 | 26.007 | 26.020 | 0.027          |
|            | 0.7087                                       | 1.0236         | 0.787          |                      | 4880                    | 5420           |                |       |                | 0.7087                     | 0.7083 | 1.0239 | 1.0244 |                |
| 19         | 19                                           | 23             | 13.0           | K19X23X13            | 10.8                    | 15.5           | 15000          | 23000 | 0.0273         | 19.000                     | 18.991 | 23.007 | 23.020 | 0.008          |
|            | 0.7480                                       | 0.9055         | 0.512          |                      | 2430                    | 3480           |                |       |                | 0.7480                     | 0.7477 | 0.9058 | 0.9063 |                |
| 19         | 19                                           | 23             | 17.0           | K19X23X17            | 13.4                    | 20.6           | 15000          | 23000 | 0.0293         | 19.000                     | 18.991 | 23.007 | 23.020 | 0.011          |
|            | 0.7480                                       | 0.9055         | 0.669          |                      | 3010                    | 4630           |                |       |                | 0.7480                     | 0.7477 | 0.9058 | 0.9063 |                |
| 20         | 20                                           | 24             | 8.0            | K20X24X8F            | 7.31                    | 9.60           | 14000          | 22000 | 0.0248         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.005          |
|            | 0.7874                                       | 0.9449         | 0.315          |                      | 1640                    | 2160           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 10.0           | K20X24X10            | 8.97                    | 12.5           | 14000          | 22000 | 0.0265         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.006          |
|            | 0.7874                                       | 0.9449         | 0.394          |                      | 2020                    | 2810           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 10.0           | K20X24X10H           | 8.97                    | 12.5           | 14000          | 22000 | 0.0265         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.006          |
|            | 0.7874                                       | 0.9449         | 0.394          |                      | 2020                    | 2810           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 12.0           | K20X24X12            | 10.7                    | 15.7           | 14000          | 22000 | 0.0280         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.008          |
|            | 0.7874                                       | 0.9449         | 0.472          |                      | 2410                    | 3530           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 13.0           | K20X24X13            | 11.5                    | 17.3           | 14000          | 22000 | 0.0287         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.008          |
|            | 0.7874                                       | 0.9449         | 0.512          |                      | 2590                    | 3890           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 13.0           | K20X24X13H           | 11.5                    | 17.3           | 14000          | 22000 | 0.0287         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.009          |
|            | 0.7874                                       | 0.9449         | 0.512          |                      | 2590                    | 3890           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 14.0           | K20X24X14            | 12.4                    | 18.9           | 14000          | 22000 | 0.0293         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.009          |
|            | 0.7874                                       | 0.9449         | 0.551          |                      | 2790                    | 4250           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 24             | 17.0           | K20X24X17H           | 14.8                    | 23.7           | 14000          | 22000 | 0.0310         | 20.000                     | 19.991 | 24.007 | 24.020 | 0.011          |
|            | 0.7874                                       | 0.9449         | 0.669          |                      | 3330                    | 5330           |                |       |                | 0.7874                     | 0.7870 | 0.9452 | 0.9457 |                |
| 20         | 20                                           | 26             | 12.0           | K20X26X12            | 13.0                    | 15.3           | 15000          | 23000 | 0.0264         | 20.000                     | 19.991 | 26.007 | 26.020 | 0.012          |
|            | 0.7874                                       | 1.0236         | 0.472          |                      | 2920                    | 3440           |                |       |                | 0.7874                     | 0.7870 | 1.0239 | 1.0244 |                |

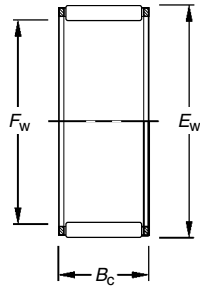
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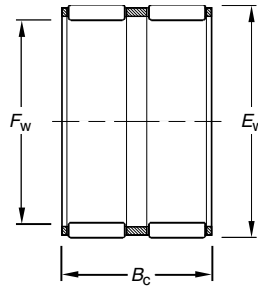
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — continued

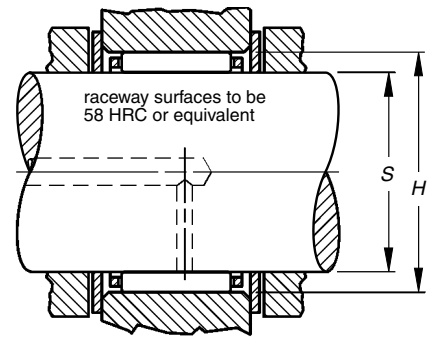
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------|----------------------------|--------|--------|--------|-------------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil            |                | Max.                       | Min.   | Min.   | Max.   |             |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>g</sub> |                | S                          | H      |        |        |             |
|            | 20                | 26             | 13.0           | K20X26X13H           | 13.4                 | 15.9           | 15000          | 23000          | 0.0267         | 20.000                     | 19.991 | 26.007 | 26.020 | 0.014       |
|            | 0.7874            | 1.0236         | 0.512          |                      | 3010                 | 3570           |                |                |                | 0.7874                     | 0.7870 | 1.0239 | 1.0244 | 0.031       |
|            | 20                | 26             | 17.0           | K20X26X17H           | 19.3                 | 25.5           | 15000          | 23000          | 0.0300         | 20.000                     | 19.991 | 26.007 | 26.020 | 0.017       |
|            | 0.7874            | 1.0236         | 0.669          |                      | 4340                 | 5730           |                |                |                | 0.7874                     | 0.7870 | 1.0239 | 1.0244 | 0.037       |
|            | 20                | 26             | 20.0           | K20X26X20            | 20.3                 | 27.2           | 15000          | 23000          | 0.0305         | 20.000                     | 19.991 | 26.007 | 26.020 | 0.020       |
|            | 0.7874            | 1.0236         | 0.787          |                      | 4560                 | 6110           |                |                |                | 0.7874                     | 0.7870 | 1.0239 | 1.0244 | 0.044       |
|            | 20                | 28             | 20.0           | K20X28X20H           | 24.6                 | 29.0           | 15000          | 23000          | 0.0300         | 20.000                     | 19.991 | 28.007 | 28.020 | 0.028       |
|            | 0.7874            | 1.1024         | 0.787          |                      | 5530                 | 6520           |                |                |                | 0.7874                     | 0.7870 | 1.1026 | 1.1031 | 0.062       |
|            | 20                | 28             | 25.0           | K20X28X25H           | 29.7                 | 37.0           | 15000          | 23000          | 0.0319         | 20.000                     | 19.991 | 28.007 | 28.020 | 0.036       |
|            | 0.7874            | 1.1024         | 0.984          |                      | 6680                 | 8320           |                |                |                | 0.7874                     | 0.7870 | 1.1026 | 1.1031 | 0.079       |
|            | 20                | 30             | 30.0           | K20X30X30H           | 38.9                 | 45.8           | 16000          | 24000          | 0.0329         | 20.000                     | 19.991 | 30.007 | 30.020 | 0.055       |
|            | 0.7874            | 1.1811         | 1.181          |                      | 8750                 | 10300          |                |                |                | 0.7874                     | 0.7870 | 1.1814 | 1.1819 | 0.121       |
|            | 20                | 32             | 36.0           | K20X32X36H           | 49.9                 | 57.0           | 16000          | 25000          | 0.0344         | 20.000                     | 19.991 | 32.009 | 32.025 | 0.082       |
|            | 0.7874            | 1.2598         | 1.417          |                      | 11220                | 12810          |                |                |                | 0.7874                     | 0.7870 | 1.2602 | 1.2608 | 0.181       |
|            | 21                | 25             | 17.0           | K21X25X17F           | 14.3                 | 23.1           | 14000          | 21000          | 0.0315         | 21.000                     | 20.991 | 25.007 | 25.020 | 0.012       |
|            | 0.8268            | 0.9843         | 0.669          |                      | 3210                 | 5190           |                |                |                | 0.8268                     | 0.8264 | 0.9845 | 0.9850 | 0.026       |
|            | 21                | 25             | 17.0           | K21X25X17H           | 14.3                 | 23.1           | 14000          | 21000          | 0.0315         | 21.000                     | 20.991 | 25.007 | 25.020 | 0.013       |
|            | 0.8268            | 0.9843         | 0.669          |                      | 3210                 | 5190           |                |                |                | 0.8268                     | 0.8264 | 0.9845 | 0.9850 | 0.029       |
|            | 22                | 26             | 10.0           | K22X26X10H           | 9.81                 | 14.5           | 13000          | 20000          | 0.0291         | 22.000                     | 21.991 | 26.007 | 26.020 | 0.007       |
|            | 0.8661            | 1.0236         | 0.394          |                      | 2210                 | 3 260          |                |                |                | 0.8661                     | 0.8658 | 1.0239 | 1.0244 | 0.015       |
|            | 22                | 26             | 13.0           | K22X26X13H           | 11.8                 | 18.3           | 13000          | 20000          | 0.0303         | 22.000                     | 21.991 | 26.007 | 26.020 | 0.012       |
|            | 0.8661            | 1.0236         | 0.512          |                      | 2650                 | 4110           |                |                |                | 0.8661                     | 0.8658 | 1.0239 | 1.0244 | 0.026       |
|            | 22                | 26             | 17.0           | K22X26X17            | 15.6                 | 26.3           | 13000          | 20000          | 0.0332         | 22.000                     | 21.991 | 26.007 | 26.020 | 0.015       |
|            | 0.8661            | 1.0236         | 0.669          |                      | 3510                 | 5910           |                |                |                | 0.8661                     | 0.8658 | 1.0239 | 1.0244 | 0.033       |
|            | 22                | 26             | 17.0           | K22X26X17H           | 15.6                 | 26.3           | 13000          | 20000          | 0.0332         | 22.000                     | 21.991 | 26.007 | 26.020 | 0.012       |
|            | 0.8661            | 1.0236         | 0.669          |                      | 3510                 | 5910           |                |                |                | 0.8661                     | 0.8658 | 1.0239 | 1.0244 | 0.026       |
|            | 22                | 26             | 18.0           | K22X26X18H           | 15.3                 | 25.5           | 13000          | 20000          | 0.0329         | 22.000                     | 21.991 | 26.007 | 26.020 | 0.017       |
|            | 0.8661            | 1.0236         | 0.709          |                      | 3440                 | 5730           |                |                |                | 0.8661                     | 0.8658 | 1.0239 | 1.0244 | 0.037       |
|            | 22                | 28             | 13.0           | K22X28X13            | 13.9                 | 17.1           | 13000          | 20000          | 0.0283         | 22.000                     | 21.991 | 28.007 | 28.020 | 0.015       |
|            | 0.8661            | 1.1024         | 0.512          |                      | 3120                 | 3840           |                |                |                | 0.8661                     | 0.8658 | 1.1026 | 1.1031 | 0.033       |
|            | 22                | 28             | 17.0           | K22X28X17H           | 18.2                 | 24.2           | 13000          | 20000          | 0.0308         | 22.000                     | 21.991 | 28.007 | 28.020 | 0.020       |
|            | 0.8661            | 1.1024         | 0.669          |                      | 4090                 | 5440           |                |                |                | 0.8661                     | 0.8658 | 1.1026 | 1.1031 | 0.044       |
|            | 22                | 30             | 15.0           | K22X30X15H           | 19.7                 | 22.3           | 14000          | 21000          | 0.0292         | 22.000                     | 21.991 | 30.007 | 30.020 | 0.023       |
|            | 0.8661            | 1.1811         | 0.591          |                      | 4430                 | 5010           |                |                |                | 0.8661                     | 0.8658 | 1.1814 | 1.1819 | 0.051       |
|            | 22                | 30             | 20.0           | K22X30X20FV          | 24.4                 | 29.4           | 14000          | 21000          | 0.0313         | 22.000                     | 21.991 | 30.007 | 30.020 | 0.031       |
|            | 0.8661            | 1.1811         | 0.787          |                      | 5490                 | 6610           |                |                |                | 0.8661                     | 0.8658 | 1.1814 | 1.1819 | 0.068       |
|            | 22                | 32             | 24.0           | K22X32X24F           | 33.1                 | 37.9           | 14000          | 22000          | 0.0326         | 22.000                     | 21.991 | 32.009 | 32.025 | 0.046       |
|            | 0.8661            | 1.2598         | 0.945          |                      | 7440                 | 8520           |                |                |                | 0.8661                     | 0.8658 | 1.2602 | 1.2608 | 0.101       |
|            | 22                | 32             | 30.0           | K22X32X30H           | 41.8                 | 51.3           | 14000          | 22000          | 0.0351         | 22.000                     | 21.991 | 32.009 | 32.025 | 0.057       |
|            | 0.8661            | 1.2598         | 1.181          |                      | 9400                 | 11530          |                |                |                | 0.8661                     | 0.8658 | 1.2602 | 1.2608 | 0.126       |
| 23         | 28                | 24.0           | K23X28X24F     | 22.4                 | 36.2                 | 12000          | 19000          | 0.0355         | 23.000         | 22.991                     | 28.007 | 28.020 | 0.023  |             |
| 0.9055     | 1.1024            | 0.945          |                | 5040                 | 8140                 |                |                |                | 0.9055         | 0.9052                     | 1.1026 | 1.1031 | 0.051  |             |
|            | 23                | 35             | 16.0           | K23X35X16H.ZB2       | 25.9                 | 25.1           | 14000          | 21000          | 0.0294         | 23.000                     | 22.991 | 35.009 | 35.025 | 0.040       |
|            | 0.9055            | 1.3780         | 0.630          |                      | 5820                 | 5640           |                |                |                | 0.9055                     | 0.9052 | 1.3783 | 1.3789 | 0.088       |
|            | 23                | 35             | 16.2           | K23X35X16.ZH         | 29.1                 | 29.3           | 14000          | 21000          | 0.0306         | 23.000                     | 22.991 | 35.009 | 35.025 | 0.040       |
|            | 0.9055            | 1.3780         | 0.638          |                      | 6540                 | 6590           |                |                |                | 0.9055                     | 0.9052 | 1.3783 | 1.3789 | 0.088       |



## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.<br>-0.2-.008<br>-0.55-.022 |        |       | Assembly Designation | Load Ratings<br>kN/lbf. |       | Limiting Speed |               | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt.<br>kg/lbs. |      |   |
|------------|----------------------------------------------|--------|-------|----------------------|-------------------------|-------|----------------|---------------|----------------|----------------------------|--------|--------|--------|----------------|------|---|
|            | mm                                           | Fw     | Ew    |                      | B <sub>c</sub>          | C     | C <sub>0</sub> | Grease<br>RPM |                | Oil<br>RPM                 | S      | Min.   |        |                | Max. |   |
|            |                                              |        |       |                      |                         |       |                |               |                |                            |        | H      | H      |                | H    | H |
| 24         | 24                                           | 28     | 10.0  | K24X28X10H           | 9.67                    | 14.6  | 12000          | 18000         | 0.0298         | 24.000                     | 23.991 | 28.007 | 28.020 | 0.027          |      |   |
|            | 0.9449                                       | 1.1024 | 0.394 |                      | 2170                    | 3280  |                |               |                | 0.9449                     | 0.9445 | 1.1026 | 1.1031 | 0.060          |      |   |
|            | 24                                           | 28     | 13.0  | K24X28X13H           | 12.5                    | 20.2  | 12000          | 18000         | 0.0323         | 24.000                     | 23.991 | 28.007 | 28.020 | 0.010          |      |   |
|            | 0.9449                                       | 1.1024 | 0.512 |                      | 2810                    | 4540  |                |               |                | 0.9449                     | 0.9445 | 1.1026 | 1.1031 | 0.022          |      |   |
|            | 24                                           | 28     | 16.0  | K24X28X16F           |                         |       |                |               |                | 24.000                     | 23.991 | 28.007 | 28.020 |                |      |   |
|            | 0.9449                                       | 1.1024 | 0.630 |                      |                         |       |                |               |                | 0.9449                     | 0.9445 | 1.1026 | 1.1031 |                |      |   |
|            | 24                                           | 28     | 17.0  | K24X28X17H           | 15.4                    | 26.4  | 12000          | 18000         | 0.0345         | 24.000                     | 23.991 | 28.007 | 28.020 | 0.013          |      |   |
|            | 0.9449                                       | 1.1024 | 0.669 |                      | 3460                    | 5930  |                |               |                | 0.9449                     | 0.9445 | 1.1026 | 1.1031 | 0.029          |      |   |
|            | 24                                           | 30     | 10.0  | K24X30X10TN          | 11.3                    | 13.5  | 12000          | 19000         | —              | 24.000                     | 23.991 | 30.007 | 30.020 | 0.008          |      |   |
|            | 0.9449                                       | 1.1811 | 0.394 |                      | 2540                    | 3030  |                |               |                | 0.9449                     | 0.9445 | 1.1814 | 1.1819 | 0.018          |      |   |
| 25         | 24                                           | 30     | 17.0  | K24X30X17H           | 19.8                    | 27.7  | 12000          | 19000         | 0.0331         | 24.000                     | 23.991 | 30.007 | 30.020 | 0.020          |      |   |
|            | 0.9449                                       | 1.1811 | 0.669 |                      | 4450                    | 6230  |                |               |                | 0.9449                     | 0.9445 | 1.1814 | 1.1819 | 0.044          |      |   |
|            | 24                                           | 30     | 22.0  | K24X30X22            | 25.0                    | 37.3  | 12000          | 19000         | 0.0356         | 24.000                     | 23.991 | 30.007 | 30.020 | 0.024          |      |   |
|            | 0.9449                                       | 1.1811 | 0.866 |                      | 5620                    | 8390  |                |               |                | 0.9449                     | 0.9445 | 1.1814 | 1.1819 | 0.053          |      |   |
|            | 24                                           | 36     | 23.0  | K24X36X23H           | 37.1                    | 40.1  | 13000          | 20000         | 0.0336         | 24.000                     | 23.991 | 36.009 | 36.025 | 0.070          |      |   |
|            | 0.9449                                       | 1.4173 | 0.906 |                      | 8340                    | 9010  |                |               |                | 0.9449                     | 0.9445 | 1.4177 | 1.4183 | 0.154          |      |   |
|            | 25                                           | 29     | 10.0  | K25X29X10H           | 9.61                    | 14.6  | 11000          | 17000         | 0.0303         | 25.000                     | 24.991 | 29.007 | 29.020 | 0.008          |      |   |
|            | 0.9843                                       | 1.1417 | 0.394 |                      | 2160                    | 3280  |                |               |                | 0.9843                     | 0.9839 | 1.1420 | 1.1425 | 0.018          |      |   |
|            | 25                                           | 29     | 13.0  | K25X29X13H           | 12.8                    | 21.1  | 11000          | 17000         | 0.0332         | 25.000                     | 24.991 | 29.007 | 29.020 | 0.010          |      |   |
|            | 0.9843                                       | 1.1417 | 0.512 |                      | 2880                    | 4740  |                |               |                | 0.9843                     | 0.9839 | 1.1420 | 1.1425 | 0.022          |      |   |
| 25         | 25                                           | 29     | 17.0  | K25X29X17H           | 15.1                    | 26.2  | 11000          | 17000         | 0.0351         | 25.000                     | 24.991 | 29.007 | 29.020 | 0.016          |      |   |
|            | 0.9843                                       | 1.1417 | 0.669 |                      | 3390                    | 5890  |                |               |                | 0.9843                     | 0.9839 | 1.1420 | 1.1425 | 0.035          |      |   |
|            | 25                                           | 30     | 13.0  | K25X30X13            | 14.6                    | 21.4  | 11000          | 17000         | 0.0323         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.012          |      |   |
|            | 0.9843                                       | 1.1811 | 0.512 |                      | 3280                    | 4810  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.026          |      |   |
|            | 25                                           | 30     | 17.0  | K25X30X17H           | 18.8                    | 29.8  | 11000          | 17000         | 0.0351         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.016          |      |   |
|            | 0.9843                                       | 1.1811 | 0.669 |                      | 4230                    | 6700  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.035          |      |   |
|            | 25                                           | 30     | 18.0  | K25X30X18            | 20.6                    | 33.4  | 11000          | 17000         | 0.0361         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.017          |      |   |
|            | 0.9843                                       | 1.1811 | 0.709 |                      | 4630                    | 7510  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.037          |      |   |
|            | 25                                           | 30     | 20.0  | K25X30X20H           | 21.9                    | 36.1  | 11000          | 17000         | 0.0368         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.019          |      |   |
|            | 0.9843                                       | 1.1811 | 0.787 |                      | 4920                    | 8120  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.042          |      |   |
| 25         | 25                                           | 30     | 24.0  | K25X30X24H           | 24.8                    | 42.4  | 11000          | 17000         | 0.0383         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.024          |      |   |
|            | 0.9843                                       | 1.1811 | 0.945 |                      | 5580                    | 9530  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.053          |      |   |
|            | 25                                           | 30     | 26.0  | K25X30X26ZW          | 23.0                    | 38.6  | 11000          | 17000         | 0.0374         | 25.000                     | 24.991 | 30.007 | 30.020 | 0.027          |      |   |
|            | 0.9843                                       | 1.1811 | 1.024 |                      | 5170                    | 8680  |                |               |                | 0.9843                     | 0.9839 | 1.1814 | 1.1819 | 0.060          |      |   |
|            | 25                                           | 31     | 14.0  | K25X31X14H           | 16.8                    | 22.7  | 12000          | 18000         | 0.0320         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.017          |      |   |
|            | 0.9843                                       | 1.2205 | 0.551 |                      | 3780                    | 5100  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.037          |      |   |
|            | 25                                           | 31     | 17.0  | K25X31X17H           | 19.7                    | 27.8  | 12000          | 18000         | 0.0337         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.020          |      |   |
|            | 0.9843                                       | 1.2205 | 0.669 |                      | 4430                    | 6250  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.044          |      |   |
|            | 25                                           | 31     | 21.0  | K25X31X21            | 25.1                    | 38.0  | 12000          | 18000         | 0.0364         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.026          |      |   |
|            | 0.9843                                       | 1.2205 | 0.827 |                      | 5640                    | 8540  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.057          |      |   |
| 25         | 25                                           | 31     | 21.0  | K25X31X21F           | 25.1                    | 38.0  | 12000          | 18000         | 0.0364         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.026          |      |   |
|            | 0.9843                                       | 1.2205 | 0.827 |                      | 5640                    | 8540  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.057          |      |   |
|            | 25                                           | 31     | 21.0  | K25X31X21H           | 25.1                    | 38.0  | 12000          | 18000         | 0.0364         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.026          |      |   |
|            | 0.9843                                       | 1.2205 | 0.827 |                      | 5640                    | 8540  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.057          |      |   |
|            | 25                                           | 31     | 24.0  | K25X31X24F           | 25.3                    | 38.5  | 12000          | 18000         | 0.0365         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.031          |      |   |
|            | 0.9843                                       | 1.2205 | 0.945 |                      | 5690                    | 8660  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.068          |      |   |
|            | 25                                           | 31     | 24.0  | K25X31X24FH          | 25.3                    | 38.5  | 12000          | 18000         | 0.0365         | 25.000                     | 24.991 | 31.009 | 31.025 | 0.031          |      |   |
|            | 0.9843                                       | 1.2205 | 0.945 |                      | 5690                    | 8660  |                |               |                | 0.9843                     | 0.9839 | 1.2208 | 1.2215 | 0.068          |      |   |
|            | 25                                           | 32     | 16.0  | K25X32X16            | 19.8                    | 25.3  | 12000          | 18000         | 0.0323         | 25.000                     | 24.991 | 32.009 | 32.025 | 0.027          |      |   |
|            | 0.9843                                       | 1.2598 | 0.630 |                      | 4450                    | 5690  |                |               |                | 0.9843                     | 0.9839 | 1.2602 | 1.2608 | 0.060          |      |   |
| 25         | 25                                           | 33     | 20.0  | K25X33X20FH.ZB2      | 25.6                    | 32.3  | 12000          | 18000         | 0.0337         | 25.000                     | 24.991 | 33.009 | 33.025 | 0.035          |      |   |
|            | 0.9843                                       | 1.2992 | 0.787 |                      | 5760                    | 7260  |                |               |                | 0.9843                     | 0.9839 | 1.2996 | 1.3002 | 0.077          |      |   |
|            | 25                                           | 33     | 20.0  | K25X33X20H           | 28.8                    | 37.6  | 12000          | 18000         | 0.0350         | 25.000                     | 24.991 | 33.009 | 33.025 | 0.035          |      |   |
|            | 0.9843                                       | 1.2992 | 0.787 |                      | 6470                    | 8450  |                |               |                | 0.9843                     | 0.9839 | 1.2996 | 1.3002 | 0.077          |      |   |
|            | 25                                           | 33     | 24.0  | K25X33X24H           | 32.3                    | 43.5  | 12000          | 18000         | 0.0363         | 25.000                     | 24.991 | 33.009 | 33.025 | 0.038          |      |   |
|            | 0.9843                                       | 1.2992 | 0.945 |                      | 7260                    | 9780  |                |               |                | 0.9843                     | 0.9839 | 1.2996 | 1.3002 | 0.084          |      |   |
|            | 25                                           | 33     | 25.0  | K25X33X25H           | 33.0                    | 44.6  | 12000          | 18000         | 0.0365         | 25.000                     | 24.991 | 33.009 | 33.025 | 0.041          |      |   |
|            | 0.9843                                       | 1.2992 | 0.984 |                      | 7420                    | 10030 |                |               |                | 0.9843                     | 0.9839 | 1.2996 | 1.3002 | 0.090          |      |   |

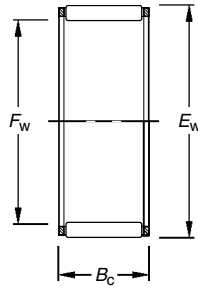
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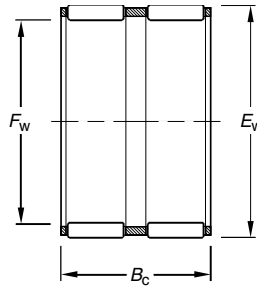
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — *continued*

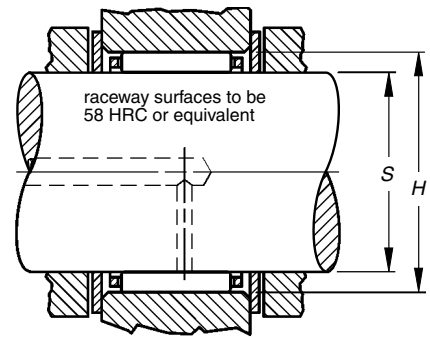
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |       |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------------------|--------|--------|--------|-------------|-------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil            | Max.                       | Min.   | Min.   | Max.   |             |       |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>0</sub> | S                          |        | H      |        |             |       |
|            | 25                | 35             | 23.7           | K25X35X23,7H         | 35.9                 | 42.3           | 12000          | 19000          | 0.0354                     | 25.000 | 24.991 | 35.009 | 35.025      | 0.050 |
|            | 0.9843            | 1.3780         | 0.933          |                      | 8070                 | 9510           |                |                |                            |        |        |        |             |       |
|            | 25                | 35             | 25.0           | K25X35X25H           | 37.8                 | 46.2           | 12000          | 19000          | 0.0360                     | 25.000 | 24.991 | 35.009 | 35.025      | 0.054 |
|            | 0.9843            | 1.3780         | 0.984          |                      | 8500                 | 10390          |                |                |                            |        |        |        |             |       |
|            | 25                | 35             | 30.0           | K25X35X30H           | 44.6                 | 57.2           | 12000          | 19000          | 0.0379                     | 25.000 | 24.991 | 35.009 | 35.025      | 0.060 |
|            | 0.9843            | 1.3780         | 1.181          |                      | 10030                | 12860          |                |                |                            |        |        |        |             |       |
|            | 25                | 35             | 30.0           | K25X35X30H.ZB2       | 44.6                 | 57.2           | 12000          | 19000          | 0.0379                     | 25.000 | 24.991 | 35.009 | 35.025      | 0.060 |
|            | 0.9843            | 1.3780         | 1.181          |                      | 10030                | 12860          |                |                |                            |        |        |        |             |       |
|            | 25                | 35             | 36.0           | K25X35X36H           | 52.4                 | 70.4           | 12000          | 19000          | 0.0399                     | 25.000 | 24.991 | 35.009 | 35.025      | 0.074 |
|            | 0.9843            | 1.3780         | 1.417          |                      | 11780                | 15830          |                |                |                            |        |        |        |             |       |
|            | 25                | 37             | 20.0           | K25X37X20H           | 32.5                 | 34.1           | 12000          | 19000          | 0.0328                     | 25.000 | 24.991 | 37.009 | 37.025      | 0.055 |
|            | 0.9843            | 1.4567         | 0.787          |                      | 7310                 | 7670           |                |                |                            |        |        |        |             |       |
| 26         | 26                | 30             | 10.0           | K26X30X10F           | 9.46                 | 14.5           | 11000          | 16000          | 0.0308                     | 26.000 | 25.991 | 30.007 | 30.020      | 0.007 |
|            | 1.0236            | 1.1811         | 0.394          |                      | 2130                 | 3260           |                |                |                            |        |        |        |             |       |
|            | 26                | 30             | 13.0           | K26X30X13            | 12.3                 | 20.4           | 10000          | 16000          | 0.0335                     | 26.000 | 25.991 | 30.007 | 30.020      | 0.011 |
|            | 1.0236            | 1.1811         | 0.512          |                      | 2770                 | 4590           |                |                |                            |        |        |        |             |       |
|            | 26                | 30             | 17.0           | K26X30X17            | 15.0                 | 26.3           | 10000          | 16000          | 0.0357                     | 26.000 | 25.991 | 30.007 | 30.020      | 0.014 |
|            | 1.0236            | 1.1811         | 0.669          |                      | 3370                 | 5910           |                |                |                            |        |        |        |             |       |
|            | 26                | 30             | 22.0           | K26X30X22ZW          | 16.7                 | 30.2           | 10000          | 16000          | 0.0370                     | 26.000 | 25.991 | 30.007 | 30.020      | 0.018 |
|            | 1.0236            | 1.1811         | 0.866          |                      | 3750                 | 6790           |                |                |                            |        |        |        |             |       |
| 28         | 28                | 32             | 21.0           | K28X32X21F           | 18.7                 | 35.7           | 9900           | 15000          | 0.0398                     | 28.000 | 27.991 | 32.009 | 32.025      | 0.018 |
|            | 1.1024            | 1.2598         | 0.827          |                      | 4200                 | 8030           |                |                |                            |        |        |        |             |       |
|            | 28                | 33             | 13.0           | K28X33X13F           | 14.1                 | 21.4           | 10000          | 15000          | 0.0339                     | 28.000 | 27.991 | 33.009 | 33.025      | 0.015 |
|            | 1.1024            | 1.2992         | 0.512          |                      | 3170                 | 4810           |                |                |                            |        |        |        |             |       |
|            | 28                | 33             | 13.0           | K28X33X13FV          | 14.1                 | 21.4           | 10000          | 15000          | 0.0339                     | 28.000 | 27.991 | 33.009 | 33.025      | 0.015 |
|            | 1.1024            | 1.2992         | 0.512          |                      | 3170                 | 4810           |                |                |                            |        |        |        |             |       |
|            | 28                | 33             | 17.0           | K28X33X17H           | 19.8                 | 33.0           | 10000          | 15000          | 0.0378                     | 28.000 | 27.991 | 33.009 | 33.025      | 0.018 |
|            | 1.1024            | 1.2992         | 0.669          |                      | 4450                 | 7420           |                |                |                            |        |        |        |             |       |
|            | 28                | 33             | 27.0           | K28X33X27            | 29.0                 | 53.8           | 10000          | 15000          | 0.0427                     | 28.000 | 27.991 | 33.009 | 33.025      | 0.027 |
|            | 1.1024            | 1.2992         | 1.063          |                      | 6520                 | 12090          |                |                |                            |        |        |        |             |       |
|            | 28                | 34             | 17.0           | K28X34X17            | 21.1                 | 31.5           | 10000          | 16000          | 0.0364                     | 28.000 | 27.991 | 34.009 | 34.025      | 0.022 |
|            | 1.1024            | 1.3386         | 0.669          |                      | 4740                 | 7080           |                |                |                            |        |        |        |             |       |
|            | 28                | 34             | 20.0           | K28X34X20H           | 24.4                 | 37.8           | 10000          | 16000          | 0.0381                     | 28.000 | 27.991 | 34.009 | 34.025      | 0.025 |
|            | 1.1024            | 1.3386         | 0.787          |                      | 5490                 | 8500           |                |                |                            |        |        |        |             |       |
|            | 28                | 35             | 15.0           | K28X35X15H           | 19.5                 | 25.6           | 10000          | 16000          | 0.0339                     | 28.000 | 27.991 | 35.009 | 35.025      | 0.025 |
|            | 1.1024            | 1.3780         | 0.591          |                      | 4380                 | 5760           |                |                |                            |        |        |        |             |       |
|            | 28                | 35             | 16.0           | K28X35X16FH          | 21.5                 | 29.1           | 10000          | 16000          | 0.0350                     | 28.000 | 27.991 | 35.009 | 35.025      | 0.026 |
|            | 1.1024            | 1.3780         | 0.630          |                      | 4830                 | 6540           |                |                |                            |        |        |        |             |       |
|            | 28                | 35             | 16.0           | K28X35X16H           | 21.5                 | 29.1           | 10000          | 16000          | 0.0350                     | 28.000 | 27.991 | 35.009 | 35.025      | 0.026 |
|            | 1.1024            | 1.3780         | 0.630          |                      | 4830                 | 6540           |                |                |                            |        |        |        |             |       |
|            | 28                | 35             | 27.0           | K28X35X27H           | 35.2                 | 54.7           | 10000          | 16000          | 0.0409                     | 28.000 | 27.991 | 35.009 | 35.025      | 0.042 |
|            | 1.1024            | 1.3780         | 1.063          |                      | 7910                 | 12300          |                |                |                            |        |        |        |             |       |
|            | 28                | 36             | 20.0           | K28X36X20FV          | 27.8                 | 37.0           | 10000          | 16000          | 0.0365                     | 28.000 | 27.991 | 36.009 | 36.025      | 0.039 |
|            | 1.1024            | 1.4173         | 0.787          |                      | 6250                 | 8320           |                |                |                            |        |        |        |             |       |
|            | 28                | 38             | 25.5           | K28X38X25,5          | 40.9                 | 52.7           | 11000          | 16000          | 0.0389                     | 28.000 | 27.991 | 38.009 | 38.025      | 0.059 |
|            | 1.1024            | 1.4961         | 1.004          |                      | 9190                 | 11850          |                |                |                            |        |        |        |             |       |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.<br>-0.2 - .008<br>-0.55 - .022 |                |                | Assembly Designation | Load Ratings<br>kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt.<br>kg/lbs. |
|------------|--------------------------------------------------|----------------|----------------|----------------------|-------------------------|----------------|----------------|-------|----------------|----------------------------|--------|--------|--------|----------------|
|            | F <sub>w</sub>                                   | E <sub>w</sub> | B <sub>c</sub> |                      | C                       | C <sub>0</sub> | Grease         | Oil   |                | Max.                       | Min.   | Min.   | Max.   |                |
| mm         |                                                  |                |                |                      |                         |                | RPM            |       | S              | H                          |        |        |        |                |
|            | 28                                               | 40             | 18.0           | K28X40X18H           | 33.6                    | 36.5           | 11000          | 17000 | 0.0349         | 28.000                     | 27.991 | 40.009 | 40.025 | 0.060          |
|            | 1.1024                                           | 1.5748         | 0.709          |                      | 7550                    | 8210           |                |       |                | 1.1024                     | 1.1020 | 1.5752 | 1.5758 |                |
|            | 28                                               | 40             | 25.0           | K28X40X25H           | 45.5                    | 54.0           | 11000          | 17000 | 0.0384         | 28.000                     | 27.991 | 40.009 | 40.025 | 0.072          |
|            | 1.1024                                           | 1.5748         | 0.984          |                      | 10230                   | 12140          |                |       |                | 1.1024                     | 1.1020 | 1.5752 | 1.5758 |                |
|            | 28                                               | 40             | 30.0           | K28X40X30H           | 54.3                    | 67.8           | 11000          | 17000 | 0.0406         | 28.000                     | 27.991 | 40.009 | 40.025 | 0.100          |
|            | 1.1024                                           | 1.5748         | 1.181          |                      | 12210                   | 15240          |                |       |                | 1.1024                     | 1.1020 | 1.5752 | 1.5758 |                |
|            | 28                                               | 41             | 25.0           | K28X41X25H           | 49.2                    | 57.1           | 11000          | 17000 | 0.0386         | 28.000                     | 27.991 | 41.009 | 41.025 | 0.082          |
|            | 1.1024                                           | 1.6142         | 0.984          |                      | 11060                   | 12840          |                |       |                | 1.1024                     | 1.1020 | 1.6145 | 1.6152 |                |
| 29         | 29                                               | 34             | 27.0           | K29X34X27F           | 28.9                    | 54.0           | 9700           | 15000 | 0.0434         | 29.000                     | 28.991 | 34.009 | 34.025 | 0.033          |
|            | 1.1417                                           | 1.3386         | 1.063          |                      | 6500                    | 12140          |                |       |                | 1.1417                     | 1.1414 | 1.3389 | 1.3396 | 0.073          |
| 30         | 30                                               | 34             | 13.0           | K30X34X13            | 13.5                    | 24.1           | 9200           | 14000 | 0.0372         | 30.000                     | 29.991 | 34.009 | 34.025 | 0.011          |
|            | 1.1811                                           | 1.3386         | 0.512          |                      | 3030                    | 5420           |                |       |                | 1.1811                     | 1.1807 | 1.3389 | 1.3396 |                |
|            | 30                                               | 35             | 13.0           | K30X35X13H           | 15.6                    | 24.9           | 9300           | 14000 | 0.0363         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.017          |
|            | 1.1811                                           | 1.3780         | 0.512          |                      | 3510                    | 5600           |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 35             | 17.0           | K30X35X17H           | 20.2                    | 34.6           | 9300           | 14000 | 0.0394         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.022          |
|            | 1.1811                                           | 1.3780         | 0.669          |                      | 4540                    | 7780           |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 35             | 20.0           | K30X35X20H           | 23.5                    | 41.9           | 9300           | 14000 | 0.0413         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.023          |
|            | 1.1811                                           | 1.3780         | 0.787          |                      | 5280                    | 9420           |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 35             | 22.8           | K30X35X23F           | 25.6                    | 46.8           | 9300           | 14000 | 0.0425         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.028          |
|            | 1.1811                                           | 1.3780         | 0.898          |                      | 5760                    | 10520          |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 35             | 27.0           | K30X35X27H           | 30.6                    | 59.0           | 9300           | 14000 | 0.0450         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.032          |
|            | 1.1811                                           | 1.3780         | 1.063          |                      | 6880                    | 13260          |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 35             | 27.0           | K30X35X27HZW         | 19.9                    | 33.6           | 9300           | 14000 | 0.0391         | 30.000                     | 29.991 | 35.009 | 35.025 | 0.033          |
|            | 1.1811                                           | 1.3780         | 1.063          |                      | 4470                    | 7550           |                |       |                | 1.1811                     | 1.1807 | 1.3783 | 1.3789 |                |
|            | 30                                               | 36             | 14.0           | K30X36X14            | 18.0                    | 26.2           | 9500           | 15000 | 0.0358         | 30.000                     | 29.991 | 36.009 | 36.025 | 0.020          |
|            | 1.1811                                           | 1.4173         | 0.551          |                      | 4050                    | 5890           |                |       |                | 1.1811                     | 1.1807 | 1.4177 | 1.4183 |                |
|            | 30                                               | 37             | 17.8           | K30X37X18            | 24.3                    | 34.8           | 9600           | 15000 | 0.0377         | 30.000                     | 29.991 | 37.009 | 37.025 | 0.033          |
|            | 1.1811                                           | 1.4567         | 0.701          |                      | 5460                    | 7820           |                |       |                | 1.1811                     | 1.1807 | 1.4570 | 1.4577 |                |
|            | 30                                               | 37             | 18.0           | K30X37X18FV          | 24.3                    | 34.8           | 9600           | 15000 | 0.0377         | 30.000                     | 29.991 | 37.009 | 37.025 | 0.033          |
|            | 1.1811                                           | 1.4567         | 0.709          |                      | 5460                    | 7820           |                |       |                | 1.1811                     | 1.1807 | 1.4570 | 1.4577 |                |
|            | 30                                               | 40             | 30.0           | K30X40X30H           | 49.2                    | 67.8           | 9900           | 15000 | 0.0426         | 30.000                     | 29.991 | 40.009 | 40.025 | 0.077          |
|            | 1.1811                                           | 1.5748         | 1.181          |                      | 11060                   | 15240          |                |       |                | 1.1811                     | 1.1807 | 1.5752 | 1.5758 |                |
|            | 30                                               | 42             | 30.0           | K30X42X30H           | 54.2                    | 68.6           | 10000          | 16000 | 0.0419         | 30.000                     | 29.991 | 42.009 | 42.025 | 0.096          |
|            | 1.1811                                           | 1.6535         | 1.181          |                      | 12180                   | 15420          |                |       |                | 1.1811                     | 1.1807 | 1.6539 | 1.6545 |                |
|            | 30                                               | 44             | 26.0           | K30X44X26H           | 52.4                    | 59.9           | 10000          | 16000 | 0.0399         | 30.000                     | 29.991 | 44.009 | 44.025 | 0.095          |
|            | 1.1811                                           | 1.7323         | 1.024          |                      | 11780                   | 13470          |                |       |                | 1.1811                     | 1.1807 | 1.7326 | 1.7333 |                |
| 31         | 31                                               | 37             | 24.0           | K30,6X36,6X24FV      | 27.8                    | 46.2           | 9300           | 14000 | 0.0416         | 30.600                     | 30.591 | 36.609 | 36.625 | 0.038          |
|            | 1.2047                                           | 1.4409         | 0.945          |                      | 6250                    | 10390          |                |       |                | 1.2047                     | 1.2044 | 1.4413 | 1.4419 | 0.084          |
| 32         | 32                                               | 36             | 15.0           | K32X36X15F           | 11.6                    | 20.2           | 8600           | 13000 | 0.0367         | 32.000                     | 31.989 | 36.009 | 36.025 | 0.015          |
|            | 1.2598                                           | 1.4173         | 0.591          |                      | 2610                    | 4540           |                |       |                | 1.2598                     | 1.2594 | 1.4177 | 1.4183 |                |
|            | 32                                               | 37             | 13.0           | K32X37X13            | 15.2                    | 24.4           | 8700           | 13000 | 0.0372         | 32.000                     | 31.989 | 37.009 | 37.025 | 0.018          |
|            | 1.2598                                           | 1.4567         | 0.512          |                      | 3420                    | 5490           |                |       |                | 1.2598                     | 1.2594 | 1.4570 | 1.4577 |                |
|            | 32                                               | 37             | 17.0           | K32X37X17H           | 20.0                    | 34.8           | 8700           | 13000 | 0.0406         | 32.000                     | 31.989 | 37.009 | 37.025 | 0.020          |
|            | 1.2598                                           | 1.4567         | 0.669          |                      | 4500                    | 7820           |                |       |                | 1.2598                     | 1.2594 | 1.4570 | 1.4577 |                |
|            | 32                                               | 37             | 27.0           | K32X37X27            | 29.3                    | 56.8           | 8700           | 13000 | 0.0459         | 32.000                     | 31.989 | 37.009 | 37.025 | 0.035          |
|            | 1.2598                                           | 1.4567         | 1.063          |                      | 6590                    | 12770          |                |       |                | 1.2598                     | 1.2594 | 1.4570 | 1.4577 |                |
|            | 32                                               | 38             | 20.0           | K32X38X20H           | 27.3                    | 45.7           | 8800           | 14000 | 0.0423         | 32.000                     | 31.989 | 38.009 | 38.025 | 0.030          |
|            | 1.2598                                           | 1.4961         | 0.787          |                      | 6140                    | 10270          |                |       |                | 1.2598                     | 1.2594 | 1.4964 | 1.4970 |                |
|            | 32                                               | 38             | 26.0           | K32X38X26H           | 33.2                    | 58.8           | 8800           | 14000 | 0.0451         | 32.000                     | 31.989 | 38.009 | 38.025 | 0.037          |
|            | 1.2598                                           | 1.4961         | 1.024          |                      | 7460                    | 13220          |                |       |                | 1.2598                     | 1.2594 | 1.4964 | 1.4970 |                |
|            | 32                                               | 39             | 16.0           | K32X39X16H           | 23.0                    | 33.0           | 8900           | 14000 | 0.0382         | 32.000                     | 31.989 | 39.009 | 39.025 | 0.030          |
|            | 1.2598                                           | 1.5354         | 0.630          |                      | 5170                    | 7420           |                |       |                | 1.2598                     | 1.2594 | 1.5358 | 1.5364 |                |
|            | 32                                               | 39             | 18.0           | K32X39X18H           | 25.8                    | 38.2           | 8900           | 14000 | 0.0397         | 32.000                     | 31.989 | 39.009 | 39.025 | 0.033          |
|            | 1.2598                                           | 1.5354         | 0.709          |                      | 5800                    | 8590           |                |       |                | 1.2598                     | 1.2594 | 1.5358 | 1.5364 |                |
|            | 32                                               | 40             | 25.0           | K32X40X25H           | 37.9                    | 57.2           | 9000           | 14000 | 0.0431         | 32.000                     | 31.989 | 40.009 | 40.025 | 0.052          |
|            | 1.2598                                           | 1.5748         | 0.984          |                      | 8520                    | 12860          |                |       |                | 1.2598                     | 1.2594 | 1.5752 | 1.5758 |                |
|            | 32                                               | 40             | 36.0           | K32X40X36H           | 52.3                    | 86.4           | 9000           | 14000 | 0.0477         | 32.000                     | 31.989 | 40.009 | 40.025 | 0.080          |
|            | 1.2598                                           | 1.5748         | 1.417          |                      | 11760                   | 19420          |                |       |                | 1.2598                     | 1.2594 | 1.5752 | 1.5758 |                |

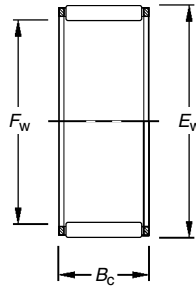
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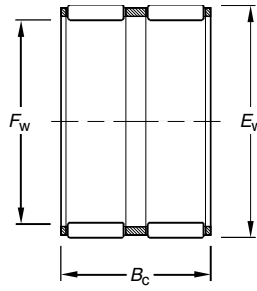
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — continued

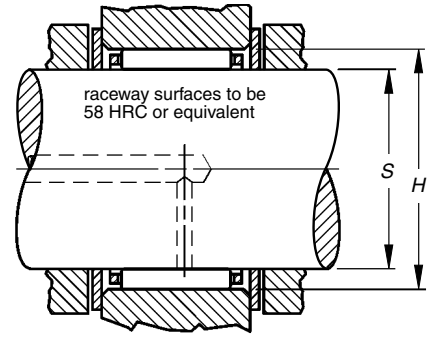
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Mounting Dimensions mm/in. |                  |                  |                  | Wt. kg/lbs.      |                |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------------------|------------------|------------------|------------------|------------------|----------------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease RPM     | Oil RPM        | C <sub>g</sub>             | Max. S           | Min. S           | Min. H           |                  | Max. H         |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>g</sub> | S                          | H                |                  |                  |                  |                |
|            | 32<br>1.2598      | 42<br>1.6535   | 42.0<br>1.654  | K32X42X42H           | 69.2<br>15560        | 108<br>24280   | 9200           | 14000          | 0.0491                     | 32.000<br>1.2598 | 31.989<br>1.2594 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.110<br>0.243 |
|            | 32<br>1.2598      | 46<br>1.8110   | 18.0<br>0.709  | K32X46X18H           | 39.2<br>8810         | 41.9<br>9420   | 9600           | 15000          | 0.0374                     | 32.000<br>1.2598 | 31.989<br>1.2594 | 46.009<br>1.8114 | 46.025<br>1.8120 | 0.075<br>0.165 |
|            | 32<br>1.2598      | 46<br>1.8110   | 32.0<br>1.260  | K32X46X32H           | 67.0<br>15060        | 83.4<br>18750  | 9600           | 15000          | 0.0444                     | 32.000<br>1.2598 | 31.989<br>1.2594 | 46.009<br>1.8114 | 46.025<br>1.8120 | 0.140<br>0.309 |
|            | 32<br>1.2598      | 46<br>1.8110   | 40.0<br>1.575  | K32X46X40H           | 81.7<br>18370        | 108<br>24280   | 9600           | 15000          | 0.0473                     | 32.000<br>1.2598 | 31.989<br>1.2594 | 46.009<br>1.8114 | 46.025<br>1.8120 | 0.158<br>0.348 |
| 33         | 33<br>1.2992      | 51<br>2.0079   | 23.0<br>0.906  | K33X51X23H.ZB2       | 55.9<br>12570        | 57.6<br>12950  | 9600           | 15000          | 0.0401                     | 33.000<br>1.2992 | 32.989<br>1.2988 | 51.010<br>2.0083 | 51.029<br>2.0090 | 0.140<br>0.309 |
| 34         | 34<br>1.3386      | 38<br>1.4961   | 11.0<br>0.433  | K34X38X11            | 12.2<br>2740         | 21.9<br>4920   | 8100           | 12000          | 0.0385                     | 34.000<br>1.3386 | 33.989<br>1.3381 | 38.009<br>1.4964 | 38.025<br>1.4970 | 0.011<br>0.024 |
|            | 34<br>1.3386      | 44<br>1.7323   | 26.0<br>1.024  | K34X44X26FH          | 42.9<br>9640         | 58.9<br>13240  | 8600           | 13000          | 0.0433                     | 34.000<br>1.3386 | 33.989<br>1.3381 | 44.009<br>1.7326 | 44.025<br>1.7333 | 0.080<br>0.176 |
|            | 34<br>1.3386      | 44<br>1.7323   | 26.0<br>1.024  | K34X44X26FV          | 42.9<br>9640         | 58.9<br>13240  | 8600           | 13000          | 0.0433                     | 34.000<br>1.3386 | 33.989<br>1.3381 | 44.009<br>1.7326 | 44.025<br>1.7333 | 0.075<br>0.165 |
| 35         | 35<br>1.3780      | 40<br>1.5748   | 13.0<br>0.512  | K35X40X13H           | 16.2<br>3640         | 27.2<br>6110   | 7900           | 12000          | 0.0398                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.018<br>0.040 |
|            | 35<br>1.3780      | 40<br>1.5748   | 17.0<br>0.669  | K35X40X17H           | 22.1<br>4970         | 40.8<br>9170   | 7900           | 12000          | 0.0440                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.025<br>0.055 |
|            | 35<br>1.3780      | 40<br>1.5748   | 19.0<br>0.748  | K35X40X19F.ZB2       | 23.2<br>5220         | 43.2<br>9710   | 7900           | 12000          | 0.0446                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.025<br>0.055 |
|            | 35<br>1.3780      | 40<br>1.5748   | 19.0<br>0.748  | K35X40X19H.ZB2       | 23.2<br>5220         | 43.2<br>9710   | 7900           | 12000          | 0.0446                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.025<br>0.055 |
|            | 35<br>1.3780      | 40<br>1.5748   | 25.0<br>0.984  | K35X40X25H           | 28.4<br>6380         | 56.2<br>12630  | 7900           | 12000          | 0.0476                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.035<br>0.077 |
|            | 35<br>1.3780      | 40<br>1.5748   | 27.0<br>1.063  | K35X40X27H           | 29.8<br>6700         | 59.6<br>13400  | 7900           | 12000          | 0.0483                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 40.009<br>1.5752 | 40.025<br>1.5758 | 0.037<br>0.082 |
|            | 35<br>1.3780      | 42<br>1.6535   | 16.0<br>0.630  | K35X42X16            | 24.5<br>5510         | 36.8<br>8270   | 8100           | 12000          | 0.0408                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.032<br>0.071 |
|            | 35<br>1.3780      | 42<br>1.6535   | 16.0<br>0.630  | K35X42X16AH          | 24.5<br>5510         | 36.8<br>8270   | 8100           | 12000          | 0.0408                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.031<br>0.068 |
|            | 35<br>1.3780      | 42<br>1.6535   | 18.0<br>0.709  | K35X42X18            | 27.5<br>6180         | 42.6<br>9580   | 8100           | 12000          | 0.0423                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.035<br>0.077 |
|            | 35<br>1.3780      | 42<br>1.6535   | 20.0<br>0.787  | K35X42X20H           | 30.4<br>6830         | 48.5<br>10900  | 8100           | 12000          | 0.0437                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.037<br>0.082 |
|            | 35<br>1.3780      | 42<br>1.6535   | 30.0<br>1.181  | K35X42X30FH          | 40.5<br>9100         | 70.0<br>15740  | 8100           | 12000          | 0.0479                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 42.009<br>1.6539 | 42.025<br>1.6545 | 0.061<br>0.134 |
|            | 35<br>1.3780      | 45<br>1.7717   | 20.0<br>0.787  | K35X45X20FH          | 36.5<br>8210         | 49.9<br>11220  | 8400           | 13000          | 0.0421                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 45.009<br>1.7720 | 45.025<br>1.7726 | 0.059<br>0.130 |
|            | 35<br>1.3780      | 45<br>1.7717   | 30.0<br>1.181  | K35X45X30F           | 51.2<br>11510        | 74.5<br>16750  | 8400           | 13000          | 0.0465                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 45.009<br>1.7720 | 45.025<br>1.7726 | 0.100<br>0.220 |
|            | 35<br>1.3780      | 45<br>1.7717   | 35.0<br>1.378  | K35X45X35H           | 62.1<br>13960        | 95.5<br>21470  | 8400           | 13000          | 0.0494                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 45.009<br>1.7720 | 45.025<br>1.7726 | 0.085<br>0.187 |
|            | 35<br>1.3780      | 45<br>1.7717   | 41.0<br>1.614  | K35X45X41            | 70.8<br>15920        | 113<br>25400   | 8400           | 13000          | 0.0515                     | 35.000<br>1.3780 | 34.989<br>1.3775 | 45.009<br>1.7720 | 45.025<br>1.7726 | 0.120<br>0.265 |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.           |        |       | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |
|------------|-----------------------------|--------|-------|----------------------|----------------------|----------------|----------------|-------|----------------|----------------------------|--------|--------|--------|-------------|
|            | -0.2 - .008<br>-0.55 - .022 |        |       |                      | C                    | C <sub>0</sub> | Grease         | Oil   |                | Max.                       | Min.   | Min.   | Max.   |             |
|            | mm                          | Fw     | Ew    |                      |                      |                |                |       |                |                            |        |        |        |             |
|            | 35                          | 45     | 49.0  | K35X45X49H           | 82.5                 | 138            | 8400           | 13000 | 0.0541         | 35.000                     | 34.989 | 45.009 | 45.025 | 0.143       |
|            | 1.3780                      | 1.7717 | 1.929 |                      | 18550                | 31020          |                |       |                | 1.3780                     | 1.3775 | 1.7720 | 1.7726 |             |
|            | 35                          | 45     | 49.0  | K35X45X49HZW         | 71.8                 | 115            | 8400           | 13000 | 0.0518         | 35.000                     | 34.989 | 45.009 | 45.025 | 0.143       |
|            | 1.3780                      | 1.7717 | 1.929 |                      | 16140                | 25850          |                |       |                | 1.3780                     | 1.3775 | 1.7720 | 1.7726 |             |
|            | 35                          | 48     | 22.8  | K35X48X22.8H.ZB2     | 47.6                 | 57.4           | 8600           | 13000 | 0.0423         | 35.000                     | 34.989 | 48.009 | 48.025 | 0.100       |
|            | 1.3780                      | 1.8898 | 0.898 |                      | 10700                | 12900          |                |       |                | 1.3780                     | 1.3775 | 1.8901 | 1.8907 |             |
|            | 35                          | 50     | 40.0  | K35X50X40F           | 79.7                 | 102            | 8700           | 13000 | 0.0480         | 35.000                     | 34.989 | 50.009 | 50.025 | 0.200       |
|            | 1.3780                      | 1.9685 | 1.575 |                      | 17920                | 22930          |                |       |                | 1.3780                     | 1.3775 | 1.9689 | 1.9695 |             |
| 36         | 36                          | 40     | 29.0  | K36X40X29TN          | 21.2                 | 45.2           | 7600           | 12000 | —              | 36.000                     | 35.989 | 40.009 | 40.025 | 0.029       |
|            | 1.4173                      | 1.5748 | 1.142 |                      | 4770                 | 10160          |                |       |                | 1.4173                     | 1.4169 | 1.5752 | 1.5758 |             |
|            | 36                          | 42     | 16.0  | K36X42X16            | 22.8                 | 37.7           | 7800           | 12000 | 0.0425         | 36.000                     | 35.989 | 42.009 | 42.025 | 0.027       |
|            | 1.4173                      | 1.6535 | 0.630 |                      | 5130                 | 8480           |                |       |                | 1.4173                     | 1.4169 | 1.6539 | 1.6545 |             |
|            | 36                          | 44     | 27.5  | K36X44X27.5H         | 42.8                 | 69.2           | 7900           | 12000 | 0.0475         | 36.000                     | 35.989 | 44.009 | 44.025 | 0.064       |
|            | 1.4173                      | 1.7323 | 1.083 |                      | 9620                 | 15560          |                |       |                | 1.4173                     | 1.4169 | 1.7326 | 1.7333 |             |
| 37         | 37                          | 42     | 13.0  | K37X42X13H           | 16.9                 | 29.4           | 7500           | 11000 | 0.0416         | 37.000                     | 36.989 | 42.009 | 42.025 | 0.017       |
|            | 1.4567                      | 1.6535 | 0.512 |                      | 3800                 | 6610           |                |       |                | 1.4567                     | 1.4563 | 1.6539 | 1.6545 |             |
|            | 37                          | 42     | 17.0  | K37X42X17H           | 21.9                 | 41.0           | 7500           | 11000 | 0.0451         | 37.000                     | 36.989 | 42.009 | 42.025 | 0.025       |
|            | 1.4567                      | 1.6535 | 0.669 |                      | 4920                 | 9220           |                |       |                | 1.4567                     | 1.4563 | 1.6539 | 1.6545 |             |
|            | 37                          | 42     | 27.0  | K37X42X27F           | 32.1                 | 66.9           | 7500           | 11000 | 0.0510         | 37.000                     | 36.989 | 42.009 | 42.025 | 0.039       |
|            | 1.4567                      | 1.6535 | 1.063 |                      | 7220                 | 15040          |                |       |                | 1.4567                     | 1.4563 | 1.6539 | 1.6545 |             |
|            | 37                          | 44     | 19.0  | K37X44X19H           | 29.7                 | 48.0           | 7600           | 12000 | 0.0447         | 37.000                     | 36.989 | 44.009 | 44.025 | 0.039       |
|            | 1.4567                      | 1.7323 | 0.748 |                      | 6680                 | 10790          |                |       |                | 1.4567                     | 1.4563 | 1.7326 | 1.7333 |             |
| 38         | 38                          | 41     | 9.0   | K38X41X9TN           | 5.93                 | 11.0           | 7100           | 11000 | —              | 38.000                     | 37.989 | 41.009 | 41.025 | 0.004       |
|            | 1.4961                      | 1.6142 | 0.354 |                      | 1330                 | 2470           |                |       |                | 1.4961                     | 1.4956 | 1.6145 | 1.6152 |             |
|            | 38                          | 43     | 17.0  | K38X43X17F           | 21.8                 | 41.0           | 7300           | 11000 | 0.0457         | 38.000                     | 37.989 | 43.009 | 43.025 | 0.032       |
|            | 1.4961                      | 1.6929 | 0.669 |                      | 4900                 | 9220           |                |       |                | 1.4961                     | 1.4956 | 1.6933 | 1.6939 |             |
|            | 38                          | 43     | 17.0  | K38X43X17H           | 21.8                 | 41.0           | 7300           | 11000 | 0.0457         | 38.000                     | 37.989 | 43.009 | 43.025 | 0.032       |
|            | 1.4961                      | 1.6929 | 0.669 |                      | 4900                 | 9220           |                |       |                | 1.4961                     | 1.4956 | 1.6933 | 1.6939 |             |
|            | 38                          | 43     | 27.0  | K38X43X27            | 31.9                 | 67.0           | 7300           | 11000 | 0.0516         | 38.000                     | 37.989 | 43.009 | 43.025 | 0.041       |
|            | 1.4961                      | 1.6929 | 1.063 |                      | 7170                 | 15060          |                |       |                | 1.4961                     | 1.4956 | 1.6933 | 1.6939 |             |
|            | 38                          | 46     | 19.8  | K38X46X20            | 33.3                 | 51.0           | 7500           | 12000 | 0.0450         | 38.000                     | 37.989 | 46.009 | 46.025 | 0.055       |
|            | 1.4961                      | 1.8110 | 0.780 |                      | 7490                 | 11470          |                |       |                | 1.4961                     | 1.4956 | 1.8114 | 1.8120 |             |
|            | 38                          | 46     | 19.8  | K38X46X20H           | 33.3                 | 51.0           | 7500           | 12000 | 0.0450         | 38.000                     | 37.989 | 46.009 | 46.025 | 0.055       |
|            | 1.4961                      | 1.8110 | 0.780 |                      | 7490                 | 11470          |                |       |                | 1.4961                     | 1.4956 | 1.8114 | 1.8120 |             |
|            | 38                          | 46     | 32.0  | K38X46X32FV1         | 53.7                 | 94.6           | 7500           | 12000 | 0.0525         | 38.000                     | 37.989 | 46.009 | 46.025 | 0.080       |
|            | 1.4961                      | 1.8110 | 1.260 |                      | 12070                | 21270          |                |       |                | 1.4961                     | 1.4956 | 1.8114 | 1.8120 |             |
|            | 38                          | 46     | 32.0  | K38X46X32H           | 55.2                 | 98.1           | 7500           | 12000 | 0.0530         | 38.000                     | 37.989 | 46.009 | 46.025 | 0.090       |
|            | 1.4961                      | 1.8110 | 1.260 |                      | 12410                | 22050          |                |       |                | 1.4961                     | 1.4956 | 1.8114 | 1.8120 |             |
|            | 38                          | 50     | 25.0  | K38X50X25            | 53.0                 | 70.8           | 7800           | 12000 | 0.0464         | 38.000                     | 37.989 | 50.009 | 50.025 | 0.100       |
|            | 1.4961                      | 1.9685 | 0.984 |                      | 11910                | 15920          |                |       |                | 1.4961                     | 1.4956 | 1.9689 | 1.9695 |             |
|            | 38                          | 50     | 33.0  | K38X50X33H           | 68.3                 | 98.2           | 7800           | 12000 | 0.0504         | 38.000                     | 37.989 | 50.009 | 50.025 | 0.126       |
|            | 1.4961                      | 1.9685 | 1.299 |                      | 15350                | 22080          |                |       |                | 1.4961                     | 1.4956 | 1.9689 | 1.9695 |             |
|            | 38                          | 50     | 40.0  | K38X50X40FCH1        | 76.2                 | 113            | 7800           | 12000 | 0.0521         | 38.000                     | 37.989 | 50.009 | 50.025 | 0.170       |
|            | 1.4961                      | 1.9685 | 1.575 |                      | 17130                | 25400          |                |       |                | 1.4961                     | 1.4956 | 1.9689 | 1.9695 |             |
| 40         | 40                          | 45     | 13.0  | K40X45X13H           | 17.6                 | 31.7           | 6900           | 11000 | 0.0438         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.022       |
|            | 1.5748                      | 1.7717 | 0.512 |                      | 3960                 | 7130           |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 17.0  | K40X45X17CH          | 19.2                 | 35.3           | 6900           | 11000 | 0.0450         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.027       |
|            | 1.5748                      | 1.7717 | 0.669 |                      | 4320                 | 7940           |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 17.0  | K40X45X17H           | 23.8                 | 47.0           | 6900           | 11000 | 0.0484         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.030       |
|            | 1.5748                      | 1.7717 | 0.669 |                      | 5350                 | 10570          |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 18.0  | K40X45X18H           | 25.1                 | 50.4           | 6900           | 11000 | 0.0492         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.031       |
|            | 1.5748                      | 1.7717 | 0.709 |                      | 5640                 | 11330          |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 21.0  | K40X45X21CH          | 23.3                 | 45.2           | 6900           | 11000 | 0.0479         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.033       |
|            | 1.5748                      | 1.7717 | 0.827 |                      | 5240                 | 10160          |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 27.0  | K40X45X27H           | 32.7                 | 70.2           | 6900           | 11000 | 0.0534         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.040       |
|            | 1.5748                      | 1.7717 | 1.063 |                      | 7350                 | 15780          |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
|            | 40                          | 45     | 27.0  | K40X45X27TN          | 33.3                 | 72.1           | 6900           | 11000 | 0.0538         | 40.000                     | 39.989 | 45.009 | 45.025 | 0.030       |
|            | 1.5748                      | 1.7717 | 1.063 |                      | 7490                 | 16210          |                |       |                | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |

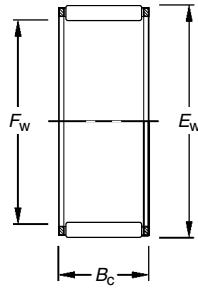
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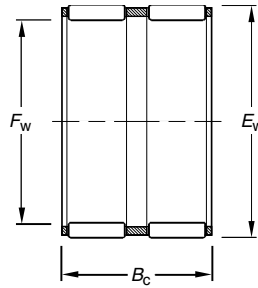
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — *continued*

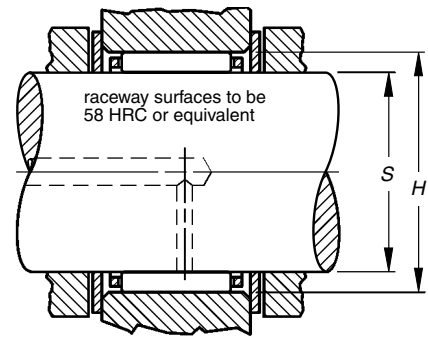
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Grease | Oil | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|--------|-----|----------------------------|--------|--------|--------|-------------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>0</sub> |        |     | S                          | H      |        |        |             |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>0</sub> |        |     | S                          | H      |        |        |             |
| 40         | 40                | 45             | 29.0           | K40X45X29H           | 34.7                 | 75.9           | 6900           | 11000          | 0.0545 |     | 40.000                     | 39.989 | 45.009 | 45.025 | 0.050       |
|            | 1.5748            | 1.7717         | 1.142          |                      | 7800                 | 17060          |                |                |        |     | 1.5748                     | 1.5744 | 1.7720 | 1.7726 |             |
| 40         | 40                | 46             | 17.0           | K40X46X17            | 25.2                 | 44.0           | 7000           | 11000          | 0.0464 |     | 40.000                     | 39.989 | 46.009 | 46.025 | 0.033       |
|            | 1.5748            | 1.8110         | 0.669          |                      | 5670                 | 9890           |                |                |        |     | 1.5748                     | 1.5744 | 1.8114 | 1.8120 |             |
| 40         | 40                | 47             | 18.0           | K40X47X18            | 28.0                 | 45.6           | 7000           | 11000          | 0.0456 |     | 40.000                     | 39.989 | 47.009 | 47.025 | 0.041       |
|            | 1.5748            | 1.8504         | 0.709          |                      | 6290                 | 10250          |                |                |        |     | 1.5748                     | 1.5744 | 1.8507 | 1.8514 |             |
| 40         | 40                | 47             | 20.0           | K40X47X20            | 31.1                 | 52.1           | 7000           | 11000          | 0.0472 |     | 40.000                     | 39.989 | 47.009 | 47.025 | 0.042       |
|            | 1.5748            | 1.8504         | 0.787          |                      | 6990                 | 11710          |                |                |        |     | 1.5748                     | 1.5744 | 1.8507 | 1.8514 |             |
| 40         | 40                | 48             | 20.0           | K40X48X20FV1         | 35.5                 | 56.3           | 7100           | 11000          | 0.0472 |     | 40.000                     | 39.989 | 48.009 | 48.025 | 0.052       |
|            | 1.5748            | 1.8898         | 0.787          |                      | 7980                 | 12660          |                |                |        |     | 1.5748                     | 1.5744 | 1.8901 | 1.8907 |             |
| 40         | 40                | 48             | 20.0           | K40X48X20H           | 35.5                 | 56.3           | 7100           | 11000          | 0.0472 |     | 40.000                     | 39.989 | 48.009 | 48.025 | 0.050       |
|            | 1.5748            | 1.8898         | 0.787          |                      | 7980                 | 12660          |                |                |        |     | 1.5748                     | 1.5744 | 1.8901 | 1.8907 |             |
| 40         | 40                | 48             | 35.0           | K40X48X35H.ZB2       | 57.3                 | 104            | 7100           | 11000          | 0.0550 |     | 40.000                     | 39.989 | 48.009 | 48.025 | 0.098       |
|            | 1.5748            | 1.8898         | 1.378          |                      | 12880                | 23380          |                |                |        |     | 1.5748                     | 1.5744 | 1.8901 | 1.8907 |             |
| 40         | 40                | 50             | 27.0           | K40X50X27H           | 53.0                 | 81.0           | 7200           | 11000          | 0.0502 |     | 40.000                     | 39.989 | 50.009 | 50.025 | 0.084       |
|            | 1.5748            | 1.9685         | 1.063          |                      | 11910                | 18210          |                |                |        |     | 1.5748                     | 1.5744 | 1.9689 | 1.9695 |             |
| 40         | 40                | 55             | 45.0           | K40X55X45H           | 103                  | 146            | 7500           | 12000          | 0.0554 |     | 40.000                     | 39.989 | 55.010 | 55.029 | 0.221       |
|            | 1.5748            | 2.1654         | 1.772          |                      | 23160                | 32820          |                |                |        |     | 1.5748                     | 1.5744 | 2.1657 | 2.1665 |             |
| 40         | 40                | 56             | 26.0           | K40X56X26H           | 63.7                 | 75.7           | 7600           | 12000          | 0.0467 |     | 40.000                     | 39.989 | 56.010 | 56.029 | 0.138       |
|            | 1.5748            | 2.2047         | 1.024          |                      | 14320                | 17020          |                |                |        |     | 1.5748                     | 1.5744 | 2.2051 | 2.2059 |             |
| 41         | 41                | 48             | 31.0           | K41X48X31HZW         | 38.0                 | 68.1           | 6800           | 11000          | 0.0510 |     | 41.000                     | 40.989 | 48.009 | 48.025 | 0.067       |
|            | 1.6142            | 1.8898         | 1.220          |                      | 8540                 | 15310          |                |                |        |     | 1.6142                     | 1.6137 | 1.8901 | 1.8907 | 0.148       |
| 42         | 42                | 47             | 13.0           | K42X47X13H           | 18.7                 | 34.9           | 6500           | 10000          | 0.0459 |     | 42.000                     | 41.989 | 47.009 | 47.025 | 0.027       |
|            | 1.6535            | 1.8504         | 0.512          |                      | 4200                 | 7850           |                |                |        |     | 1.6535                     | 1.6531 | 1.8507 | 1.8514 |             |
| 42         | 42                | 47             | 17.0           | K42X47X17H           | 22.8                 | 45.2           | 6500           | 10000          | 0.0490 |     | 42.000                     | 41.989 | 47.009 | 47.025 | 0.028       |
|            | 1.6535            | 1.8504         | 0.669          |                      | 5130                 | 10160          |                |                |        |     | 1.6535                     | 1.6531 | 1.8507 | 1.8514 |             |
| 42         | 42                | 47             | 27.0           | K42X47X27FH          | 33.8                 | 74.7           | 6500           | 10000          | 0.0555 |     | 42.000                     | 41.989 | 47.009 | 47.025 | 0.041       |
|            | 1.6535            | 1.8504         | 1.063          |                      | 7600                 | 16790          |                |                |        |     | 1.6535                     | 1.6531 | 1.8507 | 1.8514 |             |
| 42         | 42                | 47             | 27.0           | K42X47X27H           | 33.8                 | 74.7           | 6500           | 10000          | 0.0555 |     | 42.000                     | 41.989 | 47.009 | 47.025 | 0.041       |
|            | 1.6535            | 1.8504         | 1.063          |                      | 7600                 | 16790          |                |                |        |     | 1.6535                     | 1.6531 | 1.8507 | 1.8514 |             |
| 42         | 42                | 48             | 24.0           | K42X48X24F           | 33.1                 | 63.9           | 6600           | 10000          | 0.0519 |     | 42.000                     | 41.989 | 48.009 | 48.025 | 0.046       |
|            | 1.6535            | 1.8898         | 0.945          |                      | 7440                 | 14370          |                |                |        |     | 1.6535                     | 1.6531 | 1.8901 | 1.8907 |             |
| 42         | 42                | 50             | 13.0           | K42X50X13H           | 20.9                 | 28.9           | 6700           | 10000          | 0.0409 |     | 42.000                     | 41.989 | 50.009 | 50.025 | 0.035       |
|            | 1.6535            | 1.9685         | 0.512          |                      | 4700                 | 6500           |                |                |        |     | 1.6535                     | 1.6531 | 1.9689 | 1.9695 |             |
| 42         | 42                | 50             | 20.0           | K42X50X20H           | 35.2                 | 56.6           | 6700           | 10000          | 0.0483 |     | 42.000                     | 41.989 | 50.009 | 50.025 | 0.054       |
|            | 1.6535            | 1.9685         | 0.787          |                      | 7910                 | 12720          |                |                |        |     | 1.6535                     | 1.6531 | 1.9689 | 1.9695 |             |
| 42         | 42                | 50             | 30.0           | K42X50X30H.ZB2       | 51.3                 | 91.9           | 6700           | 10000          | 0.0545 |     | 42.000                     | 41.989 | 50.009 | 50.025 | 0.080       |
|            | 1.6535            | 1.9685         | 1.181          |                      | 11530                | 20660          |                |                |        |     | 1.6535                     | 1.6531 | 1.9689 | 1.9695 |             |
| 42         | 42                | 54             | 30.7           | K42X54X30,7H         | 62.7                 | 90.1           | 7000           | 11000          | 0.0514 |     | 42.000                     | 41.989 | 54.010 | 54.029 | 0.140       |
|            | 1.6535            | 2.1260         | 1.209          |                      | 14100                | 20260          |                |                |        |     | 1.6535                     | 1.6531 | 2.1264 | 2.1271 |             |
| 43         | 43                | 48             | 17.0           | K43X48X17FH          | 23.0                 | 45.8           | 6400           | 9800           | 0.0496 |     | 43.000                     | 42.989 | 48.009 | 48.025 | 0.036       |
|            | 1.6929            | 1.8898         | 0.669          |                      | 5170                 | 10300          |                |                |        |     | 1.6929                     | 1.6925 | 1.8901 | 1.8907 |             |
| 43         | 43                | 48             | 27.0           | K43X48X27H           | 34.8                 | 78.0           | 6400           | 9800           | 0.0567 |     | 43.000                     | 42.989 | 48.009 | 48.025 | 0.050       |
|            | 1.6929            | 1.8898         | 1.063          |                      | 7820                 | 17540          |                |                |        |     | 1.6929                     | 1.6925 | 1.8901 | 1.8907 |             |
| 44         | 44                | 50             | 22.0           | K44X50X22            | 31.6                 | 60.6           | 6400           | 9900           | 0.0523 |     | 44.000                     | 43.989 | 50.009 | 50.025 | 0.046       |
|            | 1.7323            | 1.9685         | 0.866          |                      | 7100                 | 13620          |                |                |        |     | 1.7323                     | 1.7319 | 1.9689 | 1.9695 |             |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.           |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |
|------------|-----------------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|-------|----------------|----------------------------|--------|--------|--------|-------------|
|            | -0.2 - .008<br>-0.55 - .022 |                |                |                      | C                    | C <sub>0</sub> | Grease         | Oil   |                | Max.                       | Min.   | Min.   | Max.   |             |
|            | mm                          | F <sub>w</sub> | E <sub>w</sub> |                      |                      |                |                |       |                |                            |        |        |        |             |
| 44         | 44                          | 50             | 22.0           | K44X50X22H           | 31.6                 | 60.6           | 6400           | 9900  | 0.0523         | 44.000                     | 43.989 | 50.009 | 50.025 | 0.046       |
|            | 1.7323                      | 1.9685         | 0.866          |                      | 7100                 | 13620          |                |       |                | 1.7323                     | 1.7319 | 1.9689 | 1.9695 | 0.101       |
| 44         | 44                          | 50             | 30.5           | K44X50X30.5HZW       | 35.5                 | 70.5           | 6400           | 9900  | 0.0543         | 44.000                     | 43.989 | 50.009 | 50.025 | 0.068       |
|            | 1.7323                      | 1.9685         | 1.201          |                      | 7980                 | 15850          |                |       |                | 1.7323                     | 1.7319 | 1.9689 | 1.9695 | 0.150       |
| 45         | 45                          | 50             | 13.0           | K45X50X13H           | 18.4                 | 35.1           | 6100           | 9400  | 0.0474         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.022       |
|            | 1.7717                      | 1.9685         | 0.512          |                      | 4140                 | 7890           |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.049       |
| 45         | 45                          | 50             | 15.0           | K45X50X15FVB         | 19.4                 | 37.3           | 6100           | 9400  | 0.0482         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.028       |
|            | 1.7717                      | 1.9685         | 0.591          |                      | 4360                 | 8390           |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.062       |
| 45         | 45                          | 50             | 17.0           | K45X50X17H           | 24.9                 | 51.8           | 6100           | 9400  | 0.0523         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.030       |
|            | 1.7717                      | 1.9685         | 0.669          |                      | 5600                 | 11650          |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.066       |
| 45         | 45                          | 50             | 20.0           | K45X50X20F           | 27.0                 | 57.4           | 6100           | 9400  | 0.0536         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.040       |
|            | 1.7717                      | 1.9685         | 0.787          |                      | 6070                 | 12900          |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.088       |
| 45         | 45                          | 50             | 21.0           | K45X50X21CH          | 24.6                 | 50.4           | 6100           | 9400  | 0.0519         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.036       |
|            | 1.7717                      | 1.9685         | 0.827          |                      | 5530                 | 11330          |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.079       |
| 45         | 45                          | 50             | 27.0           | K45X50X27FH.ZB2      | 34.2                 | 77.4           | 6100           | 9400  | 0.0577         | 45.000                     | 44.989 | 50.009 | 50.025 | 0.043       |
|            | 1.7717                      | 1.9685         | 1.063          |                      | 7690                 | 17400          |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.095       |
| 45         | 45                          | 50             | 27.0           | K45X50X27TN          | 31.8                 | 70.7           | 6100           | 9400  | —              | 45.000                     | 44.989 | 50.009 | 50.025 | 0.048       |
|            | 1.7717                      | 1.9685         | 1.063          |                      | 7150                 | 15890          |                |       |                | 1.7717                     | 1.7712 | 1.9689 | 1.9695 | 0.106       |
| 45         | 45                          | 52             | 18.0           | K45X52X18H           | 30.1                 | 52.0           | 6200           | 9500  | 0.0497         | 45.000                     | 44.989 | 52.010 | 52.029 | 0.045       |
|            | 1.7717                      | 2.0472         | 0.709          |                      | 6770                 | 11690          |                |       |                | 1.7717                     | 1.7712 | 2.0476 | 2.0484 | 0.099       |
| 45         | 45                          | 52             | 21.0           | K45X52X21F           | 35.0                 | 63.2           | 6200           | 9500  | 0.0521         | 45.000                     | 44.989 | 52.010 | 52.029 | 0.055       |
|            | 1.7717                      | 2.0472         | 0.827          |                      | 7870                 | 14210          |                |       |                | 1.7717                     | 1.7712 | 2.0476 | 2.0484 | 0.121       |
| 45         | 45                          | 53             | 19.8           | K45X53X20FH.ZB2      | 36.0                 | 59.5           | 6200           | 9600  | 0.0504         | 45.000                     | 44.989 | 53.010 | 53.029 | 0.060       |
|            | 1.7717                      | 2.0866         | 0.780          |                      | 8090                 | 13380          |                |       |                | 1.7717                     | 1.7712 | 2.0870 | 2.0878 | 0.132       |
| 45         | 45                          | 53             | 20.0           | K45X53X20H           | 36.0                 | 59.5           | 6200           | 9600  | 0.0504         | 45.000                     | 44.989 | 53.010 | 53.029 | 0.054       |
|            | 1.7717                      | 2.0866         | 0.787          |                      | 8090                 | 13380          |                |       |                | 1.7717                     | 1.7712 | 2.0870 | 2.0878 | 0.119       |
| 45         | 45                          | 53             | 24.8           | K45X53X25H           | 45.9                 | 81.5           | 6200           | 9600  | 0.0545         | 45.000                     | 44.989 | 53.010 | 53.029 | 0.072       |
|            | 1.7717                      | 2.0866         | 0.976          |                      | 10320                | 18320          |                |       |                | 1.7717                     | 1.7712 | 2.0870 | 2.0878 | 0.159       |
| 45         | 45                          | 53             | 25.0           | K45X53X25F           | 42.5                 | 73.7           | 6200           | 9600  | 0.0531         | 45.000                     | 44.989 | 53.010 | 53.029 | 0.075       |
|            | 1.7717                      | 2.0866         | 0.984          |                      | 9550                 | 16570          |                |       |                | 1.7717                     | 1.7712 | 2.0870 | 2.0878 | 0.165       |
| 45         | 45                          | 53             | 28.0           | K45X53X28H           | 49.3                 | 89.2           | 6200           | 9600  | 0.0557         | 45.000                     | 44.989 | 53.010 | 53.029 | 0.078       |
|            | 1.7717                      | 2.0866         | 1.102          |                      | 11080                | 20050          |                |       |                | 1.7717                     | 1.7712 | 2.0870 | 2.0878 | 0.172       |
| 45         | 45                          | 55             | 20.0           | K45X55X20H           | 42.0                 | 62.2           | 6400           | 9800  | 0.0494         | 45.000                     | 44.989 | 55.010 | 55.029 | 0.074       |
|            | 1.7717                      | 2.1654         | 0.787          |                      | 9440                 | 13980          |                |       |                | 1.7717                     | 1.7712 | 2.1657 | 2.1665 | 0.163       |
| 45         | 45                          | 59             | 18.0           | K45X59X18H           | 47.8                 | 58.9           | 6600           | 10000 | 0.0467         | 45.000                     | 44.989 | 59.010 | 59.029 | 0.107       |
|            | 1.7717                      | 2.3228         | 0.709          |                      | 10750                | 13240          |                |       |                | 1.7717                     | 1.7712 | 2.3232 | 2.3240 | 0.236       |
| 45         | 45                          | 59             | 18.0           | K45X59X18TN          | 45.7                 | 55.4           | 6600           | 10000 | —              | 45.000                     | 44.989 | 59.010 | 59.029 | 0.097       |
|            | 1.7717                      | 2.3228         | 0.709          |                      | 10270                | 12450          |                |       |                | 1.7717                     | 1.7712 | 2.3232 | 2.3240 | 0.214       |
| 45         | 45                          | 59             | 36.0           | K45X59X36H           | 82.4                 | 118            | 6600           | 10000 | 0.0555         | 45.000                     | 44.989 | 59.010 | 59.029 | 0.181       |
|            | 1.7717                      | 2.3228         | 1.417          |                      | 18520                | 26530          |                |       |                | 1.7717                     | 1.7712 | 2.3232 | 2.3240 | 0.399       |
| 45         | 45                          | 60             | 30.0           | K45X60X30H           | 75.5                 | 101            | 6600           | 10000 | 0.0530         | 45.000                     | 44.989 | 60.010 | 60.029 | 0.171       |
|            | 1.7717                      | 2.3622         | 1.181          |                      | 16970                | 22710          |                |       |                | 1.7717                     | 1.7712 | 2.3626 | 2.3633 | 0.377       |
| 45         | 45                          | 60             | 45.0           | K45X60X45H           | 108                  | 160            | 6600           | 10000 | 0.0594         | 45.000                     | 44.989 | 60.010 | 60.029 | 0.280       |
|            | 1.7717                      | 2.3622         | 1.772          |                      | 24280                | 35970          |                |       |                | 1.7717                     | 1.7712 | 2.3626 | 2.3633 | 0.617       |
| 46         | 46                          | 53             | 36.0           | K46X53X36HZW         | 48.6                 | 96.7           | 6100           | 9300  | 0.0585         | 46.000                     | 45.989 | 53.010 | 53.029 | 0.100       |
|            | 1.8110                      | 2.0866         | 1.417          |                      | 10930                | 21740          |                |       |                | 1.8110                     | 1.8106 | 2.0870 | 2.0878 | 0.220       |
| 47         | 47                          | 52             | 15.0           | K47X52X15FH          | 20.1                 | 39.8           | 5800           | 8900  | 0.0499         | 47.000                     | 46.989 | 52.010 | 52.029 | 0.030       |
|            | 1.8504                      | 2.0472         | 0.591          |                      | 4520                 | 8950           |                |       |                | 1.8504                     | 1.8500 | 2.0476 | 2.0484 | 0.066       |
| 47         | 47                          | 52             | 17.0           | K47X52X17H           | 24.2                 | 50.4           | 5800           | 8900  | 0.0529         | 47.000                     | 46.989 | 52.010 | 52.029 | 0.032       |
|            | 1.8504                      | 2.0472         | 0.669          |                      | 5440                 | 11330          |                |       |                | 1.8504                     | 1.8500 | 2.0476 | 2.0484 | 0.071       |
| 47         | 47                          | 52             | 26.8           | K47X52X27FH          | 35.4                 | 82.4           | 5800           | 8900  | 0.0598         | 47.000                     | 46.989 | 52.010 | 52.029 | 0.045       |
|            | 1.8504                      | 2.0472         | 1.055          |                      | 7960                 | 18520          |                |       |                | 1.8504                     | 1.8500 | 2.0476 | 2.0484 | 0.099       |
| 47         | 47                          | 52             | 27.0           | K47X52X27H           | 36.6                 | 85.9           | 5800           | 8900  | 0.0604         | 47.000                     | 46.989 | 52.010 | 52.029 | 0.045       |
|            | 1.8504                      | 2.0472         | 1.063          |                      | 8230                 | 19310          |                |       |                | 1.8504                     | 1.8500 | 2.0476 | 2.0484 | 0.099       |
| 47         | 47                          | 55             | 28.0           | K47X55X28FV1         | 48.9                 | 89.5           | 6000           | 9200  | 0.0568         | 47.000                     | 46.989 | 55.010 | 55.029 | 0.092       |
|            | 1.8504                      | 2.1654         | 1.102          |                      | 10990                | 20120          |                |       |                | 1.8504                     | 1.8500 | 2.1657 | 2.1665 | 0.203       |
| 48         | 48                          | 53             | 17.0           | K48X53X17H           | 25.7                 | 54.9           | 5700           | 8700  | 0.0546         | 48.000                     | 47.989 | 53.010 | 53.029 | 0.032       |
|            | 1.8898                      | 2.0866         | 0.669          |                      | 5780                 | 12340          |                |       |                | 1.8898                     | 1.8893 | 2.0870 | 2.0878 | 0.071       |

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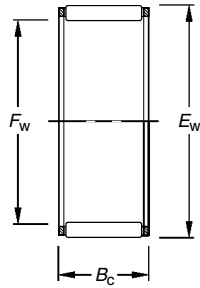




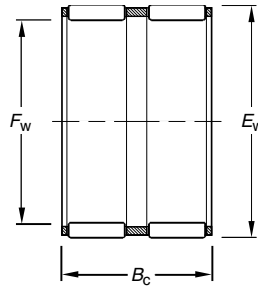
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — *continued*

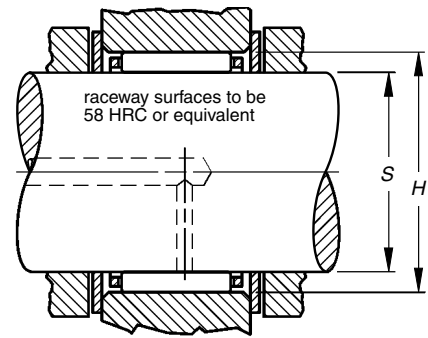
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |        |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------------------|--------|--------|--------|-------------|--------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease RPM     | Oil RPM        | C <sub>g</sub>             | Max. S | Min. S | Min. H |             | Max. H |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>g</sub> | S                          | H      |        |        |             |        |
| 48         | 48                | 54             | 19.0           | K48X54X19H.ZB2       | 30.9                 | 61.2           | 5700           | 8800           | 0.0545                     | 48.000 | 47.989 | 54.010 | 54.029      | 0.042  |
|            | 1.8898            | 2.1260         | 0.748          |                      | 6950                 | 13760          |                |                |                            |        |        |        |             |        |
| 49         | 49                | 55             | 32.0           | K49X55X32H.ZW        | 40.2                 | 86.4           | 5600           | 8600           | 0.0599                     | 49.000 | 48.989 | 55.010 | 55.029      | 0.080  |
|            | 1.9291            | 2.1654         | 1.260          |                      | 9040                 | 19420          |                |                |                            |        |        |        |             |        |
| 49         | 49                | 65             | 38.0           | K49X65X38H           | 100                  | 142            | 6100           | 9300           | 0.0593                     | 49.000 | 48.989 | 65.010 | 65.029      | 0.244  |
|            | 1.9291            | 2.5591         | 1.496          |                      | 22480                | 31920          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 55             | 17.0           | K50X55X17H           | 25.5                 | 55.0           | 5400           | 8400           | 0.0557                     | 50.000 | 49.989 | 55.010 | 55.029      | 0.032  |
|            | 1.9685            | 2.1654         | 0.669          |                      | 5730                 | 12360          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 55             | 20.0           | K50X55X20H           | 30.2                 | 68.5           | 5400           | 8400           | 0.0588                     | 50.000 | 49.989 | 55.010 | 55.029      | 0.038  |
|            | 1.9685            | 2.1654         | 0.787          |                      | 6790                 | 15400          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 55             | 30.0           | K50X55X30            | 38.2                 | 92.4           | 5400           | 8400           | 0.0633                     | 50.000 | 49.989 | 55.010 | 55.029      | 0.057  |
|            | 1.9685            | 2.1654         | 1.181          |                      | 8590                 | 20770          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 55             | 30.0           | K50X55X30FV1         | 38.2                 | 92.4           | 5400           | 8400           | 0.0633                     | 50.000 | 49.989 | 55.010 | 55.029      | 0.057  |
|            | 1.9685            | 2.1654         | 1.181          |                      | 8590                 | 20770          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 56             | 23.0           | K50X56X23            | 35.5                 | 74.1           | 5500           | 8500           | 0.0582                     | 50.000 | 49.989 | 56.010 | 56.029      | 0.051  |
|            | 1.9685            | 2.2047         | 0.906          |                      | 7980                 | 16660          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 57             | 18.0           | K50X57X18FH          | 31.3                 | 56.4           | 5500           | 8500           | 0.0531                     | 50.000 | 49.989 | 57.010 | 57.029      | 0.050  |
|            | 1.9685            | 2.2441         | 0.709          |                      | 7040                 | 12680          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 58             | 20.0           | K50X58X20H           | 38.8                 | 67.8           | 5600           | 8600           | 0.0545                     | 50.000 | 49.989 | 58.010 | 58.029      | 0.065  |
|            | 1.9685            | 2.2835         | 0.787          |                      | 8720                 | 15240          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 58             | 25.0           | K50X58X25H           | 46.5                 | 85.6           | 5600           | 8600           | 0.0577                     | 50.000 | 49.989 | 58.010 | 58.029      | 0.081  |
|            | 1.9685            | 2.2835         | 0.984          |                      | 10450                | 19240          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 58             | 35.0           | K50X58X35H           | 64.9                 | 131            | 5600           | 8600           | 0.0642                     | 50.000 | 49.989 | 58.010 | 58.029      | 0.105  |
|            | 1.9685            | 2.2835         | 1.378          |                      | 14590                | 29450          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 62             | 30.0           | K50X62X30H.ZB2       | 64.6                 | 98.1           | 5800           | 8900           | 0.0565                     | 50.000 | 49.989 | 62.010 | 62.029      | 0.136  |
|            | 1.9685            | 2.4409         | 1.181          |                      | 14520                | 22050          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 66             | 30.0           | K50X66X30H           | 80.9                 | 109            | 5900           | 9100           | 0.0559                     | 50.000 | 49.989 | 66.010 | 66.029      | 0.192  |
|            | 1.9685            | 2.5984         | 1.181          |                      | 18190                | 24500          |                |                |                            |        |        |        |             |        |
| 50         | 50                | 70             | 32.0           | K50X70X32H           | 103                  | 129            | 6100           | 9300           | 0.0569                     | 50.000 | 49.989 | 70.010 | 70.029      | 0.224  |
|            | 1.9685            | 2.7559         | 1.260          |                      | 23160                | 29000          |                |                |                            |        |        |        |             |        |
| 52         | 52                | 57             | 12.0           | K52X57X12            | 18.4                 | 36.7           | 5200           | 8000           | 0.0512                     | 52.000 | 51.987 | 57.010 | 57.029      | 0.022  |
|            | 2.0472            | 2.2441         | 0.472          |                      | 4140                 | 8250           |                |                |                            |        |        |        |             |        |
| 52         | 52                | 57             | 17.0           | K52X57X17FCH         | 21.4                 | 44.3           | 5200           | 8000           | 0.0537                     | 52.000 | 51.987 | 57.010 | 57.029      | 0.035  |
|            | 2.0472            | 2.2441         | 0.669          |                      | 4810                 | 9960           |                |                |                            |        |        |        |             |        |
| 52         | 52                | 57             | 17.0           | K52X57X17H           | 21.4                 | 44.3           | 5200           | 8000           | 0.0537                     | 52.000 | 51.987 | 57.010 | 57.029      | 0.035  |
|            | 2.0472            | 2.2441         | 0.669          |                      | 4810                 | 9960           |                |                |                            |        |        |        |             |        |
| 52         | 52                | 60             | 24.0           | K52X60X24            | 47.1                 | 88.3           | 5400           | 8200           | 0.0592                     | 52.000 | 51.987 | 60.010 | 60.029      | 0.078  |
|            | 2.0472            | 2.3622         | 0.945          |                      | 10600                | 19900          |                |                |                            |        |        |        |             |        |
| 55         | 55                | 60             | 17.0           | K55X60X17            | 26.0                 | 58.3           | 4900           | 7600           | 0.0590                     | 55.000 | 54.987 | 60.010 | 60.029      | 0.037  |
|            | 2.1654            | 2.3622         | 0.669          |                      | 5850                 | 13100          |                |                |                            |        |        |        |             |        |
| 55         | 55                | 60             | 20.0           | K55X60X20H           | 30.7                 | 72.4           | 4900           | 7600           | 0.0622                     | 55.000 | 54.987 | 60.010 | 60.029      | 0.042  |
|            | 2.1654            | 2.3622         | 0.787          |                      | 6900                 | 16300          |                |                |                            |        |        |        |             |        |
| 55         | 55                | 60             | 27.0           | K55X60X27H           | 40.1                 | 102            | 4900           | 7600           | 0.0677                     | 55.000 | 54.987 | 60.010 | 60.029      | 0.055  |
|            | 2.1654            | 2.3622         | 1.063          |                      | 9010                 | 22900          |                |                |                            |        |        |        |             |        |
| 55         | 55                | 60             | 30.0           | K55X60X30            | 40.6                 | 103            | 4900           | 7600           | 0.0680                     | 55.000 | 54.987 | 60.010 | 60.029      | 0.066  |
|            | 2.1654            | 2.3622         | 1.181          |                      | 9130                 | 23200          |                |                |                            |        |        |        |             |        |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.<br>-0.2 - .008<br>-0.55 - .022 |                |                | Assembly Designation | Load Ratings<br>kN/lbf. |                | Limiting Speed |      | C <sub>g</sub> | Mounting Dimensions mm/in. |        |        |        | Wt.<br>kg/lbs. |
|------------|--------------------------------------------------|----------------|----------------|----------------------|-------------------------|----------------|----------------|------|----------------|----------------------------|--------|--------|--------|----------------|
|            | F <sub>w</sub>                                   | E <sub>w</sub> | B <sub>c</sub> |                      | C                       | C <sub>0</sub> | Grease         | Oil  |                | Max.                       | Min.   | Min.   | Max.   |                |
| mm         |                                                  |                |                |                      |                         |                | RPM            |      | S              | H                          |        |        |        |                |
| 55         | 55                                               | 60             | 30.0           | K55X60X30FH          | 40.6                    | 103            | 4900           | 7600 | 0.0680         | 55.000                     | 54.987 | 60.010 | 60.029 | 0.068<br>0.150 |
|            | 2.1654                                           | 2.3622         | 1.181          |                      | 9130                    | 23200          |                |      |                | 2.1654                     | 2.1648 | 2.3626 | 2.3633 |                |
| 55         | 55                                               | 61             | 26.0           | K55X61X26H           | 44.3                    | 102            | 5000           | 7600 | 0.0657         | 55.000                     | 54.987 | 61.010 | 61.029 | 0.063<br>0.139 |
|            | 2.1654                                           | 2.4016         | 1.024          |                      | 9960                    | 22900          |                |      |                | 2.1654                     | 2.1648 | 2.4020 | 2.4027 |                |
| 55         | 55                                               | 62             | 18.0           | K55X62X18H           | 33.2                    | 62.8           | 5000           | 7700 | 0.0569         | 55.000                     | 54.987 | 62.010 | 62.029 | 0.055<br>0.121 |
|            | 2.1654                                           | 2.4409         | 0.709          |                      | 7460                    | 14100          |                |      |                | 2.1654                     | 2.1648 | 2.4413 | 2.4421 |                |
| 55         | 55                                               | 63             | 15.0           | K55X63X15F           | 30.5                    | 51.5           | 5000           | 7800 | 0.0531         | 55.000                     | 54.987 | 63.010 | 63.029 | 0.054<br>0.119 |
|            | 2.1654                                           | 2.4803         | 0.591          |                      | 6860                    | 11600          |                |      |                | 2.1654                     | 2.1648 | 2.4807 | 2.4815 |                |
| 55         | 55                                               | 63             | 20.0           | K55X63X20            | 40.3                    | 73.5           | 5000           | 7800 | 0.0580         | 55.000                     | 54.987 | 63.010 | 63.029 | 0.072<br>0.159 |
|            | 2.1654                                           | 2.4803         | 0.787          |                      | 9060                    | 16500          |                |      |                | 2.1654                     | 2.1648 | 2.4807 | 2.4815 |                |
| 55         | 55                                               | 63             | 25.0           | K55X63X25            | 49.8                    | 96.5           | 5000           | 7800 | 0.0621         | 55.000                     | 54.987 | 63.010 | 63.029 | 0.080<br>0.176 |
|            | 2.1654                                           | 2.4803         | 0.984          |                      | 11200                   | 21700          |                |      |                | 2.1654                     | 2.1648 | 2.4807 | 2.4815 |                |
| 55         | 55                                               | 63             | 32.0           | K55X63X32            | 62.3                    | 129            | 5000           | 7800 | 0.0667         | 55.000                     | 54.987 | 63.010 | 63.029 | 0.108<br>0.238 |
|            | 2.1654                                           | 2.4803         | 1.260          |                      | 14000                   | 29000          |                |      |                | 2.1654                     | 2.1648 | 2.4807 | 2.4815 |                |
| 58         | 58                                               | 63             | 17.0           | K58X63X17F           | 27.0                    | 62.6           | 4700           | 7200 | 0.0615         | 58.000                     | 57.987 | 63.010 | 63.029 | 0.037<br>0.082 |
|            | 2.2835                                           | 2.4803         | 0.669          |                      | 6070                    | 14100          |                |      |                | 2.2835                     | 2.2830 | 2.4807 | 2.4815 |                |
| 58         | 58                                               | 64             | 19.0           | K58X64X19H           | 32.9                    | 70.6           | 4700           | 7200 | 0.0615         | 58.000                     | 57.987 | 64.010 | 64.029 | 0.037<br>0.082 |
|            | 2.2835                                           | 2.5197         | 0.748          |                      | 7400                    | 15900          |                |      |                | 2.2835                     | 2.2830 | 2.5201 | 2.5208 |                |
| 58         | 58                                               | 65             | 18.0           | K58X65X18H           | 34.3                    | 67.1           | 4700           | 7300 | 0.0593         | 58.000                     | 57.987 | 65.010 | 65.029 | 0.058<br>0.128 |
|            | 2.2835                                           | 2.5591         | 0.709          |                      | 7710                    | 15100          |                |      |                | 2.2835                     | 2.2830 | 2.5594 | 2.5602 |                |
| 60         | 60                                               | 65             | 20.0           | K60X65X20H           | 31.9                    | 78.1           | 4500           | 6900 | 0.0660         | 60.000                     | 59.987 | 65.010 | 65.029 | 0.046<br>0.101 |
|            | 2.3622                                           | 2.5591         | 0.787          |                      | 7170                    | 17600          |                |      |                | 2.3622                     | 2.3617 | 2.5594 | 2.5602 |                |
| 60         | 60                                               | 65             | 26.8           | K60X65X27FH          | 39.5                    | 103            | 4500           | 6900 | 0.0707         | 60.000                     | 59.987 | 65.010 | 65.029 | 0.059<br>0.130 |
|            | 2.3622                                           | 2.5591         | 1.055          |                      | 8880                    | 23200          |                |      |                | 2.3622                     | 2.3617 | 2.5594 | 2.5602 |                |
| 60         | 60                                               | 65             | 29.8           | K60X65X30FH          | 42.9                    | 114            | 4500           | 6900 | 0.0726         | 60.000                     | 59.987 | 65.010 | 65.029 | 0.085<br>0.187 |
|            | 2.3622                                           | 2.5591         | 1.173          |                      | 9640                    | 25600          |                |      |                | 2.3622                     | 2.3617 | 2.5594 | 2.5602 |                |
| 60         | 60                                               | 65             | 30.0           | K60X65X30            | 42.9                    | 114            | 4500           | 6900 | 0.0726         | 60.000                     | 59.987 | 65.010 | 65.029 | 0.070<br>0.154 |
|            | 2.3622                                           | 2.5591         | 1.181          |                      | 9640                    | 25600          |                |      |                | 2.3622                     | 2.3617 | 2.5594 | 2.5602 |                |
| 60         | 60                                               | 68             | 17.0           | K60X68X17F           | 34.2                    | 61.4           | 4600           | 7100 | 0.0577         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.066<br>0.146 |
|            | 2.3622                                           | 2.6772         | 0.669          |                      | 7690                    | 13800          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 20.0           | K60X68X20H           | 41.8                    | 79.2           | 4600           | 7100 | 0.0614         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.066<br>0.146 |
|            | 2.3622                                           | 2.6772         | 0.787          |                      | 9400                    | 17800          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 23.0           | K60X68X23F           | 49.0                    | 97.2           | 4600           | 7100 | 0.0646         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.089<br>0.196 |
|            | 2.3622                                           | 2.6772         | 0.906          |                      | 11000                   | 21900          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 23.0           | K60X68X23FH          | 49.0                    | 97.2           | 4600           | 7100 | 0.0646         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.089<br>0.196 |
|            | 2.3622                                           | 2.6772         | 0.906          |                      | 11000                   | 21900          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 23.0           | K60X68X23H           | 49.0                    | 97.2           | 4600           | 7100 | 0.0646         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.089<br>0.196 |
|            | 2.3622                                           | 2.6772         | 0.906          |                      | 11000                   | 21900          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 25.0           | K60X68X25            | 51.6                    | 104            | 4600           | 7100 | 0.0657         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.091<br>0.201 |
|            | 2.3622                                           | 2.6772         | 0.984          |                      | 11600                   | 23400          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 60         | 60                                               | 68             | 30.0           | K60X68X30ZW          | 46.4                    | 90.1           | 4600           | 7100 | 0.0634         | 60.000                     | 59.987 | 68.010 | 68.029 | 0.119<br>0.262 |
|            | 2.3622                                           | 2.6772         | 1.181          |                      | 10400                   | 20300          |                |      |                | 2.3622                     | 2.3617 | 2.6776 | 2.6783 |                |
| 63         | 63                                               | 71             | 20.0           | K63X71X20            | 41.4                    | 79.4           | 4400           | 6700 | 0.0628         | 63.000                     | 62.987 | 71.010 | 71.029 | 0.070<br>0.154 |
|            | 2.4803                                           | 2.7953         | 0.787          |                      | 9310                    | 17800          |                |      |                | 2.4803                     | 2.4798 | 2.7957 | 2.7964 |                |
| 64         | 64                                               | 70             | 16.0           | K64X70X16            | 26.4                    | 55.1           | 4200           | 6500 | 0.0605         | 64.000                     | 63.987 | 70.010 | 70.029 | 0.049<br>0.108 |
|            | 2.5197                                           | 2.7559         | 0.630          |                      | 5930                    | 12400          |                |      |                | 2.5197                     | 2.5192 | 2.7563 | 2.7570 |                |
| 65         | 65                                               | 70             | 20.0           | K65X70X20CH          | 28.6                    | 69.2           | 4100           | 6400 | 0.0665         | 65.000                     | 64.987 | 70.010 | 70.029 | 0.050<br>0.110 |
|            | 2.5591                                           | 2.7559         | 0.787          |                      | 6430                    | 15600          |                |      |                | 2.5591                     | 2.5585 | 2.7563 | 2.7570 |                |
| 65         | 65                                               | 70             | 20.0           | K65X70X20F           | 31.5                    | 78.9           | 4100           | 6400 | 0.0687         | 65.000                     | 64.987 | 70.010 | 70.029 | 0.050<br>0.110 |
|            | 2.5591                                           | 2.7559         | 0.787          |                      | 7080                    | 17700          |                |      |                | 2.5591                     | 2.5585 | 2.7563 | 2.7570 |                |
| 65         | 65                                               | 70             | 20.0           | K65X70X20H           | 31.5                    | 78.9           | 4100           | 6400 | 0.0687         | 65.000                     | 64.987 | 70.010 | 70.029 | 0.050<br>0.110 |
|            | 2.5591                                           | 2.7559         | 0.787          |                      | 7080                    | 17700          |                |      |                | 2.5591                     | 2.5585 | 2.7563 | 2.7570 |                |
| 65         | 65                                               | 70             | 30.0           | K65X70X30            | 44.4                    | 123            | 4100           | 6400 | 0.0766         | 65.000                     | 64.987 | 70.010 | 70.029 | 0.075<br>0.165 |
|            | 2.5591                                           | 2.7559         | 1.181          |                      | 9980                    | 27700          |                |      |                | 2.5591                     | 2.5585 | 2.7563 | 2.7570 |                |
| 65         | 65                                               | 73             | 23.0           | K65X73X23H           | 48.2                    | 97.7           | 4200           | 6500 | 0.0671         | 65.000                     | 64.987 | 73.010 | 73.029 | 0.091<br>0.201 |
|            | 2.5591                                           | 2.8740         | 0.906          |                      | 10800                   | 22000          |                |      |                | 2.5591                     | 2.5585 | 2.8744 | 2.8752 |                |
| 65         | 65                                               | 73             | 30.0           | K65X73X30H           | 60.1                    | 129            | 4200           | 6500 | 0.0719         | 65.000                     | 64.987 | 73.010 | 73.029 | 0.116<br>0.256 |
|            | 2.5591                                           | 2.8740         | 1.181          |                      | 13500                   | 29100          |                |      |                | 2.5591                     | 2.5585 | 2.8744 | 2.8752 |                |

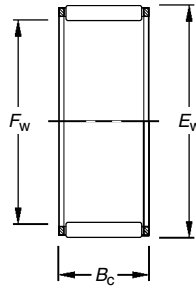
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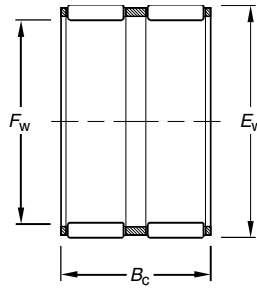
# NEEDLE ROLLER BEARINGS

## SINGLE-ROW, DOUBLE-ROW ASSEMBLIES — continued

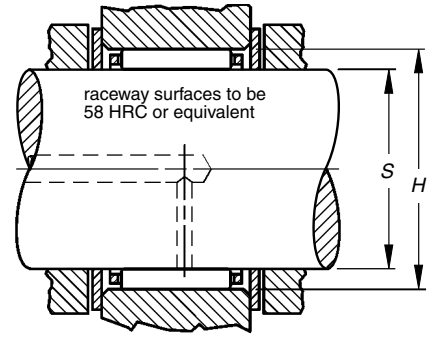
### METRIC SERIES



K



K.ZW



| Shaft Dia. | Dimensions mm/in. |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |                | Mounting Dimensions mm/in. |        |        |        | Wt. kg/lbs. |       |
|------------|-------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|----------------|----------------------------|--------|--------|--------|-------------|-------|
|            | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil            | Max.                       | Min.   | Min.   | Max.   |             |       |
| mm         | F <sub>w</sub>    | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | RPM            | C <sub>0</sub> | S                          |        | H      |        |             |       |
| 68         | 68                | 74             | 20.0           | K68X74X20FH          | 37.5                 | 88.1           | 4000           | 6100           | 0.0699                     | 68.000 | 67.987 | 74.010 | 74.029      | 0.062 |
|            | 2.6772            | 2.9134         | 0.787          |                      | 8430                 | 19800          |                |                |                            | 2.6772 | 2.6767 | 2.9138 | 2.9145      |       |
| 68         | 68                | 74             | 28.0           | K68X74X28CH          | 44.8                 | 110            | 4000           | 6100           | 0.0739                     | 68.000 | 67.987 | 74.010 | 74.029      | 0.082 |
|            | 2.6772            | 2.9134         | 1.102          |                      | 10100                | 24700          |                |                |                            | 2.6772 | 2.6767 | 2.9138 | 2.9145      |       |
| 68         | 68                | 74             | 30.0           | K68X74X30H           | 47.6                 | 119            | 4000           | 6100           | 0.0754                     | 68.000 | 67.987 | 74.010 | 74.029      | 0.098 |
|            | 2.6772            | 2.9134         | 1.181          |                      | 10700                | 26800          |                |                |                            | 2.6772 | 2.6767 | 2.9138 | 2.9145      |       |
| 68         | 68                | 74             | 35.0           | K68X74X35HZW         | 45.1                 | 111            | 4000           | 6100           | 0.0740                     | 68.000 | 67.987 | 74.010 | 74.029      | 0.120 |
|            | 2.6772            | 2.9134         | 1.378          |                      | 10100                | 25000          |                |                |                            | 2.6772 | 2.6767 | 2.9138 | 2.9145      |       |
| 68         | 68                | 76             | 20.0           | K68X76X20            | 43.8                 | 87.8           | 4000           | 6200           | 0.0667                     | 68.000 | 67.987 | 76.010 | 76.029      | 0.086 |
|            | 2.6772            | 2.9921         | 0.787          |                      | 9850                 | 19700          |                |                |                            | 2.6772 | 2.6767 | 2.9925 | 2.9933      |       |
| 68         | 68                | 82             | 38.5           | K68X82X38.5H         | 117                  | 209            | 4200           | 6400           | 0.0761                     | 68.000 | 67.987 | 82.012 | 82.034      | 0.320 |
|            | 2.6772            | 3.2283         | 1.516          |                      | 26300                | 47000          |                |                |                            | 2.6772 | 2.6767 | 3.2288 | 3.2297      |       |
| 70         | 70                | 76             | 20.0           | K70X76X20            | 36.1                 | 84.7           | 3900           | 5900           | 0.0702                     | 70.000 | 69.987 | 76.010 | 76.029      | 0.065 |
|            | 2.7559            | 2.9921         | 0.787          |                      | 8120                 | 19000          |                |                |                            | 2.7559 | 2.7554 | 2.9925 | 2.9933      |       |
| 70         | 70                | 76             | 30.0           | K70X76X30            | 51.6                 | 134.0          | 3900           | 5900           | 0.0786                     | 70.000 | 69.987 | 76.010 | 76.029      | 0.097 |
|            | 2.7559            | 2.9921         | 1.181          |                      | 11600                | 30100          |                |                |                            | 2.7559 | 2.7554 | 2.9925 | 2.9933      |       |
| 70         | 70                | 78             | 20.0           | K70X78X20H           | 43.6                 | 87.9           | 3900           | 6000           | 0.0676                     | 70.000 | 69.987 | 78.010 | 78.029      | 0.090 |
|            | 2.7559            | 3.0709         | 0.787          |                      | 9800                 | 19800          |                |                |                            | 2.7559 | 2.7554 | 3.0713 | 3.0720      |       |
| 70         | 70                | 78             | 23.0           | K70X78X23F           | 49.8                 | 104.0          | 3900           | 6000           | 0.0705                     | 70.000 | 69.987 | 78.010 | 78.029      | 0.115 |
|            | 2.7559            | 3.0709         | 0.906          |                      | 11200                | 23400          |                |                |                            | 2.7559 | 2.7554 | 3.0713 | 3.0720      |       |
| 70         | 70                | 78             | 24.8           | K70X78X25F           | 49.8                 | 104.0          | 3900           | 6000           | 0.0705                     | 70.000 | 69.987 | 78.010 | 78.029      | 0.115 |
|            | 2.7559            | 3.0709         | 0.976          |                      | 11200                | 23400          |                |                |                            | 2.7559 | 2.7554 | 3.0713 | 3.0720      |       |
| 70         | 70                | 78             | 30.0           | K70X78X30H           | 62.2                 | 139.0          | 3900           | 6000           | 0.0757                     | 70.000 | 69.987 | 78.010 | 78.029      | 0.140 |
|            | 2.7559            | 3.0709         | 1.181          |                      | 14000                | 31200          |                |                |                            | 2.7559 | 2.7554 | 3.0713 | 3.0720      |       |
| 70         | 70                | 78             | 46.0           | K70X78X46ZW          | 78.4                 | 187.0          | 3900           | 6000           | 0.0815                     | 70.000 | 69.987 | 78.010 | 78.029      | 0.188 |
|            | 2.7559            | 3.0709         | 1.811          |                      | 17600                | 42000          |                |                |                            | 2.7559 | 2.7554 | 3.0713 | 3.0720      |       |
| 70         | 70                | 85             | 40.0           | K70X85X40F           | 118                  | 203            | 4100           | 6300           | 0.0758                     | 70.000 | 69.987 | 85.012 | 85.034      | 0.338 |
|            | 2.7559            | 3.3465         | 1.575          |                      | 26500                | 45600          |                |                |                            | 2.7559 | 2.7554 | 3.3469 | 3.3478      |       |
| 70         | 70                | 88             | 30.0           | K70X88X30H.ZB2       | 115                  | 175            | 4100           | 6400           | 0.0714                     | 70.000 | 69.987 | 88.012 | 88.034      | 0.205 |
|            | 2.7559            | 3.4646         | 1.181          |                      | 25900                | 39300          |                |                |                            | 2.7559 | 2.7554 | 3.4650 | 3.4659      |       |
| 72         | 72                | 80             | 20.0           | K72X80X20            | 44.4                 | 90.7           | 3800           | 5800           | 0.0690                     | 72.000 | 71.987 | 80.010 | 80.029      | 0.084 |
|            | 2.8346            | 3.1496         | 0.787          |                      | 9980                 | 20400          |                |                |                            | 2.8346 | 2.8341 | 3.1500 | 3.1507      |       |
| 73         | 73                | 79             | 20.0           | K73X79X20            | 37.0                 | 88.7           | 3700           | 5700           | 0.0723                     | 73.000 | 72.987 | 79.010 | 79.029      | 0.068 |
|            | 2.8740            | 3.1102         | 0.787          |                      | 8320                 | 19900          |                |                |                            | 2.8740 | 2.8735 | 3.1106 | 3.1114      |       |
| 75         | 75                | 81             | 20.0           | K75X81X20F           | 37.4                 | 90.7           | 3600           | 5500           | 0.0737                     | 75.000 | 74.987 | 81.012 | 81.034      | 0.075 |
|            | 2.9528            | 3.1890         | 0.787          |                      | 8410                 | 20400          |                |                |                            | 2.9528 | 2.9522 | 3.1894 | 3.1903      |       |
| 75         | 75                | 83             | 23.0           | K75X83X23            | 52.5                 | 114.0          | 3600           | 5600           | 0.0744                     | 75.000 | 74.987 | 83.012 | 83.034      | 0.104 |
|            | 2.9528            | 3.2677         | 0.906          |                      | 11800                | 25600          |                |                |                            | 2.9528 | 2.9522 | 3.2682 | 3.2691      |       |
| 75         | 75                | 83             | 30.0           | K75X83X30            | 60.9                 | 138            | 3600           | 5600           | 0.0780                     | 75.000 | 74.987 | 83.012 | 83.034      | 0.141 |
|            | 2.9528            | 3.2677         | 1.181          |                      | 13700                | 31000          |                |                |                            | 2.9528 | 2.9522 | 3.2682 | 3.2691      |       |
| 75         | 75                | 83             | 30.0           | K75X83X30FH          | 60.9                 | 138            | 3600           | 5600           | 0.0780                     | 75.000 | 74.987 | 83.012 | 83.034      | 0.141 |
|            | 2.9528            | 3.2677         | 1.181          |                      | 13700                | 31000          |                |                |                            | 2.9528 | 2.9522 | 3.2682 | 3.2691      |       |
| 80         | 80                | 86             | 20.0           | K80X86X20H           | 38.6                 | 96.7           | 3400           | 5200           | 0.0771                     | 80.000 | 79.987 | 86.012 | 86.034      | 0.072 |
|            | 3.1496            | 3.3858         | 0.787          |                      | 8680                 | 21700          |                |                |                            | 3.1496 | 3.1491 | 3.3863 | 3.3872      |       |
| 80         | 80                | 88             | 25.0           | K80X88X25FV1         | 54.0                 | 121            | 3400           | 5200           | 0.0778                     | 80.000 | 79.987 | 88.012 | 88.034      | 0.134 |
|            | 3.1496            | 3.4646         | 0.984          |                      | 12100                | 27200          |                |                |                            | 3.1496 | 3.1491 | 3.4650 | 3.4659      |       |

## Needle Roller and Cage Radial Assemblies

| Shaft Dia. | Dimensions mm/in.<br>-0.2 -.008<br>-0.55 -.022 |                |                | Assembly Designation | Load Ratings<br>kN/bf. |                | Limiting Speed |             | C <sub>g</sub> | Mounting Dimensions mm/in. |                |                |                | Wt.<br>kg/lbs. |
|------------|------------------------------------------------|----------------|----------------|----------------------|------------------------|----------------|----------------|-------------|----------------|----------------------------|----------------|----------------|----------------|----------------|
|            | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> |                      | C                      | C <sub>0</sub> | Grease         | Oil         |                | Max.                       | Min.           | Min.           | Max.           |                |
| mm         |                                                |                |                |                      |                        |                | RPM            |             |                | S                          | H              |                |                |                |
|            | <b>80</b>                                      | <b>88</b>      | <b>30.0</b>    | <b>K80X88X30</b>     | <b>67.5</b>            | <b>161</b>     | <b>3400</b>    | <b>5200</b> | <b>0.0835</b>  | <b>80.000</b>              | <b>79.987</b>  | <b>88.012</b>  | <b>88.034</b>  | <b>0.153</b>   |
|            |                                                | 3.1496         | 3.4646         |                      | 1.181                  | 15200          |                |             |                | 36200                      | 3.1496         | 3.1491         | 3.4650         |                |
| <b>85</b>  | <b>85</b>                                      | <b>92</b>      | <b>20.0</b>    | <b>K85X92X20H</b>    | <b>39.9</b>            | <b>91.7</b>    | <b>3200</b>    | <b>4900</b> | <b>0.0763</b>  | <b>84.988</b>              | <b>84.973</b>  | <b>92.012</b>  | <b>92.034</b>  | <b>0.085</b>   |
|            |                                                | 3.3465         | 3.6220         |                      | 0.787                  | 8970           |                |             |                | 20600                      | 3.3460         | 3.3454         | 3.6225         |                |
|            | <b>85</b>                                      | <b>93</b>      | <b>25.0</b>    | <b>K85X93X25F</b>    |                        |                |                |             |                | <b>84.988</b>              | <b>84.973</b>  | <b>93.012</b>  | <b>93.034</b>  | <b>0.000</b>   |
|            |                                                | 3.3465         | 3.6614         |                      | 0.984                  |                |                |             |                |                            | 3.3460         | 3.3454         | 3.6619         |                |
|            | <b>85</b>                                      | <b>93</b>      | <b>30.0</b>    | <b>K85X93X30H</b>    | <b>69.4</b>            | <b>170</b>     | <b>3200</b>    | <b>4900</b> | <b>0.0870</b>  | <b>84.988</b>              | <b>84.973</b>  | <b>93.012</b>  | <b>93.034</b>  | <b>0.166</b>   |
|            |                                                | 3.3465         | 3.6614         |                      | 1.181                  | 15600          |                |             |                | 38200                      | 3.3460         | 3.3454         | 3.6619         |                |
| <b>90</b>  | <b>90</b>                                      | <b>97</b>      | <b>20.0</b>    | <b>K90X97X20</b>     | <b>46.3</b>            | <b>114</b>     | <b>3000</b>    | <b>4600</b> | <b>0.0827</b>  | <b>89.988</b>              | <b>89.973</b>  | <b>97.012</b>  | <b>97.034</b>  | <b>0.095</b>   |
|            |                                                | 3.5433         | 3.8189         |                      | 0.787                  | 10400          |                |             |                | 25600                      | 3.5428         | 3.5422         | 3.8194         |                |
|            | <b>90</b>                                      | <b>98</b>      | <b>25.0</b>    | <b>K90X98X25F</b>    | <b>54.8</b>            | <b>128</b>     | <b>3000</b>    | <b>4600</b> | <b>0.0832</b>  | <b>89.988</b>              | <b>89.973</b>  | <b>98.012</b>  | <b>98.034</b>  | <b>0.134</b>   |
|            |                                                | 3.5433         | 3.8583         |                      | 0.984                  | 12300          |                |             |                | 28800                      | 3.5428         | 3.5422         | 3.8587         |                |
|            | <b>90</b>                                      | <b>98</b>      | <b>30.0</b>    | <b>K90X98X30</b>     | <b>63.6</b>            | <b>155</b>     | <b>3000</b>    | <b>4600</b> | <b>0.0873</b>  | <b>89.988</b>              | <b>89.973</b>  | <b>98.012</b>  | <b>98.034</b>  | <b>0.168</b>   |
|            |                                                | 3.5433         | 3.8583         |                      | 1.181                  | 14300          |                |             |                | 34800                      | 3.5428         | 3.5422         | 3.8587         |                |
| <b>95</b>  | <b>95</b>                                      | <b>103</b>     | <b>20.0</b>    | <b>K95X103X20</b>    | <b>49.3</b>            | <b>114</b>     | <b>2800</b>    | <b>4400</b> | <b>0.0829</b>  | <b>94.988</b>              | <b>94.973</b>  | <b>103.012</b> | <b>103.034</b> | <b>0.130</b>   |
|            |                                                | 3.7402         | 4.0551         |                      | 0.787                  | 11100          |                |             |                | 25600                      | 3.7397         | 3.7391         | 4.0556         |                |
|            | <b>95</b>                                      | <b>103</b>     | <b>30.0</b>    | <b>K95X103X30F</b>   | <b>71.0</b>            | <b>183</b>     | <b>2800</b>    | <b>4400</b> | <b>0.0932</b>  | <b>94.988</b>              | <b>94.973</b>  | <b>103.012</b> | <b>103.034</b> | <b>0.180</b>   |
|            |                                                | 3.7402         | 4.0551         |                      | 1.181                  | 16000          |                |             |                | 41100                      | 3.7397         | 3.7391         | 4.0556         |                |
| <b>100</b> | <b>100</b>                                     | <b>108</b>     | <b>30.0</b>    | <b>K100X108X30</b>   | <b>72.4</b>            | <b>191</b>     | <b>2700</b>    | <b>4200</b> | <b>0.0965</b>  | <b>99.988</b>              | <b>99.973</b>  | <b>108.012</b> | <b>108.034</b> | <b>0.210</b>   |
|            |                                                | 3.9370         | 4.2520         |                      | 1.181                  | 16300          |                |             |                | 42900                      | 3.9365         | 3.9359         | 4.2524         |                |
| <b>110</b> | <b>110</b>                                     | <b>118</b>     | <b>24.0</b>    | <b>K110X118X24</b>   | <b>64.0</b>            | <b>168</b>     | <b>2400</b>    | <b>3800</b> | <b>0.0977</b>  | <b>109.988</b>             | <b>109.973</b> | <b>118.012</b> | <b>118.034</b> | <b>0.165</b>   |
|            |                                                | 4.3307         | 4.6457         |                      | 0.945                  | 14400          |                |             |                | 37800                      | 4.3302         | 4.3296         | 4.6461         |                |
|            | <b>110</b>                                     | <b>118</b>     | <b>30.0</b>    | <b>K110X118X30H</b>  | <b>75.3</b>            | <b>207</b>     | <b>2400</b>    | <b>3800</b> | <b>0.1029</b>  | <b>109.988</b>             | <b>109.973</b> | <b>118.012</b> | <b>118.034</b> | <b>0.200</b>   |
|            |                                                | 4.3307         | 4.6457         |                      | 1.181                  | 16900          |                |             |                | 46500                      | 4.3302         | 4.3296         | 4.6461         |                |





## NEEDLE ROLLER BEARINGS

### NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES FOR CONNECTING ROD APPLICATIONS – METRIC SERIES

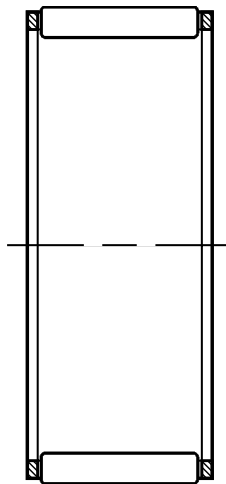
Connecting rods have two bearing positions: the crank pin or big end and the wrist pin or small end.

In the crank pin position there may be severe operating conditions due to centrifugal forces, internal forces, accelerations and high rotational speeds, requiring the use of special needle roller and cage radial assemblies.

Similarly, in the wrist pin position the reciprocating inertia loads and high oscillating speeds dictate the use of special cage designs.

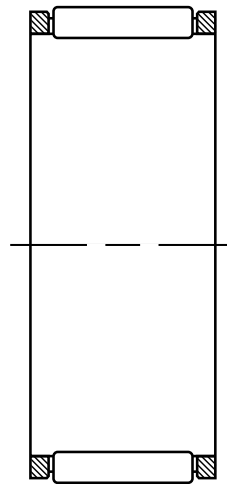
#### Types Of Metric Series Needle Roller and Cage Radial Assemblies.

Needle roller and cage assembly for crank pin applications.



K.BE

Needle roller and cage assembly for wrist pin applications.



K.SE

#### Suffixes

|           |                                                  |
|-----------|--------------------------------------------------|
| <b>BE</b> | steel cage, heat treated, for crank pin position |
| <b>SE</b> | steel cage, heat treated, for wrist pin position |

## CONSTRUCTION

### METRIC SERIES NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES FOR CRANK PIN POSITIONS

Needle roller and cage assemblies for use in crank pin positions have cages with a large outside cylindrical surface to ensure optimum radial guidance in the connecting rod bore. Due to the inherent low weight and strength of the heat-treated cages, the needle roller and cage assemblies are well-suited for high engine speed applications. When necessary, silver plating and copper plating can be applied for optimum performance during operation at high speeds.

### METRIC SERIES NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES FOR WRIST PIN POSITIONS

Reciprocating inertia loads and oscillating speeds require the cages used in the wrist pin positions to be heat treated and to guide on the wrist pin.

These cages are available in a variety of widths to allow the selection of a needle roller and cage assembly with the length of needle rollers to match the connecting rod width.

### SIZE SELECTION

In most instances selection of a suitable size of a needle roller and cage assembly for typical connecting rod positions may be based on the cylinder displacement of the engine which in turn, dictates the crank pin and wrist pin diameters.

Suggestions based on engine displacements are listed in the following table.

TABLE 1 – CRANK PIN AND WRIST PIN DIAMETERS, DETERMINED BY THE CYLINDER DISPLACEMENT OF THE ENGINE.

| CYLINDER DISPLACEMENT IN CM <sup>3</sup> |   |    |    |     |     |     |     |     |
|------------------------------------------|---|----|----|-----|-----|-----|-----|-----|
| Cylinder                                 | > |    | 40 | 60  | 100 | 150 | 200 | 300 |
| Displacement                             | ≤ | 40 | 60 | 100 | 150 | 200 | 300 |     |

| DIAMETER IN MM |  |       |          |       |          |          |       |       |
|----------------|--|-------|----------|-------|----------|----------|-------|-------|
| Crank pin      |  | 12/14 | 15/16/18 | 18/20 | 18/20/22 | 24/25/28 | 28/30 | 35/40 |
| Wrist pin      |  | 10/11 | 12/13    | 14/15 | 15/16    | 18       | 20    | 20    |







### Suitable Materials and Heat Treatment

Connecting rod crank pin end and wrist pin end bores serve as raceways:

a case hardening steel such as 15 CrNi 6, 17 MnCr 5 or AISI 8620.

Crank pins:

e.g., case hardening steel 15 Cr 3, AISI 8620, AISI 1018 or through-hardening steel 100 Cr 6, AISI 52100.

Wrist pins:

e.g., case hardening steel Ck 15, 15 Cr 3 or through-hardening steel 100 Cr 6, AISI 52100.

The effective case depth (50 HRC) of the raceways should be 0.5 mm minimum, the surface hardness should be 60 HRC or 700 HV minimum.

After hardening, the connecting rods must be stress relieved.

The connecting rod raceway bores as well as the crank pins and the wrist pins must be precision ground or preferably honed to a surface finish  $R_a$  not exceeding 0.16  $\mu\text{m}$ .

### FORM TOLERANCES

The form tolerances for crank pins, wrist pins and connecting rod bores are listed in Table 2.

TABLE 2 – FORM TOLERANCES

|                            |                       | Dimension in mm             |    |     |     |     |
|----------------------------|-----------------------|-----------------------------|----|-----|-----|-----|
| Nominal pin diameter       | >                     | 10                          | 14 | 18  | 25  | 30  |
|                            | ≤                     | 14                          | 18 | 25  | 30  | 40  |
|                            |                       | Tolerances in $\mu\text{m}$ |    |     |     |     |
| Parallelism*               | wrist pin & crank pin | 1                           | 1  | 2   | 2   | 3   |
|                            | rod bore              | 2                           | 3  | 3   | 4   | 4   |
| Circularity (DIN ISO 1101) | wrist pin & crank pin | 1                           | 1  | 1.5 | 1.5 | 2   |
|                            | rod bore              | 1.5                         | 2  | 2   | 2.5 | 2.5 |

\* The parallelism values are valid for the needle roller length  $L_w$ .

It is suggested that the parallelism of the wrist pin axis and the crank pin axis be within a tolerance zone of 0.03 mm diameter over a distance of 100 mm.

## RADIAL CLEARANCE

### METRIC SERIES CRANK PIN BEARINGS

The high speeds of modern production engines dictate the need for crank pin bearings with a relatively large radial clearance. As an approximation, the minimum clearance can be taken as the crank pin diameter/1000. The maximum radial clearance would be a result of the sorting plan shown in Table 3.

As shown in the example of the matching scheme, the suggested mounting diameters for the crank pin position are G6 for the connecting rod bore diameters and h5 for the crank pin diameters. Axial location of the cage is shown on the crank pin end guidance arrangement.

Racing and sport engines operate at yet even higher speeds than production engines, requiring 50 percent larger radial clearances in the crank pin bearings. The larger radial clearances should also be used in bores of split connecting rods to avoid the danger of distortion resulting from the unavoidable connecting rod deformation occurring in operation. Consult your Timken representative for advice on such applications.

### METRIC SERIES WRIST PIN BEARINGS

The radial clearance in wrist pin bearings should be held as small as possible. The minimum clearance should be aimed at 2 mm with the maximum clearance resulting from the proposed sorting plan in Table 3. The maximum clearance should be held as close as possible to 12 mm for all wrist pin bearings based on sorting wrist pins made to a tolerance h5, small end bore diameter tolerance of K6 and needle roller grades as shown in Table 3.



# NEEDLE ROLLER BEARINGS

## TIMKEN® TORRINGTON® METRIC SERIES NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES FOR CONNECTING ROD APPLICATIONS

TABLE 3 – RADIAL CLEARANCE

### Matching Scheme For A Crank Pin Bearing Arrangement

(three diameter ranges are specified for the connecting rod and crank pin)

Example: Crank pin diameter 20 mm, tolerance h5  
 Connecting rod bore diameter 26 mm, tolerance G6  
 Needle roller and cage assembly K20x26x12BE  
 Radial clearance 20 . . . 29 µm

|                                 |    | Connecting Rod Crank Pin End Bore Diameter 26 <sup>+20</sup> / <sub>+7</sub><br>Tolerances and Radial Clearances In µm |  |                     |                                          |    |                     |                                          |    |                     |
|---------------------------------|----|------------------------------------------------------------------------------------------------------------------------|--|---------------------|------------------------------------------|----|---------------------|------------------------------------------|----|---------------------|
|                                 |    | +12<br>+7<br>Needle Roller<br>Tolerance                                                                                |  | Radial<br>Clearance | +16<br>+12<br>Needle Roller<br>Tolerance |    | Radial<br>Clearance | +20<br>+16<br>Needle Roller<br>Tolerance |    | Radial<br>Clearance |
| Crank Pin<br>Diameter           | 0  | -7                                                                                                                     |  | 21...29             | -4                                       | -5 | 20...29             | -2                                       | -3 | 20...29             |
|                                 | -3 | -9                                                                                                                     |  |                     | -6                                       | -7 |                     | -4                                       | -5 |                     |
|                                 | -3 | -5                                                                                                                     |  | 20...28             | -3                                       |    | 21...28             | -1                                       |    | 21...28             |
|                                 | -6 | -7                                                                                                                     |  |                     | -5                                       |    |                     | -3                                       |    |                     |
| 20 <sup>0</sup> / <sub>-9</sub> | -6 | -4                                                                                                                     |  | 21...29             | -1                                       | -2 | 20...29             | 0                                        |    | 22...29             |
|                                 | -9 | -6                                                                                                                     |  |                     | -3                                       | -4 |                     | -2                                       |    |                     |

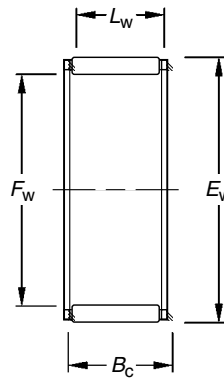
### Matching Scheme For A Wrist Pin Bearing Arrangement

(three diameter ranges are specified for the connecting rod and wrist pin)

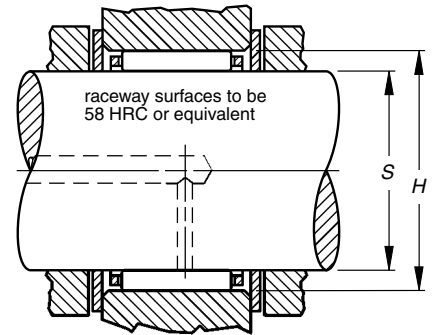
Example: Wrist pin diameter 16 mm, tolerance h5  
 Connecting rod bore diameter 20 mm, tolerance K6  
 Needle roller and cage assembly K16x20x20SE  
 Radial clearance 2 . . . 12 µm

|                                 |    | Wrist Pin End Bore Diameter 20 <sup>+2</sup> / <sub>-11</sub><br>Tolerances and Radial Clearances In µm |    |                     |                                        |    |                     |                                        |    |                     |
|---------------------------------|----|---------------------------------------------------------------------------------------------------------|----|---------------------|----------------------------------------|----|---------------------|----------------------------------------|----|---------------------|
|                                 |    | -6<br>-11<br>Needle roller<br>Tolerance                                                                 |    | Radial<br>Clearance | -2<br>-6<br>Needle Roller<br>Tolerance |    | Radial<br>Clearance | +2<br>-2<br>Needle Roller<br>Tolerance |    | Radial<br>Clearance |
| Wrist Pin<br>Diameter           | 0  |                                                                                                         |    |                     | -4                                     | -5 | 2...11              | -2                                     | -3 | 2...11              |
|                                 | -3 |                                                                                                         |    |                     | -6                                     | -7 |                     | -4                                     | -5 |                     |
|                                 | -3 | -5                                                                                                      |    | 2...10              | -3                                     | -4 | 3...12              | -1                                     | -2 | 3...12              |
| 16 <sup>0</sup> / <sub>-8</sub> | -6 | -7                                                                                                      |    |                     | -5                                     | -6 |                     | -3                                     | -4 |                     |
|                                 | -6 | -4                                                                                                      | -5 | 3...12              | -1                                     | -2 | 2...10              | 0                                      |    | 4...10              |
|                                 | -8 | -6                                                                                                      | -7 |                     | -3                                     | -4 |                     | -2                                     |    |                     |

**ASSEMBLIES FOR CRANK PIN  
END APPLICATIONS  
METRIC SERIES**



K.BE



| Shaft<br>Dia. | Dimensions mm/in.<br>-0.2 -0.08<br>-0.55 -0.22 |                |                |                | Assembly<br>Designation | Load Ratings<br>kN/lbf. |       |                | Mounting Dimensions mm/in.<br>(non-high performance engines) |        |        |        | Wt.<br>kg/lbs. |       |
|---------------|------------------------------------------------|----------------|----------------|----------------|-------------------------|-------------------------|-------|----------------|--------------------------------------------------------------|--------|--------|--------|----------------|-------|
|               | mm                                             | F <sub>w</sub> | E <sub>w</sub> | B <sub>c</sub> |                         | L <sub>w</sub>          | C     | C <sub>0</sub> | C <sub>g</sub>                                               | Max.   | Min.   | Min.   |                | Max.  |
| 12            | 12                                             | 16             | 10             | 7.8            | K12X16X10BE             | 6.21                    | 6.70  | n/a            | 12.000                                                       | 11.992 | 16.006 | 16.017 | 0.004          | 0.009 |
|               | 0.4724                                         | 0.6299         | 0.394          | 0.307          |                         | 1400                    | 1510  |                | 0.4724                                                       | 0.4721 | 0.6302 | 0.6306 |                |       |
| 12            | 12                                             | 17             | 10             | 7.8            | K12X17X10BE             | 7.32                    | 7.21  | n/a            | 12.000                                                       | 11.992 | 17.006 | 17.017 | 0.005          | 0.011 |
|               | 0.4724                                         | 0.6693         | 0.394          | 0.307          |                         | 1650                    | 1620  |                | 0.4724                                                       | 0.4721 | 0.6695 | 0.6700 |                |       |
| 14            | 14                                             | 18             | 10             | 7.8            | K14X18X10BE             | 6.89                    | 7.98  | n/a            | 14.000                                                       | 13.992 | 18.006 | 18.017 | 0.005          | 0.011 |
|               | 0.5512                                         | 0.7087         | 0.394          | 0.307          |                         | 1550                    | 1790  |                | 0.5512                                                       | 0.5509 | 0.7089 | 0.7093 |                |       |
| 14            | 14                                             | 18             | 10             | 7.8            | WK14X18X10BE            | 6.89                    | 7.98  | 0.0204         | 14.000                                                       | 13.992 | 18.006 | 18.017 | 0.005          | 0.011 |
|               | 0.5512                                         | 0.7087         | 0.394          | 0.307          |                         | 1550                    | 1790  |                | 0.5512                                                       | 0.5509 | 0.7089 | 0.7093 |                |       |
| 14            | 14                                             | 20             | 10             | 7.8            | K14X20X10BE             | 8.90                    | 8.61  | 0.0198         | 14.000                                                       | 13.992 | 20.007 | 20.020 | 0.007          | 0.015 |
|               | 0.5512                                         | 0.7874         | 0.394          | 0.307          |                         | 2000                    | 1940  |                | 0.5512                                                       | 0.5509 | 0.7877 | 0.7882 |                |       |
| 14            | 14                                             | 20             | 12             | 9.5            | K14X20X12BE             | 10.50                   | 10.60 | 0.0209         | 14.000                                                       | 13.992 | 20.007 | 20.020 | 0.009          | 0.020 |
|               | 0.5512                                         | 0.7874         | 0.472          | 0.374          |                         | 2360                    | 2380  |                | 0.5512                                                       | 0.5509 | 0.7877 | 0.7882 |                |       |
| 14            | 14                                             | 20             | 12             | 9.5            | WK14X20X12BE            | 10.50                   | 10.60 | 0.0209         | 14.000                                                       | 13.992 | 20.007 | 20.020 | 0.009          | 0.020 |
|               | 0.5512                                         | 0.7874         | 0.472          | 0.374          |                         | 2360                    | 2380  |                | 0.5512                                                       | 0.5509 | 0.7877 | 0.7882 |                |       |
| 15            | 15                                             | 22             | 12             | 9.0            | K15,2X22,2X12BE         | 10.80                   | 10.30 | 0.0211         | 15.200                                                       | 15.192 | 22.207 | 22.220 | 0.012          | 0.026 |
| 16            | 16                                             | 21             | 10             | 7.8            | K16X21X10BE             | 8.17                    | 8.90  | 0.0215         | 16.000                                                       | 15.992 | 21.007 | 21.020 | 0.007          | 0.015 |
|               | 0.6299                                         | 0.8268         | 0.394          | 0.307          |                         | 1840                    | 2000  |                | 0.6299                                                       | 0.6296 | 0.8270 | 0.8276 |                |       |
| 16            | 16                                             | 21             | 10             | 7.8            | WK16X21X10BE            | 8.17                    | 8.90  | 0.0215         | 16.000                                                       | 15.992 | 21.007 | 21.020 | 0.007          | 0.015 |
|               | 0.6299                                         | 0.8268         | 0.394          | 0.307          |                         | 1840                    | 2000  |                | 0.6299                                                       | 0.6296 | 0.8270 | 0.8276 |                |       |
| 16            | 16                                             | 22             | 12             | 9.5            | K16X22X12BE             | 11.20                   | 11.90 | 0.0227         | 16.000                                                       | 15.992 | 22.007 | 22.020 | 0.011          | 0.024 |
|               | 0.6299                                         | 0.8661         | 0.472          | 0.374          |                         | 2520                    | 2680  |                | 0.6299                                                       | 0.6296 | 0.8664 | 0.8669 |                |       |
| 18            | 18                                             | 24             | 12             | 9.5            | K18X24X12BE             | 11.80                   | 13.10 | 0.0243         | 18.000                                                       | 17.992 | 24.007 | 24.020 | 0.011          | 0.024 |
|               | 0.7087                                         | 0.9449         | 0.472          | 0.374          |                         | 2650                    | 2940  |                | 0.7087                                                       | 0.7083 | 0.9452 | 0.9457 |                |       |
| 18            | 18                                             | 24             | 13             | 9.8            | K18X24X13BE             | 12.10                   | 13.50 | 0.0245         | 18.000                                                       | 17.992 | 24.007 | 24.020 | 0.013          | 0.029 |
|               | 0.7087                                         | 0.9449         | 0.512          | 0.386          |                         | 2720                    | 3030  |                | 0.7087                                                       | 0.7083 | 0.9452 | 0.9457 |                |       |
| 18            | 18                                             | 24             | 13             | 10.5           | WK18X24X13BE            | 12.80                   | 14.60 | 0.0250         | 18.000                                                       | 17.992 | 24.007 | 24.020 | 0.011          | 0.024 |
|               | 0.7087                                         | 0.9449         | 0.512          | 0.413          |                         | 2880                    | 3280  |                | 0.7087                                                       | 0.7083 | 0.9452 | 0.9457 |                |       |
| 18            | 18                                             | 24             | 15             | 11.8           | K18X24X15BE             | 13.30                   | 15.20 | 0.0253         | 18.000                                                       | 17.992 | 24.007 | 24.020 | 0.014          | 0.031 |
|               | 0.7087                                         | 0.9449         | 0.591          | 0.465          |                         | 2990                    | 3420  |                | 0.7087                                                       | 0.7083 | 0.9452 | 0.9457 |                |       |
| 19            | 19                                             | 25             | 15             | 12.5           | K19X25X15BE             | 14.70                   | 17.60 | 0.0268         | 19.000                                                       | 18.991 | 25.007 | 25.020 | 0.014          | 0.031 |
| 20            | 20                                             | 26             | 12             | 9.8            | K20X26X12BE             | 13.30                   | 15.80 | 0.0267         | 20.000                                                       | 19.991 | 26.007 | 26.020 | 0.013          | 0.029 |
|               | 0.7874                                         | 1.0236         | 0.472          | 0.386          |                         | 2990                    | 3550  |                | 0.7874                                                       | 0.7870 | 1.0239 | 1.0244 |                |       |
| 20            | 20                                             | 26             | 17             | 13.8           | K20X26X17BE             | 14.90                   | 18.20 | 0.0276         | 20.000                                                       | 19.991 | 26.007 | 26.020 | 0.017          | 0.037 |
|               | 0.7874                                         | 1.0236         | 0.669          | 0.543          |                         | 3350                    | 4090  |                | 0.7874                                                       | 0.7870 | 1.0239 | 1.0244 |                |       |
| 21            | 21                                             | 27             | 13             | 10.5           | K21,1X27,1X13BE         | 14.10                   | 17.20 | 0.0278         | 21.100                                                       | 21.091 | 27.107 | 27.120 | 0.016          | 0.035 |
|               | 0.8307                                         | 1.0669         | 0.512          | 0.413          |                         | 3170                    | 3870  |                | 0.8307                                                       | 0.8304 | 1.0672 | 1.0677 |                |       |
| 22            | 22                                             | 28             | 13             | 9.8            | K22X28X13BE             | 13.90                   | 17.10 | 0.0283         | 22.000                                                       | 21.991 | 28.007 | 28.020 | 0.015          | 0.033 |
|               | 0.8661                                         | 1.1024         | 0.512          | 0.386          |                         | 3120                    | 3840  |                | 0.8661                                                       | 0.8658 | 1.1026 | 1.1031 |                |       |
| 22            | 22                                             | 29             | 15.6           | 12.8           | WK22X29X15,6BE          | 18.50                   | 22.30 | 0.0296         | 22.000                                                       | 21.991 | 29.007 | 29.020 | 0.021          | 0.046 |
|               | 0.8661                                         | 1.1417         | 0.614          | 0.504          |                         | 4160                    | 5010  |                | 0.8661                                                       | 0.8658 | 1.1420 | 1.1425 |                |       |
| 22            | 22                                             | 29             | 16             | 12.8           | K22X29X16BE             | 18.50                   | 22.30 | 0.0296         | 22.000                                                       | 21.991 | 29.007 | 29.020 | 0.021          | 0.046 |
|               | 0.8661                                         | 1.1417         | 0.630          | 0.504          |                         | 4160                    | 5010  |                | 0.8661                                                       | 0.8658 | 1.1420 | 1.1425 |                |       |

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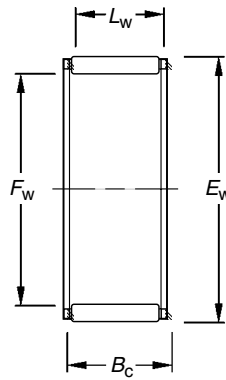


# NEEDLE ROLLER BEARINGS

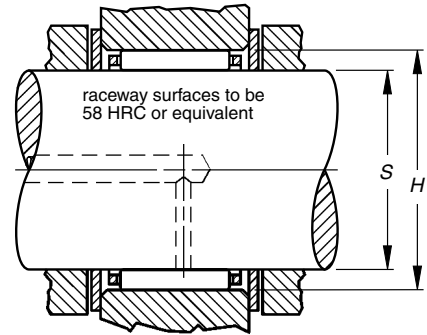
## ASSEMBLIES FOR CRANK PIN END APPLICATIONS

continued

### METRIC SERIES

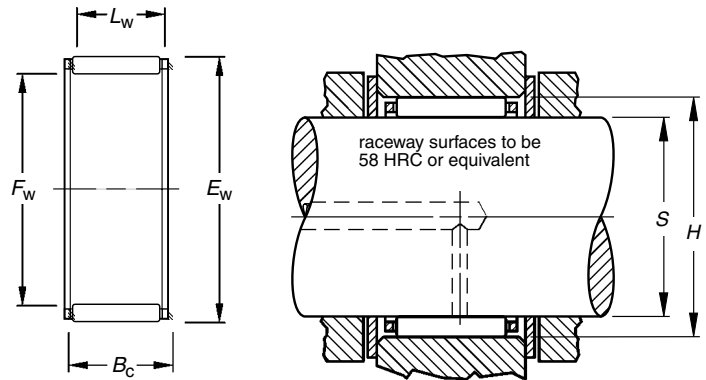


K.BE



| Shaft Dia. | Dimensions mm/in.<br>-0.2 -.008<br>-0.55 -.022 |                |                |                | Assembly Designation | Load Ratings<br>kN/lbf. |                |                | Mounting Dimensions mm/in.<br>(non-high performance engines) |        |        |        | Wt.<br>kg/lbs. |        |
|------------|------------------------------------------------|----------------|----------------|----------------|----------------------|-------------------------|----------------|----------------|--------------------------------------------------------------|--------|--------|--------|----------------|--------|
|            | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> | L <sub>w</sub> |                      | C                       | C <sub>0</sub> | C <sub>g</sub> | Max.                                                         | Min.   | Min.   | Max.   |                |        |
| mm         | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> | L <sub>w</sub> |                      | C                       | C <sub>0</sub> | C <sub>g</sub> | S                                                            |        | H      |        |                |        |
| 24         | 24                                             | 30             | 13             | 9.8            | K24X30X13BE          | 14.40                   | 18.40          | 0.0298         | 24.000                                                       | 23.991 | 30.007 | 30.020 | 0.016          |        |
|            | 0.9449                                         | 1.1811         | 0.512          | 0.386          |                      | 3240                    | 4140           |                | 0.9449                                                       | 0.9445 | 1.1814 | 1.1819 |                | 0.035  |
|            | 24                                             | 30             | 15             | 11.8           |                      | K24X30X15BE             | 15.30          |                | 19.70                                                        | 0.0304 | 24.000 | 23.991 |                | 30.007 |
| 24         | 24                                             | 30             | 17             | 13.8           | K24X30X17BE          | 19.00                   | 26.30          | 0.0326         | 24.000                                                       | 23.991 | 30.007 | 30.020 | 0.021          |        |
|            | 0.9449                                         | 1.1811         | 0.669          | 0.543          |                      | 4270                    | 5910           |                | 0.9449                                                       | 0.9445 | 1.1814 | 1.1819 |                | 0.04   |
|            | 25                                             | 31             | 19.8           | 17.8           |                      | WK25X31X20BE            | 23.30          |                | 34.50                                                        | 0.0355 | 25.000 | 24.991 |                | 31.009 |
| 25         | 25                                             | 31             | 19.8           | 17.8           | WK25X31X20BE         | 23.30                   | 34.50          | 0.0355         | 25.000                                                       | 24.991 | 31.009 | 31.025 | 0.024          |        |
|            | 0.9843                                         | 1.2205         | 0.780          | 0.701          |                      | 5240                    | 7760           |                | 0.9843                                                       | 0.9839 | 1.2208 | 1.2215 |                | 0.053  |
|            | 25                                             | 32             | 16             | 12.8           |                      | K25X32X16BE             | 19.20          |                | 24.30                                                        | 0.0319 | 25.000 | 24.991 |                | 32.009 |
| 25         | 25                                             | 32             | 16             | 12.8           | K25X32X16BE          | 19.20                   | 24.30          | 0.0319         | 25.000                                                       | 24.991 | 32.009 | 32.025 | 0.022          |        |
|            | 0.9843                                         | 1.2598         | 0.630          | 0.504          |                      | 4320                    | 5460           |                | 0.9843                                                       | 0.9839 | 1.2602 | 1.2608 |                | 0.049  |
|            | 25                                             | 32             | 24             | 19.8           |                      | K25X32X24BE             | 27.50          |                | 38.50                                                        | 0.0358 | 25.000 | 24.991 |                | 32.009 |
| 25         | 25                                             | 32             | 24             | 19.8           | K25X32X24BE          | 27.50                   | 38.50          | 0.0358         | 25.000                                                       | 24.991 | 32.009 | 32.025 | 0.035          |        |
|            | 0.9843                                         | 1.2598         | 0.945          | 0.780          |                      | 6180                    | 8660           |                | 0.9843                                                       | 0.9839 | 1.2602 | 1.2608 |                | 0.077  |
|            | 30                                             | 37             | 16             | 12.8           |                      | K30X37X16BE             | 21.60          |                | 29.80                                                        | 0.0363 | 30.000 | 29.991 |                | 37.009 |
| 30         | 30                                             | 37             | 16             | 12.8           | K30X37X16BE          | 21.60                   | 29.80          | 0.0363         | 30.000                                                       | 29.991 | 37.009 | 37.025 | 0.029          |        |
|            | 1.1811                                         | 1.4567         | 0.630          | 0.504          |                      | 4860                    | 6700           |                | 1.1811                                                       | 1.1807 | 1.4570 | 1.4577 |                | 0.064  |
|            | 35                                             | 42             | 20             | 16.8           |                      | K35X42X20BE             | 29.70          |                | 47.00                                                        | 0.0434 | 35.000 | 34.989 |                | 42.009 |
| 35         | 35                                             | 42             | 20             | 16.8           | K35X42X20BE          | 29.70                   | 47.00          | 0.0434         | 35.000                                                       | 34.989 | 42.009 | 42.025 | 0.039          |        |
|            | 1.3780                                         | 1.6535         | 0.787          | 0.661          |                      | 6680                    | 10600          |                | 1.3780                                                       | 1.3775 | 1.6539 | 1.6545 |                | 0.086  |

**ASSEMBLIES FOR WRIST PIN  
END APPLICATIONS  
METRIC SERIES**



K.SE

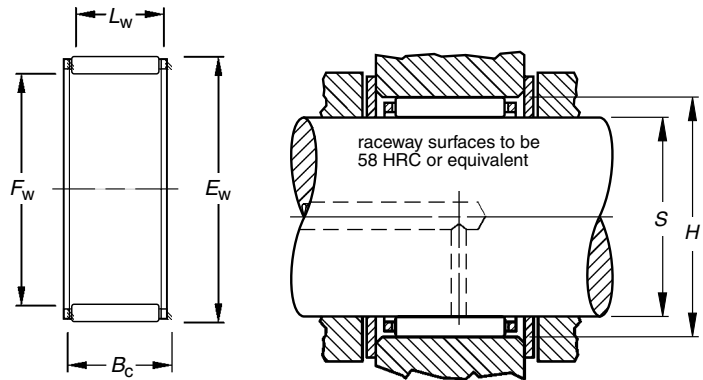
| Shaft<br>Dia. | Dimensions mm/in.<br>-0.2 -.008<br>-0.55 -.022 |                |                |                | Assembly<br>Designation | Load Ratings<br>kN/lbf. |                |                | Mounting Dimensions mm/in.<br>(non-high performance engines) |           |        |        | Wt.<br>kg/lbs. |
|---------------|------------------------------------------------|----------------|----------------|----------------|-------------------------|-------------------------|----------------|----------------|--------------------------------------------------------------|-----------|--------|--------|----------------|
|               | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> | L <sub>w</sub> |                         | C                       | C <sub>0</sub> | C <sub>g</sub> | Max.<br>S                                                    | Min.<br>H | Min.   | Max.   |                |
| mm            |                                                |                |                |                |                         |                         |                |                |                                                              |           |        |        |                |
| 9             | 9                                              | 12             | 11.5           | 8.4            | K9X12X11,5SE            | 4.23                    | 4.53           | 0.0296         | 9.000                                                        | 8.994     | 12.006 | 12.017 | 0.003<br>0.007 |
|               | 0.3543                                         | 0.4724         | 0.453          | 0.331          |                         | 951                     | 1020           |                | 0.3543                                                       | 0.3541    | 0.4727 | 0.4731 |                |
| 10            | 9                                              | 13             | 12.5           | 9.8            | K9X13X12,5SE            | 5.58                    | 5.41           | 0.0306         | 9.000                                                        | 8.994     | 13.006 | 13.017 | 0.005<br>0.011 |
|               | 0.3543                                         | 0.5118         | 0.492          | 0.386          |                         | 1250                    | 1220           |                | 0.3543                                                       | 0.3541    | 0.5120 | 0.5125 |                |
| 10            | 10                                             | 13             | 14.5           | 11.8           | K10X13X14,5SE           | 5.93                    | 7.20           | 0.0152         | 10.000                                                       | 9.994     | 13.006 | 13.017 | 0.004<br>0.009 |
|               | 0.3937                                         | 0.5118         | 0.571          | 0.465          |                         | 1330                    | 1620           |                | 0.3937                                                       | 0.3935    | 0.5120 | 0.5125 |                |
| 12            | 10                                             | 14             | 10.0           | 7.0            | K10X14X10SE             | 4.62                    | 4.36           | 0.0155         | 10.000                                                       | 9.994     | 14.006 | 14.017 | 0.004<br>0.009 |
|               | 0.3937                                         | 0.5512         | 0.394          | 0.276          |                         | 1040                    | 980            |                | 0.3937                                                       | 0.3935    | 0.5514 | 0.5519 |                |
| 12            | 12                                             | 15             | 13.0           | 9.8            | K12X15X13SE             | 6.00                    | 7.72           | 0.0179         | 12.000                                                       | 11.992    | 15.006 | 15.017 | 0.004<br>0.009 |
|               | 0.4724                                         | 0.5906         | 0.512          | 0.386          |                         | 1350                    | 1740           |                | 0.4724                                                       | 0.4721    | 0.5908 | 0.5912 |                |
| 12            | 12                                             | 15             | 15.0           | 11.8           | K12X15X15SE             | 6.97                    | 9.36           | 0.0153         | 12.000                                                       | 11.992    | 15.006 | 15.017 | 0.005<br>0.011 |
|               | 0.4724                                         | 0.5906         | 0.591          | 0.465          |                         | 1570                    | 2100           |                | 0.4724                                                       | 0.4721    | 0.5908 | 0.5912 |                |
| 12            | 12                                             | 15             | 17.5           | 12.8           | K12X15X17,5SE           | 7.45                    | 10.2           | 0.0196         | 12.000                                                       | 11.992    | 15.006 | 15.017 | 0.006<br>0.013 |
|               | 0.4724                                         | 0.5906         | 0.689          | 0.504          |                         | 1670                    | 2290           |                | 0.4724                                                       | 0.4721    | 0.5908 | 0.5912 |                |
| 12            | 12                                             | 16             | 13.0           | 9.8            | K12X16X13SE             | 6.03                    | 6.38           | 0.0206         | 12.000                                                       | 11.992    | 16.006 | 16.017 | 0.006<br>0.013 |
|               | 0.4724                                         | 0.6299         | 0.512          | 0.386          |                         | 1360                    | 1430           |                | 0.4724                                                       | 0.4721    | 0.6302 | 0.6306 |                |
| 12            | 12                                             | 17             | 13.0           | 9.8            | K12X17X13SE             | 7.61                    | 7.54           | 0.0210         | 12.000                                                       | 11.992    | 17.006 | 17.017 | 0.007<br>0.015 |
|               | 0.4724                                         | 0.6693         | 0.512          | 0.386          |                         | 1710                    | 1700           |                | 0.4724                                                       | 0.4721    | 0.6695 | 0.6700 |                |
| 12            | 12                                             | 17             | 15.0           | 12.5           | K12X17X15SE             | 9.30                    | 9.75           | 0.0181         | 12.000                                                       | 11.992    | 17.006 | 17.017 | 0.007<br>0.015 |
|               | 0.4724                                         | 0.6693         | 0.591          | 0.492          |                         | 2090                    | 2190           |                | 0.4724                                                       | 0.4721    | 0.6695 | 0.6700 |                |
| 13            | 13                                             | 16             | 14.0           | 9.8            | K13X16X14SE             | 5.62                    | 7.23           | 0.0184         | 13.000                                                       | 12.992    | 16.006 | 16.017 | 0.005<br>0.011 |
|               | 0.5118                                         | 0.6299         | 0.551          | 0.386          |                         | 1260                    | 1630           |                | 0.5118                                                       | 0.5115    | 0.6302 | 0.6306 |                |
| 13            | 13                                             | 17             | 17.7           | 13.8           | K13X17X17,7SE           | 9.80                    | 12.3           | 0.0196         | 13.000                                                       | 12.992    | 17.006 | 17.017 | 0.008<br>0.018 |
|               | 0.5118                                         | 0.6693         | 0.697          | 0.543          |                         | 2200                    | 2770           |                | 0.5118                                                       | 0.5115    | 0.6695 | 0.6700 |                |
| 13            | 13                                             | 18             | 15.0           | 12.5           | K13X18X15SE             | 9.28                    | 9.88           | 0.0200         | 13.000                                                       | 12.992    | 18.006 | 18.017 | 0.008<br>0.018 |
|               | 0.5118                                         | 0.7087         | 0.591          | 0.492          |                         | 2090                    | 2220           |                | 0.5118                                                       | 0.5115    | 0.7089 | 0.7093 |                |
| 14            | 14                                             | 18             | 13.0           | 9.8            | K14X18X13SE             | 7.39                    | 8.69           | 0.0220         | 14.000                                                       | 13.992    | 18.006 | 18.017 | 0.007<br>0.015 |
|               | 0.5512                                         | 0.7087         | 0.512          | 0.386          |                         | 1660                    | 1950           |                | 0.5512                                                       | 0.5509    | 0.7089 | 0.7093 |                |
| 14            | 14                                             | 18             | 17.0           | 11.8           | K14X18X17SE             | 8.59                    | 10.5           | 0.0203         | 14.000                                                       | 13.992    | 18.006 | 18.017 | 0.00<br>0.020  |
|               | 0.5512                                         | 0.7087         | 0.669          | 0.465          |                         | 1930                    | 2360           |                | 0.5512                                                       | 0.5509    | 0.7089 | 0.7093 |                |
| 14            | 14                                             | 18             | 21.0           | 14.8           | K14X18X21SE             | 10.3                    | 13.3           | 0.0208         | 14.000                                                       | 13.992    | 18.006 | 18.017 | 0.011<br>0.024 |
|               | 0.5512                                         | 0.7087         | 0.827          | 0.583          |                         | 2320                    | 2990           |                | 0.5512                                                       | 0.5509    | 0.7089 | 0.7093 |                |
| 15            | 15                                             | 19             | 17.0           | 11.8           | K15X19X17SE             | 9.05                    | 11.5           | 0.0218         | 15.000                                                       | 14.992    | 19.007 | 19.020 | 0.009<br>0.020 |
|               | 0.5906                                         | 0.7480         | 0.669          | 0.465          |                         | 2030                    | 2590           |                | 0.5906                                                       | 0.5902    | 0.7483 | 0.7488 |                |
| 15            | 15                                             | 19             | 19.5           | 15.8           | K15X19X19,5SE           | 10.8                    | 14.3           | 0.0231         | 15.000                                                       | 14.992    | 19.007 | 19.020 | 0.010<br>0.022 |
|               | 0.5906                                         | 0.7480         | 0.768          | 0.622          |                         | 2430                    | 3210           |                | 0.5906                                                       | 0.5902    | 0.7483 | 0.7488 |                |
| 15            | 15                                             | 19             | 20.0           | 15.8           | K15X19X20SE             | 10.8                    | 14.3           | 0.0229         | 15.000                                                       | 14.992    | 19.007 | 19.020 | 0.010<br>0.022 |
|               | 0.5906                                         | 0.7480         | 0.787          | 0.622          |                         | 2430                    | 3210           |                | 0.5906                                                       | 0.5902    | 0.7483 | 0.7488 |                |
| 16            | 16                                             | 20             | 20.0           | 15.8           | K16X20X20SE             | 12.0                    | 16.9           | 0.0242         | 16.000                                                       | 15.992    | 20.007 | 20.020 | 0.011<br>0.024 |
|               | 0.6299                                         | 0.7874         | 0.787          | 0.622          |                         | 2700                    | 3800           |                | 0.6299                                                       | 0.6296    | 0.7877 | 0.7882 |                |
| 16            | 16                                             | 20             | 22.0           | 15.8           | K16X20X22SE             | 12.0                    | 16.9           | 0.0242         | 16.000                                                       | 15.992    | 20.007 | 20.020 | 0.013<br>0.029 |
|               | 0.6299                                         | 0.7874         | 0.866          | 0.622          |                         | 2700                    | 3800           |                | 0.6299                                                       | 0.6296    | 0.7877 | 0.7882 |                |
| 16            | 16                                             | 20             | 23.0           | 15.8           | K16X20X23SE             | 10.7                    | 14.5           | 0.0259         | 16.000                                                       | 15.992    | 20.007 | 20.020 | 0.013<br>0.029 |
|               | 0.6299                                         | 0.7874         | 0.906          | 0.622          |                         | 2410                    | 3260           |                | 0.6299                                                       | 0.6296    | 0.7877 | 0.7882 |                |

Continued on next page.



# NEEDLE ROLLER BEARINGS

## ASSEMBLIES FOR WRIST PIN END APPLICATIONS — *continued* METRIC SERIES



K.SE

| Shaft<br>Dia. | Dimensions mm/in.<br>-0.2 -0.08<br>-0.55 -0.22 |                |                |                | Assembly<br>Designation | Load Ratings<br>kN/lbf. |                |                | Mounting Dimensions mm/in.<br>(non-high performance engines) |        |        |        | Wt.<br>kg/lbs. |        |
|---------------|------------------------------------------------|----------------|----------------|----------------|-------------------------|-------------------------|----------------|----------------|--------------------------------------------------------------|--------|--------|--------|----------------|--------|
|               | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> | L <sub>w</sub> |                         | C                       | C <sub>0</sub> | C <sub>g</sub> | Max.                                                         | Min.   | Min.   | Max.   |                |        |
| mm            | F <sub>w</sub>                                 | E <sub>w</sub> | B <sub>c</sub> | L <sub>w</sub> |                         | C                       | C <sub>0</sub> | C <sub>g</sub> | S                                                            |        | H      |        |                |        |
| 18            | 18                                             | 22             | 22.0           | 17.8           | K18X22X22SE             | 14.4                    | 22.0           | 0.0259         | 18.000                                                       | 17.992 | 22.007 | 22.020 | 0.016          |        |
|               | 0.7087                                         | 0.8661         | 0.866          | 0.701          |                         | 3240                    | 4950           |                | 0.7087                                                       | 0.7083 | 0.8664 | 0.8669 |                | 0.035  |
|               | 18                                             | 23             | 20.0           | 15.8           |                         | K18X23X20SE             | 13.6           |                | 17.6                                                         | 0.0249 | 18.000 | 17.992 |                | 23.007 |
| 18            | 18                                             | 23             | 23.0           | 17.8           | K18X23X23SE             | 15.9                    | 21.6           | 0.0291         | 18.000                                                       | 17.992 | 23.007 | 23.020 | 0.018          |        |
|               | 0.7087                                         | 0.9055         | 0.906          | 0.701          |                         | 3570                    | 4860           |                | 0.7087                                                       | 0.7083 | 0.9058 | 0.9063 |                | 0.040  |
|               | 19                                             | 24             | 25.5           | 17.8           |                         | K19X24X25,5SE           | 16.7           |                | 23.4                                                         | 0.0268 | 19.000 | 18.991 |                | 24.007 |
| 19            | 19                                             | 24             | 25.5           | 17.8           | K19X24X25,5SE           | 16.7                    | 23.4           | 0.0268         | 19.000                                                       | 18.991 | 24.007 | 24.020 | 0.022          |        |
|               | 0.7480                                         | 0.9449         | 1.004          | 0.701          |                         | 3750                    | 5260           |                | 0.7480                                                       | 0.7477 | 0.9452 | 0.9457 |                | 0.049  |
|               | 20                                             | 24             | 23.0           | 17.8           |                         | K20X24X23SE             | 14.8           |                | 23.7                                                         | 0.0282 | 20.000 | 19.991 |                | 24.007 |
| 20            | 20                                             | 24             | 23.0           | 17.8           | K20X24X23SE             | 14.8                    | 23.7           | 0.0282         | 20.000                                                       | 19.991 | 24.007 | 24.020 | 0.017          |        |
|               | 0.7874                                         | 0.9449         | 0.906          | 0.701          |                         | 3330                    | 5330           |                | 0.7874                                                       | 0.7870 | 0.9452 | 0.9457 |                | 0.037  |
|               | 20                                             | 25             | 22.0           | 16.8           |                         | K20X25X22SE             | 15.9           |                | 22.2                                                         | 0.0294 | 20.000 | 19.991 |                | 25.007 |
| 20            | 20                                             | 25             | 22.0           | 16.8           | K20X25X22SE             | 15.9                    | 22.2           | 0.0294         | 20.000                                                       | 19.991 | 25.007 | 25.020 | 0.020          |        |
|               | 0.7874                                         | 0.9843         | 0.866          | 0.661          |                         | 3570                    | 4990           |                | 0.7874                                                       | 0.7870 | 0.9845 | 0.9850 |                | 0.044  |
|               | 20                                             | 25             | 23.0           | 17.8           |                         | K20X25X23SE             | 17.5           |                | 25.2                                                         | 0.0310 | 20.000 | 19.991 |                | 25.007 |
| 20            | 20                                             | 25             | 23.0           | 17.8           | K20X25X23SE             | 17.5                    | 25.2           | 0.0310         | 20.000                                                       | 19.991 | 25.007 | 25.020 | 0.025          |        |
|               | 0.7874                                         | 0.9843         | 0.906          | 0.701          |                         | 3930                    | 5670           |                | 0.7874                                                       | 0.7870 | 0.9845 | 0.9850 |                | 0.055  |

## NEEDLE ROLLER AND CAGE RADIAL ASSEMBLIES

### INCH SERIES

Timken® Torrington® inch series needle roller and cage radial assemblies are available in a variety of sizes and designs. This catalog includes the most popular standard designs.

#### REFERENCE STANDARDS:

- **ANSI/ABMA 18.2** – Needle roller bearings – Radial, inch design.

Before selecting specific inch series, needle roller and cage radial assemblies, the engineering section of this catalog should be reviewed.

### Types Of Inch Series Needle Roller And Cage Radial Assemblies



WJ



WJC

There are two primary constructions of inch series needle roller and cage assemblies. The WJ assemblies generally employ larger diameter needle rollers whereas the WJC assemblies normally employ smaller diameter needle rollers.

### CONSTRUCTION

Needle roller and cage radial assemblies have a steel cage which provides both inward and outward retention for the needle rollers. The designs provide maximum cage strength consistent with the inherent high load ratings of needle roller bearings.

Accurate guidance of the needle rollers by the cage bars allows for operation at high speeds. Needle roller and cage assemblies have either one or two rows of needle rollers.

Also available (on request) are needle roller and cage assemblies using molded, one piece glass reinforced engineered polymer cages. These operate well at temperatures up to 250° F (120° C) over extended periods. However, care should be exercised when bearings are lubricated with oils containing additives as service life may be reduced if the operating temperature exceeds 212° F (100° C). At such high temperatures oil can deteriorate with time and it is suggested that oil change intervals are observed.

Needle rollers with relieved ends used in these assemblies are made of high carbon chrome steel, through-hardened, ground and lapped to close tolerances for diameter and roundness. See the engineering section of this catalog for further discussion of relieved end rollers.

### DIMENSIONAL ACCURACY

The nominal inch assemblies, WJ and WJC, contain needle rollers manufactured to only one diameter grade. Within any one assembly, the needle rollers have a total diameter tolerance of .0001 inch.

The limit to precision of the radial clearance of mounted needle roller and cage assemblies is the capability of the user to hold close tolerances on the inner and outer raceways.

The tolerance of the overall width of these assemblies is given on the tabular pages of this section.

### MOUNTING DIMENSIONS

The cage and needle roller assembly normally uses the shaft and housing as the inner and outer raceways. In order to realize full bearing load rating and life, the shaft and housing must have the correct geometric and metallurgical characteristics.

The tables of dimensions for these assemblies list the suggested diameters for the shaft when used as the inner raceway. These are consistent with ISO h5 shaft raceway tolerances. Additional design details for shafts used as inner raceways can be found in the engineering section of this catalog.

Since the housing normally serves as the outer raceway, it should be of sufficient cross section to maintain adequate roundness and running clearance under load. The tables of dimensions also list the suggested diameters for the housings when used as outer raceways. These are consistent with ISO G6





## NEEDLE ROLLER BEARINGS

housing bore tolerances. Additional design details for housings used as outer raceways can be found in the engineering section of this catalog.

The suggested mounting diameter tolerances for these needle roller and cage assemblies will provide correct running clearance for most applications.

The needle roller and cage assembly must be axially located by shoulders or other suitable means. End locating surfaces should be hardened to minimize wear. For satisfactory operation, minimum axial clearance should be 0.008 inch. When using type WJ assembly, fillets adjacent to the assembly must not exceed 0.03 inch radius. When it is necessary to use fillets adjacent to WJC assembly, please consult your Timken representative for suggestions.

### LUBRICATION

Oil is the preferred lubricant for most applications. In critical applications involving high speeds, ample oil flow must be provided. Where assemblies are subjected to high centrifugal forces, such as in epicyclic gearing, or inertia forces, as in the small end of a connecting rod, the contact pressure between the cage and the raceway guiding surface becomes critical. The allowable contact pressure depends on a combination of the induced force and the rubbing velocity between the cage and the raceway and the rate of lubricant flow. Consult your Timken representative when cages will be subjected to high induced forces.

### SPECIAL DESIGNS

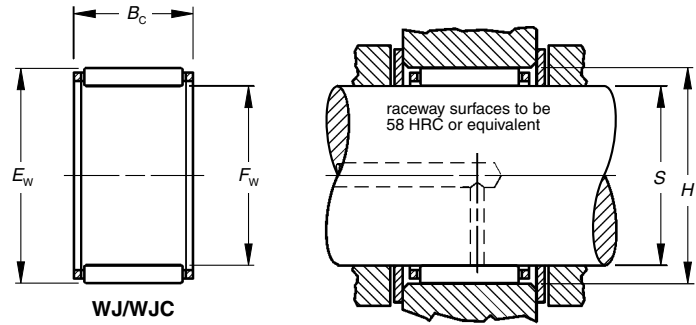
Needle roller and cage assemblies made to special dimensions or configurations, such as those that are split to assemble around a one-piece crankshaft, can be made available on special order where quantities permit. Special plated cages to enhance life under conditions of high induced forces can also be made available.

C



SINGLE-ROW ASSEMBLIES

INCH SERIES



| Shaft Dia.       | Dimensions mm/in.           |                  |                  | Assembly Designation | Load Ratings kN/lbf. |                 | Limiting Speed |       | C <sub>g</sub> | S                | H                | Wt. kg/lbs.      |                  |                  |
|------------------|-----------------------------|------------------|------------------|----------------------|----------------------|-----------------|----------------|-------|----------------|------------------|------------------|------------------|------------------|------------------|
|                  | -0.2 - .008<br>-0.55 - .022 |                  |                  |                      | C                    | C <sub>0</sub>  | Grease         | Oil   |                |                  |                  |                  | Max.             | Min.             |
| in.              | F <sub>w</sub>              | E <sub>w</sub>   | B <sub>c</sub>   |                      |                      |                 | RPM            |       |                |                  |                  |                  |                  |                  |
| 3/8              | 9.525<br>0.3750             | 12.700<br>0.5000 | 9.53<br>0.375    | WJC-060806           | 3.87<br>870          | 4.00<br>900     | 24000          | 37000 | 0.0170         | 9.525<br>0.3750  | 9.520<br>0.3748  | 12.705<br>0.5002 | 12.715<br>0.5006 | 0.003<br>0.006   |
| 1/2              | 12.700<br>0.5000            | 15.875<br>0.6250 | 12.70<br>0.500   | WJC-081008           | 6.23<br>1 400        | 8.01<br>1 800   | 23000          | 35000 | 0.0227         | 12.700<br>0.5000 | 12.692<br>0.4997 | 15.880<br>0.6252 | 15.890<br>0.6256 | 0.005<br>0.010   |
| 9/16             | 14.288<br>0.5625            | 17.463<br>0.6875 | 12.70<br>0.500   | WJC-091108           | 6.81<br>1 530        | 9.25<br>2 080   | 22000          | 34000 | 0.0247         | 14.288<br>0.5625 | 14.280<br>0.5622 | 17.468<br>0.6877 | 17.478<br>0.6881 | 0.006<br>0.013   |
| 5/8              | 15.875<br>0.6250            | 19.050<br>0.7500 | 12.70<br>0.500   | WJC-101208           | 7.03<br>1 580        | 9.96<br>2 240   | 18000          | 27000 | 0.0264         | 15.875<br>0.6250 | 15.867<br>0.6247 | 19.058<br>0.7503 | 19.070<br>0.7508 | 0.006<br>0.013   |
|                  | 15.875<br>0.6250            | 22.225<br>0.8750 | 15.88<br>0.625   | WJ-101410            | 15.6<br>3 510        | 17.8<br>3 990   | 19000          | 29000 | 0.0280         | 15.875<br>0.6250 | 15.867<br>0.6247 | 22.233<br>0.8753 | 22.245<br>0.8758 | 0.012<br>0.027   |
| 3/4              | 15.875<br>0.6250            | 22.225<br>0.8750 | 22.23<br>0.875   | WJ-101414            | 21.3<br>4 780        | 26.4<br>5 940   | 19000          | 29000 | 0.0309         | 15.875<br>0.6250 | 15.867<br>0.6247 | 22.233<br>0.8753 | 22.245<br>0.8758 | 0.017<br>0.038   |
|                  | 19.050<br>0.7500            | 25.400<br>1.0000 | 25.40<br>1.000   | WJ-121616            | 26.8<br>6 020        | 37.2<br>8 370   | 16000          | 24000 | 0.0362         | 19.050<br>0.7500 | 19.040<br>0.7496 | 25.408<br>1.0003 | 25.420<br>1.0008 | 0.023<br>0.051   |
| 13/16            | 20.638<br>0.8125            | 26.988<br>1.0625 | 22.23<br>0.875   | WJ-131714            | 25.1<br>5 650        | 35.0<br>7 880   | 14000          | 22000 | 0.0368         | 20.638<br>0.8125 | 20.627<br>0.8121 | 26.995<br>1.0628 | 27.008<br>1.0633 | 0.021<br>0.046   |
| 7/8              | 22.225<br>0.8750            | 28.575<br>1.1250 | 25.40<br>1.000   | WJ-141816            | 29.2<br>6 570        | 43.5<br>9 770   | 13000          | 20000 | 0.0401         | 22.225<br>0.8750 | 22.215<br>0.8746 | 28.583<br>1.1253 | 28.595<br>1.1258 | 0.026<br>0.058   |
| 1                | 25.400<br>1.0000            | 33.338<br>1.3125 | 19.05<br>0.750   | WJ-162112            | 28.1<br>6 320        | 37.1<br>8 340   | 12000          | 18000 | 0.0397         | 25.400<br>1.0000 | 25.390<br>0.9996 | 33.348<br>1.3129 | 33.363<br>1.3135 | 0.029<br>0.063   |
|                  | 25.400<br>1.0000            | 33.338<br>1.3125 | 25.40<br>1.000   | WJ-162116            | 36.8<br>8 270        | 52.5<br>11 800  | 12000          | 18000 | 0.0432         | 25.400<br>1.0000 | 25.390<br>0.9996 | 33.348<br>1.3129 | 33.363<br>1.3135 | 0.038<br>0.084   |
|                  | 25.400<br>1.0000            | 33.338<br>1.3125 | 31.75<br>1.250   | WJ-162120            | 44.5<br>10 000       | 67.2<br>15 100  | 12000          | 18000 | 0.0460         | 25.400<br>1.0000 | 25.390<br>0.9996 | 33.348<br>1.3129 | 33.363<br>1.3135 | 0.048<br>0.105   |
| 1 1/8            | 28.575<br>1.1250            | 38.100<br>1.5000 | 25.40<br>1.000   | WJ-182416            | 42.4<br>9 520        | 57.8<br>13 000  | 10000          | 16000 | 0.0455         | 28.575<br>1.1250 | 28.565<br>1.1246 | 38.110<br>1.5004 | 38.125<br>1.5010 | 0.041<br>0.090   |
|                  | 28.575<br>1.1250            | 38.100<br>1.5000 | 31.75<br>1.250   | WJ-182420            | 52<br>11 700         | 74.7<br>16 800  | 10000          | 16000 | 0.0485         | 28.575<br>1.1250 | 28.565<br>1.1246 | 38.110<br>1.5004 | 38.125<br>1.5010 | 0.065<br>0.143   |
| 1 1/4            | 31.750<br>1.2500            | 41.275<br>1.6250 | 19.05<br>0.750   | WJ-202612            | 33.4<br>7 520        | 43.7<br>9 830   | 9300           | 14000 | 0.0443         | 31.750<br>1.2500 | 31.740<br>1.2496 | 41.285<br>1.6254 | 41.300<br>1.6260 | 0.043<br>0.094   |
|                  | 31.750<br>1.2500            | 41.275<br>1.6250 | 25.40<br>1.000   | WJ-202616            | 44.1<br>9 910        | 62.3<br>14 000  | 9300           | 14000 | 0.0484         | 31.750<br>1.2500 | 31.740<br>1.2496 | 41.285<br>1.6254 | 41.300<br>1.6260 | 0.061<br>0.134   |
|                  | 31.750<br>1.2500            | 41.275<br>1.6250 | 31.75<br>1.250   | WJ-202620            | 53.8<br>12 100       | 81.0<br>18 200  | 9300           | 14000 | 0.0517         | 31.750<br>1.2500 | 31.740<br>1.2496 | 41.285<br>1.6254 | 41.300<br>1.6260 | 0.071<br>0.156   |
| 1 1/2            | 31.750<br>1.2500            | 41.275<br>1.6250 | 38.10<br>1.500   | WJ-202624            | 63.6<br>14 300       | 99.6<br>22 400  | 9300           | 14000 | 0.0544         | 31.750<br>1.2500 | 31.740<br>1.2496 | 41.285<br>1.6254 | 41.300<br>1.6260 | 0.085<br>0.188   |
|                  | 34.925<br>1.3750            | 44.450<br>1.7500 | 25.40<br>1.000   | WJ-222816            | 45.8<br>10 300       | 67.2<br>15 100  | 8300           | 13000 | 0.0513         | 34.925<br>1.3750 | 34.915<br>1.3746 | 44.460<br>1.7504 | 44.475<br>1.7510 | 0.067<br>0.147   |
| 1 3/8            | 34.925<br>1.3750            | 44.450<br>1.7500 | 31.75<br>1.250   | WJ-222820            | 56.0<br>12 600       | 87.2<br>19 600  | 8300           | 13000 | 0.0547         | 34.925<br>1.3750 | 34.915<br>1.3746 | 44.460<br>1.7504 | 44.475<br>1.7510 | 0.077<br>0.170   |
|                  | 1 1/2                       | 38.100<br>1.5000 | 47.625<br>1.8750 | 25.40<br>1.000       | WJ-243016            | 47.2<br>10 600  | 71.6<br>16 100 | 7600  | 12000          | 0.0541           | 38.100<br>1.5000 | 38.090<br>1.4996 | 47.635<br>1.8754 | 47.650<br>1.8760 |
| 38.100<br>1.5000 |                             | 47.625<br>1.8750 | 31.75<br>1.250   | WJ-243020            | 57.8<br>13 000       | 93.0<br>20 900  | 7600           | 12000 | 0.0577         | 38.100<br>1.5000 | 38.090<br>1.4996 | 47.635<br>1.8754 | 47.650<br>1.8760 | 0.083<br>0.184   |
| 38.100<br>1.5000 |                             | 47.625<br>1.8750 | 38.10<br>1.500   | WJ-243024            | 68.1<br>15 300       | 114.8<br>25 800 | 7600           | 12000 | 0.0608         | 38.100<br>1.5000 | 38.090<br>1.4996 | 47.635<br>1.8754 | 47.650<br>1.8760 | 0.100<br>0.220   |

Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.

Minimum axial clearance should be .02 mm, .008 in.

Continued on next page.



# NEEDLE ROLLER BEARINGS

| Shaft Dia. | Dimensions mm/in.           |                |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed |       | C <sub>g</sub> | Max.    | Min.    | Min.    | Max.    | Wt. kg/lbs. |
|------------|-----------------------------|----------------|----------------|----------------------|----------------------|----------------|----------------|-------|----------------|---------|---------|---------|---------|-------------|
|            | F <sub>w</sub>              | E <sub>w</sub> | B <sub>c</sub> |                      | C                    | C <sub>0</sub> | Grease         | Oil   |                |         |         |         |         |             |
| in.        | -0.2 - .008<br>-0.55 - .022 |                |                |                      |                      |                | RPM            |       |                |         |         |         |         |             |
| 1 3/4      | 38.100                      | 47.625         | 44.45          | WJ-243028            | 77.4                 | 135.7          | 7600           | 12000 | 0.0634         | 38.100  | 38.090  | 47.635  | 47.650  | 0.13        |
|            | 1.5000                      | 1.8750         | 1.750          |                      | 17 400               | 30 500         |                |       |                |         |         |         |         |             |
| 1 3/4      | 44.450                      | 53.975         | 19.05          | WJ-283412            | 39.5                 | 59.6           | 6400           | 9900  | 0.0552         | 44.450  | 44.440  | 53.985  | 54.003  | 0.058       |
|            | 1.7500                      | 2.1250         | 0.750          |                      | 8 870                | 13 400         |                |       |                |         |         |         |         |             |
| 1 3/4      | 44.450                      | 53.975         | 25.40          | WJ-283416            | 52.0                 | 85.0           | 6400           | 9900  | 0.0603         | 44.450  | 44.440  | 53.985  | 54.003  | 0.084       |
|            | 1.7500                      | 2.1250         | 1.000          |                      | 11 700               | 19 100         |                |       |                |         |         |         |         |             |
| 1 3/4      | 44.450                      | 53.975         | 38.10          | WJ-283424            | 74.7                 | 136            | 6400           | 9900  | 0.0677         | 44.450  | 44.440  | 53.985  | 54.003  | 0.115       |
|            | 1.7500                      | 2.1250         | 1.500          |                      | 16 800               | 30 600         |                |       |                |         |         |         |         |             |
| 2          | 50.800                      | 60.325         | 19.05          | WJ-323812            | 42.8                 | 69             | 5600           | 8600  | 0.0606         | 50.800  | 50.787  | 60.335  | 60.353  | 0.065       |
|            | 2.0000                      | 2.3750         | 0.750          |                      | 9 610                | 15 500         |                |       |                |         |         |         |         |             |
| 2          | 50.800                      | 60.325         | 25.40          | WJ-323816            | 56.5                 | 98             | 5600           | 8600  | 0.0662         | 50.800  | 50.787  | 60.335  | 60.353  | 0.105       |
|            | 2.0000                      | 2.3750         | 1.000          |                      | 12 700               | 22 100         |                |       |                |         |         |         |         |             |
| 2          | 50.800                      | 60.325         | 31.75          | WJ-323820            | 69.0                 | 127            | 5600           | 8600  | 0.0707         | 50.800  | 50.787  | 60.335  | 60.353  | 0.10        |
|            | 2.0000                      | 2.3750         | 1.250          |                      | 15 500               | 28 700         |                |       |                |         |         |         |         |             |
| 2          | 50.800                      | 60.325         | 38.10          | WJ-323824            | 81.0                 | 157            | 5600           | 8600  | 0.0744         | 50.800  | 50.787  | 60.335  | 60.353  | 0.130       |
|            | 2.0000                      | 2.3750         | 1.500          |                      | 18 200               | 35 300         |                |       |                |         |         |         |         |             |
| 2 1/16     | 52.388                      | 61.913         | 25.40          | WJ-333916            | 57.8                 | 102            | 5400           | 8300  | 0.0678         | 52.388  | 52.375  | 61.923  | 61.940  | 0.099       |
|            | 2.0625                      | 2.4375         | 1.000          |                      | 13 000               | 23 100         |                |       |                |         |         |         |         |             |
| 2 1/8      | 53.975                      | 63.500         | 25.40          | WJ-344016            | 52.5                 | 92.08          | 5200           | 8000  | 0.0668         | 53.975  | 53.962  | 63.510  | 63.528  | 0.089       |
|            | 2.1250                      | 2.5000         | 1.000          |                      | 11 800               | 20 700         |                |       |                |         |         |         |         |             |
| 2 1/8      | 53.975                      | 63.500         | 38.10          | WJ-344024            | 78.3                 | 153            | 5200           | 8000  | 0.0759         | 53.975  | 53.962  | 63.510  | 63.528  | 0.137       |
|            | 2.1250                      | 2.5000         | 1.500          |                      | 17 600               | 34 500         |                |       |                |         |         |         |         |             |
| 2 3/16     | 55.563                      | 65.088         | 19.05          | WJ-354112            | 44.5                 | 75.17          | 5000           | 7800  | 0.0644         | 55.563  | 55.550  | 65.098  | 65.115  | 0.070       |
|            | 2.1875                      | 2.5625         | .750           |                      | 10 000               | 16 900         |                |       |                |         |         |         |         |             |
| 2 3/16     | 55.563                      | 65.088         | 25.40          | WJ-354116            | 57.8                 | 107            | 5000           | 7800  | 0.0704         | 55.563  | 55.550  | 65.098  | 65.115  | 0.094       |
|            | 2.1875                      | 2.5625         | 1.000          |                      | 13 000               | 24 100         |                |       |                |         |         |         |         |             |
| 2 1/4      | 57.150                      | 66.675         | 25.40          | WJ-364216            | 53.8                 | 96.08          | 4900           | 7500  | 0.0693         | 57.150  | 57.137  | 66.685  | 66.703  | 0.096       |
|            | 2.2500                      | 2.6250         | 1.000          |                      | 12 100               | 21 600         |                |       |                |         |         |         |         |             |
| 2 1/4      | 57.150                      | 66.675         | 31.75          | WJ-364220            | 67.6                 | 128            | 4900           | 7500  | 0.0745         | 57.150  | 57.137  | 66.685  | 66.703  | 0.120       |
|            | 2.2500                      | 2.6250         | 1.250          |                      | 15 200               | 28 900         |                |       |                |         |         |         |         |             |
| 2 3/8      | 60.325                      | 69.850         | 38.10          | WJ-384424            | 81.4                 | 167            | 4600           | 7100  | 0.0815         | 60.325  | 60.312  | 69.860  | 69.878  | 0.151       |
|            | 2.3750                      | 2.7500         | 1.500          |                      | 18 300               | 37 600         |                |       |                |         |         |         |         |             |
| 2 1/2      | 63.500                      | 73.025         | 25.40          | WJ-404616            | 55.6                 | 104            | 4400           | 6700  | 0.0741         | 63.500  | 63.487  | 73.035  | 73.053  | 0.106       |
|            | 2.5000                      | 2.8750         | 1.000          |                      | 12 500               | 23 400         |                |       |                |         |         |         |         |             |
| 2 1/2      | 63.500                      | 73.025         | 31.75          | WJ-404620            | 69.8                 | 139            | 4400           | 6700  | 0.0797         | 63.500  | 63.487  | 73.035  | 73.053  | 0.132       |
|            | 2.5000                      | 2.8750         | 1.250          |                      | 15 700               | 31 400         |                |       |                |         |         |         |         |             |
| 2 1/2      | 63.500                      | 73.025         | 38.10          | WJ-404624            | 83.2                 | 173            | 4400           | 6700  | 0.0842         | 63.500  | 63.487  | 73.035  | 73.053  | 0.179       |
|            | 2.5000                      | 2.8750         | 1.500          |                      | 18 700               | 39 100         |                |       |                |         |         |         |         |             |
| 2 3/4      | 69.850                      | 79.375         | 25.40          | WJ-445016            | 57.8                 | 112.54         | 4000           | 6100  | 0.0788         | 69.850  | 69.837  | 79.385  | 79.403  | 0.116       |
|            | 2.7500                      | 3.1250         | 1.000          |                      | 13 000               | 25 300         |                |       |                |         |         |         |         |             |
| 3          | 76.200                      | 85.725         | 25.40          | WJ-485416            | 59.6                 | 120.55         | 3600           | 5600  | 0.0833         | 76.200  | 76.187  | 85.738  | 85.761  | 0.126       |
|            | 3.0000                      | 3.3750         | 1.000          |                      | 13 400               | 27 100         |                |       |                |         |         |         |         |             |
| 3          | 76.200                      | 85.725         | 38.10          | WJ-485424            | 85.4                 | 191.72         | 3600           | 5600  | 0.0935         | 76.200  | 76.187  | 85.738  | 85.761  | 0.189       |
|            | 3.0000                      | 3.3750         | 1.500          |                      | 19 200               | 43 100         |                |       |                |         |         |         |         |             |
| 3 1/4      | 82.550                      | 92.075         | 25.40          | WJ-525816            | 61.4                 | 128.55         | 3300           | 5100  | 0.0878         | 82.550  | 82.535  | 92.088  | 92.111  | 0.136       |
|            | 3.2500                      | 3.6250         | 1.000          |                      | 13 800               | 28 900         |                |       |                |         |         |         |         |             |
| 3 1/4      | 82.550                      | 92.075         | 38.10          | WJ-525824            | 88.1                 | 204.62         | 3300           | 5100  | 0.0985         | 82.550  | 82.535  | 92.088  | 92.111  | 0.220       |
|            | 3.2500                      | 3.6250         | 1.500          |                      | 19 800               | 46 000         |                |       |                |         |         |         |         |             |
| 3 1/2      | 88.900                      | 98.425         | 25.40          | WJ-566216            | 63.2                 | 136.56         | 3100           | 4700  | 0.0922         | 88.900  | 88.885  | 98.438  | 98.461  | 0.146       |
|            | 3.5000                      | 3.8750         | 1.000          |                      | 14 200               | 30 700         |                |       |                |         |         |         |         |             |
| 3 1/2      | 88.900                      | 101.600        | 25.40          | WJ-566416            | 79.6                 | 150.35         | 3100           | 4800  | 0.0903         | 88.900  | 88.885  | 101.613 | 101.636 | 0.197       |
|            | 3.5000                      | 4.0000         | 1.000          |                      | 17 900               | 33 800         |                |       |                |         |         |         |         |             |
| 3 1/2      | 88.900                      | 101.600        | 38.10          | WJ-566424            | 113                  | 237.53         | 3100           | 4800  | 0.1011         | 88.900  | 88.885  | 101.613 | 101.636 | 0.296       |
|            | 3.5000                      | 4.0000         | 1.500          |                      | 25 600               | 53 400         |                |       |                |         |         |         |         |             |
| 4          | 101.600                     | 114.300        | 25.40          | WJ-647216            | 83.6                 | 166.59         | 2700           | 4200  | 0.0983         | 101.600 | 101.585 | 114.313 | 114.336 | 0.224       |
|            | 4.0000                      | 4.5000         | 1.000          |                      | 18 800               | 37 450         |                |       |                |         |         |         |         |             |
| 4          | 101.600                     | 114.300        | 38.10          | WJ-647224            | 119                  | 263.33         | 2700           | 4200  | 0.1102         | 101.600 | 101.585 | 114.313 | 114.336 | 0.335       |
|            | 4.0000                      | 4.5000         | 1.500          |                      | 26 800               | 59 200         |                |       |                |         |         |         |         |             |
| 5          | 127.000                     | 152.400        | 38.10          | WJ-809624            | 211                  | 365.20         | 2200           | 3400  | 0.1196         | 127.000 | 126.982 | 152.415 | 152.438 | 1.018       |
|            | 5.0000                      | 6.0000         | 1.500          |                      | 47 600               | 82 100         |                |       |                |         |         |         |         |             |

Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.

Minimum axial clearance should be .02 mm, .008 in.

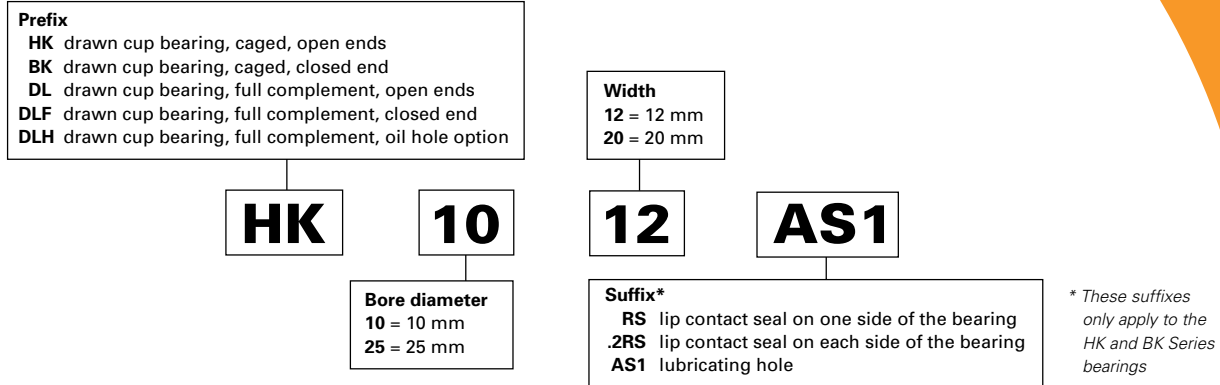
## DRAWN CUP NEEDLE ROLLER BEARINGS

**Overview:** Drawn cup needle roller bearings support radial loads and reduce friction between rotating components, with a drawn outer shell serving as a raceway for the rollers. The low cross section of the drawn cup bearing provides high load-carrying capability with minimum required space. Drawn cup bearings are easily installed with a press fit in the housing.

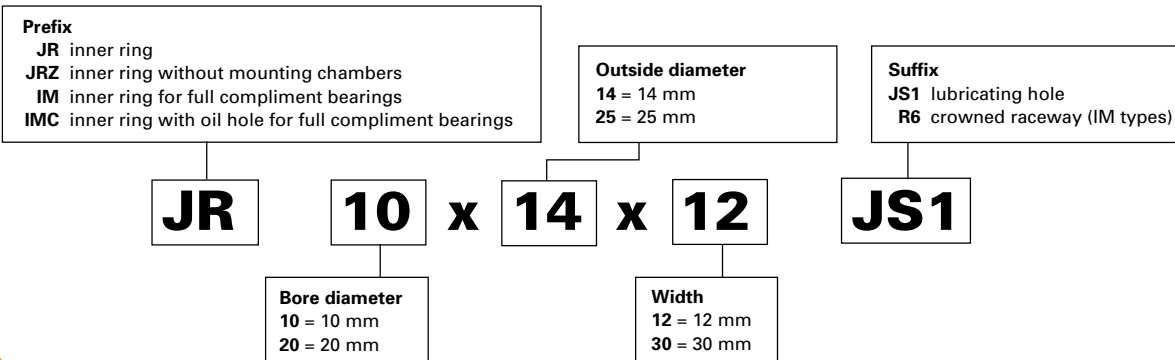
- **Sizes:** 3 mm - 60 mm bore (1/8 in. - 5 1/2 in. bore).
- **Markets:** Transmissions, transfer cases, engines, valve trains, steering and braking systems, axle supports, outboard engines, power tools, copiers, fax machines, paper-moving equipment and appliances.
- **Features:** Available in two basic designs: full complement and caged.
- **Benefits:** Full complement handles high radial load-carrying capability at a low cost. Caged provides high speed and maximum lubricant retention capability.



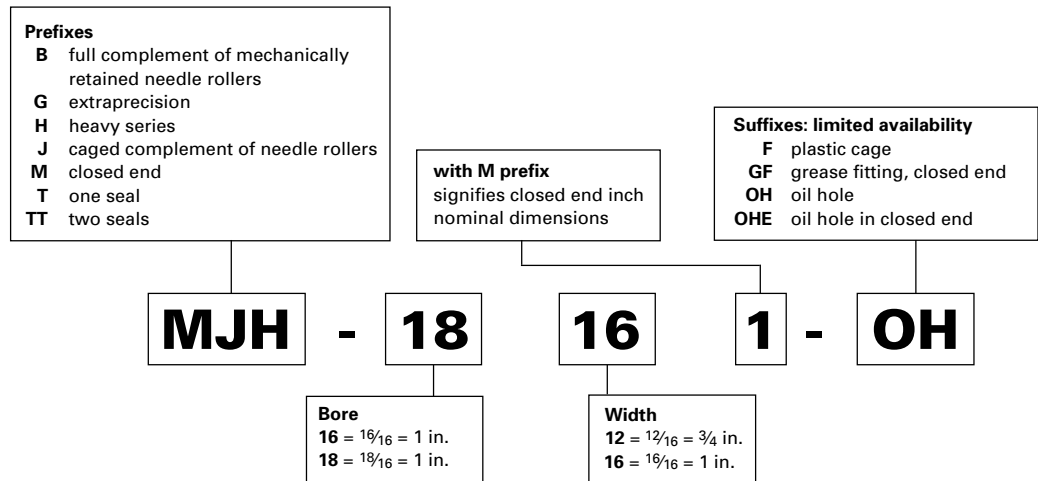
## Drawn Cup Needle Roller Bearings – Metric Nominal Dimensions



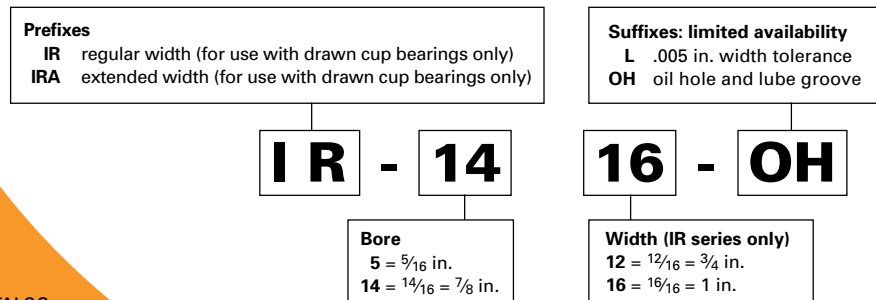
## Inner Rings – Metric Nominal Dimensions



## Drawn Cup Needle Roller Bearings – Inch Nominal Dimensions



## Inner Rings (with 4-digit number) Inch Nominal Dimensions



# ***Drawn Cup Bearings***

|                                                                                             | <i>Page</i> |
|---------------------------------------------------------------------------------------------|-------------|
| Introduction .....                                                                          | C38         |
| Open Ends, Closed One End – Metric Series .....                                             | C42         |
| Sealed Bearings – Metric Series.....                                                        | C50         |
| Drawn Cup Needle Roller Bearings – Inch Series.....                                         | C58         |
| Full Complement Bearings, Caged Bearings –<br>Open Ends, Closed One End – Inch Series ..... | C66         |
| Extra-Precision Bearings – Inch Series .....                                                | C80         |
| Caged Bearings – Open Ends, Closed One End –<br>Inch Series .....                           | C82         |
| Sealed Drawn Cup Bearings – Inch Series .....                                               | C90         |
| Inner Rings for Inch Series Drawn Cup Bearings .....                                        | C92         |

C





## NEEDLE ROLLER BEARINGS

### DRAWN CUP NEEDLE ROLLER BEARINGS

#### METRIC SERIES

When a rolling bearing is needed for a compact and economic design and where it is not practical to harden and grind the housing bore, or where the housing materials are of low rigidity such as cast iron, aluminum or even plastics, drawn cup needle roller bearings should be considered.

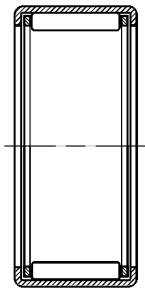
#### REFERENCE STANDARDS ARE:

- **ISO 3245** – Rolling bearings – Needle roller bearings, drawn cup, without inner ring, boundary dimensions and tolerances.
- **ANSI/ABMA 18.1** – Needle roller bearings – Radial, metric design.
- **DIN 618** – Needle roller bearings with cage – Drawn cups with open end, drawn cup with closed end.

Before selecting specific drawn cup needle roller bearings, the engineering section of this catalog should be reviewed.

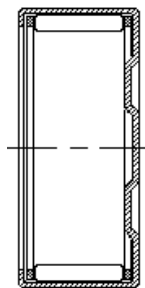
#### Types Of Metric Series Drawn Cup Needle Roller Bearings

Drawn cup needle roller bearing, open ends



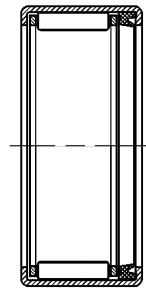
HK

Drawn cup needle roller bearing, closed end

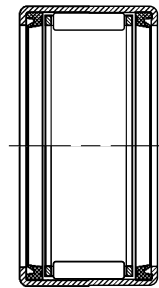


BK

Drawn cup needle roller bearings, open ends, sealed



HKRS



HK.2RS

#### Suffixes

|      |                  |
|------|------------------|
| AS1  | lubricating hole |
| RS   | one seal         |
| .2RS | two seals        |

### CONSTRUCTION

The prefix letters in metric series drawn cup bearing designations denote whether the bearings are made with a full complement of needle rollers or caged needle rollers. The use of a full complement of needle rollers is indicated by the prefix code letters DL or DLF and for use of caged needle rollers by the prefix code letters HK or BK.

The outer ring, in the form of a cup, is accurately drawn and no subsequent machining is performed. Drawn cup needle roller bearings of series HK and DL have open ends. The HK Series are also available with one seal, HKRS, and with two seals, HK.2RS. The stamped lip of a drawn cup needle roller bearing of series HKRS with one seal is at the seal end.

Drawn cup needle roller bearings of series BK and DLF are closed at one end. They are used for shaft end mounting. The open end is not sealed.

The one-piece steel cage used in HK Series drawn cup bearings is designed to provide rigidity and minimize wear. This cage design separates the needle roller guiding and retention functions.

Drawn cup needle roller bearings are manufactured with two needle roller and cage assemblies. They have a lubricating hole in the outer ring. Metric series drawn cup bearings with one needle roller and cage assembly may be made available on request with a lubricating hole, indicated by suffix AS1.

#### SEALED BEARINGS

The HK Series drawn cup bearings are offered with integral seals. The tables of dimensions on page C50 indicates those sizes available with lip contact seals. The seal lip design achieves a light and constant contact with the inner raceway throughout the range



of mounted bearing clearances thereby ensuring positive sealing and low frictional drag.

Sealed drawn cup bearings are intended to retain grease or non-pressurized oil within a bearing while also preventing contaminants entering the raceway area.

Details of shaft design for sealed bearings are given in the engineering section of this catalog.

The standard lip contact seals are compatible with common lubricating oils and petroleum based fuels, but they are adversely affected by certain fire-resistant hydraulic fluids and most common solvents. Sealed drawn cup bearings are normally filled with a high quality lithium soap base general purpose grease. The seal material and grease properties limit the bearing operating temperature between -30° C and +100° C.

If the operating temperature must be outside of the range for the seals mentioned here, or if the seals are exposed to unusual fluids please consult your Timken automotive representative.

## BEARING MOUNTING FITS AND INTERNAL CLEARANCE

Drawn cup bearings are manufactured to a degree of precision that will satisfy the radial clearance requirements of most applications. The total radial clearance for an installed drawn cup bearing results from the build up of manufacturing tolerances of the housing bore, the inner raceway diameter and the bearing, as well as the minimum radial clearance required for the application.

For metric series drawn cup bearings requiring close control of radial internal clearance, the suggested housing bore tolerance is N6 and h5 tolerance for the inner raceway diameter. When such exacting close control of radial internal clearance is not required, the user may select N7 housing bore and h6 inner raceway diameter tolerances.

## TOLERANCES FOR HOUSING MATERIALS OF LOW RIGIDITY

Metric series drawn cup bearings used in housings made from materials of low rigidity or steel housings of small section, the suggested housing bore tolerance is R6 (R7). To maintain normal radial internal clearance the inner raceway diameter tolerance should be h5 (h6).

## OUTER RING ROTATION

For metric series drawn cup bearing applications where the outer ring rotates with respect to the load, it is suggested that both the housing bore and the inner raceway diameter be reduced using R6 (R7) and f5 (f6) tolerance practice respectively.

## OSCILLATING MOTION

Metric series drawn cup bearing applications involving oscillating motion may require reduced radial internal clearances. This reduction may be accomplished by increasing the inner raceway diameter using j6 tolerance.

## INNER RINGS

When it becomes impractical to meet the shaft raceway design requirements (hardness, case depth, surface finish etc.) outlined in the engineering section, standard inner rings may be used with metric series drawn cup bearings. It is suggested that when metric series inner rings are used with metric series drawn cup bearings, they should be mounted with a loose transition fit on the shaft using g6 (g5) shaft diameter tolerance. The inner ring should be end-clamped against a shoulder. If a tight transition fit must be used, [shaft diameter tolerance h6 (h5)], to keep the inner ring from rotating relative to the shaft, the inner ring outside diameter, as mounted, must not exceed the raceway diameter required by the drawn cup bearing for the particular application. In case the outside diameter of the inner ring, when mounted on the shaft, exceeds the required raceway diameter for the matching drawn cup bearing, it should be ground to proper diameter while mounted on the shaft.

## LOAD RATING FACTORS

### DYNAMIC LOADS

Drawn cup needle roller bearings can accommodate only radial loads.

$$P = F_r$$

$P$  = The maximum dynamic radial load that may be applied to a drawn cup bearing based on the dynamic load rating,  $C$  given in the tabular pages. This load should be  $\leq C/3$ .

### STATIC LOADS

$$f_0 = \frac{C_0}{P_0}$$

$f_0$  – static load safety factor

$C_0$  – basic static load rating (kN)

$P_0$  – maximum applied static load (kN)

To ensure satisfactory operation of drawn cup needle roller bearings under all types of conditions the static load safety factor  $f_0$  should be  $\geq 3$ .

## ADJUSTED RATING LIFE

When application data includes details of operating temperature, oil viscosity, operating speed and the applied load meets the  $\leq C/3$  condition adjusted rating life may be evaluated using the information given in the engineering section of this catalog.





## NEEDLE ROLLER BEARINGS

### INSPECTION OF DRAWN CUP NEEDLE ROLLER BEARINGS

Although the bearing cup is accurately drawn from strip steel, because of its fairly thin section it may go out of round during heat treatment. When the bearing is pressed into a true round housing or ring gage, of correct size and wall thickness, it becomes round and is sized properly. For this reason, it is incorrect to inspect an unmounted drawn cup bearing by measuring the outside diameter. The correct method for inspecting the bearing size is to:

1. press the bearing into a ring gage of proper size
2. plug the bearing bore with the appropriate "go" and "no go" gages or measure it with a tapered arbor (lathe mandrel)

The "go" gage size is the minimum needle roller complement bore diameter. The "no go" gage size is larger than the maximum needle roller complement bore diameter by 0.002 mm.

TABLE 1 – HK SERIES BEARINGS

| Nominal Bore Diameter mm | Ring Gage * | Dimensions – mm<br>Needle Roller Complement Bore Diameter |        |
|--------------------------|-------------|-----------------------------------------------------------|--------|
|                          |             | Min.                                                      | Max.   |
|                          |             | <b>F<sub>ws min</sub></b>                                 |        |
| 3                        | 6.484       | 3.006                                                     | 3.024  |
| 4                        | 7.984       | 4.010                                                     | 4.028  |
| 5                        | 8.984       | 5.010                                                     | 5.028  |
| 6                        | 9.984       | 6.010                                                     | 6.028  |
| 7                        | 10.980      | 7.013                                                     | 7.031  |
| 8                        | 11.980      | 8.013                                                     | 8.031  |
| 9                        | 12.980      | 9.013                                                     | 9.031  |
| 10                       | 13.980      | 10.013                                                    | 10.031 |
| 12                       | 15.980      | 12.016                                                    | 12.034 |
| 12                       | 17.980      | 12.016                                                    | 12.034 |
| 13                       | 18.976      | 13.016                                                    | 13.034 |
| 14                       | 19.976      | 14.016                                                    | 14.034 |
| 15                       | 20.976      | 15.016                                                    | 15.034 |
| 16                       | 21.976      | 16.016                                                    | 16.034 |
| 17                       | 22.976      | 17.016                                                    | 17.034 |
| 18                       | 23.976      | 18.016                                                    | 18.034 |
| 20                       | 25.976      | 20.020                                                    | 20.041 |
| 22                       | 27.976      | 22.020                                                    | 22.041 |
| 25                       | 31.972      | 25.020                                                    | 25.041 |
| 28                       | 34.972      | 28.020                                                    | 28.041 |
| 30                       | 36.972      | 30.020                                                    | 30.041 |
| 35                       | 41.972      | 35.025                                                    | 35.050 |
| 40                       | 46.972      | 40.025                                                    | 40.050 |
| 45                       | 51.967      | 45.025                                                    | 45.050 |
| 50                       | 57.967      | 50.025                                                    | 50.050 |
| 60                       | 67.967      | 60.030                                                    | 60.060 |

\*The ring gage sizes are in accordance with ISO N6 lower limit.

### INSTALLATION PROCEDURES

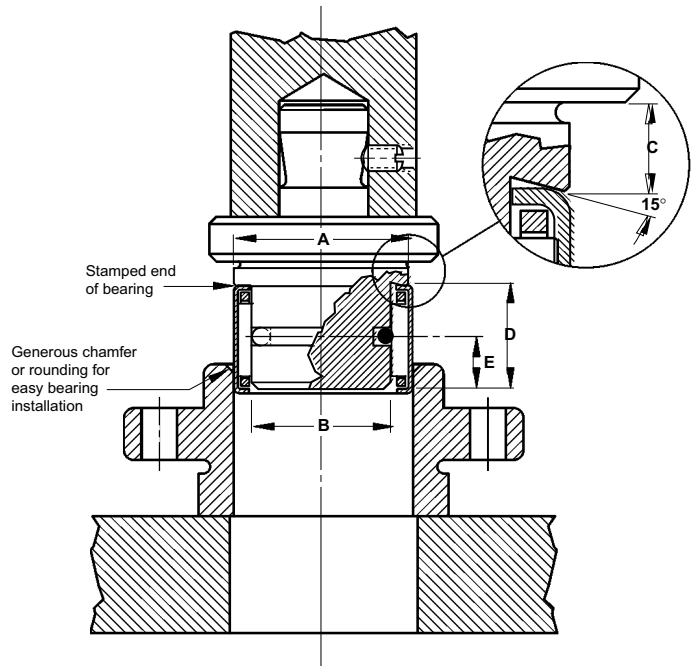
#### GENERAL INSTALLATION REQUIREMENTS

- A drawn cup bearing must be pressed into its housing.
- An installation tool, similar to the one illustrated, must be used in conjunction with a standard press.
- The bearing must not be hammered into its housing even in conjunction with the proper assembly mandrel.
- The bearing must not be pressed tightly against a shoulder in the housing.
- If it is necessary to use a shouldered housing, the depth of the housing bore must be sufficient to ensure that the housing shoulder fillet, as well as the shoulder face, clears the bearing.
- The installation tool must be coaxial with the housing bore.

### INSTALLATION OF OPEN END BEARINGS

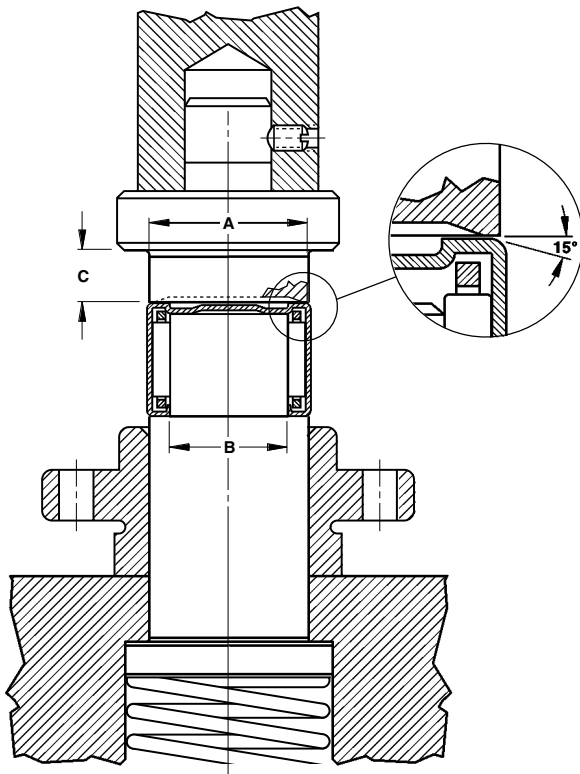
It is advisable to utilize a positive stop on the press tool to locate the bearing properly in the housing. The assembly tool should have a leader or a pilot, as shown, to aid in starting the bearing true in the housing. The "O" ring shown on the drawing may be used to assist in holding the bearing on the installation tool. The bearing should be installed with the marked end (the end with the identification markings) against the angled shoulder of the pressing tool.

- A – 0.4 mm less than housing bore
- B – 0.08 mm less than shaft diameter
- C – distance bearing will be inset into housing, minimum of 0.2 mm
- D – pilot length should be length of bearing less 0.8 mm
- E – approximately  $\frac{1}{2}$  D



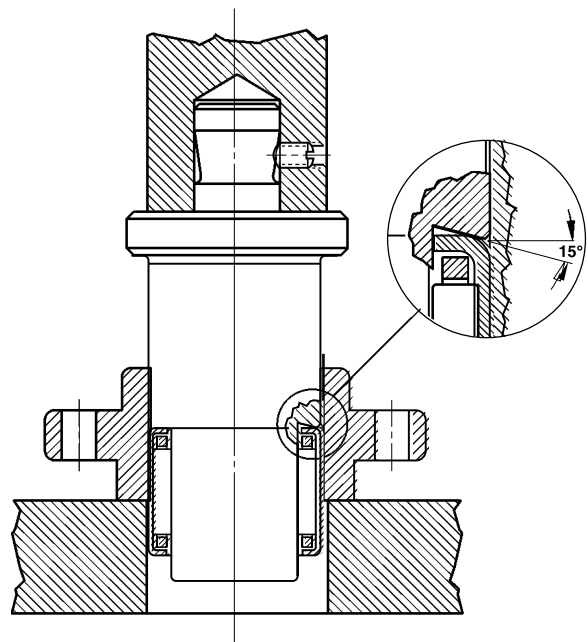
### INSTALLATION OF CLOSED END BEARINGS

Bearing can be piloted from below for installation.



### EXTRACTION FROM A STRAIGHT HOUSING

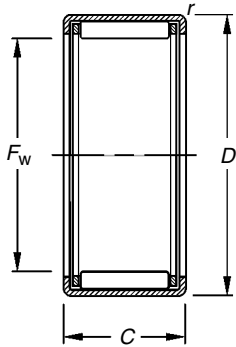
Bearing can be extracted by pushing it through the housing. After extraction, the drawn cup bearing should not be reused.



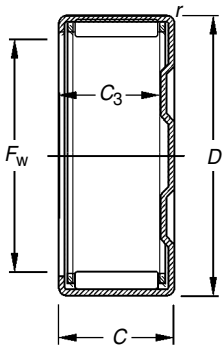


# NEEDLE ROLLER BEARINGS

## OPEN ENDS, CLOSED ONE END METRIC SERIES



HK



BK

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    |                    | Bearing Designation | Load Ratings kN/bf. |        | Limiting Speed Approx. |       | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|--------------------|---------------------|---------------------|--------|------------------------|-------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic             | Static | Grease                 | Oil   |                |
| 3                | 3                 | 7      | 6     | —                  | 0.3                | HK0306              | 1.6                 | 1.14   | 30000                  | 46000 | 0.0065         |
|                  | 0.1181            | 0.2559 | 0.236 | —                  | 0.012              |                     | 360                 | 256    |                        |       |                |
| 4                | 4                 | 8      | 8     | —                  | 0.4                | HK0408              | 1.88                | 1.32   | 25000                  | 39000 | 0.0083         |
|                  | 0.1575            | 0.315  | 0.315 | —                  | 0.016              |                     | 423                 | 297    |                        |       |                |
| 5                | 5                 | 9      | 9     | 7.4                | 0.4                | BK0509              | 2.52                | 2.07   | 23000                  | 36000 | 0.01           |
|                  | 0.1969            | 0.3543 | 0.354 | 0.291              | 0.016              |                     | 567                 | 465    |                        |       |                |
| 5                | 5                 | 9      | 9     | —                  | 0.4                | HK0509              | 2.52                | 2.07   | 23000                  | 36000 | 0.01           |
|                  | 0.1969            | 0.3543 | 0.354 | —                  | 0.016              |                     | 567                 | 465    |                        |       |                |
| 6                | 6                 | 10     | 8     | —                  | 0.4                | HK0608              | 2.34                | 1.95   | 22000                  | 33000 | 0.0105         |
|                  | 0.2362            | 0.3937 | 0.315 | —                  | 0.016              |                     | 526                 | 438    |                        |       |                |
| 6                | 6                 | 10     | 9     | 7.4                | 0.4                | BK0609              | 3.14                | 2.85   | 22000                  | 33000 | 0.0116         |
|                  | 0.2362            | 0.3937 | 0.354 | 0.291              | 0.016              |                     | 706                 | 641    |                        |       |                |
| 6                | 6                 | 10     | 9     | —                  | 0.4                | HK0609              | 3.15                | 2.94   | 22000                  | 33000 | 0.0116         |
|                  | 0.2362            | 0.3937 | 0.354 | —                  | 0.016              |                     | 708                 | 661    |                        |       |                |
| 7                | 7                 | 11     | 9     | 7.4                | 0.4                | BK0709              | 3.23                | 3.05   | 21000                  | 32000 | 0.0125         |
|                  | 0.2756            | 0.4331 | 0.354 | 0.291              | 0.016              |                     | 726                 | 686    |                        |       |                |
| 7                | 7                 | 11     | 9     | —                  | 0.4                | HK0709              | 3.22                | 3.12   | 21000                  | 32000 | 0.0125         |
|                  | 0.2756            | 0.4331 | 0.354 | —                  | 0.016              |                     | 724                 | 701    |                        |       |                |
| 8                | 8                 | 12     | 8     | 6.4                | 0.4                | BK0808              | 2.9                 | 2.73   | 20000                  | 31000 | 0.0128         |
|                  | 0.315             | 0.4724 | 0.315 | 0.252              | 0.016              |                     | 652                 | 614    |                        |       |                |
| 8                | 8                 | 12     | 8     | —                  | 0.4                | HK0808              | 2.9                 | 2.73   | 20000                  | 31000 | 0.0128         |
|                  | 0.315             | 0.4724 | 0.315 | —                  | 0.016              |                     | 652                 | 614    |                        |       |                |
| 8                | 8                 | 12     | 10    | 8.4                | 0.4                | BK0810              | 3.93                | 4.14   | 20000                  | 31000 | 0.0184         |
|                  | 0.315             | 0.4724 | 0.394 | 0.331              | 0.016              |                     | 883                 | 931    |                        |       |                |
| 8                | 8                 | 12     | 10    | —                  | 0.4                | HK0810              | 3.95                | 4.07   | 20000                  | 31000 | 0.0186         |
|                  | 0.315             | 0.4724 | 0.394 | —                  | 0.016              |                     | 888                 | 915    |                        |       |                |
| 9                | 9                 | 13     | 10    | 8.4                | 0.4                | BK0910              | 4.57                | 5.07   | 19000                  | 30000 | 0.0206         |
|                  | 0.3543            | 0.5118 | 0.394 | 0.331              | 0.016              |                     | 1030                | 1140   |                        |       |                |
| 9                | 9                 | 13     | 10    | —                  | 0.4                | HK0910              | 4.57                | 5.07   | 19000                  | 30000 | 0.0206         |
|                  | 0.3543            | 0.5118 | 0.394 | —                  | 0.016              |                     | 1030                | 1140   |                        |       |                |
| 9                | 9                 | 13     | 12    | 10.4               | 0.4                | BK0912              | 5.65                | 6.65   | 19000                  | 30000 | 0.022          |
|                  | 0.3543            | 0.5118 | 0.472 | 0.409              | 0.016              |                     | 1270                | 1490   |                        |       |                |
| 9                | 9                 | 13     | 12    | —                  | 0.4                | HK0912              | 5.65                | 6.65   | 19000                  | 30000 | 0.022          |
|                  | 0.3543            | 0.5118 | 0.472 | —                  | 0.016              |                     | 1270                | 1490   |                        |       |                |
| 10               | 10                | 14     | 10    | 8.4                | 0.4                | BK1010              | 4.78                | 5.51   | 19000                  | 29000 | 0.0219         |
|                  | 0.3937            | 0.5512 | 0.394 | 0.331              | 0.016              |                     | 1070                | 1240   |                        |       |                |
| 10               | 10                | 14     | 10    | —                  | 0.4                | HK1010              | 4.78                | 5.51   | 19000                  | 29000 | 0.0219         |
|                  | 0.3937            | 0.5512 | 0.394 | —                  | 0.016              |                     | 1070                | 1240   |                        |       |                |
| 10               | 10                | 14     | 12    | 10.4               | 0.4                | BK1012              | 5.9                 | 7.23   | 19000                  | 29000 | 0.0239         |
|                  | 0.3937            | 0.5512 | 0.472 | 0.409              | 0.016              |                     | 1330                | 1630   |                        |       |                |
| 10               | 10                | 14     | 12    | —                  | 0.4                | HK1012              | 5.9                 | 7.23   | 19000                  | 29000 | 0.0235         |
|                  | 0.3937            | 0.5512 | 0.472 | —                  | 0.016              |                     | 1330                | 1630   |                        |       |                |
| 10               | 10                | 14     | 15    | —                  | 0.4                | HK1015              | 7.49                | 9.81   | 19000                  | 29000 | 0.0253         |
|                  | 0.3937            | 0.5512 | 0.591 | —                  | 0.016              |                     | 1680                | 2210   |                        |       |                |
| 12               | 12                | 16     | 10    | 8.4                | 0.4                | BK1210              | 4.96                | 6.08   | 18000                  | 28000 | 0.0243         |
|                  | 0.4724            | 0.6299 | 0.394 | 0.331              | 0.016              |                     | 1120                | 1370   |                        |       |                |
| 12               | 12                | 16     | 10    | —                  | 0.4                | HK1210              | 4.96                | 6.08   | 18000                  | 28000 | 0.0243         |
|                  | 0.4724            | 0.6299 | 0.394 | —                  | 0.016              |                     | 1120                | 1370   |                        |       |                |
| 12               | 12                | 18     | 12    | 9.3                | 1                  | BK1212              | 6.61                | 7.29   | 14000                  | 22000 | 0.0245         |
|                  | 0.4724            | 0.7087 | 0.472 | 0.366              | 0.039              |                     | 1490                | 1640   |                        |       |                |
| 12               | 12                | 18     | 12    | —                  | 1                  | HK1212              | 6.61                | 7.29   | 14000                  | 22000 | 0.0245         |
|                  | 0.4724            | 0.7087 | 0.472 | —                  | 0.039              |                     | 1490                | 1640   |                        |       |                |
| 13               | 13                | 19     | 12    | 9.3                | 1                  | BK1312              | 6.92                | 7.89   | 14000                  | 22000 | 0.0258         |
|                  | 0.5118            | 0.748  | 0.472 | 0.366              | 0.039              |                     | 1560                | 1770   |                        |       |                |
| 13               | 13                | 19     | 12    | —                  | 1                  | HK1312              | 6.92                | 7.89   | 14000                  | 22000 | 0.0258         |
|                  | 0.5118            | 0.748  | 0.472 | —                  | 0.039              |                     | 1560                | 1770   |                        |       |                |
| 14               | 14                | 20     | 12    | 9.3                | 1                  | BK1412              | 7.21                | 8.5    | 14000                  | 21000 | 0.0271         |
|                  | 0.5512            | 0.7874 | 0.472 | 0.366              | 0.039              |                     | 1620                | 1910   |                        |       |                |

## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs.        | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching<br>Inner Ring | Shaft<br>Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|------------------------|---------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                        |                     |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                        |                     |
| <b>0.001</b><br>0.002 | <b>3</b><br>0.1181         | <b>2.996</b><br>0.118   | <b>6.487</b><br>0.2554  | <b>6.495</b><br>0.2557  | <b>6.484</b><br>0.2553  | <b>3.006</b><br>0.1183  | <b>3.026</b><br>0.1191  |                |                        | <b>3</b>            |
| <b>0.002</b><br>0.004 | <b>4</b><br>0.1575         | <b>3.995</b><br>0.1573  | <b>7.984</b><br>0.3143  | <b>7.993</b><br>0.3147  | <b>7.984</b><br>0.3143  | <b>4.01</b><br>0.1579   | <b>4.03</b><br>0.1587   |                |                        | <b>4</b>            |
| <b>0.002</b><br>0.004 | <b>5</b><br>0.1969         | <b>4.995</b><br>0.1967  | <b>8.984</b><br>0.3537  | <b>8.993</b><br>0.3541  | <b>8.984</b><br>0.3537  | <b>5.01</b><br>0.1972   | <b>5.03</b><br>0.198    |                |                        | <b>5</b>            |
| <b>0.002</b><br>0.004 | <b>5</b><br>0.1969         | <b>4.995</b><br>0.1967  | <b>8.984</b><br>0.3537  | <b>8.993</b><br>0.3541  | <b>8.984</b><br>0.3537  | <b>5.01</b><br>0.1972   | <b>5.03</b><br>0.198    |                |                        |                     |
| <b>0.002</b><br>0.004 | <b>6</b><br>0.2362         | <b>5.995</b><br>0.236   | <b>9.984</b><br>0.3931  | <b>9.993</b><br>0.3934  | <b>9.984</b><br>0.3931  | <b>6.01</b><br>0.2366   | <b>6.03</b><br>0.2374   |                |                        | <b>6</b>            |
| <b>0.003</b><br>0.007 | <b>6</b><br>0.2362         | <b>5.995</b><br>0.236   | <b>9.984</b><br>0.3931  | <b>9.993</b><br>0.3934  | <b>9.984</b><br>0.3931  | <b>6.01</b><br>0.2366   | <b>6.03</b><br>0.2374   |                |                        |                     |
| <b>0.002</b><br>0.004 | <b>6</b><br>0.2362         | <b>5.995</b><br>0.236   | <b>9.984</b><br>0.3931  | <b>9.993</b><br>0.3934  | <b>9.984</b><br>0.3931  | <b>6.01</b><br>0.2366   | <b>6.03</b><br>0.2374   |                |                        |                     |
| <b>0.003</b><br>0.007 | <b>7</b><br>0.2756         | <b>6.994</b><br>0.2754  | <b>10.98</b><br>0.4323  | <b>10.991</b><br>0.4327 | <b>10.98</b><br>0.4323  | <b>7.013</b><br>0.2761  | <b>7.033</b><br>0.2769  |                |                        | <b>7</b>            |
| <b>0.003</b><br>0.007 | <b>7</b><br>0.2756         | <b>6.994</b><br>0.2754  | <b>10.98</b><br>0.4323  | <b>10.991</b><br>0.4327 | <b>10.98</b><br>0.4323  | <b>7.013</b><br>0.2761  | <b>7.033</b><br>0.2769  |                |                        |                     |
| <b>0.003</b><br>0.007 | <b>8</b><br>0.315          | <b>7.994</b><br>0.3147  | <b>11.98</b><br>0.4717  | <b>11.991</b><br>0.4721 | <b>11.98</b><br>0.4717  | <b>8.013</b><br>0.3155  | <b>8.033</b><br>0.3163  |                |                        | <b>8</b>            |
| <b>0.003</b><br>0.007 | <b>8</b><br>0.315          | <b>7.994</b><br>0.3147  | <b>11.98</b><br>0.4717  | <b>11.991</b><br>0.4721 | <b>11.98</b><br>0.4717  | <b>8.013</b><br>0.3155  | <b>8.033</b><br>0.3163  |                |                        |                     |
| <b>0.004</b><br>0.009 | <b>8</b><br>0.315          | <b>7.994</b><br>0.3147  | <b>11.98</b><br>0.4717  | <b>11.991</b><br>0.4721 | <b>11.98</b><br>0.4717  | <b>8.013</b><br>0.3155  | <b>8.033</b><br>0.3163  | <b>0.0241</b>  | <b>JR5x8x12</b>        |                     |
| <b>0.004</b><br>0.009 | <b>8</b><br>0.315          | <b>7.994</b><br>0.3147  | <b>11.98</b><br>0.4717  | <b>11.991</b><br>0.4721 | <b>11.98</b><br>0.4717  | <b>8.013</b><br>0.3155  | <b>8.033</b><br>0.3163  | <b>0.0244</b>  | <b>JR5x8x12</b>        |                     |
| <b>0.004</b><br>0.009 | <b>9</b><br>0.3543         | <b>8.994</b><br>0.3541  | <b>12.98</b><br>0.511   | <b>12.991</b><br>0.5115 | <b>12.98</b><br>0.511   | <b>9.013</b><br>0.3548  | <b>9.033</b><br>0.3556  | <b>0.027</b>   | <b>JR6x9x12</b>        | <b>9</b>            |
| <b>0.004</b><br>0.009 | <b>9</b><br>0.3543         | <b>8.994</b><br>0.3541  | <b>12.98</b><br>0.511   | <b>12.991</b><br>0.5115 | <b>12.98</b><br>0.511   | <b>9.013</b><br>0.3548  | <b>9.033</b><br>0.3556  | <b>0.027</b>   | <b>JR6x9x12</b>        |                     |
| <b>0.005</b><br>0.011 | <b>9</b><br>0.3543         | <b>8.994</b><br>0.3541  | <b>12.98</b><br>0.511   | <b>12.991</b><br>0.5115 | <b>12.98</b><br>0.511   | <b>9.013</b><br>0.3548  | <b>9.033</b><br>0.3556  | <b>0.0289</b>  | <b>JR6x9x12</b>        |                     |
| <b>0.005</b><br>0.011 | <b>9</b><br>0.3543         | <b>8.994</b><br>0.3541  | <b>12.98</b><br>0.511   | <b>12.991</b><br>0.5115 | <b>12.98</b><br>0.511   | <b>9.013</b><br>0.3548  | <b>9.033</b><br>0.3556  | <b>0.0289</b>  | <b>JR6x9x12</b>        |                     |
| <b>0.004</b><br>0.009 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  | <b>0.0287</b>  | <b>JR7x10x10.5</b>     | <b>10</b>           |
| <b>0.004</b><br>0.009 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  | <b>0.0287</b>  | <b>JR7x10x10.5</b>     |                     |
| <b>0.005</b><br>0.011 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  | <b>0.0314</b>  | <b>JR7x10x12</b>       |                     |
| <b>0.005</b><br>0.011 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  | <b>0.0308</b>  | <b>JR7x10x12</b>       |                     |
| <b>0.007</b><br>0.015 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  | <b>0.0332</b>  | <b>JR7x10x16</b>       |                     |
| <b>0.006</b><br>0.013 | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>15.98</b><br>0.6291  | <b>15.991</b><br>0.6296 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 | <b>0.0319</b>  | <b>JR8x12x10.5</b>     | <b>12</b>           |
| <b>0.006</b><br>0.013 | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>15.98</b><br>0.6291  | <b>15.991</b><br>0.6296 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 | <b>0.0319</b>  | <b>JR8x12x10.5</b>     |                     |
| <b>0.012</b><br>0.026 | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>17.98</b><br>0.7079  | <b>17.991</b><br>0.7083 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 | <b>0.0321</b>  | <b>JR8x12x12.5</b>     |                     |
| <b>0.01</b><br>0.022  | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>17.98</b><br>0.7079  | <b>17.991</b><br>0.7083 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 | <b>0.0321</b>  | <b>JR8x12x12.5</b>     |                     |
| <b>0.012</b><br>0.026 | <b>13</b><br>0.5118        | <b>12.992</b><br>0.5115 | <b>18.976</b><br>0.7471 | <b>18.989</b><br>0.7476 | <b>18.976</b><br>0.7471 | <b>13.016</b><br>0.5124 | <b>13.036</b><br>0.5132 | <b>0.0338</b>  | <b>JR10x13x12.5</b>    | <b>13</b>           |
| <b>0.01</b><br>0.022  | <b>13</b><br>0.5118        | <b>12.992</b><br>0.5115 | <b>18.976</b><br>0.7471 | <b>18.989</b><br>0.7476 | <b>18.976</b><br>0.7471 | <b>13.016</b><br>0.5124 | <b>13.036</b><br>0.5132 | <b>0.0338</b>  | <b>JR10x13x12.5</b>    |                     |
| <b>0.014</b><br>0.031 | <b>14</b><br>0.5512        | <b>13.992</b><br>0.5509 | <b>19.976</b><br>0.7865 | <b>19.989</b><br>0.787  | <b>19.976</b><br>0.7865 | <b>14.016</b><br>0.5518 | <b>14.036</b><br>0.5526 | <b>0.0356</b>  | <b>JR10x14x12</b>      | <b>14</b>           |

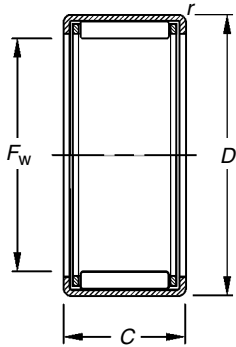
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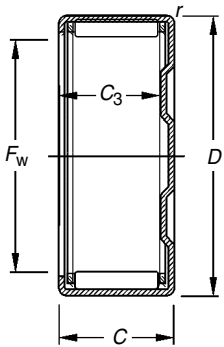
# NEEDLE ROLLER BEARINGS

## OPEN ENDS, CLOSED ONE END METRIC SERIES

continued



HK



BK

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    |                    | Bearing Designation | Load Ratings<br>kN/bf. |        | Limiting Speed<br>Approx. |       | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|--------------------|---------------------|------------------------|--------|---------------------------|-------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic                | Static | Grease                    | Oil   |                |
| 14               | 14                | 20     | 12    | —                  | 1                  | HK1412              | 7.21                   | 8.5    | 14000                     | 21000 | 0.0271         |
|                  | 0.5512            | 0.7874 | 0.472 | —                  | 0.039              |                     | 1620                   | 1910   |                           |       |                |
| 15               | 15                | 21     | 12    | 9.3                | 1                  | BK1512              | 7.16                   | 8.57   | 14000                     | 21000 | 0.0284         |
|                  | 0.5906            | 0.8268 | 0.472 | 0.366              | 0.039              |                     | 1610                   | 1930   |                           |       |                |
| 15               | 15                | 21     | 12    | —                  | 1                  | HK1512              | 7.49                   | 9.11   | 14000                     | 21000 | 0.0284         |
|                  | 0.5906            | 0.8268 | 0.472 | —                  | 0.039              |                     | 1680                   | 2050   |                           |       |                |
| 15               | 15                | 21     | 16    | 13.3               | 1                  | BK1516              | 10.7                   | 14.4   | 14000                     | 21000 | 0.0318         |
|                  | 0.5906            | 0.8268 | 0.63  | 0.524              | 0.039              |                     | 2410                   | 3240   |                           |       |                |
| 15               | 15                | 21     | 16    | —                  | 1                  | HK1516              | 10.7                   | 14.4   | 14000                     | 21000 | 0.0318         |
|                  | 0.5906            | 0.8268 | 0.63  | —                  | 0.039              |                     | 2410                   | 3240   |                           |       |                |
| 15               | 15                | 21     | 22    | 19.3               | 1                  | BK1522              | 13.5                   | 19.4   | 14000                     | 21000 | 0.0288         |
|                  | 0.5906            | 0.8268 | 0.866 | 0.76               | 0.039              |                     | 3030                   | 4360   |                           |       |                |
| 15               | 15                | 21     | 22    | —                  | 1                  | HK1522              | 13.5                   | 19.4   | 14000                     | 21000 | 0.0288         |
|                  | 0.5906            | 0.8268 | 0.866 | —                  | 0.039              |                     | 3030                   | 4360   |                           |       |                |
| 16               | 16                | 22     | 12    | 9.3                | 1                  | BK1612              | 7.76                   | 9.72   | 14000                     | 21000 | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.472 | 0.366              | 0.039              |                     | 1740                   | 2190   |                           |       |                |
| 16               | 16                | 22     | 12    | —                  | 1                  | HK1612              | 7.76                   | 7.72   | 14000                     | 21000 | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.472 | —                  | 0.039              |                     | 1740                   | 1740   |                           |       |                |
| 16               | 16                | 22     | 16    | 13.3               | 1                  | BK1616              | 11.1                   | 15.3   | 14000                     | 21000 | 0.0332         |
|                  | 0.6299            | 0.8661 | 0.63  | 0.524              | 0.039              |                     | 2500                   | 3440   |                           |       |                |
| 16               | 16                | 22     | 16    | —                  | 1                  | HK1616              | 11.1                   | 15.3   | 14000                     | 21000 | 0.0332         |
|                  | 0.6299            | 0.8661 | 0.63  | —                  | 0.039              |                     | 2500                   | 3440   |                           |       |                |
| 16               | 16                | 22     | 22    | 19.3               | 1                  | BK1622              | 13.4                   | 19.5   | 14000                     | 21000 | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.866 | 0.76               | 0.039              |                     | 3010                   | 4380   |                           |       |                |
| 16               | 16                | 22     | 22    | —                  | 1                  | HK1622              | 13.4                   | 19.5   | 14000                     | 21000 | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.866 | —                  | 0.039              |                     | 3010                   | 4380   |                           |       |                |
| 17               | 17                | 23     | 12    | 9.3                | 1                  | BK1712              | 8.12                   | 10.4   | 13000                     | 20000 | 0.0236         |
|                  | 0.6693            | 0.9055 | 0.472 | 0.366              | 0.039              |                     | 1830                   | 2340   |                           |       |                |
| 17               | 17                | 23     | 12    | —                  | 1                  | HK1712              | 8.12                   | 10.4   | 13000                     | 20000 | 0.0236         |
|                  | 0.6693            | 0.9055 | 0.472 | —                  | 0.039              |                     | 1830                   | 2340   |                           |       |                |
| 18               | 18                | 24     | 12    | —                  | 1                  | HK1812              | 8.41                   | 11.11  | 12000                     | 18000 | 0.0246         |
|                  | 0.7087            | 0.9449 | 0.472 | —                  | 0.039              |                     | 1890                   | 2500   |                           |       |                |
| 18               | 18                | 24     | 16    | 13.3               | 1                  | BK1816              | 11.6                   | 16.8   | 12000                     | 18000 | 0.0357         |
|                  | 0.7087            | 0.9449 | 0.63  | 0.524              | 0.039              |                     | 2610                   | 3780   |                           |       |                |
| 18               | 18                | 24     | 16    | —                  | 1                  | HK1816              | 11.6                   | 16.8   | 12000                     | 18000 | 0.0357         |
|                  | 0.7087            | 0.9449 | 0.63  | —                  | 0.039              |                     | 2610                   | 3780   |                           |       |                |
| 20               | 20                | 26     | 12    | 9.3                | 1                  | BK2012              | 8.97                   | 12.5   | 11000                     | 16000 | 0.0347         |
|                  | 0.7874            | 1.0236 | 0.472 | 0.366              | 0.039              |                     | 2020                   | 2810   |                           |       |                |
| 20               | 20                | 26     | 12    | —                  | 1                  | HK2012              | 8.97                   | 12.5   | 11000                     | 16000 | 0.0347         |
|                  | 0.7874            | 1.0236 | 0.472 | —                  | 0.039              |                     | 2020                   | 2810   |                           |       |                |
| 20               | 20                | 26     | 16    | 13.3               | 1                  | BK2016              | 12.4                   | 18.9   | 11000                     | 16000 | 0.0385         |
|                  | 0.7874            | 1.0236 | 0.63  | 0.524              | 0.039              |                     | 2790                   | 4250   |                           |       |                |
| 20               | 20                | 26     | 16    | —                  | 1                  | HK2016              | 12.4                   | 18.9   | 11000                     | 16000 | 0.0385         |
|                  | 0.7874            | 1.0236 | 0.63  | —                  | 0.039              |                     | 2790                   | 4250   |                           |       |                |
| 20               | 20                | 26     | 20    | 17.3               | 1                  | BK2020              | 15.5                   | 25.3   | 11000                     | 16000 | 0.0414         |
|                  | 0.7874            | 1.0236 | 0.787 | 0.681              | 0.039              |                     | 3480                   | 5690   |                           |       |                |
| 20               | 20                | 26     | 20    | —                  | 1                  | HK2020              | 15.9                   | 26.2   | 11000                     | 16000 | 0.0414         |
|                  | 0.7874            | 1.0236 | 0.787 | —                  | 0.039              |                     | 3570                   | 5890   |                           |       |                |
| 20               | 20                | 26     | 30    | 27.3               | 1                  | BK2030              | 21.2                   | 37.8   | 11000                     | 16000 | 0.0385         |
|                  | 0.7874            | 1.0236 | 1.181 | 1.075              | 0.039              |                     | 4770                   | 8500   |                           |       |                |
| 20               | 20                | 26     | 30    | —                  | 1                  | HK2030              | 21.2                   | 37.8   | 11000                     | 16000 | 0.0385         |
|                  | 0.7874            | 1.0236 | 1.181 | —                  | 0.039              |                     | 4770                   | 8500   |                           |       |                |
| 22               | 22                | 28     | 12    | 9.3                | 1                  | BK2212              | 9.81                   | 14.5   | 9600                      | 15000 | 0.0375         |
|                  | 0.8661            | 1.1024 | 0.472 | 0.366              | 0.039              |                     | 2210                   | 3260   |                           |       |                |
| 22               | 22                | 28     | 12    | —                  | 1                  | HK2212              | 9.81                   | 14.5   | 9600                      | 15000 | 0.0382         |
|                  | 0.8661            | 1.1024 | 0.472 | —                  | 0.039              |                     | 2210                   | 3260   |                           |       |                |
| 22               | 22                | 28     | 16    | 13.3               | 1                  | BK2216              | 13.1                   | 20.9   | 9600                      | 15000 | 0.0412         |
|                  | 0.8661            | 1.1024 | 0.63  | 0.524              | 0.039              |                     | 2940                   | 4700   |                           |       |                |

## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs         | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching Inner Ring | Shaft Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|---------------------|------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                     |                  |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                     |                  |
| <b>0.011</b><br>0.024 | <b>14</b><br>0.5512        | <b>13.992</b><br>0.5509 | <b>19.976</b><br>0.7865 | <b>19.989</b><br>0.787  | <b>19.976</b><br>0.7865 | <b>14.016</b><br>0.5518 | <b>14.036</b><br>0.5526 | <b>0.0356</b>  | <b>JR10x14x12</b>   |                  |
| <b>0.015</b><br>0.033 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0373</b>  | <b>JR12x15x12.5</b> | <b>15</b>        |
| <b>0.011</b><br>0.024 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0373</b>  | <b>JR12x15x12.5</b> |                  |
| <b>0.019</b><br>0.042 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0417</b>  | <b>JR12x15x16.5</b> |                  |
| <b>0.016</b><br>0.035 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0417</b>  | <b>JR12x15x16.5</b> |                  |
| <b>0.025</b><br>0.055 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0378</b>  | <b>JR12x15x22.5</b> |                  |
| <b>0.024</b><br>0.053 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0378</b>  | <b>JR12x15x22.5</b> |                  |
| <b>0.016</b><br>0.035 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x12</b>   | <b>16</b>        |
| <b>0.012</b><br>0.026 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x12</b>   |                  |
| <b>0.02</b><br>0.044  | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.0436</b>  | <b>JR12x16x16</b>   |                  |
| <b>0.018</b><br>0.04  | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.0436</b>  | <b>JR12x16x16</b>   |                  |
| <b>0.028</b><br>0.062 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x22</b>   |                  |
| <b>0.022</b><br>0.049 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x22</b>   |                  |
| <b>0.018</b><br>0.04  | <b>17</b><br>0.6693        | <b>16.992</b><br>0.669  | <b>22.976</b><br>0.9046 | <b>22.989</b><br>0.9051 | <b>22.976</b><br>0.9046 | <b>17.016</b><br>0.6699 | <b>17.036</b><br>0.6707 |                |                     | <b>17</b>        |
| <b>0.013</b><br>0.029 | <b>17</b><br>0.6693        | <b>16.992</b><br>0.669  | <b>22.976</b><br>0.9046 | <b>22.989</b><br>0.9051 | <b>22.976</b><br>0.9046 | <b>17.016</b><br>0.6699 | <b>17.036</b><br>0.6707 |                |                     |                  |
| <b>0.015</b><br>0.033 | <b>18</b><br>0.7087        | <b>17.992</b><br>0.7083 | <b>23.976</b><br>0.9439 | <b>23.989</b><br>0.9444 | <b>23.976</b><br>0.9439 | <b>18.016</b><br>0.7093 | <b>18.036</b><br>0.7101 |                |                     | <b>18</b>        |
| <b>0.022</b><br>0.049 | <b>18</b><br>0.7087        | <b>17.992</b><br>0.7083 | <b>23.976</b><br>0.9439 | <b>23.989</b><br>0.9444 | <b>23.976</b><br>0.9439 | <b>18.016</b><br>0.7093 | <b>18.036</b><br>0.7101 | <b>0.0468</b>  | <b>JR15x18x16.5</b> |                  |
| <b>0.018</b><br>0.04  | <b>18</b><br>0.7087        | <b>17.992</b><br>0.7083 | <b>23.976</b><br>0.9439 | <b>23.989</b><br>0.9444 | <b>23.976</b><br>0.9439 | <b>18.016</b><br>0.7093 | <b>18.036</b><br>0.7101 | <b>0.0468</b>  | <b>JR15x18x16.5</b> |                  |
| <b>0.017</b><br>0.037 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0455</b>  | <b>JR15x20x12</b>   | <b>20</b>        |
| <b>0.016</b><br>0.035 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0455</b>  | <b>JR15x20x12</b>   |                  |
| <b>0.022</b><br>0.049 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x16.5</b> |                  |
| <b>0.022</b><br>0.049 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x16.5</b> |                  |
| <b>0.027</b><br>0.06  | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0543</b>  | <b>JR17x20x20.5</b> |                  |
| <b>0.025</b><br>0.055 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0543</b>  | <b>JR17x20x20.5</b> |                  |
| <b>0.043</b><br>0.095 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x30.5</b> |                  |
| <b>0.041</b><br>0.09  | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x30.5</b> |                  |
| <b>0.02</b><br>0.044  | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0492</b>  | <b>JR17x22x13</b>   | <b>22</b>        |
| <b>0.015</b><br>0.033 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0501</b>  | <b>JR17x22x13</b>   |                  |
| <b>0.027</b><br>0.06  | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0541</b>  | <b>JR17x22x16</b>   |                  |

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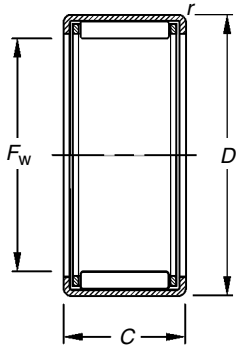




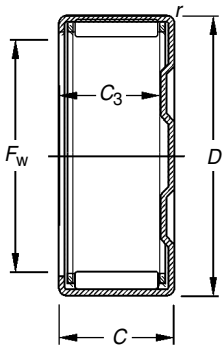
# NEEDLE ROLLER BEARINGS

## OPEN ENDS, CLOSED ONE END METRIC SERIES

continued



HK



BK

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    |                    | Bearing Designation | Load Ratings<br>kN/bf. |        | Limiting Speed<br>Approx. |       | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|--------------------|---------------------|------------------------|--------|---------------------------|-------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic                | Static | Grease                    | Oil   |                |
|                  | 22                | 28     | 16    | —                  | 1                  | HK2216              | 13.1                   | 20.9   | 9600                      | 15000 | 0.0412         |
|                  | 0.8661            | 1.1024 | 0.63  | —                  | 0.039              |                     | 2940                   | 4700   |                           |       |                |
|                  | 22                | 28     | 20    | 17.3               | 1                  | BK2220              | 15.3                   | 25.5   | 9600                      | 15000 | 0.0432         |
|                  | 0.8661            | 1.1024 | 0.787 | 0.681              | 0.039              |                     | 3440                   | 5730   |                           |       |                |
|                  | 22                | 28     | 20    | —                  | 1                  | HK2220              | 15.3                   | 25.5   | 9600                      | 15000 | 0.0432         |
|                  | 0.8661            | 1.1024 | 0.787 | —                  | 0.039              |                     | 3440                   | 5730   |                           |       |                |
| 25               | 25                | 32     | 12    | —                  | 1                  | HK2512              | 10.9                   | 14.7   | 8500                      | 13000 | 0.0295         |
|                  | 0.9843            | 1.2598 | 0.472 | —                  | 0.039              |                     | 2450                   | 3300   |                           |       |                |
|                  | 25                | 32     | 16    | 13.3               | 1                  | BK2516              | 15.6                   | 23.5   | 8500                      | 13000 | 0.0434         |
|                  | 0.9843            | 1.2598 | 0.63  | 0.524              | 0.039              |                     | 3510                   | 5280   |                           |       |                |
|                  | 25                | 32     | 16    | —                  | 1                  | HK2516              | 15.6                   | 23.5   | 8500                      | 13000 | 0.0434         |
|                  | 0.9843            | 1.2598 | 0.63  | —                  | 0.039              |                     | 3510                   | 5280   |                           |       |                |
|                  | 25                | 32     | 20    | 17.3               | 1                  | BK2520              | 20.6                   | 33.4   | 8500                      | 13000 | 0.0474         |
|                  | 0.9843            | 1.2598 | 0.787 | 0.681              | 0.039              |                     | 4630                   | 7510   |                           |       |                |
|                  | 25                | 32     | 20    | —                  | 1                  | HK2520              | 20.6                   | 33.4   | 8500                      | 13000 | 0.0474         |
|                  | 0.9843            | 1.2598 | 0.787 | —                  | 0.039              |                     | 4630                   | 7510   |                           |       |                |
|                  | 25                | 32     | 26    | 23.3               | 1                  | BK2526              | 25.7                   | 44.4   | 8500                      | 13000 | 0.0508         |
|                  | 0.9843            | 1.2598 | 1.024 | 0.917              | 0.039              |                     | 5780                   | 9980   |                           |       |                |
|                  | 25                | 32     | 26    | —                  | 1                  | HK2526              | 25.7                   | 44.4   | 8500                      | 13000 | 0.0508         |
|                  | 0.9843            | 1.2598 | 1.024 | —                  | 0.039              |                     | 5780                   | 9980   |                           |       |                |
|                  | 25                | 32     | 38    | 35.3               | 1                  | BK2538              | 35.3                   | 66.9   | 8500                      | 13000 | 0.0474         |
|                  | 0.9843            | 1.2598 | 1.496 | 1.39               | 0.039              |                     | 7940                   | 15000  |                           |       |                |
|                  | 25                | 32     | 38    | —                  | 1                  | HK2538              | 35.3                   | 66.9   | 8500                      | 13000 | 0.0474         |
|                  | 0.9843            | 1.2598 | 1.496 | —                  | 0.039              |                     | 7940                   | 15000  |                           |       |                |
| 28               | 28                | 35     | 16    | —                  | 1                  | HK2816              | 15.9                   | 24.9   | 7500                      | 12000 | 0.0462         |
|                  | 1.1024            | 1.378  | 0.63  | —                  | 0.039              |                     | 3570                   | 5600   |                           |       |                |
|                  | 28                | 35     | 20    | 17.3               | 1                  | BK2820              | 20.9                   | 35.3   | 7500                      | 12000 | 0.0504         |
|                  | 1.1024            | 1.378  | 0.787 | 0.681              | 0.039              |                     | 4700                   | 7940   |                           |       |                |
|                  | 28                | 35     | 20    | —                  | 1                  | HK2820              | 20.9                   | 35.3   | 7500                      | 12000 | 0.0504         |
|                  | 1.1024            | 1.378  | 0.787 | —                  | 0.039              |                     | 4700                   | 7940   |                           |       |                |
| 30               | 30                | 37     | 12    | 9.3                | 1                  | BK3012              | 11.6                   | 16.8   | 7000                      | 11000 | 0.033          |
|                  | 1.1811            | 1.4567 | 0.472 | 0.366              | 0.039              |                     | 2610                   | 3780   |                           |       |                |
|                  | 30                | 37     | 12    | —                  | 1                  | HK3012              | 12                     | 17.7   | 7000                      | 11000 | 0.033          |
|                  | 1.1811            | 1.4567 | 0.472 | —                  | 0.039              |                     | 2700                   | 3980   |                           |       |                |
|                  | 30                | 37     | 16    | —                  | 1                  | HK3016              | 16.8                   | 27.3   | 7000                      | 11000 | 0.0488         |
|                  | 1.1811            | 1.4567 | 0.63  | —                  | 0.039              |                     | 3780                   | 6140   |                           |       |                |
|                  | 30                | 37     | 20    | 17.3               | 1                  | BK3020              | 22.4                   | 39.6   | 7000                      | 11000 | 0.0537         |
|                  | 1.1811            | 1.4567 | 0.787 | 0.681              | 0.039              |                     | 5040                   | 8900   |                           |       |                |
|                  | 30                | 37     | 20    | —                  | 1                  | HK3020              | 22.4                   | 39.6   | 7000                      | 11000 | 0.0537         |
|                  | 1.1811            | 1.4567 | 0.787 | —                  | 0.039              |                     | 5040                   | 8900   |                           |       |                |
|                  | 30                | 37     | 26    | 23.3               | 1                  | BK3026              | 27.4                   | 51.2   | 7000                      | 11000 | 0.057          |
|                  | 1.1811            | 1.4567 | 1.024 | 0.917              | 0.039              |                     | 6160                   | 11500  |                           |       |                |
|                  | 30                | 37     | 26    | —                  | 1                  | HK3026              | 27.4                   | 51.2   | 7000                      | 11000 | 0.0571         |
|                  | 1.1811            | 1.4567 | 1.024 | —                  | 0.039              |                     | 6160                   | 11500  |                           |       |                |
|                  | 30                | 37     | 38    | 35.3               | 1                  | BK3038              | 38.4                   | 79.2   | 7000                      | 11000 | 0.0535         |
|                  | 1.1811            | 1.4567 | 1.496 | 1.39               | 0.039              |                     | 8630                   | 17800  |                           |       |                |
|                  | 30                | 37     | 38    | —                  | 1                  | HK3038              | 38.4                   | 79.2   | 7000                      | 11000 | 0.0535         |
|                  | 1.1811            | 1.4567 | 1.496 | —                  | 0.039              |                     | 8630                   | 17800  |                           |       |                |
| 35               | 35                | 42     | 12    | —                  | 1                  | HK3512              | 13                     | 20.6   | 5900                      | 9100  | 0.0365         |
|                  | 1.378             | 1.6535 | 0.472 | —                  | 0.039              |                     | 2920                   | 4630   |                           |       |                |
|                  | 35                | 42     | 16    | —                  | 1                  | HK3516              | 17.4                   | 29.9   | 5900                      | 9100  | 0.0534         |
|                  | 1.378             | 1.6535 | 0.63  | —                  | 0.039              |                     | 3910                   | 6720   |                           |       |                |
|                  | 35                | 42     | 20    | 17.3               | 1                  | BK3520              | 24.5                   | 46.8   | 5900                      | 9100  | 0.0597         |
|                  | 1.378             | 1.6535 | 0.787 | 0.681              | 0.039              |                     | 5510                   | 10520  |                           |       |                |
|                  | 35                | 42     | 20    | —                  | 1                  | HK3520              | 24.5                   | 46.8   | 5900                      | 9100  | 0.0597         |
|                  | 1.378             | 1.6535 | 0.787 | —                  | 0.039              |                     | 5510                   | 10500  |                           |       |                |
| 40               | 40                | 47     | 12    | —                  | 1                  | HK4012              | 14.7                   | 25.3   | 5200                      | 7900  | 0.0402         |
|                  | 1.5748            | 1.8504 | 0.472 | —                  | 0.039              |                     | 3300                   | 5690   |                           |       |                |

## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs         | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching Inner Ring | Shaft Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|---------------------|------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                     |                  |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                     |                  |
| <b>0.022</b><br>0.049 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0541</b>  | JR17x22x16          |                  |
| <b>0.028</b><br>0.062 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0567</b>  | JR17x22x23          |                  |
| <b>0.026</b><br>0.057 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0567</b>  | JR17x22x23          |                  |
| <b>0.021</b><br>0.046 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 |                |                     | <b>25</b>        |
| <b>0.031</b><br>0.068 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0569</b>  | JR20x25x17          |                  |
| <b>0.028</b><br>0.062 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0569</b>  | JR20x25x17          |                  |
| <b>0.043</b><br>0.095 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | JR20x25x20.5        |                  |
| <b>0.04</b><br>0.088  | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | JR20x25x20.5        |                  |
| <b>0.048</b><br>0.106 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0666</b>  | JR20x25x26.5        |                  |
| <b>0.046</b><br>0.101 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0666</b>  | JR20x25x26.5        |                  |
| <b>0.077</b><br>0.17  | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | JR20x25x38.5        |                  |
| <b>0.073</b><br>0.161 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | JR20x25x38.5        |                  |
| <b>0.032</b><br>0.071 | <b>28</b><br>1.1024        | <b>27.991</b><br>1.102  | <b>34.972</b><br>1.3769 | <b>34.988</b><br>1.3775 | <b>34.972</b><br>1.3769 | <b>28.02</b><br>1.1031  | <b>28.043</b><br>1.1041 | <b>0.0606</b>  | JR22x28x17          | <b>28</b>        |
| <b>0.047</b><br>0.104 | <b>28</b><br>1.1024        | <b>27.991</b><br>1.102  | <b>34.972</b><br>1.3769 | <b>34.988</b><br>1.3775 | <b>34.972</b><br>1.3769 | <b>28.02</b><br>1.1031  | <b>28.043</b><br>1.1041 | <b>0.0661</b>  | JR22x28x20.5        |                  |
| <b>0.04</b><br>0.088  | <b>28</b><br>1.1024        | <b>27.991</b><br>1.102  | <b>34.972</b><br>1.3769 | <b>34.988</b><br>1.3775 | <b>34.972</b><br>1.3769 | <b>28.02</b><br>1.1031  | <b>28.043</b><br>1.1041 | <b>0.0661</b>  | JR22x28x20.5        |                  |
| <b>0.031</b><br>0.068 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 |                |                     | <b>30</b>        |
| <b>0.042</b><br>0.093 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 |                |                     |                  |
| <b>0.032</b><br>0.071 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.064</b>   | JR25x30x17          |                  |
| <b>0.053</b><br>0.117 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0705</b>  | JR25x30x20.5        |                  |
| <b>0.047</b><br>0.104 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0705</b>  | JR25x30x20.5        |                  |
| <b>0.067</b><br>0.148 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0748</b>  | JR25x30x26.5        |                  |
| <b>0.052</b><br>0.115 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0749</b>  | JR25x30x26.5        |                  |
| <b>0.093</b><br>0.205 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0702</b>  | JR25x30x38.5        |                  |
| <b>0.087</b><br>0.192 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0702</b>  | JR25x30x38.5        |                  |
| <b>0.028</b><br>0.062 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   |                |                     | <b>35</b>        |
| <b>0.037</b><br>0.082 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0701</b>  | JR30x35x17          |                  |
| <b>0.065</b><br>0.143 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0783</b>  | JR30x35x20.5        |                  |
| <b>0.049</b><br>0.108 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0783</b>  | JR30x35x20.5        |                  |
| <b>0.036</b><br>0.079 | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 |                |                     | <b>40</b>        |

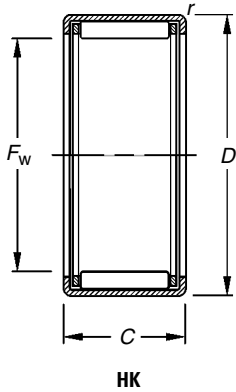
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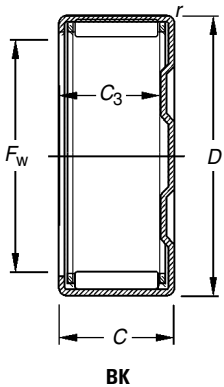
# NEEDLE ROLLER BEARINGS

## OPEN ENDS, CLOSED ONE END METRIC SERIES

continued



| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    |                    | Bearing Designation | Load Ratings<br>kN/lbf. |        | Limiting Speed<br>Approx. |        | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|--------------------|---------------------|-------------------------|--------|---------------------------|--------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic                 | Static | Grease                    | Oil    |                |
| 40               | 47                | 16     | —     | 1                  | HK4016             | 18.9                | 34.8                    | 5200   | 7900                      | 0.0589 |                |
|                  | 1.5748            | 1.8504 | 0.63  | 0.039              |                    | 4250                | 7820                    |        |                           |        |                |
| 40               | 47                | 20     | 17.3  | 1                  | BK4020             | 25.1                | 50.4                    | 5200   | 7900                      | 0.0646 |                |
|                  | 1.5748            | 1.8504 | 0.787 | 0.681              |                    | 0.039               | 5640                    |        |                           |        | 11300          |
| 40               | 47                | 20     | —     | 1                  | HK4020             | 25.1                | 50.4                    | 5200   | 7900                      | 0.0646 |                |
|                  | 1.5748            | 1.8504 | 0.787 | 0.039              |                    | 5640                | 11300                   |        |                           |        |                |
| 45               | 52                | 12     | —     | 1                  | HK4512             | 14.1                | 24.8                    | 4600   | 7000                      | N/A    |                |
|                  | 1.7717            | 2.0472 | 0.472 | 0.039              |                    | 3170                | 5580                    |        |                           |        |                |
| 45               | 52                | 16     | —     | 1                  | HK4516             | 19.8                | 38.5                    | 4600   | 7000                      | 0.0637 |                |
|                  | 1.7717            | 2.0472 | 0.63  | 0.039              |                    | 4450                | 8660                    |        |                           |        |                |
| 45               | 52                | 20     | 17.3  | 1                  | BK4520             | 26.3                | 55.4                    | 4600   | 7000                      | 0.0697 |                |
|                  | 1.7717            | 2.0472 | 0.787 | 0.681              |                    | 0.039               | 5910                    |        |                           |        | 12500          |
| 45               | 52                | 20     | —     | 1                  | HK4520             | 27.2                | 58.2                    | 4600   | 7000                      | 0.0697 |                |
|                  | 1.7717            | 2.0472 | 0.787 | 0.039              |                    | 6110                | 13100                   |        |                           |        |                |
| 50               | 58                | 20     | —     | 1                  | HK5020             | 30.9                | 62.2                    | 4100   | 6300                      | 0.0714 |                |
|                  | 1.9685            | 2.2835 | 0.787 | 0.039              |                    | 6950                | 14000                   |        |                           |        |                |
| 50               | 58                | 25     | —     | 1                  | HK5025             | 35.5                | 74.1                    | 4100   | 6300                      | 0.0764 |                |
|                  | 1.9685            | 2.2835 | 0.984 | 0.039              |                    | 7980                | 16700                   |        |                           |        |                |
| 60               | 68                | 12     | —     | 1                  | HK6012             | 17.2                | 31.2                    | 3400   | 5200                      | 0.0523 |                |
|                  | 2.3622            | 2.6772 | 0.472 | 0.039              |                    | 3870                | 7010                    |        |                           |        |                |



## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs         | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching<br>Inner Ring | Shaft<br>Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|------------------------|---------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                        |                     |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                        |                     |
| <b>0.048</b><br>0.106 | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0773</b>  | <b>JR35x40x17</b>      |                     |
| <b>0.07</b><br>0.154  | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0848</b>  | <b>JR35x40x20.5</b>    |                     |
| <b>0.06</b><br>0.132  | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0848</b>  | <b>JR35x40x20.5</b>    |                     |
| <b>0.036</b><br>0.079 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>N/A</b>     |                        | <b>45</b>           |
| <b>0.048</b><br>0.106 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>0.0836</b>  | <b>JR40x45x17</b>      |                     |
| <b>0.079</b><br>0.174 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>0.0914</b>  | <b>JR40x45x20.5</b>    |                     |
| <b>0.057</b><br>0.126 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>0.0914</b>  | <b>JR40x45x20.5</b>    |                     |
| <b>0.072</b><br>0.159 | <b>50</b><br>1.9685        | <b>49.989</b><br>1.9681 | <b>57.967</b><br>2.2822 | <b>57.986</b><br>2.2829 | <b>57.967</b><br>2.2822 | <b>50.025</b><br>1.9695 | <b>50.052</b><br>1.9706 | <b>0.0937</b>  | <b>JR45x50x20</b>      |                     |
| <b>0.092</b><br>0.203 | <b>50</b><br>1.9685        | <b>49.989</b><br>1.9681 | <b>57.967</b><br>2.2822 | <b>57.986</b><br>2.2829 | <b>57.967</b><br>2.2822 | <b>50.025</b><br>1.9695 | <b>50.052</b><br>1.9706 | <b>0.1002</b>  | <b>JR45x50x25.5</b>    | <b>50</b>           |
| <b>0.06</b><br>0.132  | <b>60</b><br>2.3622        | <b>59.987</b><br>2.3617 | <b>67.967</b><br>2.6759 | <b>67.986</b><br>2.6766 | <b>67.967</b><br>2.6759 | <b>60.03</b><br>2.3634  | <b>60.062</b><br>2.3646 |                |                        |                     |

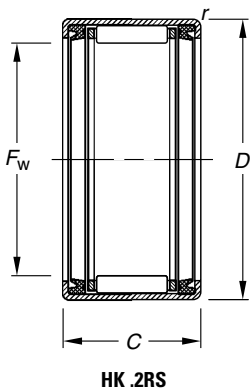
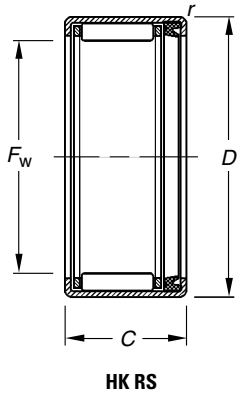
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# NEEDLE ROLLER BEARINGS

## SEALED BEARINGS METRIC SERIES



| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    |                    | Bearing Designation | Load Ratings<br>kN/bf. |                          | Limiting Speed<br>Approx. Grease<br>RPM | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|--------------------|---------------------|------------------------|--------------------------|-----------------------------------------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic<br>C           | Static<br>C <sub>0</sub> |                                         |                |
| 8                | 8                 | 12     | 10    | —                  | 0.4                | HK0810RS            | 2.9                    | 2.73                     | 20000                                   | N/A            |
|                  | 0.315             | 0.4724 | 0.394 | —                  | 0.016              |                     | 650                    | 610                      |                                         |                |
| 10               | 10                | 14     | 12    | —                  | 0.4                | HK1012RS            | 4.78                   | 5.51                     | 19000                                   | N/A            |
|                  | 0.3937            | 0.5512 | 0.472 | —                  | 0.016              |                     | 1070                   | 1240                     |                                         |                |
| 12               | 12                | 18     | 14    | —                  | 1                  | HK1214RS            | 6.61                   | 7.29                     | 14000                                   | 0.0189         |
|                  | 0.4724            | 0.7087 | 0.551 | —                  | 0.039              |                     | 1490                   | 1640                     |                                         |                |
| 14               | 12                | 18     | 16    | —                  | 1                  | HK1216.2RS          | 6.87                   | 7.65                     | 14000                                   | 0.0189         |
|                  | 0.4724            | 0.7087 | 0.63  | —                  | 0.039              |                     | 1610                   | 1890                     |                                         |                |
| 14               | 14                | 20     | 14    | 11.3               | 1                  | BK1414RS            | 7.17                   | 8.41                     | 14000                                   | N/A            |
|                  | 0.5512            | 0.7874 | 0.551 | 0.445              | 0.039              |                     | 1610                   | 1890                     |                                         |                |
| 14               | 14                | 20     | 14    | —                  | 1                  | HK1414RS            | 7.17                   | 8.41                     | 14000                                   | 0.0271         |
|                  | 0.5512            | 0.7874 | 0.551 | —                  | 0.039              |                     | 1610                   | 1890                     |                                         |                |
| 14               | 14                | 20     | 16    | —                  | 1                  | HK1416.2RS          | 7.17                   | 8.41                     | 14000                                   | 0.0271         |
|                  | 0.5512            | 0.7874 | 0.63  | —                  | 0.039              |                     | 1610                   | 1890                     |                                         |                |
| 15               | 15                | 21     | 14    | 11.3               | 1                  | BK1514RS            | 7.87                   | 9.69                     | 13000                                   | N/A            |
|                  | 0.5906            | 0.8268 | 0.551 | 0.445              | 0.039              |                     | 1770                   | 2180                     |                                         |                |
| 15               | 15                | 21     | 14    | —                  | 1                  | HK1514RS            | 7.87                   | 9.69                     | 13000                                   | 0.0288         |
|                  | 0.5906            | 0.8268 | 0.551 | —                  | 0.039              |                     | 1770                   | 2180                     |                                         |                |
| 15               | 15                | 21     | 16    | —                  | 1                  | HK1516.2RS          | 7.87                   | 9.69                     | 13000                                   | 0.0288         |
|                  | 0.5906            | 0.8268 | 0.63  | —                  | 0.039              |                     | 1770                   | 2180                     |                                         |                |
| 16               | 16                | 22     | 16    | —                  | 1                  | HK1614RS            | 7.82                   | 9.76                     | 12000                                   | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.63  | —                  | 0.039              |                     | 1760                   | 2190                     |                                         |                |
| 16               | 16                | 22     | 16    | —                  | 1                  | HK1616.2RS          | 7.82                   | 9.76                     | 12000                                   | 0.0297         |
|                  | 0.6299            | 0.8661 | 0.63  | —                  | 0.039              |                     | 1760                   | 2190                     |                                         |                |
| 18               | 18                | 24     | 14    | —                  | 1                  | HK1814RS            | 8.41                   | 11.1                     | 11000                                   | 0.0246         |
|                  | 0.7087            | 0.9449 | 0.551 | —                  | 0.039              |                     | 1890                   | 2500                     |                                         |                |
| 18               | 18                | 24     | 16    | —                  | 1                  | HK1816.2RS          | 8.41                   | 11.1                     | 11000                                   | 0.0322         |
|                  | 0.7087            | 0.9449 | 0.63  | —                  | 0.039              |                     | 1890                   | 2500                     |                                         |                |
| 20               | 20                | 26     | 16    | —                  | 1                  | HK2016.2RS          | 8.97                   | 12.5                     | 9700                                    | 0.0347         |
|                  | 0.7874            | 1.0236 | 0.63  | —                  | 0.039              |                     | 2020                   | 2810                     |                                         |                |
| 20               | 20                | 26     | 18    | —                  | 1                  | HK2018RS            | 12.4                   | 18.9                     | 9700                                    | 0.0385         |
|                  | 0.7874            | 1.0236 | 0.709 | —                  | 0.039              |                     | 2790                   | 4250                     |                                         |                |
| 20               | 20                | 26     | 20    | —                  | 1                  | HK2020.2RS          | 12.4                   | 18.9                     | 9700                                    | 0.0385         |
|                  | 0.7874            | 1.0236 | 0.787 | —                  | 0.039              |                     | 2790                   | 4250                     |                                         |                |
| 22               | 22                | 28     | 16    | —                  | 1                  | HK2216.2RS          | 9.81                   | 14.5                     | 8800                                    | 0.0286         |
|                  | 0.8661            | 1.1024 | 0.63  | —                  | 0.039              |                     | 2210                   | 3260                     |                                         |                |
| 22               | 22                | 28     | 18    | —                  | 1                  | HK2218RS            | 13.1                   | 20.9                     | 8800                                    | 0.0412         |
|                  | 0.8661            | 1.1024 | 0.709 | —                  | 0.039              |                     | 2950                   | 4700                     |                                         |                |
| 22               | 22                | 28     | 20    | —                  | 1                  | HK2220.2RS          | 13.1                   | 20.9                     | 8800                                    | 0.0412         |
|                  | 0.8661            | 1.1024 | 0.787 | —                  | 0.039              |                     | 2950                   | 4700                     |                                         |                |
| 25               | 25                | 32     | 16    | —                  | 1                  | HK2516.2RS          | 11.1                   | 15.1                     | 7800                                    | 0.0389         |
|                  | 0.9843            | 1.2598 | 0.63  | —                  | 0.039              |                     | 2500                   | 3390                     |                                         |                |
| 25               | 25                | 32     | 18    | —                  | 1                  | HK2518RS            | 16.2                   | 24.6                     | 7800                                    | 0.0439         |
|                  | 0.9843            | 1.2598 | 0.709 | —                  | 0.039              |                     | 3640                   | 5530                     |                                         |                |
| 25               | 25                | 32     | 20    | —                  | 1                  | HK2520.2RS          | 16.2                   | 24.6                     | 7800                                    | 0.0439         |
|                  | 0.9843            | 1.2598 | 0.787 | —                  | 0.039              |                     | 3640                   | 5530                     |                                         |                |
| 25               | 25                | 32     | 22    | —                  | 1                  | HK2522RS            | 20.6                   | 33.4                     | 7800                                    | 0.0474         |
|                  | 0.9843            | 1.2598 | 0.866 | —                  | 0.039              |                     | 4630                   | 7510                     |                                         |                |
| 25               | 25                | 32     | 24    | —                  | 1                  | HK2524.2RS          | 20.6                   | 33.4                     | 7800                                    | 0.0474         |
|                  | 0.9843            | 1.2598 | 0.945 | —                  | 0.039              |                     | 4630                   | 7510                     |                                         |                |
| 28               | 28                | 35     | 20    | —                  | 1                  | HK2820.2RS          | 15.9                   | 24.9                     | 6900                                    | 0.0462         |
|                  | 1.1024            | 1.378  | 0.787 | —                  | 0.039              |                     | 3570                   | 5600                     |                                         |                |
| 30               | 30                | 37     | 16    | —                  | 1                  | HK3016.2RS          | 11.6                   | 16.8                     | 6500                                    | 0.0432         |
|                  | 1.1811            | 1.4567 | 0.63  | —                  | 0.039              |                     | 2610                   | 3780                     |                                         |                |
| 30               | 30                | 37     | 18    | —                  | 1                  | HK3018RS            | 16.8                   | 27.3                     | 6500                                    | 0.0488         |
|                  | 1.1811            | 1.4567 | 0.709 | —                  | 0.039              |                     | 3780                   | 6140                     |                                         |                |
| 30               | 30                | 37     | 20    | —                  | 1                  | HK3020.2RS          | 16.8                   | 27.3                     | 6500                                    | 0.0488         |
|                  | 1.1811            | 1.4567 | 0.787 | —                  | 0.039              |                     | 3780                   | 6140                     |                                         |                |

## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs         | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching Inner Ring | Shaft Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|---------------------|------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                     |                  |
|                       | S                          |                         | H                       |                         |                         |                         |                         |                |                     |                  |
| <b>0.004</b><br>0.009 | <b>8</b><br>0.315          | <b>7.994</b><br>0.3147  | <b>11.98</b><br>0.4717  | <b>11.991</b><br>0.4721 | <b>11.98</b><br>0.4717  | <b>8.013</b><br>0.3155  | <b>8.033</b><br>0.3163  |                |                     | <b>8</b>         |
| <b>0.005</b><br>0.011 | <b>10</b><br>0.3937        | <b>9.994</b><br>0.3935  | <b>13.98</b><br>0.5504  | <b>13.991</b><br>0.5508 | <b>13.98</b><br>0.5504  | <b>10.013</b><br>0.3942 | <b>10.033</b><br>0.395  |                |                     | <b>10</b>        |
| <b>0.013</b><br>0.029 | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>17.98</b><br>0.7079  | <b>17.991</b><br>0.7083 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 |                |                     | <b>12</b>        |
| <b>0.016</b><br>0.035 | <b>12</b><br>0.4724        | <b>11.992</b><br>0.4721 | <b>17.98</b><br>0.7079  | <b>17.991</b><br>0.7083 | <b>17.98</b><br>0.7079  | <b>12.016</b><br>0.4731 | <b>12.036</b><br>0.4739 |                |                     |                  |
| <b>0.014</b><br>0.031 | <b>14</b><br>0.5512        | <b>13.992</b><br>0.5509 | <b>19.976</b><br>0.7865 | <b>19.989</b><br>0.787  | <b>19.976</b><br>0.7865 | <b>14.016</b><br>0.5518 | <b>14.036</b><br>0.5526 |                |                     | <b>14</b>        |
| <b>0.015</b><br>0.033 | <b>14</b><br>0.5512        | <b>13.992</b><br>0.5509 | <b>19.976</b><br>0.7865 | <b>19.989</b><br>0.787  | <b>19.976</b><br>0.7865 | <b>14.016</b><br>0.5518 | <b>14.036</b><br>0.5526 | <b>0.0356</b>  | <b>JR10x14x16</b>   |                  |
| <b>0.014</b><br>0.031 | <b>14</b><br>0.5512        | <b>13.992</b><br>0.5509 | <b>19.976</b><br>0.7865 | <b>19.989</b><br>0.787  | <b>19.976</b><br>0.7865 | <b>14.016</b><br>0.5518 | <b>14.036</b><br>0.5526 | <b>0.0356</b>  | <b>JR10x14x20</b>   |                  |
| <b>0.017</b><br>0.037 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0378</b>  | <b>JR12x15x16.5</b> | <b>15</b>        |
| <b>0.016</b><br>0.035 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0378</b>  | <b>JR12x15x16.5</b> |                  |
| <b>0.019</b><br>0.042 | <b>15</b><br>0.5906        | <b>14.992</b><br>0.5902 | <b>20.976</b><br>0.8258 | <b>20.989</b><br>0.8263 | <b>20.976</b><br>0.8258 | <b>15.016</b><br>0.5912 | <b>15.036</b><br>0.592  | <b>0.0378</b>  | <b>JR12x15x16.5</b> |                  |
| <b>0.014</b><br>0.031 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x16</b>   | <b>16</b>        |
| <b>0.015</b><br>0.033 | <b>16</b><br>0.6299        | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>21.976</b><br>0.8652 | <b>16.016</b><br>0.6306 | <b>16.036</b><br>0.6313 | <b>0.039</b>   | <b>JR12x16x20</b>   |                  |
| <b>0.018</b><br>0.04  | <b>18</b><br>0.7087        | <b>17.992</b><br>0.7083 | <b>23.976</b><br>0.9439 | <b>23.989</b><br>0.9444 | <b>23.976</b><br>0.9439 | <b>18.016</b><br>0.7093 | <b>18.036</b><br>0.7101 |                |                     | <b>18</b>        |
| <b>0.017</b><br>0.037 | <b>18</b><br>0.7087        | <b>17.992</b><br>0.7083 | <b>23.976</b><br>0.9439 | <b>23.989</b><br>0.9444 | <b>23.976</b><br>0.9439 | <b>18.016</b><br>0.7093 | <b>18.036</b><br>0.7101 | <b>0.0422</b>  | <b>JR15x18x16.5</b> |                  |
| <b>0.023</b><br>0.051 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0455</b>  | <b>JR17x20x16.5</b> | <b>20</b>        |
| <b>0.025</b><br>0.055 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x20.5</b> |                  |
| <b>0.028</b><br>0.062 | <b>20</b><br>0.7874        | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>25.976</b><br>1.0227 | <b>20.02</b><br>0.7882  | <b>20.043</b><br>0.7891 | <b>0.0505</b>  | <b>JR17x20x20.5</b> |                  |
| <b>0.025</b><br>0.055 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 |                |                     | <b>22</b>        |
| <b>0.027</b><br>0.06  | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0541</b>  | <b>JR17x22x23</b>   | <b>22</b>        |
| <b>0.026</b><br>0.057 | <b>22</b><br>0.8661        | <b>21.991</b><br>0.8658 | <b>27.976</b><br>1.1014 | <b>27.989</b><br>1.1019 | <b>27.976</b><br>1.1014 | <b>22.02</b><br>0.8669  | <b>22.043</b><br>0.8678 | <b>0.0541</b>  | <b>JR17x22x23</b>   |                  |
| <b>0.03</b><br>0.066  | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.051</b>   | <b>JR20x25x17</b>   | <b>25</b>        |
| <b>0.034</b><br>0.075 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0576</b>  | <b>JR20x25x20.5</b> |                  |
| <b>0.038</b><br>0.084 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0576</b>  | <b>JR20x25x20.5</b> |                  |
| <b>0.042</b><br>0.093 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | <b>JR20x25x26</b>   |                  |
| <b>0.047</b><br>0.104 | <b>25</b><br>0.9843        | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>31.972</b><br>1.2587 | <b>25.02</b><br>0.985   | <b>25.043</b><br>0.9859 | <b>0.0622</b>  | <b>JR20x25x26</b>   |                  |
| <b>0.042</b><br>0.093 | <b>28</b><br>1.1024        | <b>27.991</b><br>1.102  | <b>34.972</b><br>1.3769 | <b>34.988</b><br>1.3775 | <b>34.972</b><br>1.3769 | <b>28.02</b><br>1.1031  | <b>28.043</b><br>1.1041 | <b>0.0606</b>  | <b>JR22x28x20.5</b> | <b>28</b>        |
| <b>0.03</b><br>0.066  | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0567</b>  | <b>JR25x30x17</b>   | <b>30</b>        |
| <b>0.042</b><br>0.093 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.064</b>   | <b>JR25x30x20.5</b> |                  |
| <b>0.04</b><br>0.088  | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.064</b>   | <b>JR25x30x20.5</b> |                  |

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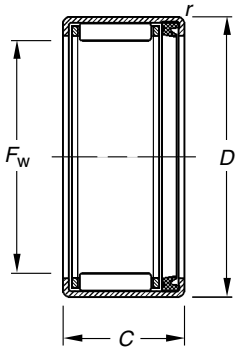


# NEEDLE ROLLER BEARINGS

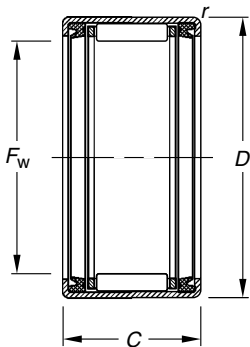
## SEALED BEARINGS

### METRIC SERIES

continued



HK RS



HK .2RS

| Shaft Dia. | Dimensions mm/in. |              |             |                    |                    | Bearing Designation | Load Ratings kN/lbf. |                       | Limiting Speed Approx. Grease RPM | C <sub>g</sub> |
|------------|-------------------|--------------|-------------|--------------------|--------------------|---------------------|----------------------|-----------------------|-----------------------------------|----------------|
|            | F <sub>w</sub>    | D            | C           | C <sub>3 min</sub> | r <sub>s min</sub> |                     | Dynamic C            | Static C <sub>0</sub> |                                   |                |
|            | 30<br>1.1811      | 37<br>1.4567 | 22<br>0.866 | —                  | 1<br>0.039         | HK3022RS            | 22.4<br>5040         | 39.6<br>8900          | 6500                              | 0.0535         |
|            | 30<br>1.1811      | 37<br>1.4567 | 24<br>0.945 | —                  | 1<br>0.039         | HK3024.2RS          | 22.4<br>5040         | 39.6<br>8900          | 6500                              | 0.0535         |
| 35         | 35<br>1.378       | 42<br>1.6535 | 16<br>0.63  | —                  | 1<br>0.039         | HK3516.2RS          | 14.2<br>3190         | 23.2<br>5220          | 5500                              | 0.0492         |
|            | 35<br>1.378       | 42<br>1.6535 | 18<br>0.709 | —                  | 1<br>0.039         | HK3518RS            | 17.4<br>3910         | 29.9<br>6720          | 5500                              | 0.0534         |
|            | 35<br>1.378       | 42<br>1.6535 | 20<br>0.787 | —                  | 1<br>0.039         | HK3520.2RS          | 17.4<br>3910         | 29.9<br>6720          | 5500                              | 0.0534         |
| 40         | 40<br>1.5748      | 47<br>1.8504 | 16<br>0.63  | —                  | 1<br>0.039         | HK4016.2RS          | 13.4<br>3010         | 22.4<br>5040          | 4900                              | 0.0528         |
|            | 40<br>1.5748      | 47<br>1.8504 | 18<br>0.709 | —                  | 1<br>0.039         | HK4018RS            | 18.9<br>4250         | 34.8<br>7820          | 4900                              | 0.0589         |
|            | 40<br>1.5748      | 47<br>1.8504 | 20<br>0.787 | —                  | 1<br>0.039         | HK4020.2RS          | 18.9<br>4250         | 34.8<br>7820          | 4900                              | 0.0589         |
| 45         | 45<br>1.7717      | 52<br>2.0472 | 18<br>0.709 | —                  | 1<br>0.039         | HK4518RS            | 19.8<br>4450         | 38.5<br>8660          | 4300                              | 0.0637         |
|            | 45<br>1.7717      | 52<br>2.0472 | 20<br>0.787 | —                  | 1<br>0.039         | HK4520.2RS          | 19.8<br>4450         | 38.5<br>8660          | 4300                              | 0.0637         |
| 50         | 50<br>1.9685      | 58<br>2.2835 | 22<br>0.866 | —                  | 1<br>0.039         | HK5022RS            | 28.8<br>6470         | 56.6<br>12700         | 3900                              | 0.0714         |
|            | 50<br>1.9685      | 58<br>2.2835 | 24<br>0.945 | —                  | 1<br>0.039         | HK5024.2RS          | 28.8<br>6470         | 56.6<br>12700         | 3900                              | 0.0714         |



## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs.        | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching<br>Inner Ring | Shaft<br>Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|------------------------|---------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                        |                     |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                        |                     |
| <b>0.051</b><br>0.112 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0702</b>  | JR25x30x26             |                     |
| <b>0.057</b><br>0.126 | <b>30</b><br>1.1811        | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>36.972</b><br>1.4556 | <b>30.02</b><br>1.1819  | <b>30.043</b><br>1.1828 | <b>0.0702</b>  | JR25x30x26             |                     |
| <b>0.047</b><br>0.104 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0646</b>  | JR30x35x17             | <b>35</b>           |
| <b>0.54</b><br>1.19   | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0701</b>  | JR30x35x20.5           |                     |
| <b>0.044</b><br>0.097 | <b>35</b><br>1.378         | <b>34.989</b><br>1.3775 | <b>41.972</b><br>1.6524 | <b>41.988</b><br>1.6531 | <b>41.972</b><br>1.6524 | <b>35.025</b><br>1.3789 | <b>35.052</b><br>1.38   | <b>0.0701</b>  | JR30x35x20.5           |                     |
| <b>0.037</b><br>0.082 | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0693</b>  | JR35x40x20             | <b>40</b>           |
| <b>0.057</b><br>0.126 | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0773</b>  | JR35x40x20.5           |                     |
| <b>0.053</b><br>0.117 | <b>40</b><br>1.5748        | <b>39.989</b><br>1.5744 | <b>46.972</b><br>1.8493 | <b>46.988</b><br>1.8499 | <b>46.972</b><br>1.8493 | <b>40.025</b><br>1.5758 | <b>40.052</b><br>1.5769 | <b>0.0773</b>  | JR35x40x20.5           |                     |
| <b>0.064</b><br>0.141 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>0.0836</b>  | JR40x45x20.5           | <b>45</b>           |
| <b>0.075</b><br>0.165 | <b>45</b><br>1.7717        | <b>44.989</b><br>1.7712 | <b>51.967</b><br>2.0459 | <b>51.986</b><br>2.0467 | <b>51.967</b><br>2.0459 | <b>45.025</b><br>1.7726 | <b>45.052</b><br>1.7737 | <b>0.0836</b>  | JR40x45x20.5           |                     |
| <b>0.097</b><br>0.214 | <b>50</b><br>1.9685        | <b>49.989</b><br>1.9681 | <b>57.967</b><br>2.2822 | <b>57.986</b><br>2.2829 | <b>57.967</b><br>2.2822 | <b>50.025</b><br>1.9695 | <b>50.052</b><br>1.9706 | <b>0.0937</b>  | JR45x50x25.5           | <b>50</b>           |
| <b>0.083</b><br>0.183 | <b>50</b><br>1.9685        | <b>49.989</b><br>1.9681 | <b>57.967</b><br>2.2822 | <b>57.986</b><br>2.2829 | <b>57.967</b><br>2.2822 | <b>50.025</b><br>1.9695 | <b>50.052</b><br>1.9706 | <b>0.0937</b>  | JR45x50x25.5           |                     |

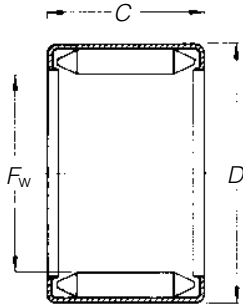
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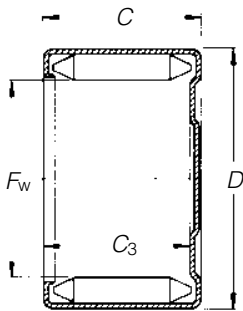


# NEEDLE ROLLER BEARINGS

**FULL  
COMPLEMENT  
OPEN ENDS,  
CLOSED ONE END  
METRIC SERIES**



DL



DLF

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    | Bearing Designation | Load Ratings<br>kN/bf. |        | Limiting Speed<br>Approx. |       | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|---------------------|------------------------|--------|---------------------------|-------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> |                     | Dynamic                | Static | Grease                    | Oil   |                |
| 6                | 6                 | 12     | 10    | -                  | DL 6 10             | 2.90                   | 3.80   | 33000                     | 50000 | 0.0120         |
|                  | 0.2362            | 0.4724 | 0.394 | -                  |                     | 650                    | 850    |                           |       |                |
| 6                | 6                 | 12     | 10    | 7.7                | DLF 6 10            | 2.90                   | 3.80   | 33000                     | 50000 | 0.0120         |
|                  | 0.2362            | 0.4724 | 0.394 | 0.303              |                     | 650                    | 850    |                           |       |                |
| 8                | 8                 | 14     | 10    | -                  | DL 8 10             | 4.50                   | 6.50   | 24000                     | 37500 | 0.0145         |
|                  | 0.3150            | 0.5512 | 0.394 | -                  |                     | 1010                   | 1460   |                           |       |                |
| 8                | 8                 | 14     | 10    | 7.7                | DLF 8 10            | 4.50                   | 6.50   | 24000                     | 37500 | 0.0145         |
|                  | 0.3150            | 0.5512 | 0.394 | 0.303              |                     | 1010                   | 1460   |                           |       |                |
| 10               | 10                | 16     | 12    | -                  | DL 10 12            | 7.00                   | 10.9   | 20000                     | 30000 | 0.0180         |
|                  | 0.3937            | 0.6299 | 0.472 | -                  |                     | 1570                   | 2450   |                           |       |                |
| 10               | 10                | 16     | 12    | 9.7                | DLF 10 12           | 7.00                   | 10.9   | 20000                     | 30000 | 0.0180         |
|                  | 0.3937            | 0.6299 | 0.472 | 0.382              |                     | 1570                   | 2450   |                           |       |                |
| 12               | 12                | 18     | 10    | -                  | DL 12 10            | 6.00                   | 9.7    | 16000                     | 25000 | 0.0195         |
|                  | 0.4724            | 0.7087 | 0.394 | -                  |                     | 1350                   | 2180   |                           |       |                |
| 12               | 12                | 20     | 12    | -                  | DL 12 12            | 7.00                   | 11.5   | 16000                     | 25000 | 0.0206         |
|                  | 0.4724            | 0.7874 | 0.472 | -                  |                     | 1570                   | 2590   |                           |       |                |
| 12               | 12                | 20     | 12    | 9.7                | DLF 12 12           | 7.00                   | 11.5   | 16000                     | 25000 | 0.0206         |
|                  | 0.4724            | 0.7874 | 0.472 | 0.382              |                     | 1570                   | 2590   |                           |       |                |
| 13               | 13                | 19     | 12    | -                  | DL 13 12            | 8.50                   | 14.2   | 15000                     | 23000 | 0.0217         |
|                  | 0.5118            | 0.7480 | 0.472 | -                  |                     | 1910                   | 3190   |                           |       |                |
| 13               | 13                | 19     | 12    | 9.7                | DLF 13 12           | 8.50                   | 14.2   | 15000                     | 23000 | 0.0217         |
|                  | 0.5118            | 0.7480 | 0.472 | 0.382              |                     | 1910                   | 3190   |                           |       |                |
| 14               | 14                | 20     | 12    | -                  | DL 14 12            | 7.90                   | 13.5   | 14000                     | 21500 | 0.0229         |
|                  | 0.5512            | 0.7874 | 0.472 | -                  |                     | 1780                   | 3030   |                           |       |                |
| 14               | 14                | 20     | 12    | 9.7                | DLF 14 12           | 7.90                   | 13.5   | 14000                     | 21500 | 0.0229         |
|                  | 0.5512            | 0.7874 | 0.472 | 0.382              |                     | 1780                   | 3030   |                           |       |                |
| 15               | 15                | 21     | 12    | -                  | DL 15 12            | 9.40                   | 16.4   | 13000                     | 20000 | 0.0238         |
|                  | 0.5906            | 0.8268 | 0.472 | -                  |                     | 2110                   | 3690   |                           |       |                |
| 15               | 15                | 21     | 12    | 9.7                | DLF 15 12           | 9.40                   | 16.4   | 13000                     | 20000 | 0.0238         |
|                  | 0.5906            | 0.8268 | 0.472 | 0.382              |                     | 2110                   | 3690   |                           |       |                |
| 16               | 16                | 22     | 12    | -                  | DL 16 12            | 8.70                   | 15.5   | 12000                     | 18500 | 0.0251         |
|                  | 0.6299            | 0.8661 | 0.472 | -                  |                     | 1960                   | 3480   |                           |       |                |
| 16               | 16                | 22     | 12    | 9.7                | DLF 16 12           | 8.70                   | 15.5   | 12000                     | 18500 | 0.0251         |
|                  | 0.6299            | 0.8661 | 0.472 | 0.382              |                     | 1960                   | 3480   |                           |       |                |
| 17               | 17                | 23     | 12    | -                  | DL 17 12            | 9.00                   | 16.2   | 11000                     | 17500 | 0.0260         |
|                  | 0.6693            | 0.9055 | 0.472 | -                  |                     | 2020                   | 3640   |                           |       |                |
| 17               | 17                | 23     | 12    | 9.7                | DLF 17 12           | 9.00                   | 16.2   | 11000                     | 17500 | 0.0260         |
|                  | 0.6693            | 0.9055 | 0.472 | 0.382              |                     | 2020                   | 3640   |                           |       |                |
| 18               | 18                | 24     | 12    | -                  | DL 18 12            | 10.7                   | 19.5   | 11000                     | 16500 | 0.0272         |
|                  | 0.7087            | 0.9449 | 0.472 | -                  |                     | 2410                   | 4380   |                           |       |                |
| 18               | 18                | 24     | 12    | 9.7                | DLF 18 12           | 10.7                   | 19.5   | 11000                     | 16500 | 0.0272         |
|                  | 0.7087            | 0.9449 | 0.472 | 0.382              |                     | 2410                   | 4380   |                           |       |                |
| 18               | 18                | 24     | 16    | -                  | DL 18 16            | 16.0                   | 29.5   | 11000                     | 16500 | 0.0304         |
|                  | 0.7087            | 0.9449 | 0.630 | -                  |                     | 3600                   | 6630   |                           |       |                |
| 18               | 18                | 24     | 16    | 13.7               | DLF 18 16           | 16.0                   | 29.5   | 11000                     | 16500 | 0.0304         |
|                  | 0.7087            | 0.9449 | 0.630 | 0.539              |                     | 3600                   | 6630   |                           |       |                |
| 20               | 20                | 26     | 12    | -                  | DL 20 12            | 10.2                   | 19.5   | 10000                     | 15000 | 0.0292         |
|                  | 0.7874            | 1.0236 | 0.472 | -                  |                     | 2290                   | 4380   |                           |       |                |
| 20               | 20                | 26     | 12    | 9.7                | DLF 20 12           | 10.2                   | 19.5   | 10000                     | 15000 | 0.0292         |
|                  | 0.7874            | 1.0236 | 0.472 | 0.382              |                     | 2290                   | 4380   |                           |       |                |
| 20               | 20                | 26     | 16    | -                  | DL 20 16            | 16.0                   | 30.5   | 10000                     | 15000 | 0.0327         |
|                  | 0.7874            | 1.0236 | 0.630 | -                  |                     | 3600                   | 6860   |                           |       |                |
| 20               | 20                | 26     | 16    | 13.7               | DLF 20 16           | 16.0                   | 30.5   | 10000                     | 15000 | 0.0327         |
|                  | 0.7874            | 1.0236 | 0.630 | 0.539              |                     | 3600                   | 6860   |                           |       |                |
| 22               | 22                | 28     | 16    | -                  | DL 22 16            | 17.0                   | 33.0   | 8800                      | 13500 | 0.0349         |
|                  | 0.8661            | 1.1024 | 0.630 | -                  |                     | 3820                   | 7420   |                           |       |                |
| 22               | 22                | 28     | 16    | 13.7               | DLF 22 16           | 17.0                   | 33.0   | 8800                      | 13500 | 0.0349         |
|                  | 0.8661            | 1.1024 | 0.630 | 0.539              |                     | 3820                   | 7420   |                           |       |                |

## Drawn Cup Needle Roller Bearings

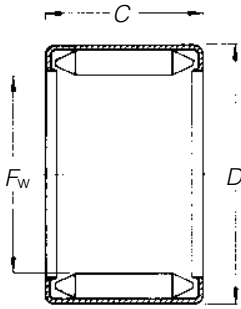
| Wt.<br>kg/lbs.        | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching<br>Inner Ring | Shaft<br>Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|------------------------|---------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                        |                     |
|                       | <b>S</b>                   |                         | <b>H</b>                |                         |                         |                         |                         |                |                        |                     |
| <b>0.004</b><br>0.009 | <b>6.000</b><br>0.2362     | <b>5.995</b><br>0.2360  | <b>12.000</b><br>0.4724 | <b>12.011</b><br>0.4729 | <b>12.000</b><br>0.4724 | <b>6.009</b><br>0.2366  | <b>6.036</b><br>0.2376  |                |                        | <b>6</b>            |
| <b>0.004</b><br>0.010 | <b>6.000</b><br>0.2362     | <b>5.995</b><br>0.2360  | <b>12.000</b><br>0.4724 | <b>12.011</b><br>0.4729 | <b>12.000</b><br>0.4724 | <b>6.009</b><br>0.2366  | <b>6.036</b><br>0.2376  |                |                        |                     |
| <b>0.005</b><br>0.012 | <b>8.000</b><br>0.3150     | <b>7.994</b><br>0.3147  | <b>14.000</b><br>0.5512 | <b>14.011</b><br>0.5516 | <b>14.000</b><br>0.5512 | <b>8.009</b><br>0.3153  | <b>8.036</b><br>0.3164  |                |                        | <b>8</b>            |
| <b>0.005</b><br>0.012 | <b>8.000</b><br>0.3150     | <b>7.994</b><br>0.3147  | <b>14.000</b><br>0.5512 | <b>14.011</b><br>0.5516 | <b>14.000</b><br>0.5512 | <b>8.009</b><br>0.3153  | <b>8.036</b><br>0.3164  |                |                        |                     |
| <b>0.008</b><br>0.018 | <b>10.000</b><br>0.3937    | <b>9.994</b><br>0.3935  | <b>16.000</b><br>0.6299 | <b>16.011</b><br>0.6304 | <b>16.000</b><br>0.6299 | <b>10.009</b><br>0.3941 | <b>10.036</b><br>0.3951 |                |                        | <b>10</b>           |
| <b>0.008</b><br>0.018 | <b>10.000</b><br>0.3937    | <b>9.994</b><br>0.3935  | <b>16.000</b><br>0.6299 | <b>16.011</b><br>0.6304 | <b>16.000</b><br>0.6299 | <b>10.009</b><br>0.3941 | <b>10.036</b><br>0.3951 |                |                        |                     |
| <b>0.008</b><br>0.017 | <b>12.000</b><br>0.4724    | <b>11.992</b><br>0.4721 | <b>18.000</b><br>0.7087 | <b>18.011</b><br>0.7091 | <b>18.000</b><br>0.7087 | <b>12.009</b><br>0.4728 | <b>12.035</b><br>0.4738 |                |                        | <b>12</b>           |
| <b>0.009</b><br>0.021 | <b>12.000</b><br>0.4724    | <b>11.992</b><br>0.4721 | <b>20.000</b><br>0.7874 | <b>20.013</b><br>0.7879 | <b>20.000</b><br>0.7874 | <b>12.009</b><br>0.4728 | <b>12.035</b><br>0.4738 | <b>0.0270</b>  | <b>IM 8 12 12.4</b>    |                     |
| <b>0.009</b><br>0.021 | <b>12.000</b><br>0.4724    | <b>11.992</b><br>0.4721 | <b>20.000</b><br>0.7874 | <b>20.013</b><br>0.7879 | <b>20.000</b><br>0.7874 | <b>12.009</b><br>0.4728 | <b>12.035</b><br>0.4738 | <b>0.0270</b>  | <b>IM 8 12 12.4</b>    |                     |
| <b>0.010</b><br>0.022 | <b>13.000</b><br>0.5118    | <b>12.992</b><br>0.5115 | <b>19.000</b><br>0.7480 | <b>19.013</b><br>0.7485 | <b>19.000</b><br>0.7480 | <b>13.009</b><br>0.5122 | <b>13.035</b><br>0.5132 | <b>0.0285</b>  | <b>IM 9 13 12.4</b>    | <b>13</b>           |
| <b>0.010</b><br>0.022 | <b>13.000</b><br>0.5118    | <b>12.992</b><br>0.5115 | <b>19.000</b><br>0.7480 | <b>19.013</b><br>0.7485 | <b>19.000</b><br>0.7480 | <b>13.009</b><br>0.5122 | <b>13.035</b><br>0.5132 | <b>0.0285</b>  | <b>IM 9 13 12.4</b>    |                     |
| <b>0.011</b><br>0.023 | <b>14.000</b><br>0.5512    | <b>13.992</b><br>0.5509 | <b>20.000</b><br>0.7874 | <b>20.013</b><br>0.7879 | <b>20.000</b><br>0.7874 | <b>14.009</b><br>0.5515 | <b>14.035</b><br>0.5526 | <b>0.0300</b>  | <b>IM 10 14 12.4</b>   | <b>14</b>           |
| <b>0.011</b><br>0.023 | <b>14.000</b><br>0.5512    | <b>13.992</b><br>0.5509 | <b>20.000</b><br>0.7874 | <b>20.013</b><br>0.7879 | <b>20.000</b><br>0.7874 | <b>14.009</b><br>0.5515 | <b>14.035</b><br>0.5526 | <b>0.0300</b>  | <b>IM 10 14 12.4</b>   |                     |
| <b>0.011</b><br>0.024 | <b>15.000</b><br>0.5906    | <b>14.992</b><br>0.5902 | <b>21.000</b><br>0.8268 | <b>21.013</b><br>0.8273 | <b>21.000</b><br>0.8268 | <b>15.009</b><br>0.5909 | <b>15.035</b><br>0.5919 | <b>0.0312</b>  | <b>IM 12 15 12.4</b>   | <b>15</b>           |
| <b>0.011</b><br>0.024 | <b>15.000</b><br>0.5906    | <b>14.992</b><br>0.5902 | <b>21.000</b><br>0.8268 | <b>21.013</b><br>0.8273 | <b>21.000</b><br>0.8268 | <b>15.009</b><br>0.5909 | <b>15.035</b><br>0.5919 | <b>0.0312</b>  | <b>IM 12 15 12.4</b>   |                     |
| <b>0.012</b><br>0.026 | <b>16.000</b><br>0.6299    | <b>15.992</b><br>0.6296 | <b>22.000</b><br>0.8661 | <b>22.013</b><br>0.8667 | <b>22.000</b><br>0.8661 | <b>16.009</b><br>0.6303 | <b>16.035</b><br>0.6313 |                |                        | <b>16</b>           |
| <b>0.012</b><br>0.026 | <b>16.000</b><br>0.6299    | <b>15.992</b><br>0.6296 | <b>22.000</b><br>0.8661 | <b>22.013</b><br>0.8667 | <b>22.000</b><br>0.8661 | <b>16.009</b><br>0.6303 | <b>16.035</b><br>0.6313 |                |                        |                     |
| <b>0.013</b><br>0.029 | <b>17.000</b><br>0.6693    | <b>16.992</b><br>0.6690 | <b>23.000</b><br>0.9055 | <b>23.013</b><br>0.9060 | <b>23.000</b><br>0.9055 | <b>17.009</b><br>0.6696 | <b>17.035</b><br>0.6707 | <b>0.0341</b>  | <b>IM 13 17 12.4</b>   | <b>17</b>           |
| <b>0.013</b><br>0.029 | <b>17.000</b><br>0.6693    | <b>16.992</b><br>0.6690 | <b>23.000</b><br>0.9055 | <b>23.013</b><br>0.9060 | <b>23.000</b><br>0.9055 | <b>17.009</b><br>0.6696 | <b>17.035</b><br>0.6707 | <b>0.0341</b>  | <b>IM 13 17 12.4</b>   |                     |
| <b>0.014</b><br>0.031 | <b>18.000</b><br>0.7087    | <b>17.992</b><br>0.7083 | <b>24.000</b><br>0.9449 | <b>24.013</b><br>0.9454 | <b>24.000</b><br>0.9449 | <b>18.009</b><br>0.7090 | <b>18.035</b><br>0.7100 | <b>0.0357</b>  | <b>IM 13 18 12.4</b>   | <b>18</b>           |
| <b>0.014</b><br>0.031 | <b>18.000</b><br>0.7087    | <b>17.992</b><br>0.7083 | <b>24.000</b><br>0.9449 | <b>24.013</b><br>0.9454 | <b>24.000</b><br>0.9449 | <b>18.009</b><br>0.7090 | <b>18.035</b><br>0.7100 | <b>0.0357</b>  | <b>IM 13 18 12.4</b>   |                     |
| <b>0.019</b><br>0.042 | <b>18.000</b><br>0.7087    | <b>17.992</b><br>0.7083 | <b>24.000</b><br>0.9449 | <b>24.013</b><br>0.9454 | <b>24.000</b><br>0.9449 | <b>18.009</b><br>0.7090 | <b>18.035</b><br>0.7100 | <b>0.0399</b>  | <b>IM 13 18 16.4</b>   |                     |
| <b>0.019</b><br>0.042 | <b>18.000</b><br>0.7087    | <b>17.992</b><br>0.7083 | <b>24.000</b><br>0.9449 | <b>24.013</b><br>0.9454 | <b>24.000</b><br>0.9449 | <b>18.009</b><br>0.7090 | <b>18.035</b><br>0.7100 | <b>0.0399</b>  | <b>IM 13 18 16.4</b>   |                     |
| <b>0.015</b><br>0.033 | <b>20.000</b><br>0.7874    | <b>19.991</b><br>0.7870 | <b>26.000</b><br>1.0236 | <b>26.013</b><br>1.0241 | <b>26.000</b><br>1.0236 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0383</b>  | <b>IM 15 20 12.4</b>   | <b>20</b>           |
| <b>0.015</b><br>0.033 | <b>20.000</b><br>0.7874    | <b>19.991</b><br>0.7870 | <b>26.000</b><br>1.0236 | <b>26.013</b><br>1.0241 | <b>26.000</b><br>1.0236 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0383</b>  | <b>IM 15 20 12.4</b>   |                     |
| <b>0.020</b><br>0.044 | <b>20.000</b><br>0.7874    | <b>19.991</b><br>0.7870 | <b>26.000</b><br>1.0236 | <b>26.013</b><br>1.0241 | <b>26.000</b><br>1.0236 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0429</b>  | <b>IM 15 20 16.4</b>   |                     |
| <b>0.020</b><br>0.044 | <b>20.000</b><br>0.7874    | <b>19.991</b><br>0.7870 | <b>26.000</b><br>1.0236 | <b>26.013</b><br>1.0241 | <b>26.000</b><br>1.0236 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0429</b>  | <b>IM 15 20 16.4</b>   |                     |
| <b>0.022</b><br>0.049 | <b>22.000</b><br>0.8661    | <b>21.991</b><br>0.8658 | <b>28.000</b><br>1.1024 | <b>28.013</b><br>1.1029 | <b>28.000</b><br>1.1024 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0458</b>  | <b>IM 17 22 16.4</b>   | <b>22</b>           |
| <b>0.022</b><br>0.049 | <b>22.000</b><br>0.8661    | <b>21.991</b><br>0.8658 | <b>28.000</b><br>1.1024 | <b>28.013</b><br>1.1029 | <b>28.000</b><br>1.1024 | <b>20.009</b><br>0.7878 | <b>20.035</b><br>0.7888 | <b>0.0458</b>  | <b>IM 17 22 16.4</b>   |                     |

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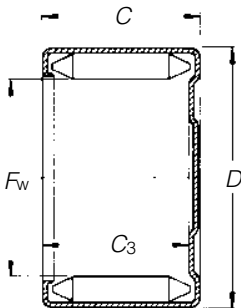


# NEEDLE ROLLER BEARINGS

**FULL  
COMPLEMENT  
OPEN ENDS,  
CLOSED ONE END  
METRIC SERIES**



DL



DLF

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                    | Bearing Designation | Load Ratings<br>kN/lbf. |        | Limiting Speed<br>Approx. |       | C <sub>g</sub> |
|------------------|-------------------|--------|-------|--------------------|---------------------|-------------------------|--------|---------------------------|-------|----------------|
|                  | F <sub>w</sub>    | D      | C     | C <sub>3 min</sub> |                     | Dynamic                 | Static | Grease                    | Oil   |                |
| 25               | 25                | 33     | 16    | -                  | DL 25 16            | 16.0                    | 32.5   | 7800                      | 12000 | 0.0348         |
|                  | 0.9843            | 1.2992 | 0.630 | -                  |                     | 3600                    | 7310   |                           |       |                |
|                  | 25                | 33     | 16    | 13.7               | DLF 25 16           | 16.0                    | 32.5   | 7800                      | 12000 | 0.0348         |
|                  | 0.9843            | 1.2992 | 0.630 | 0.539              |                     | 3600                    | 7310   |                           |       |                |
|                  | 25                | 33     | 20    | -                  | DL 25 20            | 22.8                    | 46.0   | 7800                      | 12000 | 0.0379         |
|                  | 0.9843            | 1.2992 | 0.787 | -                  |                     | 5130                    | 10300  |                           |       |                |
|                  | 25                | 33     | 20    | 17.7               | DLF 25 20           | 22.8                    | 46.0   | 7800                      | 12000 | 0.0379         |
|                  | 0.9843            | 1.2992 | 0.787 | 0.697              |                     | 5130                    | 10300  |                           |       |                |
| 28               | 28                | 36     | 20    | -                  | DL 28 20            | 24.5                    | 52.0   | 7200                      | 11000 | 0.0417         |
|                  | 1.1024            | 1.4173 | 0.787 | -                  | 24.5                | 5510                    | 11700  | 7200                      | 11000 | 0.0417         |
|                  | 30                | 30     | 38    | 16                 |                     | -                       | 21.7   |                           |       |                |
|                  | 1.1811            | 1.4961 | 0.630 | -                  | 21.7                | 4880                    | 10500  | 6500                      | 10000 | 0.0403         |
|                  | 30                | 38     | 20    | -                  |                     | 26.0                    | 56.0   |                           |       |                |
|                  | 1.1811            | 1.4961 | 0.787 | -                  | 26.0                | 5850                    | 12600  | 6500                      | 10000 | 0.0437         |
|                  | 30                | 38     | 20    | 17.7               |                     | 26.0                    | 56.0   |                           |       |                |
|                  | 1.1811            | 1.4961 | 0.787 | 0.697              | 26.0                | 5850                    | 12600  | 6500                      | 10000 | 0.0437         |
|                  | 30                | 38     | 25    | -                  |                     | 35.5                    | 76.0   |                           |       |                |
|                  | 1.1811            | 1.4961 | 0.984 | -                  | 35.5                | 7980                    | 17100  | 6500                      | 10000 | 0.0470         |
|                  | 35                | 35     | 16    | -                  |                     | 24.0                    | 54.0   |                           |       |                |
|                  | 1.3780            | 0.0000 | 0.630 | -                  | 24.0                | 5400                    | 12100  | 5500                      | 8500  | 0.0437         |
|                  | 35                | 43     | 20    | -                  |                     | 29.0                    | 65.0   |                           |       |                |
|                  | 1.3780            | 1.6929 | 0.787 | -                  | 29.0                | 6520                    | 14600  | 5500                      | 8500  | 0.0477         |
|                  | 35                | 43     | 20    | 17.7               |                     | 29.0                    | 65.0   |                           |       |                |
|                  | 1.3780            | 1.6929 | 0.787 | 0.697              | 29.0                | 6520                    | 14600  | 5500                      | 8500  | 0.0477         |
|                  | 40                | 40     | 48    | 16                 |                     | -                       | 26.5   |                           |       |                |
|                  | 1.5748            | 1.8898 | 0.630 | -                  | 26.5                | 5960                    | 13900  | 4900                      | 7500  | 0.0479         |
|                  | 40                | 48     | 20    | -                  |                     | 36.0                    | 84.0   |                           |       |                |
|                  | 1.5748            | 1.8898 | 0.787 | -                  | 36.0                | 8090                    | 18900  | 4900                      | 7500  | 0.0523         |
|                  | 40                | 48     | 20    | 17.7               |                     | 36.0                    | 84.0   |                           |       |                |
|                  | 1.5748            | 1.8898 | 0.787 | 0.697              | 36.0                | 8090                    | 18900  | 4900                      | 7500  | 0.0523         |
|                  | 44                | 44     | 52    | 16                 |                     | -                       | 23.8   |                           |       |                |
|                  | 1.7323            | 2.0472 | 0.630 | -                  | 23.8                | 5350                    | 12800  | 4400                      | 6800  | 0.0512         |
|                  | 47                | 47     | 55    | 16                 |                     | -                       | 25.0   |                           |       |                |
|                  | 1.8504            | 2.1654 | 0.630 | -                  | 25.0                | 5620                    | 13700  | 4200                      | 6400  | 0.0536         |
|                  | 50                | 50     | 58    | 12                 |                     | -                       | 20.0   |                           |       |                |
|                  | 1.9685            | 2.2835 | 0.472 | -                  | 20.0                | 4500                    | 11200  | 3900                      | 6000  | 0.0508         |
|                  | 50                | 58     | 18    | -                  |                     | 36.5                    | 92.0   |                           |       |                |
|                  | 1.9685            | 2.2835 | 0.709 | -                  | 36.5                | 8210                    | 20700  | 3900                      | 6000  | 0.0587         |
|                  | 50                | 58     | 20    | -                  |                     | 37.0                    | 93.0   |                           |       |                |
|                  | 1.9685            | 2.2835 | 0.787 | -                  | 37.0                | 8320                    | 20900  | 3900                      | 6000  | 0.0611         |
|                  | 50                | 58     | 20    | 17.7               |                     | 37.0                    | 93.0   |                           |       |                |
|                  | 1.9685            | 2.2835 | 0.787 | 0.697              | 37.0                | 8320                    | 20900  | 3900                      | 6000  | 0.0611         |
|                  | 55                | 55     | 63    | 20                 |                     | -                       | 39.5   |                           |       |                |
|                  | 2.1654            | 2.4803 | 0.787 | -                  | 39.5                | 8880                    | 22900  | 3600                      | 5500  | 0.0653         |

## Drawn Cup Needle Roller Bearings

| Wt.<br>kg/lbs.        | Mounting Dimensions mm/in. |                         |                         |                         | Ring Gage               | Plug Gage               |                         | C <sub>g</sub> | Matching<br>Inner Ring | Shaft<br>Dia.<br>mm |
|-----------------------|----------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------|------------------------|---------------------|
|                       | Max.                       | Min.                    | Min.                    | Max.                    |                         | Go                      | No-Go                   |                |                        |                     |
|                       | S                          |                         | H                       |                         |                         |                         |                         |                |                        |                     |
| <b>0.035</b><br>0.077 | <b>25.000</b><br>0.9843    | <b>24.991</b><br>0.9839 | <b>33.000</b><br>1.2992 | <b>33.016</b><br>1.2998 | <b>33.000</b><br>1.2992 | <b>22.009</b><br>0.8665 | <b>22.035</b><br>0.8675 | <b>0.0457</b>  | <b>IM 20 25 16.4</b>   | <b>25</b>           |
| <b>0.035</b><br>0.077 | <b>25.000</b><br>0.9843    | <b>24.991</b><br>0.9839 | <b>33.000</b><br>1.2992 | <b>33.016</b><br>1.2998 | <b>33.000</b><br>1.2992 | <b>22.009</b><br>0.8665 | <b>22.035</b><br>0.8675 | <b>0.0457</b>  | <b>IM 20 25 16.4</b>   |                     |
| <b>0.043</b><br>0.095 | <b>25.000</b><br>0.9843    | <b>24.991</b><br>0.9839 | <b>33.000</b><br>1.2992 | <b>33.016</b><br>1.2998 | <b>33.000</b><br>1.2992 | <b>25.015</b><br>0.9848 | <b>25.041</b><br>0.9859 | <b>0.0497</b>  | <b>IM 20 25 20.4</b>   |                     |
| <b>0.043</b><br>0.095 | <b>25.000</b><br>0.9843    | <b>24.991</b><br>0.9839 | <b>33.000</b><br>1.2992 | <b>33.016</b><br>1.2998 | <b>33.000</b><br>1.2992 | <b>25.015</b><br>0.9848 | <b>25.041</b><br>0.9859 | <b>0.0497</b>  | <b>IM 20 25 20.4</b>   |                     |
| <b>0.047</b><br>0.104 | <b>28.000</b><br>1.1024    | <b>27.991</b><br>1.1020 | <b>36.000</b><br>1.4173 | <b>36.016</b><br>1.4180 | <b>36.000</b><br>1.4173 | <b>28.015</b><br>1.1030 | <b>28.041</b><br>1.1040 | <b>0.0547</b>  | <b>IM 23 28 20.4</b>   | <b>28</b>           |
| <b>0.040</b><br>0.088 | <b>30.000</b><br>1.1811    | <b>29.991</b><br>1.1807 | <b>38.000</b><br>1.4961 | <b>38.016</b><br>1.4967 | <b>38.000</b><br>1.4961 | <b>30.015</b><br>1.1817 | <b>30.041</b><br>1.1827 | <b>0.0529</b>  | <b>IM 25 30 16.4</b>   | <b>30</b>           |
| <b>0.050</b><br>0.110 | <b>30.000</b><br>1.1811    | <b>29.991</b><br>1.1807 | <b>38.000</b><br>1.4961 | <b>38.016</b><br>1.4967 | <b>38.000</b><br>1.4961 | <b>30.015</b><br>1.1817 | <b>30.041</b><br>1.1827 | <b>0.0573</b>  | <b>IM 25 30 20.4</b>   |                     |
| <b>0.050</b><br>0.110 | <b>30.000</b><br>1.1811    | <b>29.991</b><br>1.1807 | <b>38.000</b><br>1.4961 | <b>38.016</b><br>1.4967 | <b>38.000</b><br>1.4961 | <b>30.015</b><br>1.1817 | <b>30.041</b><br>1.1827 | <b>0.0573</b>  | <b>IM 25 30 20.4</b>   |                     |
| <b>0.063</b><br>0.139 | <b>30.000</b><br>1.1811    | <b>29.991</b><br>1.1807 | <b>38.000</b><br>1.4961 | <b>38.016</b><br>1.4967 | <b>38.000</b><br>1.4961 | <b>30.015</b><br>1.1817 | <b>30.041</b><br>1.1827 | <b>0.0617</b>  | <b>IM 25 30 25</b>     |                     |
| <b>0.046</b><br>0.101 | <b>35.000</b><br>1.3780    | <b>34.989</b><br>1.3775 | <b>0.000</b><br>0.0000  | <b>#N/A</b><br>#N/A     | <b>43.000</b><br>1.6929 | <b>35.015</b><br>1.3785 | <b>35.041</b><br>1.3796 | <b>0.0573</b>  | <b>IM 30 35 16.4</b>   | <b>35</b>           |
| <b>0.057</b><br>0.126 | <b>35.000</b><br>1.3780    | <b>34.989</b><br>1.3775 | <b>43.000</b><br>1.6929 | <b>43.016</b><br>1.6935 | <b>43.000</b><br>1.6929 | <b>35.015</b><br>1.3785 | <b>35.041</b><br>1.3796 | <b>0.0626</b>  | <b>IM 30 35 20.4</b>   |                     |
| <b>0.057</b><br>0.126 | <b>35.000</b><br>1.3780    | <b>34.989</b><br>1.3775 | <b>43.000</b><br>1.6929 | <b>43.016</b><br>1.6935 | <b>43.000</b><br>1.6929 | <b>35.015</b><br>1.3785 | <b>35.041</b><br>1.3796 | <b>0.0626</b>  | <b>IM 30 35 20.4</b>   |                     |
| <b>0.051</b><br>0.112 | <b>40.000</b><br>1.5748    | <b>39.989</b><br>1.5744 | <b>48.000</b><br>1.8898 | <b>48.016</b><br>1.8904 | <b>48.000</b><br>1.8898 | <b>40.015</b><br>1.5754 | <b>40.041</b><br>1.5764 | <b>0.0628</b>  | <b>IM 35 40 16.4</b>   | <b>40</b>           |
| <b>0.064</b><br>0.141 | <b>40.000</b><br>1.5748    | <b>39.989</b><br>1.5744 | <b>48.000</b><br>1.8898 | <b>48.016</b><br>1.8904 | <b>48.000</b><br>1.8898 | <b>40.015</b><br>1.5754 | <b>40.041</b><br>1.5764 | <b>0.0686</b>  | <b>IM 35 40 20.4</b>   |                     |
| <b>0.064</b><br>0.141 | <b>40.000</b><br>1.5748    | <b>39.989</b><br>1.5744 | <b>48.000</b><br>1.8898 | <b>48.016</b><br>1.8904 | <b>48.000</b><br>1.8898 | <b>40.015</b><br>1.5754 | <b>40.041</b><br>1.5764 | <b>0.0686</b>  | <b>IM 35 40 20.4</b>   |                     |
| <b>0.056</b><br>0.123 | <b>44.000</b><br>1.7323    | <b>43.989</b><br>1.7319 | <b>52.000</b><br>2.0472 | <b>52.019</b><br>2.0480 | <b>52.000</b><br>2.0472 | <b>44.015</b><br>1.7329 | <b>44.041</b><br>1.7339 | <b>0.0672</b>  | <b>IM 40 44 16.4</b>   | <b>44</b>           |
| <b>0.060</b><br>0.132 | <b>47.000</b><br>1.8504    | <b>46.989</b><br>1.8500 | <b>55.000</b><br>2.1654 | <b>55.019</b><br>2.1661 | <b>55.000</b><br>2.1654 | <b>47.015</b><br>1.8510 | <b>47.041</b><br>1.8520 | <b>0.0703</b>  | <b>IM 40 44 16.4</b>   | <b>47</b>           |
| <b>0.047</b><br>0.104 | <b>50.000</b><br>1.9685    | <b>49.989</b><br>1.9681 | <b>58.000</b><br>2.2835 | <b>58.019</b><br>2.2842 | <b>58.000</b><br>2.2835 | <b>50.015</b><br>1.9691 | <b>50.041</b><br>1.9701 |                |                        | <b>50</b>           |
| <b>0.071</b><br>0.157 | <b>50.000</b><br>1.9685    | <b>49.989</b><br>1.9681 | <b>58.000</b><br>2.2835 | <b>58.019</b><br>2.2842 | <b>58.000</b><br>2.2835 | <b>50.015</b><br>1.9691 | <b>50.041</b><br>1.9701 |                |                        |                     |
| <b>0.077</b><br>0.170 | <b>50.000</b><br>1.9685    | <b>49.989</b><br>1.9681 | <b>58.000</b><br>2.2835 | <b>58.019</b><br>2.2842 | <b>58.000</b><br>2.2835 | <b>50.015</b><br>1.9691 | <b>50.041</b><br>1.9701 | <b>0.0802</b>  | <b>IM 45 50 20.4</b>   |                     |
| <b>0.077</b><br>0.170 | <b>50.000</b><br>1.9685    | <b>49.989</b><br>1.9681 | <b>58.000</b><br>2.2835 | <b>58.019</b><br>2.2842 | <b>58.000</b><br>2.2835 | <b>50.015</b><br>1.9691 | <b>50.041</b><br>1.9701 | <b>0.0802</b>  | <b>IM 45 50 20.4</b>   |                     |
| <b>0.086</b><br>0.190 | <b>55.000</b><br>2.1654    | <b>54.987</b><br>2.1648 | <b>63.000</b><br>2.4803 | <b>63.019</b><br>2.4811 | <b>63.000</b><br>2.4803 | <b>55.015</b><br>2.1659 | <b>55.041</b><br>2.1670 | <b>0.0857</b>  | <b>IM 50 55 20.4</b>   | <b>55</b>           |





## NEEDLE ROLLER BEARINGS

### DRAWN CUP NEEDLE ROLLER BEARINGS –

#### INCH SERIES

When a rolling bearing is needed for a compact and economical design where it is not practical to harden and grind the housing bore, or where the housing materials are of low rigidity such as cast iron, aluminum or even plastics, drawn cup needle roller bearings should be considered.

#### REFERENCE STANDARDS

- **ANSI/ABMA 18.2** - Needle roller bearings - Radial, inch design.

Before selecting specific inch series drawn cup needle roller bearings, the engineering section of this catalog should be reviewed.

#### TYPES OF INCH SERIES DRAWN CUP NEEDLE ROLLER BEARINGS



**B**

Full complement bearings



**M**



**J**

Caged bearings



**JTT**

#### IDENTIFICATION

The prefix letter or letters in inch series drawn cup bearing designation denote whether the bearings are made with a full complement of needle rollers or caged needle rollers. The use of full complement of needle rollers is indicated by the prefix code letter B and for use of caged needle rollers by the prefix code letter J.

Inch bearings are available in either of two radial cross-sections. The larger cross-section is indicated by the prefix code letter H. Absence of the letter H indicates the smaller radial cross section.

These major features of dimension and construction are summarized in Table 1.

In addition, there can be other identifying letters which cover special modification. Please consult your Timken representative when special modifications are required.

Since the entire identification code in the bearing designation may not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for service or field replacement to make certain that the correct bearing with the correct lubricant is used.

TABLE 1 – IDENTIFYING LETTERS – INCH SERIES

|                                         | Prefix letters in Bearing Designation |               |
|-----------------------------------------|---------------------------------------|---------------|
|                                         | Smaller Roller                        | Larger Roller |
| Full complement (mechanically retained) | B                                     | BH            |
| Caged                                   | J                                     | JH            |

Other prefix letters denoting major construction features are:

- M – closed end style
- P – open end (finger)cage
- T – single seal
- TT – double seal
- G – extra-precision

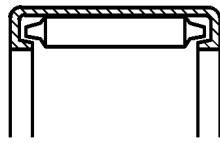
#### CONSTRUCTION

##### FULL COMPLEMENT BEARINGS

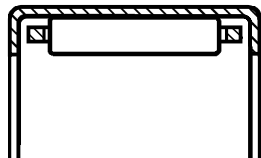
The original drawn cup needle roller bearing employs a full complement of needle rollers. The full complement drawn cup bearing combines maximum load carrying capability and low cost with the advantages of the drawn outer ring.

The inward turned lips of the cup are used to mechanically

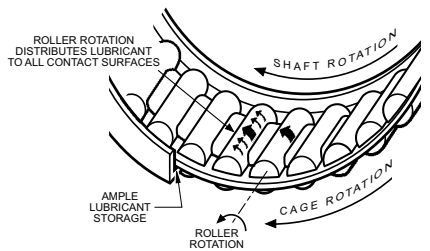
retain the full complement of needle rollers, providing their positive radial retention even though it may be necessary to remove the shaft repeatedly during servicing of the mechanism employing the bearing.



Full Complement Bearing



Caged Bearing



### CAGED BEARINGS

The one-piece steel cage, used in most Timken® Torrington® caged drawn cup bearings, is designed to provide rigidity and minimize wear. This cage design separates the roller guiding and roller retention functions. The portions of the cage that retain the rollers cannot contact the rollers while the bearing is operating. Thus, there is no wear which might affect roller retention.

The cage contacts the rollers only near their ends at the roller pitch line, so accurate guidance is achieved with least effort. Pitch line guidance at the ends of the rollers prevents skewing and assures roller stability, with little stress on the cage itself. The design minimizes the contact area and force required for roller guidance, and thus minimizes drag between cage and rollers.

The same design feature which assures no contact between roller retention bars and rollers while the bearing is operating also provides ample clearance along the length of the roller to enhance the circulation of lubricant.

Timken also has available bearings with other cage designs. Bearings with engineered polymer cages are for use where operating conditions permit. Before applying bearings with engineered polymer cages, please consult your Timken representative.

### SEALED BEARINGS

Drawn cup caged needle roller bearings are offered with integral seals. The tables of dimensions on pages C90-C91 indicate those sizes available with lip contact seals which limit the bearing operating temperature between -25° F and 225° F. The seal lip design achieves a light and constant contact with the shaft throughout the range of mounting bearing clearances thereby ensuring positive sealing and low frictional drag.

Sealed drawn cup bearings are intended to retain grease or non-pressurized oil within a bearing while also preventing contaminants from entering the raceway area.

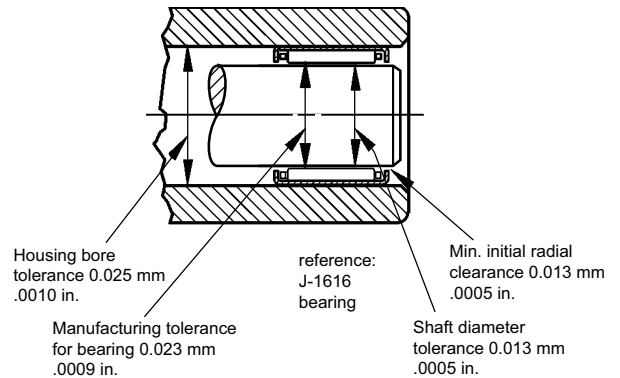
Details of shaft design for sealed bearings are given in the engineering section.

The standard lip contact seals are compatible with common lubricating oils and petroleum based fuels, but they are adversely affected by certain fire-resistant hydraulic fluids and most common solvents.

If the operating temperature must be outside of the specified range, or if the seals are exposed to unusual fluids, please consult your Timken representative.

## DIMENSIONAL ACCURACY AND MOUNTING DIMENSIONS

### MANUFACTURING TOLERANCES AND RESULTING CLEARANCES



### BEARING MOUNTING FITS AND RADIAL INTERNAL CLEARANCE

Drawn cup bearings are manufactured to a degree of precision that will satisfy the radial clearance requirements of most applications. The total radial clearance of an installed drawn cup bearing results from the build up of manufacturing tolerances of the housing bore, inner raceway O.D. and the bearing, as well as the minimum radial clearance required for the application.

For bearings of nominal inch dimensions, the suggested mounting dimensions will provide correct running clearance for most applications. Closer control of radial clearance would be governed by the user's capability of holding housing and shaft raceway dimensional tolerances tighter than the limits shown on the tabular pages.

The drawing illustrates the manufacturing tolerances and resulting clearances applying to medium size drawn cup bearings in rotating applications when using the suggested tabulated mounting dimensions.

Radial clearance in a mounted bearing may be more closely controlled by reducing the manufacturing tolerances of the housing bore and inner raceway diameter. Where extremely close control of radial clearance is required for bearings of nominal inch dimensions, extra-precision full complement bearings are available (see page C80).





## NEEDLE ROLLER BEARINGS

### TOLERANCES FOR HOUSING MATERIALS OF LOW RIGIDITY

For housing materials of low rigidity, or steel housings of small section, it is suggested that for initial trial the housing bore diameters given in the tabular pages be reduced by the amounts shown in Table 3. To maintain normal radial internal clearance, the inner raceway diameter tolerance given in the tabular pages should be used.

TABLE 3 –  
LOW RIGIDITY HOUSING BORE

| Nom. Housing Bore<br>inch |       |      |       | Subtract<br>inch |       |
|---------------------------|-------|------|-------|------------------|-------|
| mm                        |       | inch |       | mm               | inch  |
| over                      | incl. | over | incl. |                  |       |
| 0                         | 9.5   | 0    | .38   | .010             | .0004 |
| 9.5                       | 25.4  | .38  | 1.00  | .015             | .0006 |
| 25.4                      | 50.8  | 1.00 | 2.00  | .025             | .0010 |
| 50.8                      | 76.2  | 2.00 | 3.00  | .030             | .0012 |
| 76.2                      | 152.4 | 3.00 | 6.00  | .036             | .0014 |

### OUTER RING ROTATION

For applications where the outer ring rotates with respect to the load, it is suggested that both the housing bore and inner raceway diameter be reduced. Bearings of nominal inch dimensions should have the housing bore and inner raceway diameters reduced by .0005 in.

### OSCILLATING MOTION

Applications involving oscillating motion often require reduced radial clearances. This reduction is accomplished by increasing the shaft raceway diameters as shown in Table 4.

TABLE 4 –  
NOMINAL INCH BEARING OSCILLATING SHAFT SIZE

| Shaft Size    |              | Add  |       |
|---------------|--------------|------|-------|
| mm            | inch         | mm   | inch  |
| 2.38 to 4.76  | .094 to .188 | .008 | .0003 |
| 6.35 to 47.62 | .25 to 1.875 | .013 | .0005 |
| 50.8 to 139.7 | 2 to 5.5     | .015 | .0006 |

### INNER RINGS

Where it becomes impractical to meet the shaft raceway design requirements (hardness, case depth, surface finish, etc.) outlined in the general engineering section, standard inner rings for drawn cup bearings are available. These are tabulated on pages C92 of the drawn cup section.

Inner rings for drawn cup bearings are designed to be a loose transition fit on the shaft and should be clamped against a shoulder. If a tight transition fit must be used to keep the inner ring from rotating relative to the shaft, the inner ring O.D., as mounted, must not exceed the raceway diameters required by the drawn cup bearing for the particular application. See the previous discussion on internal clearances and fits for further details on inner raceway diameter choice.

### LUBRICATION

Inch series drawn cup bearings can be furnished with an oil hole (centered in the drawn cup) to facilitate relubrication. If desired, specify on order by adding an -OH suffix to the bearing designation.

### LOAD RATING FACTORS DYNAMIC LOADS

Drawn cup needle roller bearings can accommodate only radial loads.

$$P = F_r$$

P = The maximum dynamic radial load that may be applied to a drawn cup bearing based on the dynamic load rating, C given in the tabular pages. This load should be  $\leq C/3$ .

### STATIC LOADS

$$f_0 = \frac{C_0}{P_0}$$

$f_0$  – static load safety factor

$C_0$  – basic static load rating

$P_0$  – maximum applied static load

To ensure satisfactory operation of drawn cup needle roller bearings under all types of conditions the static load safety factor  $f_0$  should be  $\geq 3$ .

### ADJUSTED RATING LIFE

When application data includes details of operating temperature, oil viscosity, operating speed and the applied load meets the  $\leq C/3$  condition adjusted rating life may be evaluated using the information given in the engineering section.

**INSPECTION PROCEDURES**

Although the bearing cup (outer ring) is accurately drawn from strip steel it may go out of round during heat treatment. When the bearing is pressed into a true, round housing or ring gage of correct size and wall thickness, it becomes round and is sized properly. For this reason, it is incorrect to inspect an unmounted drawn cup bearing by measuring the O.D. The correct method for inspecting the bearing size is to:

1. press the bearing into a ring gage of proper size.
2. plug the bearing bore with the appropriate "go" and "no go" gages.

Table 2 provides the correct ring and plug gage diameters for inspecting Torrington drawn cup needle roller bearings. When the letter H appears in the columns headed "Bearing Bore Designation" and "Nominal Shaft Diameter", the gage sizes listed are for the larger cross section bearings which include H in their bearing designation prefix.

**EXAMPLE**

Find the ring gage and plug gage dimensions for a BH-68 bearing.

The nominal bore diameter ( $F_w$ ) for this bearing, as shown in the table of dimensions on this page, is .3750". Since the letter H appears in the bearing designation, the following information will be found opposite H6 .3750" in Table 2.

|                                     | inch  |
|-------------------------------------|-------|
| ring gage                           | .6255 |
| diameter under needle rollers, min. | .3765 |
| diameter under needle rollers, max. | .3774 |

The "go" plug gage is the same size as the minimum needle roller complement bore diameter and the "no go" plug gage size is .0001" larger than the maximum bore diameter. Therefore the correct ring and plug gage dimensions are:

|                    | inch  |
|--------------------|-------|
| ring gage          | .6255 |
| plug gage, "go"    | .3765 |
| plug gage, "no go" | .3775 |

These same gage dimensions also apply to JH-68.

**TABLE 2 – INCH SERIES BEARINGS**

| Bearing Bore Designation | Nominal Shaft Diameter | Nominal Bore Diameter | Ring Gage | Dimensions - inch                      |        |
|--------------------------|------------------------|-----------------------|-----------|----------------------------------------|--------|
|                          |                        |                       |           | Needle Roller Complement Bore Diameter |        |
| inch                     |                        |                       |           | min.                                   | max.   |
| 2                        | 1/8                    | .1250                 | .2505     | .1258                                  | .1267  |
| 2 1/2                    | 5/32                   | .1562                 | .2817     | .1571                                  | .1580  |
| 3                        | 3/16                   | .1875                 | .3437     | .1883                                  | .1892  |
| 4                        | 1/4                    | .2500                 | .4380     | .2515                                  | .2524  |
| 5                        | 5/16                   | .3125                 | .5005     | .3140                                  | .3149  |
| H 5                      | H 5/16                 | .3125                 | .5630     | .3140                                  | .3149  |
| 6                        | 3/8                    | .3750                 | .5630     | .3765                                  | .3774  |
| H 6                      | H 3/8                  | .3750                 | .6255     | .3765                                  | .3774  |
| 7                        | 7/16                   | .4375                 | .6255     | .4390                                  | .4399  |
| H 7                      | H 7/16                 | .4375                 | .6880     | .4390                                  | .4399  |
| 8                        | 1/2                    | .5000                 | .6880     | .5015                                  | .5024  |
| H 8                      | H 1/2                  | .5000                 | .7505     | .5015                                  | .5024  |
| 9                        | 9/16                   | .5625                 | .7505     | .5640                                  | .5649  |
| H 9                      | H 9/16                 | .5625                 | .8130     | .5640                                  | .5649  |
| 10                       | 5/8                    | .6250                 | .8130     | .6265                                  | .6274  |
| H10                      | H 5/8                  | .6250                 | .8755     | .6265                                  | .6274  |
| 11                       | 11/16                  | .6875                 | .8755     | .6890                                  | .6899  |
| H11                      | H 11/16                | .6875                 | .9380     | .6890                                  | .6899  |
| 12                       | 3/4                    | .7500                 | .9995     | .7505                                  | .7514  |
| H12                      | H 3/4                  | .7500                 | 1.0620    | .7505                                  | .7514  |
| 13                       | 13/16                  | .8125                 | 1.0620    | .8130                                  | .8139  |
| H13                      | H 13/16                | .8125                 | 1.1245    | .8130                                  | .8139  |
| 14                       | 7/8                    | .8750                 | 1.1245    | .8755                                  | .8764  |
| H14                      | H 7/8                  | .8750                 | 1.1870    | .8755                                  | .8764  |
| 15                       | 15/16                  | .9375                 | 1.1870    | .9380                                  | .9389  |
| 16                       | 1                      | 1.0000                | 1.2495    | 1.0005                                 | 1.0014 |
| H16                      | H 1                    | 1.0000                | 1.3120    | 1.0005                                 | 1.0014 |
| 17                       | 1 1/16                 | 1.0625                | 1.3120    | 1.0630                                 | 1.0639 |
| 18                       | 1 1/8                  | 1.1250                | 1.3745    | 1.1255                                 | 1.1264 |
| H18                      | H 1 1/8                | 1.1250                | 1.4995    | 1.1255                                 | 1.1264 |
| 19                       | 1 3/16                 | 1.1875                | 1.4995    | 1.1880                                 | 1.1889 |
| 20                       | 1 1/4                  | 1.2500                | 1.4995    | 1.2505                                 | 1.2514 |
| H20                      | H 1 1/4                | 1.2500                | 1.6245    | 1.2505                                 | 1.2514 |
| 21                       | 1 5/16                 | 1.3125                | 1.6245    | 1.3130                                 | 1.3140 |
| 22                       | 1 3/8                  | 1.3750                | 1.6245    | 1.3755                                 | 1.3765 |
| H22                      | H 1 3/8                | 1.3750                | 1.7495    | 1.3755                                 | 1.3765 |
| 24                       | 1 1/2                  | 1.5000                | 1.8745    | 1.5005                                 | 1.5016 |
| 26                       | 1 5/8                  | 1.6250                | 1.9995    | 1.6255                                 | 1.6266 |
| 28                       | 1 3/4                  | 1.7500                | 2.1245    | 1.7505                                 | 1.7517 |
| 30                       | 1 7/8                  | 1.8750                | 2.2495    | 1.8755                                 | 1.8767 |
| 32                       | 2                      | 2.0000                | 2.3745    | 2.0006                                 | 2.0018 |
| H33                      | H 2 1/16               | 2.0625                | 2.5307    | 2.0630                                 | 2.0644 |
| 34                       | 2 1/8                  | 2.1250                | 2.4995    | 2.1256                                 | 2.1270 |
| 36                       | 2 1/4                  | 2.2500                | 2.6245    | 2.2506                                 | 2.2520 |
| 42                       | 2 5/8                  | 2.6250                | 2.9995    | 2.6260                                 | 2.6274 |
| 44                       | 2 3/4                  | 2.7500                | 3.1245    | 2.7510                                 | 2.7524 |
| 56                       | 3 1/2                  | 3.5000                | 3.9995    | 3.5010                                 | 3.5024 |
| 88                       | 5 1/2                  | 5.5000                | 5.9990    | 5.5010                                 | 5.5029 |

Bearing bore should be checked with "go" and "no go" plug gages. The "go" gage size is the minimum needle roller complement bore diameter. The "no go" gage size is larger than the maximum needle roller complement bore diameter by 0.0001".



## NEEDLE ROLLER BEARINGS

### INSTALLATION OF DRAWN CUP BEARINGS

#### GENERAL INSTALLATION REQUIREMENTS

- A drawn cup bearing must be pressed into its housing.
- An installation tool, similar to the ones shown, must be used in conjunction with a standard press.
- The bearing must not be hammered into its housing, even in conjunction with the proper assembly mandrel.
- The bearing must not be pressed tightly against a shoulder in the housing.
- If it is necessary to use a shouldered housing, the depth of the housing bore must be sufficient to ensure the housing shoulder fillet, as well as the shoulder face, clears the bearing.
- The installation tool must be coaxial with the housing bore.

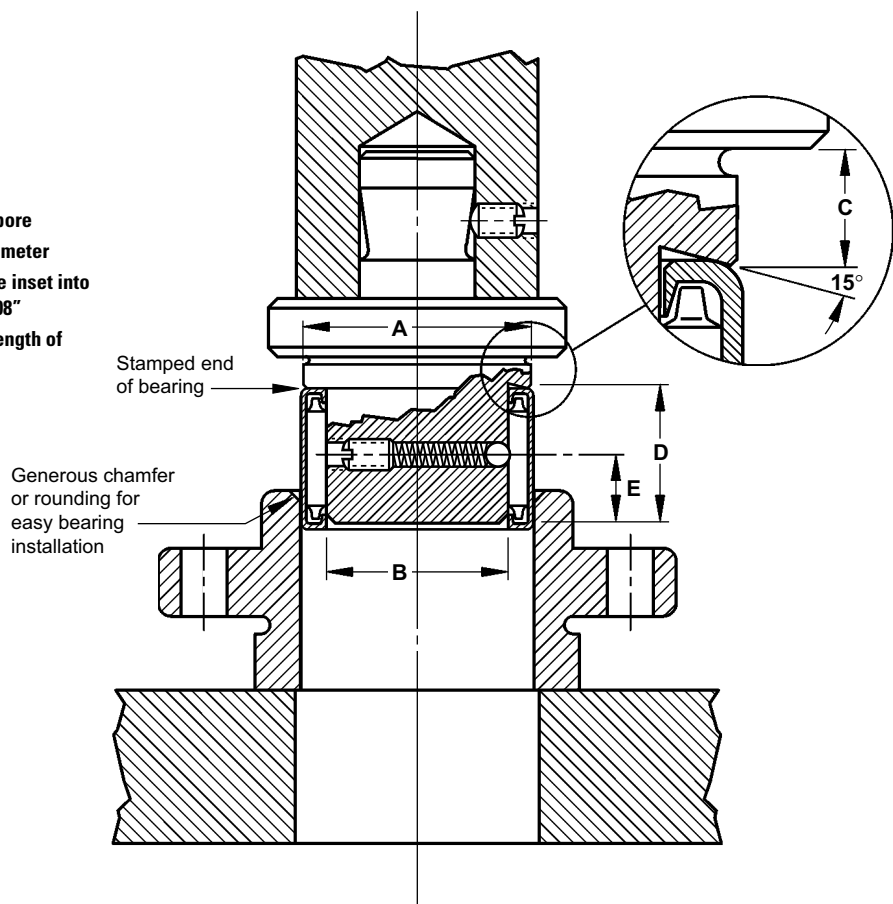
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### INSTALLATION OF OPEN END BEARINGS

It is advisable to utilize a positive stop on the press tool to locate the bearing properly in the housing. The assembly tool should have a leader or a pilot, as shown, to aid in starting the bearing true in the housing. The ball detent shown on the drawing is used to assist in aligning the rollers of a full complement bearing during installation and to hold the bearing on the installation tool. A caged type drawn cup bearing does not require a ball detent to align its rollers. The

ball detent may still be used to hold the bearing on the installation tool or an "O" ring may be used as shown in the drawing on page C41. The bearing should be installed with the marked end (the end with identification markings) against the angled shoulder of the pressing tool.

- A –  $\frac{1}{64}$ " less than housing bore
- B – .003" less than shaft diameter
- C – distance bearing will be inset into housing, minimum of .008"
- D – pilot length should be length of bearing less  $\frac{1}{32}$ "
- E – approximately  $\frac{1}{2}$  D

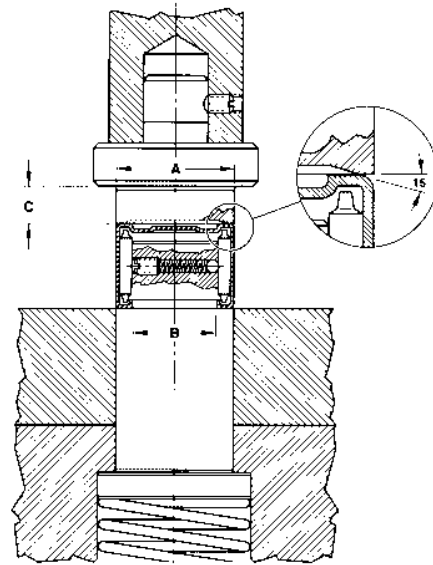


### INSTALLATION OF CLOSED END BEARINGS

The installation tool combines all the features of the tool used to install open end bearings, but the pilot is spring loaded and is part of the press bed.

The angled shoulder of the pressing tool should bear against the closed end with the bearing held on the pilot to aid in starting the bearing true in the housing.

- A** –  $\frac{1}{64}$ " less than housing bore
- B** – .003" less than shaft diameter
- C** – distance bearing will be inset into housing, minimum of .008"

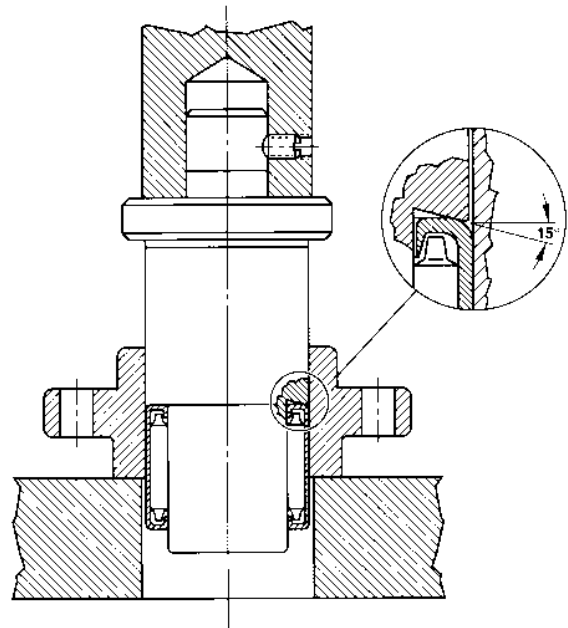


### EXTRACTION OF DRAWN CUP BEARINGS

The need to extract a drawn cup bearing does not arise often. Standard extractor tools may be purchased from a reputable manufacturer. Customers may produce the special extraction tools at their own facilities. In certain cases, The Timken Company may assist, particularly when a drawn cup bearing appears to be damaged and a full analysis is required. After extraction, the drawn cup bearing should not be reused.

#### EXTRACTION FROM A STRAIGHT HOUSING

When it is necessary to extract a drawn cup bearing from a straight housing, a similar tool to the installation tool, but without the stop, may be used. To avoid damage to the bearing, pressure should be applied against the marked end of the bearing, just as it is done at installation.

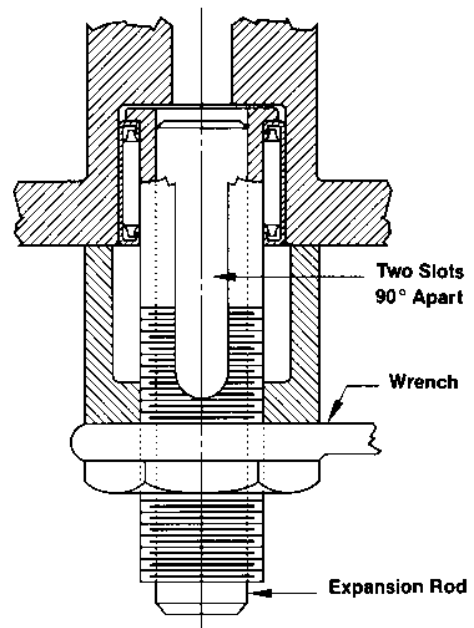




## NEEDLE ROLLER BEARINGS

### EXTRACTION FROM A SHOULDERED OR DEAD END HOUSING (with space between the bearing and the housing shoulder)

Bearings may be extracted from shouldered or dead end housings with a common bearing puller tool as shown. This type of tool is slotted in two places at right angles to form four prongs. The four puller prongs are pressed together and inserted into the space between the end of the bearing and the shoulder. The prongs are forced outward by inserting the expansion rod, and then the bearing is extracted. Do not reuse the bearing after extraction.



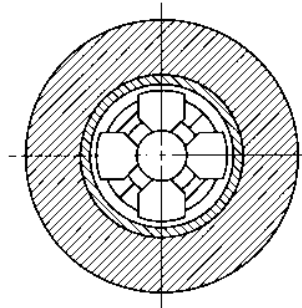
C



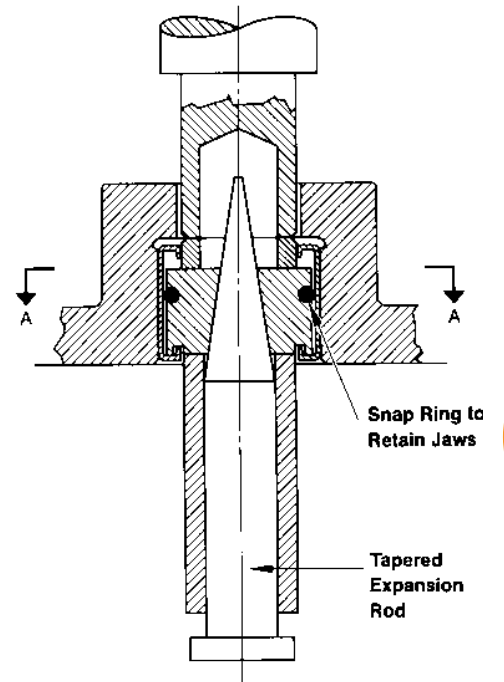
**EXTRACTION FROM A SHOULDERED HOUSING (with bearing pressed up close to the shoulder)**

The tool to be used, as shown, is of a similar type described for a shouldered or dead end housing, but the rollers must first be removed from the bearing.

The four segment puller jaws are collapsed and slipped into the empty cup. The jaws are then forced outward into the cup bore by means of the tapered expansion rod. The jaws should bear on the lip as near as possible to the cup bore. The cup is then pressed out from the top.



Section A-A of Four Jaws

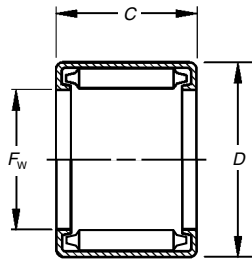




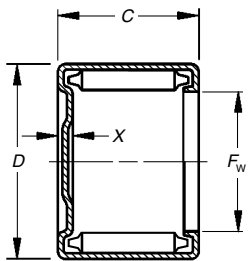
# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END

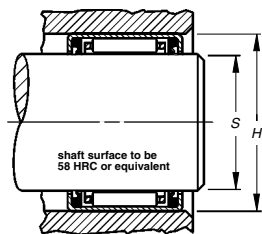
### INCH SERIES



**B, BH**



**M-1, MH-1**



**Full Complement Bearing**

Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |        |       |      | Bearing Designation |        | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|--------|-------|------|---------------------|--------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D      | C     | Y    |                     |        | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
| 1/8               | 3.175                                         | 6.350  | 6.35  | —    | B-24                | —      | 1.73                    | 1.65                     | 8100           | 13000      | 0.0081         |
|                   | 0.1250                                        | 0.2500 | 0.250 |      |                     |        | 390                     | 370                      |                |            |                |
| 5/32              | 3.970                                         | 7.142  | 6.35  | —    | B-2-1/2-4           | —      | 2.00                    | 2.00                     | 7000           | 11000      | 0.0093         |
|                   | 0.1563                                        | 0.2812 | 0.250 |      |                     |        | 450                     | 450                      |                |            |                |
|                   | 3.970                                         | 7.142  | 7.92  | —    | B-2-1/2-5           | —      | 2.58                    | 2.80                     | 7000           | 11000      | 0.0101         |
|                   | 0.1563                                        | 0.2812 | 0.312 |      |                     |        | 580                     | 630                      |                |            |                |
| 3/16              | 4.763                                         | 8.733  | 6.35  | 1.78 | B-34                | M-341  | 2.22                    | 2.14                     | 7000           | 11000      | 0.0099         |
|                   | 0.1875                                        | 0.3438 | 0.250 | 0.07 |                     |        | 500                     | 480                      |                |            |                |
|                   | 4.763                                         | 8.733  | 9.53  | 1.78 | B-36                | M-361  | 3.78                    | 4.23                     | 7000           | 11000      | 0.0118         |
|                   | 0.1875                                        | 0.3438 | 0.375 | 0.07 |                     |        | 850                     | 950                      |                |            |                |
| 1/4               | 6.350                                         | 11.113 | 6.35  | 2.03 | B-44                | M-441  | 2.76                    | 2.62                     | 6500           | 10000      | 0.0115         |
|                   | 0.2500                                        | 0.4375 | 0.250 | 0.08 |                     |        | 620                     | 590                      |                |            |                |
|                   | 6.350                                         | 11.113 | 7.92  | 2.03 | B-45                | M-451  | 3.56                    | 3.69                     | 6500           | 10000      | 0.0125         |
|                   | 0.2500                                        | 0.4375 | 0.312 | 0.08 |                     |        | 800                     | 830                      |                |            |                |
|                   | 6.350                                         | 11.113 | 9.53  | —    | B-46                | —      | 4.54                    | 5.03                     | 6500           | 10000      | N/A            |
|                   | 0.2500                                        | 0.4375 | 0.375 |      |                     |        | 1020                    | 1130                     |                |            |                |
|                   | 6.350                                         | 11.113 | 11.13 | 2.03 | B-47                | M-471  | 5.52                    | 6.45                     | 6500           | 10000      | 0.0143         |
|                   | 0.2500                                        | 0.4375 | 0.438 | 0.08 |                     |        | 1240                    | 1450                     |                |            |                |
| 5/16              | 7.938                                         | 12.700 | 7.92  | 2.03 | B-55                | M-551  | 4.09                    | 4.58                     | 5400           | 8300       | 0.0144         |
|                   | 0.3125                                        | 0.5000 | 0.312 | 0.08 |                     |        | 920                     | 1030                     |                |            |                |
|                   | 7.938                                         | 12.700 | 9.53  | —    | B-56                | —      | 5.25                    | 6.32                     | 5400           | 8300       | 0.0156         |
|                   | 0.3125                                        | 0.5000 | 0.375 |      |                     |        | 1180                    | 1420                     |                |            |                |
|                   | 7.938                                         | 12.700 | 11.13 | 2.03 | B-57                | M-571  | 6.32                    | 8.1                      | 5400           | 8300       | 0.0165         |
|                   | 0.3125                                        | 0.5000 | 0.438 | 0.08 |                     |        | 1420                    | 1820                     |                |            |                |
|                   | 7.938                                         | 12.700 | 14.27 | —    | B-59                | —      | 8.36                    | 11.60                    | 5400           | 8300       | 0.0181         |
|                   | 0.3125                                        | 0.5000 | 0.562 |      |                     |        | 1880                    | 2600                     |                |            |                |
|                   | 7.938                                         | 14.288 | 11.13 | 2.29 | BH-57               | MH-571 | 7.03                    | 7.34                     | 7500           | 12000      | 0.0156         |
|                   | 0.3125                                        | 0.5625 | 0.438 | 0.09 |                     |        | 1580                    | 1650                     |                |            |                |
|                   | 7.938                                         | 14.288 | 14.27 | —    | BH-59               | —      | 9.47                    | 10.80                    | 7500           | 12000      | 0.0171         |
|                   | 0.3125                                        | 0.5625 | 0.562 |      |                     |        | 2130                    | 2420                     |                |            |                |
| 3/8               | 9.525                                         | 14.288 | 7.92  | 2.03 | B-65                | M-651  | 4.54                    | 5.52                     | 4600           | 7100       | 0.0162         |
|                   | 0.3750                                        | 0.5625 | 0.312 | 0.08 |                     |        | 1020                    | 1240                     |                |            |                |
|                   | 9.525                                         | 14.288 | 9.53  | 2.03 | B-66                | M-661  | 5.83                    | 7.61                     | 4600           | 7100       | 0.0175         |
|                   | 0.3750                                        | 0.5625 | 0.375 | 0.08 |                     |        | 1310                    | 1710                     |                |            |                |
|                   | 9.525                                         | 14.288 | 11.13 | —    | B-67                | —      | 7.07                    | 9.7                      | 4600           | 7100       | 0.0186         |
|                   | 0.3750                                        | 0.5625 | 0.438 |      |                     |        | 1590                    | 2180                     |                |            |                |
|                   | 9.525                                         | 14.288 | 12.70 | 2.03 | B-68                | M-681  | 8.18                    | 11.80                    | 4600           | 7100       | 0.0195         |
|                   | 0.3750                                        | 0.5625 | 0.500 | 0.08 |                     |        | 1840                    | 2650                     |                |            |                |
|                   | 9.525                                         | 14.288 | 14.27 | —    | B-69                | —      | 9.34                    | 13.92                    | 4600           | 7100       | 0.0203         |
|                   | 0.3750                                        | 0.5625 | 0.562 |      |                     |        | 2100                    | 3130                     |                |            |                |
|                   | 9.525                                         | 14.288 | 15.88 | 2.03 | B-610               | M-6101 | 10.4                    | 16.00                    | 4600           | 7100       | 0.0211         |
|                   | 0.3750                                        | 0.5625 | 0.625 | 0.08 |                     |        | 2340                    | 3590                     |                |            |                |
|                   | 9.525                                         | 15.875 | 12.70 | —    | BH-68               | —      | 9.34                    | 10.90                    | 6500           | 10000      | 0.0184         |
|                   | 0.3750                                        | 0.6250 | 0.500 |      |                     |        | 2100                    | 2460                     |                |            |                |
| 7/16              | 11.113                                        | 15.875 | 9.53  | —    | B-76                | —      | 6.36                    | 8.90                     | 4100           | 6300       | 0.0194         |
|                   | 0.4375                                        | 0.6250 | 0.375 |      |                     |        | 1430                    | 2000                     |                |            |                |
|                   | 11.113                                        | 15.875 | 11.13 | —    | B-77                | —      | 7.70                    | 11.3                     | 4100           | 6300       | 0.0206         |
|                   | 0.4375                                        | 0.6250 | 0.438 |      |                     |        | 1730                    | 2550                     |                |            |                |
|                   | 11.113                                        | 15.875 | 12.70 | 2.03 | B-78                | M-781  | 8.99                    | 13.80                    | 4100           | 6300       | 0.0216         |
|                   | 0.4375                                        | 0.6250 | 0.500 | 0.08 |                     |        | 2020                    | 3100                     |                |            |                |
|                   | 11.113                                        | 15.875 | 15.88 | —    | B-710               | —      | 11.3                    | 18.7                     | 4100           | 6300       | 0.0233         |
|                   | 0.4375                                        | 0.6250 | 0.625 |      |                     |        | 2550                    | 4200                     |                |            |                |



## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia.<br>in. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|----------------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |                      |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         |                      |
| 0.001<br>0.002         | —              | 3.175<br>0.1250         | 3.167<br>0.1247  | 6.350<br>0.2500  | 6.363<br>0.2505  | 6.363<br>0.2505   | 3.195<br>0.1258  | 3.221<br>0.1268  |                         | 1/8                  |
| 0.001<br>0.002         | —              | 3.970<br>0.1563         | 3.962<br>0.1560  | 7.142<br>0.2812  | 7.155<br>0.2817  | 7.155<br>0.2817   | 3.990<br>0.1571  | 4.016<br>0.1581  |                         | 5/32                 |
| 0.001<br>0.003         | —              | 3.970<br>0.1563         | 3.962<br>0.1560  | 7.142<br>0.2812  | 7.155<br>0.2817  | 7.155<br>0.2817   | 3.990<br>0.1571  | 4.016<br>0.1581  |                         |                      |
| 0.001<br>0.003         | 0.002<br>0.004 | 4.763<br>0.1875         | 4.755<br>0.1872  | 8.717<br>0.3432  | 8.730<br>0.3437  | 8.730<br>0.3437   | 4.783<br>0.1883  | 4.808<br>0.1893  |                         | 3/16                 |
| 0.002<br>0.005         | 0.003<br>0.006 | 4.763<br>0.1875         | 4.755<br>0.1872  | 8.717<br>0.3432  | 8.730<br>0.3437  | 8.730<br>0.3437   | 4.783<br>0.1883  | 4.808<br>0.1893  |                         |                      |
| 0.002<br>0.005         | 0.003<br>0.006 | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                         | 1/4                  |
| 0.003<br>0.007         | 0.004<br>0.008 | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                         |                      |
| 0.004<br>0.008         | —              | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                         |                      |
| 0.004<br>0.009         | 0.005<br>0.011 | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                         |                      |
| 0.004<br>0.008         | 0.004<br>0.009 | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         | 5/16                 |
| 0.005<br>0.010         | —              | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         |                      |
| 0.005<br>0.011         | 0.006<br>0.013 | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         |                      |
| 0.006<br>0.014         | —              | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         |                      |
| 0.007<br>0.016         | 0.008<br>0.018 | 7.938<br>0.3125         | 7.925<br>0.3120  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         |                      |
| 0.009<br>0.020         | —              | 7.938<br>0.3125         | 7.925<br>0.3120  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 7.976<br>0.3140  | 8.001<br>0.3150  |                         |                      |
| 0.004<br>0.009         | 0.005<br>0.010 | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                         | 3/8                  |
| 0.005<br>0.011         | 0.005<br>0.012 | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                         |                      |
| 0.006<br>0.013         | —              | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                         |                      |
| 0.007<br>0.015         | 0.008<br>0.017 | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  | IRA-3                   |                      |
| 0.007<br>0.016         | —              | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                         |                      |
| 0.008<br>0.018         | 0.01<br>0.021  | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                         |                      |
| 0.010<br>0.021         | 0.000          | 9.525<br>0.3750         | 9.512<br>0.3745  | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 9.563<br>0.3765  | 9.589<br>0.3775  | IRA-3                   |                      |
| 0.005<br>0.012         | —              | 11.113<br>0.4375        | 11.100<br>0.4370 | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 11.151<br>0.4390 | 11.176<br>0.4400 | IRA-4                   | 7/16                 |
| 0.007<br>0.015         | —              | 11.113<br>0.4375        | 11.100<br>0.4370 | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 11.151<br>0.4390 | 11.176<br>0.4400 | IRA-4                   |                      |
| 0.008<br>0.017         | 0.009<br>0.019 | 11.113<br>0.4375        | 11.100<br>0.4370 | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 11.151<br>0.4390 | 11.176<br>0.4400 | IRA-4                   |                      |
| 0.010<br>0.021         | —              | 11.113<br>0.4375        | 11.100<br>0.4370 | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 11.151<br>0.4390 | 11.176<br>0.4400 |                         |                      |

\* Further reduces shaft diameter.

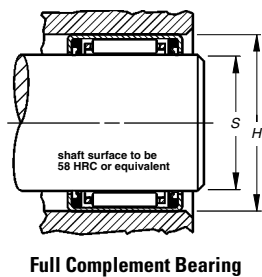
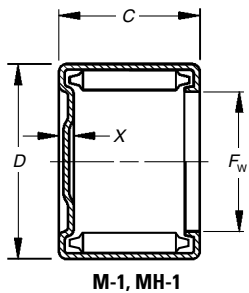
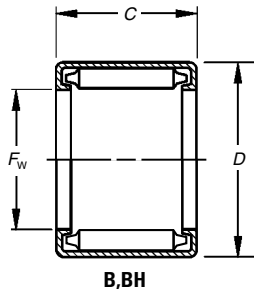
Continued on next page.



# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END — *continued*

### INCH SERIES



Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |                  |                |              | Bearing Designation |                | Load Ratings<br>kN/lbf. |               | Limiting Speed |      | C <sub>g</sub> |
|-------------------|-----------------------------------------------|------------------|----------------|--------------|---------------------|----------------|-------------------------|---------------|----------------|------|----------------|
|                   | F <sub>w</sub>                                | D                | C              | Y            | C                   | C <sub>0</sub> | Grease<br>RPM           | Oil<br>RPM    |                |      |                |
|                   | 11.113<br>0.4375                              | 17.463<br>0.6875 | 12.70<br>0.500 | —            | BH-78               | —              | 10.3<br>2320            | 12.8<br>2870  | 5700           | 8800 | 0.0203         |
| 1/2               | 12.700<br>0.5000                              | 17.463<br>0.6875 | 7.92<br>0.312  | 2.03<br>0.08 | B-85                | M-851          | 5.34<br>1200            | 7.38<br>1660  | 3600           | 5600 | 0.0196         |
|                   | 12.700<br>0.5000                              | 17.463<br>0.6875 | 9.53<br>0.375  | 2.03<br>0.08 | B-86                | M-861          | 6.85<br>1540            | 10.1<br>2280  | 3600           | 5600 | 0.0212         |
|                   | 12.700<br>0.5000                              | 17.463<br>0.6875 | 11.13<br>0.438 | 2.03<br>0.08 | B-87                | M-871          | 8.32<br>1870            | 13.0<br>2920  | 3600           | 5600 | 0.0225         |
|                   | 12.700<br>0.5000                              | 17.463<br>0.6875 | 12.70<br>0.500 | 2.03<br>0.08 | B-88                | M-881          | 9.61<br>2160            | 15.7<br>3530  | 3600           | 5600 | 0.0236         |
|                   | 12.700<br>0.5000                              | 17.463<br>0.6875 | 15.88<br>0.625 | 2.03<br>0.08 | B-810               | M-8101         | 12.2<br>2750            | 21.34<br>4800 | 3600           | 5600 | 0.0255         |
|                   | 12.700<br>0.5000                              | 17.463<br>0.6875 | 19.05<br>0.750 | 2.03<br>0.08 | B-812               | M-8121         | 14.7<br>3300            | 27.0<br>6060  | 3600           | 5600 | 0.0270         |
|                   | 12.700<br>0.5000                              | 19.050<br>0.7500 | 11.13<br>0.438 | —            | BH-87               | —              | 9.47<br>2130            | 11.8<br>2650  | 5100           | 7900 | 0.0210         |
|                   | 12.700<br>0.5000                              | 19.050<br>0.7500 | 12.70<br>0.500 | —            | BH-88               | —              | 11.2<br>2510            | 14.6<br>3280  | 5100           | 7900 | 0.0221         |
|                   | 12.700<br>0.5000                              | 19.050<br>0.7500 | 15.88<br>0.625 | —            | BH-810              | —              | 14.4<br>3230            | 20.2<br>4540  | 5100           | 7900 | 0.0240         |
|                   | 12.700<br>0.5000                              | 19.050<br>0.7500 | 19.05<br>0.750 | 2.29<br>0.09 | BH-812              | MH-8121        | 17.4<br>3910            | 25.8<br>5790  | 5100           | 7900 | 0.0255         |
| 9/16              | 14.288<br>0.5625                              | 19.050<br>0.7500 | 7.92<br>0.312  | 2.03<br>0.08 | B-95                | M-951          | 5.74<br>1290            | 8.32<br>1870  | 3300           | 5000 | 0.0212         |
|                   | 14.288<br>0.5625                              | 19.050<br>0.7500 | 9.53<br>0.375  | 2.03<br>0.08 | B-96                | M-961          | 7.34<br>1650            | 11.4<br>2570  | 3300           | 5000 | 0.0229         |
|                   | 14.288<br>0.5625                              | 19.050<br>0.7500 | 11.13<br>0.438 | 2.03<br>0.08 | B-97                | M-971          | 8.85<br>1990            | 14.6<br>3280  | 3300           | 5000 | 0.0244         |
|                   | 14.288<br>0.5625                              | 19.050<br>0.7500 | 12.70<br>0.500 | 2.03<br>0.08 | B-98                | M-981          | 10.3<br>2320            | 17.7<br>3990  | 3300           | 5000 | 0.0256         |
|                   | 14.288<br>0.5625                              | 19.050<br>0.7500 | 15.88<br>0.625 | 2.03<br>0.08 | B-910               | M-9101         | 13.1<br>2940            | 24.0<br>5400  | 3300           | 5000 | 0.0276         |
|                   | 14.288<br>0.5625                              | 19.050<br>0.7500 | 19.05<br>0.750 | 2.03<br>0.08 | B-912               | M-9121         | 15.7<br>3520            | 30.3<br>6820  | 3300           | 5000 | 0.0292         |
|                   | 14.288<br>0.5625                              | 20.638<br>0.8125 | 12.70<br>0.500 | —            | BH-98               | —              | 12.0<br>2690            | 16.5<br>3700  | 4600           | 7100 | 0.0239         |
|                   | 14.288<br>0.5625                              | 20.638<br>0.8125 | 15.88<br>0.625 | —            | BH-910              | —              | 15.4<br>3460            | 22.7<br>5110  | 4600           | 7100 | 0.0259         |
|                   | 14.288<br>0.5625                              | 20.638<br>0.8125 | 19.05<br>0.750 | —            | BH-912              | —              | 18.6<br>4190            | 29.0<br>6520  | 4600           | 7100 | 0.0275         |
| 5/8               | 15.875<br>0.6250                              | 20.638<br>0.8125 | 7.92<br>0.312  | 2.03<br>0.08 | B-105               | M-1051         | 6.1<br>1360             | 9.25<br>2080  | 3000           | 4500 | 0.0227         |
|                   | 15.875<br>0.6250                              | 20.638<br>0.8125 | 11.13<br>0.438 | 2.03<br>0.08 | B-107               | M-1071         | 9.39<br>2110            | 16.2<br>3650  | 3000           | 4500 | 0.0262         |
|                   | 15.875<br>0.6250                              | 20.638<br>0.8125 | 12.70<br>0.500 | 2.03<br>0.08 | B-108               | M-1081         | 10.9<br>2450            | 19.7<br>4430  | 3000           | 4500 | 0.0275         |
|                   | 15.875<br>0.6250                              | 20.638<br>0.8125 | 15.88<br>0.625 | 2.03<br>0.08 | B-1010              | M-10101        | 13.80<br>3110           | 26.7<br>6000  | 3000           | 4500 | 0.0296         |
|                   | 15.875<br>0.6250                              | 20.638<br>0.8125 | 19.05<br>0.750 | 2.03<br>0.08 | B-1012              | M-10121        | 16.6<br>3720            | 33.7<br>7580  | 3000           | 4500 | 0.0314         |
| 5/8               | 15.875<br>0.6250                              | 22.212<br>0.8745 | 12.70<br>0.500 | 2.29<br>0.09 | BH-108              | MH-1081        | 12.7<br>2860            | 18.3<br>4110  | 4200           | 6500 | 0.0256         |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|---------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |               |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         | in.           |
| 0.010<br>0.023         | —              | 11.113<br>0.4375        | 11.100<br>0.4370 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 11.151<br>0.4390 | 11.176<br>0.4400 | IRA-4                   |               |
| 0.005<br>0.012         | 0.006<br>0.014 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                   | 1/2           |
| 0.006<br>0.014         | 0.007<br>0.016 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                   |               |
| 0.007<br>0.016         | 0.008<br>0.018 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                   |               |
| 0.009<br>0.019         | 0.010<br>0.021 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                         |               |
| 0.010<br>0.023         | 0.012<br>0.026 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                         |               |
| 0.013<br>0.028         | 0.014<br>0.031 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                         |               |
| 0.010<br>0.023         | —              | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                   |               |
| 0.012<br>0.026         | —              | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                   |               |
| 0.015<br>0.033         | —              | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 |                         |               |
| 0.018<br>0.039         | 0.020<br>0.044 | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 |                         |               |
| 0.006<br>0.013         | 0.006<br>0.014 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                   | 9/16          |
| 0.007<br>0.015         | 0.008<br>0.018 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                   |               |
| 0.008<br>0.018         | 0.010<br>0.021 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                   |               |
| 0.009<br>0.020         | 0.010<br>0.023 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                   |               |
| 0.012<br>0.026         | 0.013<br>0.029 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-612                  |               |
| 0.014<br>0.031         | 0.015<br>0.034 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-612                  |               |
| 0.013<br>0.029         | —              | 14.288<br>0.5625        | 14.275<br>0.5620 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                   |               |
| 0.016<br>0.036         | —              | 14.288<br>0.5625        | 14.275<br>0.5620 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-612                  |               |
| 0.020<br>0.043         | —              | 14.288<br>0.5625        | 14.275<br>0.5620 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 14.326<br>0.5640 | 14.351<br>0.5650 | IRA-6                   |               |
| 0.006<br>0.014         | 0.007<br>0.016 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-68-1                 | 5/8           |
| 0.009<br>0.020         | 0.010<br>0.022 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-68-1                 |               |
| 0.010<br>0.022         | 0.012<br>0.026 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-68-1                 |               |
| 0.013<br>0.028         | 0.015<br>0.032 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-612-1                |               |
| 0.015<br>0.034         | 0.017<br>0.038 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-612-1                |               |
| 0.014<br>0.031         | 0.016<br>0.035 | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-68-1                 | 5/8           |

\* Further reduces shaft diameter.

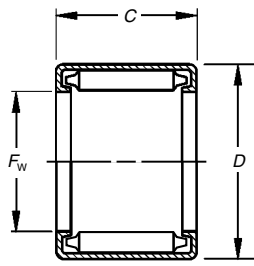
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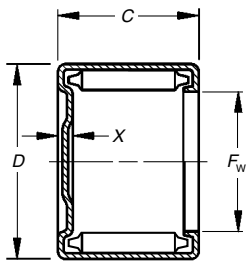
# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END – *continued*

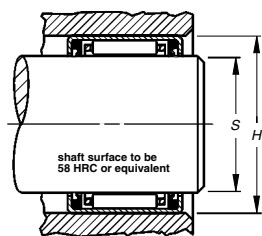
### INCH SERIES



**B, BH**



**M-1, MH-1**



**Full Complement Bearing**

Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material.

See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |        |       |      | Bearing Designation |          | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|--------|-------|------|---------------------|----------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D      | C     | Y    |                     |          | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
|                   | 15.875                                        | 22.212 | 15.88 | —    | BH-1010             | —        | 16.4                    | 25.3                     | 4200           | 6500       | 0.0278         |
|                   | 0.6250                                        | 0.8745 | 0.625 | —    |                     |          | 3680                    | 5680                     |                |            |                |
| 5/8               | 15.875                                        | 22.212 | 19.05 | —    | BH-1012             | —        | 19.8                    | 32.3                     | 4200           | 6500       | 0.0295         |
|                   | 0.6250                                        | 0.8745 | 0.750 | —    |                     |          | 4450                    | 7250                     |                |            |                |
|                   | 15.875                                        | 22.212 | 25.40 | —    | BH-1016             | —        | 26.2                    | 46.3                     | 4200           | 6500       | 0.0322         |
|                   | 0.6250                                        | 0.8745 | 1.000 | —    |                     |          | 5890                    | 10400                    |                |            |                |
| 11/16             | 17.463                                        | 22.212 | 9.53  | 2.03 | B-116               | M-1161   | 8.18                    | 14.0                     | 2700           | 4200       | 0.0263         |
|                   | 0.6875                                        | 0.8745 | 0.375 | 0.08 |                     |          | 1840                    | 3140                     |                |            |                |
|                   | 17.463                                        | 22.212 | 12.70 | 2.03 | B-118               | M-1181   | 11.5                    | 21.7                     | 2700           | 4200       | 0.0293         |
|                   | 0.6875                                        | 0.8745 | 0.500 | 0.08 |                     |          | 2580                    | 4880                     |                |            |                |
|                   | 17.463                                        | 22.212 | 15.88 | 2.03 | B-1110              | M-11101  | 14.6                    | 29.4                     | 2700           | 4200       | 0.0316         |
|                   | 0.6875                                        | 0.8745 | 0.625 | 0.08 |                     |          | 3270                    | 6610                     |                |            |                |
|                   | 17.463                                        | 22.212 | 19.05 | 2.03 | B-1112              | M-11121  | 17.4                    | 37.1                     | 2700           | 4200       | 0.0335         |
|                   | 0.6875                                        | 0.8745 | 0.750 | 0.08 |                     |          | 3920                    | 8340                     |                |            |                |
|                   | 17.463                                        | 23.813 | 11.13 | —    | BH-117              | —        | 11.4                    | 16.2                     | 3900           | 6000       | 0.0259         |
|                   | 0.6875                                        | 0.9375 | 0.438 | —    |                     |          | 2560                    | 3650                     |                |            |                |
|                   | 17.463                                        | 23.813 | 15.88 | 2.29 | BH-1110             | MH-11101 | 17.3                    | 27.8                     | 3900           | 6000       | 0.0296         |
|                   | 0.6875                                        | 0.9375 | 0.625 | 0.09 |                     |          | 3890                    | 6250                     |                |            |                |
|                   | 17.463                                        | 23.813 | 19.05 | —    | BH-1112             | —        | 20.9                    | 35.5                     | 3900           | 6000       | 0.0314         |
|                   | 0.6875                                        | 0.9375 | 0.750 | —    |                     |          | 4700                    | 7980                     |                |            |                |
| 3/4               | 19.050                                        | 25.400 | 9.53  | 2.29 | B-126               | M-1261   | 9.7                     | 13.6                     | 3600           | 5600       | 0.0256         |
|                   | 0.7500                                        | 1.0000 | 0.375 | 0.09 |                     |          | 2180                    | 3050                     |                |            |                |
|                   | 19.050                                        | 25.400 | 12.70 | 2.29 | B-128               | M-1281   | 14.1                    | 22.0                     | 3600           | 5600       | 0.0289         |
|                   | 0.7500                                        | 1.0000 | 0.500 | 0.09 |                     |          | 3170                    | 4940                     |                |            |                |
|                   | 19.050                                        | 25.400 | 15.88 | 2.29 | B-1210              | M-12101  | 18.2                    | 30.3                     | 3600           | 5600       | 0.0313         |
|                   | 0.7500                                        | 1.0000 | 0.625 | 0.09 |                     |          | 4080                    | 6820                     |                |            |                |
|                   | 19.050                                        | 25.400 | 19.05 | 2.29 | B-1212              | M-12121  | 21.9                    | 38.7                     | 3600           | 5600       | 0.0333         |
|                   | 0.7500                                        | 1.0000 | 0.750 | 0.09 |                     |          | 4930                    | 8710                     |                |            |                |
| 13/16             | 20.638                                        | 26.988 | 9.53  | —    | B-136               | —        | 10.1                    | 14.68                    | 3400           | 5200       | 0.0271         |
|                   | 0.8125                                        | 1.0625 | 0.375 | —    |                     |          | 2280                    | 3300                     |                |            |                |
|                   | 20.638                                        | 26.988 | 12.70 | 2.29 | B-138               | M-1381   | 14.8                    | 23.80                    | 3400           | 5200       | 0.0305         |
|                   | 0.8125                                        | 1.0625 | 0.500 | 0.09 |                     |          | 3320                    | 5350                     |                |            |                |
|                   | 20.638                                        | 26.988 | 22.23 | 2.29 | B-1314              | M-13141  | 26.7                    | 51.15                    | 3400           | 5200       | 0.0369         |
|                   | 0.8125                                        | 1.0625 | 0.875 | 0.09 |                     |          | 6010                    | 11500                    |                |            |                |
|                   | 20.638                                        | 26.988 | 25.40 | 2.29 | B-1316              | M-13161  | 30.3                    | 60.05                    | 3400           | 5200       | 0.0384         |
|                   | 0.8125                                        | 1.0625 | 1.000 | 0.09 |                     |          | 6820                    | 13500                    |                |            |                |
|                   | 20.638                                        | 26.988 | 31.75 | —    | B-1320              | —        | 37.3                    | 78.29                    | 3500           | 5200       | N/A            |
|                   | 0.8125                                        | 1.0625 | 1.250 | —    |                     |          | 8380                    | 17600                    |                |            |                |
|                   | 20.643                                        | 28.575 | 12.70 | 2.79 | BH-138              | MH-1381  | 14.9                    | 20.82                    | 4100           | 6300       | 0.0287         |
|                   | 0.8127                                        | 1.1250 | 0.500 | 0.11 |                     |          | 3340                    | 4680                     |                |            |                |
|                   | 20.638                                        | 28.575 | 15.88 | 2.79 | BH-1310             | MH-13101 | 19.70                   | 29.89                    | 4100           | 6300       | 0.0314         |
|                   | 0.8125                                        | 1.1250 | 0.625 | 0.11 |                     |          | 4430                    | 6720                     |                |            |                |
|                   | 20.638                                        | 28.575 | 19.05 | 2.79 | BH-1312             | MH-13121 | 24.2                    | 38.97                    | 4100           | 6300       | 0.0336         |
|                   | 0.8125                                        | 1.1250 | 0.750 | 0.11 |                     |          | 5440                    | 8760                     |                |            |                |
| 7/8               | 22.225                                        | 28.575 | 9.53  | 2.29 | B-146               | M-1461   | 10.5                    | 15.84                    | 3100           | 4800       | 0.0285         |
|                   | 0.8750                                        | 1.1250 | 0.375 | 0.09 |                     |          | 2370                    | 3560                     |                |            |                |
|                   | 22.225                                        | 28.575 | 12.70 | 2.29 | B-148               | M-1481   | 15.4                    | 25.62                    | 3100           | 4800       | 0.0321         |
|                   | 0.8750                                        | 1.1250 | 0.500 | 0.09 |                     |          | 3450                    | 5760                     |                |            |                |
|                   | 22.225                                        | 28.575 | 19.05 | 2.29 | B-1412              | M-14121  | 23.9                    | 45.37                    | 3100           | 4800       | 0.0369         |
|                   | 0.8750                                        | 1.1250 | 0.750 | 0.09 |                     |          | 5370                    | 10200                    |                |            |                |
|                   | 22.225                                        | 28.575 | 25.40 | 2.29 | B-1416              | M-14161  | 31.6                    | 64.94                    | 3100           | 4800       | 0.0404         |
|                   | 0.8750                                        | 1.1250 | 1.000 | 0.09 |                     |          | 7100                    | 14600                    |                |            |                |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|---------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |               |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         | in.           |
| 0.018<br>0.039         | —              | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-612-1                |               |
| 0.021<br>0.047         | —              | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-612-1                | 5/8           |
| 0.028<br>0.062         | —              | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 |                         |               |
| 0.008<br>0.018         | 0.009<br>0.020 | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         | 11/16         |
| 0.011<br>0.024         | 0.012<br>0.027 | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.014<br>0.030         | 0.015<br>0.034 | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.016<br>0.036         | 0.019<br>0.041 | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.014<br>0.030         | —              | 17.463<br>0.6875        | 17.450<br>0.6870 | 23.800<br>0.9370 | 23.825<br>0.9380 | 23.825<br>0.9380  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.019<br>0.042         | 0.021<br>0.047 | 17.463<br>0.6875        | 17.450<br>0.6870 | 23.800<br>0.9370 | 23.825<br>0.9380 | 23.825<br>0.9380  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.023<br>0.051         | —              | 17.463<br>0.6875        | 17.450<br>0.6870 | 23.800<br>0.9370 | 23.825<br>0.9380 | 23.825<br>0.9380  | 17.501<br>0.6890 | 17.526<br>0.6900 |                         |               |
| 0.012<br>0.027         | 0.014<br>0.031 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-88                   | 3/4           |
| 0.016<br>0.036         | 0.019<br>0.041 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-88                   |               |
| 0.020<br>0.045         | 0.024<br>0.052 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 |                         |               |
| 0.024<br>0.054         | 0.028<br>0.062 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-812                  |               |
| 0.013<br>0.029         | —              | 20.638<br>0.8125        | 20.625<br>0.8120 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         | 13/16         |
| 0.018<br>0.039         | 0.020<br>0.044 | 20.638<br>0.8125        | 20.625<br>0.8120 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.031<br>0.068         | 0.035<br>0.077 | 20.638<br>0.8125        | 20.625<br>0.8120 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.035<br>0.078         | 0.040<br>0.088 | 20.638<br>0.8125        | 20.625<br>0.8120 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.044<br>0.098         | —              | 20.638<br>0.8125        | 29.625<br>0.8120 | 27.000<br>1.0630 | 26.975<br>1.0620 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.023<br>0.050         | 0.026<br>0.057 | 20.638<br>0.8125        | 20.625<br>0.8120 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.029<br>0.063         | 0.032<br>0.071 | 20.638<br>0.8125        | 20.625<br>0.8120 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.034<br>0.076         | 0.039<br>0.086 | 20.638<br>0.8125        | 20.625<br>0.8120 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 20.650<br>0.8130 | 20.676<br>0.8140 |                         |               |
| 0.014<br>0.031         | 0.016<br>0.035 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 |                         | 7/8           |
| 0.019<br>0.042         | 0.022<br>0.048 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1012                 |               |
| 0.028<br>0.062         | 0.032<br>0.070 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 | IRA-10                  |               |
| 0.038<br>0.083         | 0.043<br>0.094 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1016                 |               |

\* Further reduces shaft diameter.

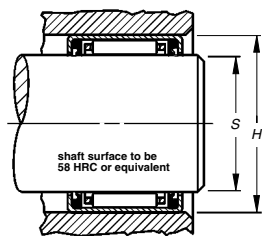
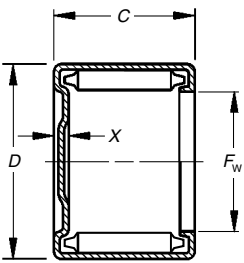
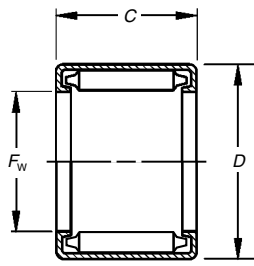
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# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END — *continued*

### INCH SERIES



Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |        |       |      | Bearing Designation |          | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|--------|-------|------|---------------------|----------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D      | C     | Y    |                     |          | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
| 1 1/8             | 22.225                                        | 28.575 | 28.58 | —    | B-1418              | —        | 35.2                    | 74.73                    | 3100           | 4800       | 0.0418         |
|                   | 0.8750                                        | 1.1250 | 1.125 | —    |                     |          | 7920                    | 16800                    |                |            |                |
| 1 1/8             | 22.225                                        | 30.163 | 15.88 | 2.79 | BH-1410             | MH-14101 | 20.3                    | 32.21                    | 3800           | 5880       | 0.0331         |
|                   | 0.8750                                        | 1.1875 | 0.625 | 0.11 |                     |          | 4570                    | 7240                     |                |            |                |
| 1 1/8             | 22.225                                        | 30.163 | 19.05 | 2.79 | BH-1412             | MH-14121 | 25.0                    | 41.99                    | 3800           | 5880       | 0.0354         |
|                   | 0.8750                                        | 1.1875 | 0.750 | 0.11 |                     |          | 5620                    | 9440                     |                |            |                |
| 1 1/8             | 22.225                                        | 30.163 | 25.40 | —    | BH-1416             | —        | 33.7                    | 61.39                    | 3800           | 5880       | 0.0389         |
|                   | 0.8750                                        | 1.1875 | 1.000 | —    |                     |          | 7570                    | 13800                    |                |            |                |
| 1 5/16            | 23.813                                        | 30.163 | 12.70 | —    | B-158               | —        | 15.9                    | 27.49                    | 3000           | 4500       | 0.0336         |
|                   | 0.9375                                        | 1.1875 | 0.500 | —    |                     |          | 3580                    | 6180                     |                |            |                |
| 1 5/16            | 23.813                                        | 30.163 | 25.40 | 2.29 | B-1516              | M-15161  | 32.8                    | 69.39                    | 3000           | 4500       | 0.0423         |
|                   | 0.9375                                        | 1.1875 | 1.000 | 0.09 |                     |          | 7370                    | 15600                    |                |            |                |
| 1/2               | 25.400                                        | 31.750 | 9.53  | —    | B-166               | —        | 11.3                    | 18.10                    | 2800           | 4300       | 0.0312         |
|                   | 1.0000                                        | 1.2500 | 0.375 | —    |                     |          | 2550                    | 4070                     |                |            |                |
| 1/2               | 25.400                                        | 31.750 | 11.13 | 2.29 | B-167               | M-1671   | 14.0                    | 23.66                    | 2800           | 4300       | 0.0333         |
|                   | 1.0000                                        | 1.2500 | 0.438 | 0.09 |                     |          | 3140                    | 5320                     |                |            |                |
| 1/2               | 25.400                                        | 31.750 | 15.88 | 2.29 | B-1610              | M-16101  | 21.2                    | 40.52                    | 2800           | 4300       | 0.0381         |
|                   | 1.0000                                        | 1.2500 | 0.625 | 0.09 |                     |          | 4770                    | 9110                     |                |            |                |
| 1/2               | 25.400                                        | 31.750 | 19.05 | 2.29 | B-1612              | M-16121  | 25.7                    | 51.60                    | 2800           | 4300       | 0.0404         |
|                   | 1.0000                                        | 1.2500 | 0.750 | 0.09 |                     |          | 5770                    | 11600                    |                |            |                |
| 1/2               | 25.400                                        | 31.750 | 25.40 | 2.29 | B-1616              | M-16161  | 33.9                    | 74.29                    | 2800           | 4300       | 0.0442         |
|                   | 1.0000                                        | 1.2500 | 1.000 | 0.09 |                     |          | 7630                    | 16700                    |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 12.70 | 2.79 | BH-168              | MH-1681  | 16.6                    | 25.6                     | 3400           | 5200       | 0.0330         |
|                   | 1.0000                                        | 1.3125 | 0.500 | 0.11 |                     |          | 3740                    | 5760                     |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 15.88 | —    | BH-1610             | —        | 22.0                    | 36.8                     | 3400           | 5200       | 0.0361         |
|                   | 1.0000                                        | 1.3125 | 0.625 | —    |                     |          | 4950                    | 8280                     |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 19.05 | 2.79 | BH-1612             | MH-16121 | 27.1                    | 48.0                     | 3400           | 5200       | 0.0386         |
|                   | 1.0000                                        | 1.3125 | 0.750 | 0.11 |                     |          | 6090                    | 10800                    |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 22.23 | —    | BH-1614             | —        | 31.9                    | 59.2                     | 3400           | 5200       | 0.0407         |
|                   | 1.0000                                        | 1.3125 | 0.875 | —    |                     |          | 7170                    | 13300                    |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 25.40 | 2.79 | BH-1616             | MH-16161 | 36.5                    | 70.3                     | 3400           | 5200       | 0.0425         |
|                   | 1.0000                                        | 1.3125 | 1.000 | 0.11 |                     |          | 8200                    | 15800                    |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 31.75 | —    | BH-1620             | —        | 45.4                    | 93.0                     | 3400           | 5200       | 0.0455         |
|                   | 1.0000                                        | 1.3125 | 1.250 | —    |                     |          | 10200                   | 20900                    |                |            |                |
| 1/2               | 25.400                                        | 33.338 | 38.10 | 2.79 | BH-1624             | MH-16241 | 53.4                    | 115.2                    | 3400           | 5200       | 0.0480         |
|                   | 1.0000                                        | 1.3125 | 1.500 | 0.11 |                     |          | 12000                   | 25900                    |                |            |                |
| 1 1/16            | 26.988                                        | 33.338 | 15.88 | 2.29 | B-1710              | M-17101  | 21.9                    | 43.1                     | 2600           | 4000       | 0.0397         |
|                   | 1.0625                                        | 1.3125 | 0.625 | 0.09 |                     |          | 4930                    | 9680                     |                |            |                |
| 1 1/16            | 26.988                                        | 34.925 | 19.05 | —    | BH-1712             | —        | 29.49                   | 52.49                    | 2300           | 3400       | N/A            |
|                   | 1.0625                                        | 1.3750 | 0.750 | —    |                     |          | 6630                    | 11800                    |                |            |                |
| 1 1/8             | 28.575                                        | 34.925 | 9.53  | 2.29 | B-186               | M-1861   | 12.1                    | 20.37                    | 2500           | 3800       | 0.0338         |
|                   | 1.1250                                        | 1.3750 | 0.375 | 0.09 |                     |          | 2720                    | 4580                     |                |            |                |
| 1 1/8             | 28.575                                        | 34.925 | 12.70 | 2.29 | B-188               | M-1881   | 17.6                    | 33.0                     | 2500           | 3800       | 0.0381         |
|                   | 1.1250                                        | 1.3750 | 0.500 | 0.09 |                     |          | 3950                    | 7420                     |                |            |                |
| 1 1/8             | 28.575                                        | 34.925 | 15.88 | —    | B-1810              | —        | 22.6                    | 45.8                     | 2500           | 3800       | 0.0413         |
|                   | 1.1250                                        | 1.3750 | 0.625 | —    |                     |          | 5080                    | 10300                    |                |            |                |
| 1 1/8             | 28.575                                        | 34.925 | 19.05 | 2.29 | B-1812              | M-18121  | 27.3                    | 58.3                     | 2500           | 3800       | 0.0438         |
|                   | 1.1250                                        | 1.3750 | 0.750 | 0.09 |                     |          | 6140                    | 13100                    |                |            |                |
| 1 1/8             | 28.575                                        | 34.925 | 25.40 | 2.29 | B-1816              | M-18161  | 36.2                    | 83.6                     | 2500           | 3800       | 0.0479         |
|                   | 1.1250                                        | 1.3750 | 1.000 | 0.09 |                     |          | 8130                    | 18800                    |                |            |                |
| 1 1/8             | 28.575                                        | 38.100 | 19.05 | 3.05 | BH-1812             | MH-18121 | 31.5                    | 52.9                     | 3600           | 5600       | 0.0405         |
|                   | 1.1250                                        | 1.5000 | 0.750 | 0.12 |                     |          | 7090                    | 11900                    |                |            |                |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|---------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |               |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         | in.           |
| 0.043<br>0.094         | —              | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 |                         |               |
| 0.030<br>0.067         | 0.035<br>0.076 | 22.225<br>0.8750        | 22.212<br>0.8745 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1012                 |               |
| 0.036<br>0.080         | 0.041<br>0.091 | 22.225<br>0.8750        | 22.212<br>0.8745 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 22.238<br>0.8755 | 22.263<br>0.8765 | IRA-10                  |               |
| 0.049<br>0.107         | —              | 22.225<br>0.8750        | 22.212<br>0.8745 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1016                 |               |
| 0.020<br>0.044         | —              | 23.813<br>0.9375        | 23.800<br>0.9370 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 23.825<br>0.9380 | 23.851<br>0.9390 |                         | 15/16         |
| 0.040<br>0.088         | 0.045<br>0.100 | 23.813<br>0.9375        | 23.800<br>0.9370 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 23.825<br>0.9380 | 23.851<br>0.9390 |                         |               |
| 0.016<br>0.035         | —              | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-128                  | 1/2           |
| 0.019<br>0.041         | 0.021<br>0.046 | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-128                  |               |
| 0.026<br>0.058         | 0.030<br>0.066 | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                 |               |
| 0.032<br>0.070         | 0.036<br>0.080 | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                 |               |
| 0.043<br>0.094         | 0.048<br>0.106 | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1216                 |               |
| 0.027<br>0.060         | 0.031<br>0.068 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-128                  |               |
| 0.034<br>0.075         | —              | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                 |               |
| 0.041<br>0.090         | 0.046<br>0.102 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                 |               |
| 0.048<br>0.105         | —              | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1216                 |               |
| 0.054<br>0.120         | 0.062<br>0.136 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1216                 |               |
| 0.068<br>0.150         | —              | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1220                 |               |
| 0.082<br>0.180         | 0.093<br>0.204 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1224                 |               |
| 0.028<br>0.062         | 0.032<br>0.070 | 26.988<br>1.0625        | 26.975<br>1.0620 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 27.000<br>1.0630 | 27.026<br>1.0640 |                         | 1 1/16        |
| 0.035<br>0.078         | —              | 26.988<br>1.0625        | 26.975<br>1.0620 | 34.912<br>1.3745 | 34.938<br>1.3755 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 |                         |               |
| 0.018<br>0.039         | 0.020<br>0.044 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         | 1 1/8         |
| 0.024<br>0.052         | 0.027<br>0.059 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         |               |
| 0.029<br>0.065         | —              | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         |               |
| 0.035<br>0.078         | 0.040<br>0.088 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         |               |
| 0.047<br>0.104         | 0.054<br>0.118 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 | IR-1416                 |               |
| 0.056<br>0.123         | 0.063<br>0.138 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         |               |

\* Further reduces shaft diameter.

Continued on next page.

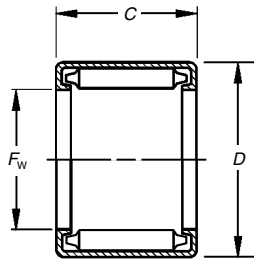




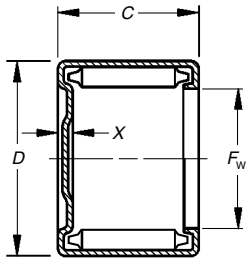
# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END – *continued*

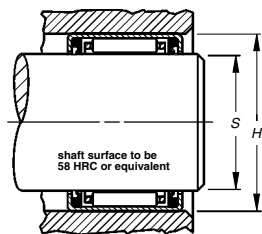
### INCH SERIES



**B, BH**



**M-1, MH-1**



**Full Complement Bearing**

Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |        |       |      | Bearing Designation |          | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|--------|-------|------|---------------------|----------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D      | C     | Y    |                     |          | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
|                   | 28.575                                        | 38.100 | 25.40 | 3.05 | BH-1816             | MH-18161 | 42.5                    | 77.8                     | 3600           | 5600       | 0.0446         |
|                   | 1.1250                                        | 1.5000 | 1.000 | 0.12 |                     |          | 9560                    | 17500                    |                |            |                |
|                   | 28.575                                        | 38.100 | 31.75 | 3.05 | BH-1820             | MH-18201 | 52.9                    | 103.2                    | 3600           | 5600       | 0.0479         |
|                   | 1.1250                                        | 1.5000 | 1.250 | 0.12 |                     |          | 11900                   | 23200                    |                |            |                |
| 1 3/16            | 30.163                                        | 38.100 | 15.88 | 2.79 | B-1910              | M-19101  | 24.1                    | 43.8                     | 2900           | 4400       | 0.0406         |
|                   | 1.1875                                        | 1.5000 | 0.625 | 0.11 |                     |          | 5420                    | 9840                     |                |            |                |
|                   | 30.163                                        | 38.100 | 25.40 | —    | B-1916              | —        | 40.0                    | 83.6                     | 2900           | 4400       | 0.0477         |
|                   | 1.1875                                        | 1.5000 | 1.000 | —    |                     |          | 8980                    | 18800                    |                |            |                |
| 1 1/4             | 31.750                                        | 38.100 | 12.70 | 2.29 | B-208               | M-2081   | 18.6                    | 36.6                     | 2300           | 3500       | 0.0409         |
|                   | 1.2500                                        | 1.5000 | 0.500 | 0.09 |                     |          | 4170                    | 8240                     |                |            |                |
|                   | 31.750                                        | 38.100 | 15.88 | 2.29 | B-2010              | M-20101  | 23.9                    | 50.7                     | 2300           | 3500       | 0.0444         |
|                   | 1.2500                                        | 1.5000 | 0.625 | 0.09 |                     |          | 5370                    | 11400                    |                |            |                |
|                   | 31.750                                        | 38.100 | 19.05 | 2.29 | B-2012              | M-20121  | 28.9                    | 64.5                     | 2300           | 3500       | 0.0471         |
|                   | 1.2500                                        | 1.5000 | 0.750 | 0.09 |                     |          | 6490                    | 14500                    |                |            |                |
|                   | 31.750                                        | 38.100 | 25.40 | 2.29 | B-2016              | M-20161  | 38.2                    | 92.5                     | 2300           | 3500       | 0.0515         |
|                   | 1.2500                                        | 1.5000 | 1.000 | 0.09 |                     |          | 8590                    | 20800                    |                |            |                |
|                   | 31.750                                        | 38.100 | 31.75 | 2.29 | B-2020              | M-20201  | 47.2                    | 121                      | 2300           | 3500       | 0.0550         |
|                   | 1.2500                                        | 1.5000 | 1.250 | 0.09 |                     |          | 10600                   | 27200                    |                |            |                |
|                   | 31.750                                        | 41.275 | 12.70 | 3.05 | BH-208              | MH-2081  | 19.7                    | 30                       | 3300           | 5000       | 0.0369         |
|                   | 1.2500                                        | 1.6250 | 0.500 | 0.12 |                     |          | 4420                    | 6750                     |                |            |                |
|                   | 31.750                                        | 41.275 | 19.05 | 3.05 | BH-2012             | MH-20121 | 33.1                    | 58.7                     | 3300           | 5000       | 0.0435         |
|                   | 1.2500                                        | 1.6250 | 0.750 | 0.12 |                     |          | 7440                    | 13200                    |                |            |                |
|                   | 31.750                                        | 41.275 | 25.40 | 3.05 | BH-2016             | MH-20161 | 44.9                    | 86.7                     | 3300           | 5000       | 0.0480         |
|                   | 1.2500                                        | 1.6250 | 1.000 | 0.12 |                     |          | 10100                   | 19500                    |                |            |                |
|                   | 31.750                                        | 41.275 | 31.75 | 3.05 | BH-2020             | MH-20201 | 56.0                    | 115                      | 3300           | 5000       | 0.0515         |
|                   | 1.2500                                        | 1.6250 | 1.250 | 0.12 |                     |          | 12600                   | 25800                    |                |            |                |
| 1 5/16            | 33.338                                        | 41.275 | 12.70 | 2.79 | B-218               | M-2181   | 19.3                    | 33.7                     | 2600           | 4100       | 0.0397         |
|                   | 1.3125                                        | 1.6250 | 0.500 | 0.11 |                     |          | 4330                    | 7570                     |                |            |                |
|                   | 33.338                                        | 41.275 | 15.88 | 2.79 | B-2110              | M-21101  | 25.5                    | 48.5                     | 2600           | 4100       | 0.0435         |
|                   | 1.3125                                        | 1.6250 | 0.625 | 0.11 |                     |          | 5740                    | 10900                    |                |            |                |
|                   | 33.338                                        | 41.275 | 31.75 | —    | B-2120              | —        | 52.5                    | 122                      | 2600           | 4100       | 0.0547         |
|                   | 1.3125                                        | 1.6250 | 1.250 | —    |                     |          | 11800                   | 27500                    |                |            |                |
| 1 3/8             | 34.925                                        | 41.275 | 12.70 | 2.29 | B-228               | M-2281   | 19.5                    | 40.4                     | 2100           | 3200       | 0.0437         |
|                   | 1.3750                                        | 1.6250 | 0.500 | 0.09 |                     |          | 4390                    | 9070                     |                |            |                |
|                   | 34.925                                        | 41.275 | 19.05 | 2.29 | B-2212              | M-22121  | 30.4                    | 71.2                     | 2100           | 3200       | 0.0504         |
|                   | 1.3750                                        | 1.6250 | 0.750 | 0.09 |                     |          | 6830                    | 16000                    |                |            |                |
|                   | 34.925                                        | 41.275 | 25.40 | 2.29 | B-2216              | M-22161  | 40.2                    | 102                      | 2100           | 3200       | 0.0551         |
|                   | 1.3750                                        | 1.6250 | 1.000 | 0.09 |                     |          | 9030                    | 22900                    |                |            |                |
|                   | 34.925                                        | 41.275 | 31.75 | 2.29 | B-2220              | M-22201  | 49.4                    | 133                      | 2100           | 3200       | 0.0588         |
|                   | 1.3750                                        | 1.6250 | 1.250 | 0.09 |                     |          | 11100                   | 29900                    |                |            |                |
|                   | 34.925                                        | 44.450 | 12.70 | —    | BH-228              | —        | 21.2                    | 33.5                     | 3000           | 4700       | 0.0394         |
|                   | 1.3750                                        | 1.7500 | 0.500 | —    |                     |          | 4770                    | 7540                     |                |            |                |
|                   | 34.925                                        | 44.450 | 15.88 | —    | BH-2210             | —        | 28.5                    | 48.9                     | 3000           | 4700       | 0.0432         |
|                   | 1.3750                                        | 1.7500 | 0.625 | —    |                     |          | 6410                    | 11000                    |                |            |                |
|                   | 34.925                                        | 44.450 | 19.05 | 3.05 | BH-2212             | MH-22121 | 35.3                    | 64.5                     | 3000           | 4700       | 0.0463         |
|                   | 1.3750                                        | 1.7500 | 0.750 | 0.12 |                     |          | 7930                    | 14500                    |                |            |                |
|                   | 34.925                                        | 44.450 | 25.40 | 3.05 | BH-2216             | MH-22161 | 47.6                    | 94.8                     | 3000           | 4700       | 0.0509         |
|                   | 1.3750                                        | 1.7500 | 1.000 | 0.12 |                     |          | 10700                   | 21300                    |                |            |                |
|                   | 34.925                                        | 44.450 | 31.75 | —    | BH-2220             | —        | 59.6                    | 126                      | 3000           | 4700       | 0.0547         |
|                   | 1.3750                                        | 1.7500 | 1.250 | —    |                     |          | 13400                   | 28300                    |                |            |                |
| 1 1/2             | 38.100                                        | 47.625 | 12.70 | 3.05 | B-248               | M-2481   | 22.3                    | 37.1                     | 2800           | 4300       | 0.0420         |
|                   | 1.5000                                        | 1.8750 | 0.500 | 0.12 |                     |          | 5020                    | 8340                     |                |            |                |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|---------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |               |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         | in.           |
| 0.074<br>0.164         | 0.084<br>0.186 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 | IR-1416                 |               |
| 0.093<br>0.205         | 0.105<br>0.232 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 |                         |               |
| 0.040<br>0.088         | 0.045<br>0.099 | 30.163<br>1.1875        | 30.150<br>1.1870 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 30.175<br>1.1880 | 30.201<br>1.1890 |                         | 1 3/16        |
| 0.064<br>0.140         | —              | 30.163<br>1.1875        | 30.150<br>1.1870 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 30.175<br>1.1880 | 30.201<br>1.1890 |                         |               |
| 0.026<br>0.057         | 0.029<br>0.065 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 |                         | 1 1/4         |
| 0.032<br>0.071         | 0.044<br>0.097 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 |                         |               |
| 0.039<br>0.086         | 0.045<br>0.099 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1612                 |               |
| 0.052<br>0.114         | 0.059<br>0.130 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1616                 |               |
| 0.065<br>0.143         | 0.073<br>0.162 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 |                         |               |
| 0.041<br>0.090         | 0.046<br>0.102 | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 |                         |               |
| 0.061<br>0.135         | 0.069<br>0.153 | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1612                 |               |
| 0.081<br>0.179         | 0.092<br>0.203 | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1616                 |               |
| 0.102<br>0.224         | 0.115<br>0.254 | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 |                         |               |
| 0.034<br>0.076         | 0.039<br>0.086 | 33.338<br>1.3125        | 33.325<br>1.3120 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 33.350<br>1.3130 | 33.378<br>1.3141 |                         | 1 5/16        |
| 0.043<br>0.095         | 0.049<br>0.108 | 33.338<br>1.3125        | 33.325<br>1.3120 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 33.350<br>1.3130 | 33.378<br>1.3141 |                         |               |
| 0.087<br>0.191         | —              | 33.338<br>1.3125        | 33.325<br>1.3120 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 33.350<br>1.3130 | 33.378<br>1.3141 |                         |               |
| 0.028<br>0.062         | 0.032<br>0.070 | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 |                         | 1 3/8         |
| 0.043<br>0.094         | 0.049<br>0.107 | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1812                 |               |
| 0.057<br>0.125         | 0.064<br>0.142 | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1816                 |               |
| 0.071<br>0.156         | 0.080<br>0.177 | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1820                 |               |
| 0.044<br>0.098         | —              | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 |                         |               |
| 0.055<br>0.122         | —              | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1812                 |               |
| 0.066<br>0.146         | 0.075<br>0.165 | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1812                 |               |
| 0.088<br>0.195         | 0.100<br>0.221 | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1816                 |               |
| 0.111<br>0.244         | 0.125<br>0.276 | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1820                 |               |
| 0.048<br>0.105         | 0.054<br>0.119 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 |                         | 1 1/2         |

\* Further reduces shaft diameter.

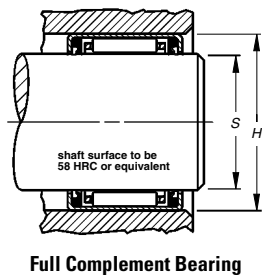
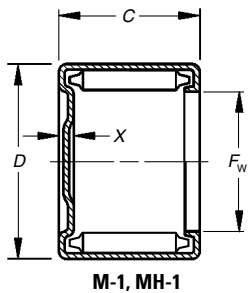
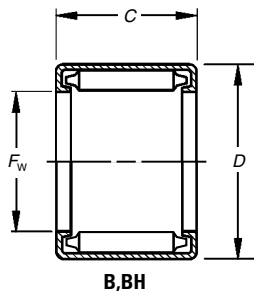
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# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END — *continued*

### INCH SERIES



Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |        |        |      | Bearing Designation |         | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|--------|--------|------|---------------------|---------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D      | C      | Y    |                     |         | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
|                   | 38.100                                        | 47.625 | 15.88  | 3.05 | B-2410              | M-24101 | 29.8                    | 53.8                     | 2800           | 4300       | 0.0460         |
|                   | 1.5000                                        | 1.8750 | 0.625  | 0.12 |                     |         | 6710                    | 12100                    |                |            |                |
|                   | 38.100                                        | 47.625 | 19.05  | 3.05 | B-2412              | M-24121 | 36.9                    | 70.7                     | 2800           | 4300       | 0.0493         |
|                   | 1.5000                                        | 1.8750 | 0.750  | 0.12 |                     |         | 8290                    | 15900                    |                |            |                |
|                   | 38.100                                        | 47.625 | 22.23  | 3.05 | B-2414              | M-24141 | 43.5                    | 87.6                     | 2800           | 4300       | 0.0519         |
|                   | 1.5000                                        | 1.8750 | 0.875  | 0.12 |                     |         | 9780                    | 19700                    |                |            |                |
|                   | 38.100                                        | 47.625 | 25.40  | 3.05 | B-2416              | M-24161 | 49.8                    | 103                      | 2800           | 4300       | 0.0542         |
|                   | 1.5000                                        | 1.8750 | 1.000  | 0.12 |                     |         | 11200                   | 23300                    |                |            |                |
|                   | 38.100                                        | 47.625 | 31.75  | 3.05 | B-2420              | M-24201 | 61.8                    | 138                      | 2800           | 4300       | 0.0581         |
|                   | 1.5000                                        | 1.8750 | 1.250  | 0.12 |                     |         | 13900                   | 31000                    |                |            |                |
| 1 5/8             | 41.275                                        | 50.800 | 12.70  | —    | B-268               | —       | 22.8                    | 39.2                     | 2600           | 3900       | 0.0441         |
|                   | 1.6250                                        | 2.0000 | 0.500  | —    |                     |         | 5120                    | 8820                     |                |            |                |
|                   | 41.275                                        | 50.800 | 15.88  | 3.05 | B-2610              | M-26101 | 30.6                    | 57.4                     | 2600           | 3900       | 0.0485         |
|                   | 1.6250                                        | 2.0000 | 0.625  | 0.12 |                     |         | 6890                    | 12900                    |                |            |                |
|                   | 41.275                                        | 50.800 | 25.40  | —    | B-2616              | —       | 51.6                    | 112                      | 2600           | 3900       | 0.0573         |
|                   | 1.6250                                        | 2.0000 | 1.000  | —    |                     |         | 11600                   | 25200                    |                |            |                |
|                   | 41.275                                        | 50.800 | 31.75  | 3.05 | B-2620              | M-26201 | 64.0                    | 149                      | 2600           | 3900       | 0.0614         |
|                   | 1.6250                                        | 2.0000 | 1.250  | 0.12 |                     |         | 14400                   | 33400                    |                |            |                |
| 1 3/4             | 44.450                                        | 53.975 | 19.05  | 3.05 | B-2812              | M-28121 | 39.3                    | 81.4                     | 2400           | 3700       | 0.0547         |
|                   | 1.7500                                        | 2.1250 | 0.750  | 0.12 |                     |         | 8830                    | 18300                    |                |            |                |
|                   | 44.450                                        | 53.975 | 25.40  | 3.05 | B-2816              | M-28161 | 53.4                    | 121                      | 2400           | 3700       | 0.0603         |
|                   | 1.7500                                        | 2.1250 | 1.000  | 0.12 |                     |         | 12000                   | 27100                    |                |            |                |
|                   | 44.450                                        | 53.975 | 31.75  | —    | B-2820              | —       | 66.3                    | 160                      | 2400           | 3700       | 0.0647         |
|                   | 1.7500                                        | 2.1250 | 1.250  | —    |                     |         | 14900                   | 36000                    |                |            |                |
|                   | 44.450                                        | 53.975 | 38.10  | 3.05 | B-2824              | M-26241 | 78.7                    | 199                      | 2400           | 3700       | 0.0683         |
|                   | 1.7500                                        | 2.1250 | 1.500  | 0.12 |                     |         | 17700                   | 44800                    |                |            |                |
| 1 7/8             | 47.625                                        | 57.150 | 12.70  | 3.05 | B-308               | M-3081  | 25.1                    | 46.3                     | 2300           | 3500       | 0.0489         |
|                   | 1.8750                                        | 2.2500 | 0.500  | 0.12 |                     |         | 5650                    | 10400                    |                |            |                |
|                   | 47.625                                        | 57.150 | 15.888 | —    | B-3010              | —       | 33.6                    | 67.61                    | 2300           | 3500       | N/A            |
|                   | 1.8750                                        | 2.2500 | 0.625  | —    |                     |         | 7550                    | 15200                    |                |            |                |
|                   | 47.625                                        | 57.150 | 19.05  | —    | B-3012              | —       | 41.5                    | 88.5                     | 2300           | 3500       | 0.0574         |
|                   | 1.8750                                        | 2.2500 | 0.750  | —    |                     |         | 9330                    | 19900                    |                |            |                |
|                   | 47.625                                        | 57.150 | 25.40  | 3.05 | B-3016              | M-30161 | 56.0                    | 130                      | 2300           | 3500       | 0.0632         |
|                   | 1.8750                                        | 2.2500 | 1.000  | 0.12 |                     |         | 12600                   | 29200                    |                |            |                |
| 2                 | 50.800                                        | 60.325 | 12.70  | 3.05 | B-328               | M-3281  | 25.4                    | 48.0                     | 2100           | 3300       | 0.0509         |
|                   | 2.0000                                        | 2.3750 | 0.500  | 0.12 |                     |         | 5710                    | 10800                    |                |            |                |
|                   | 50.800                                        | 60.325 | 15.88  | —    | B-3210              | —       | 34.2                    | 70.7                     | 2200           | 3300       | N/A            |
|                   | 2.0000                                        | 2.3750 | 0.625  | —    |                     |         | 7680                    | 15900                    |                |            |                |
|                   | 50.800                                        | 60.325 | 22.23  | —    | B-3214              | —       | 54.3                    | 115                      | 2200           | 3300       | N/A            |
|                   | 2.0000                                        | 2.3750 | 0.875  | —    |                     |         | 11300                   | 26000                    |                |            |                |
|                   | 50.800                                        | 60.325 | 25.40  | 3.05 | B-3216              | M-32161 | 57.4                    | 138                      | 2100           | 3300       | 0.0661         |
|                   | 2.0000                                        | 2.3750 | 1.000  | 0.12 |                     |         | 12900                   | 31000                    |                |            |                |
|                   | 50.800                                        | 60.325 | 31.75  | 3.05 | B-3220              | M-32201 | 71.6                    | 183                      | 2100           | 3300       | 0.0708         |
|                   | 2.0000                                        | 2.3750 | 1.250  | 0.12 |                     |         | 16100                   | 41100                    |                |            |                |
|                   | 50.800                                        | 60.325 | 38.10  | 3.05 | B-3224              | M-32241 | 85.0                    | 228                      | 2100           | 3300       | 0.0748         |
|                   | 2.0000                                        | 2.3750 | 1.500  | 0.12 |                     |         | 19100                   | 51200                    |                |            |                |
|                   | 50.800                                        | 60.325 | 44.45  | 3.05 | B-3228              | M-32281 | 97.4                    | 273                      | 2100           | 3300       | 0.0782         |
|                   | 2.0000                                        | 2.3750 | 1.750  | 0.12 |                     |         | 21900                   | 61300                    |                |            |                |
| 2 1/16            | 52.388                                        | 64.292 | 19.05  | —    | BH-3312             | —       | 46.3                    | 86.7                     | 2600           | 4100       | 0.0574         |
|                   | 2.0625                                        | 2.5312 | 0.750  | —    |                     |         | 10400                   | 19500                    |                |            |                |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------------|---------------|
| Open Ends              | Closed Ends    | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                         |               |
|                        |                | S                       |                  | H                |                  |                   |                  |                  |                         | in.           |
| 0.060<br>0.132         | 0.068<br>0.150 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 |                         |               |
| 0.072<br>0.158         | 0.081<br>0.179 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 |                         |               |
| 0.083<br>0.184         | 0.095<br>0.209 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 |                         |               |
| 0.096<br>0.211         | 0.108<br>0.239 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 | IR-1916                 |               |
| 0.119<br>0.263         | 0.135<br>0.298 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 | IR-1920                 |               |
| 0.051<br>0.113         | —              | 41.275<br>1.6250        | 41.262<br>1.6245 | 50.787<br>1.9995 | 50.813<br>2.0005 | 50.787<br>1.9995  | 41.288<br>1.6255 | 41.318<br>1.6267 |                         | 1 5/8         |
| 0.064<br>0.141         | 0.073<br>0.16  | 41.275<br>1.6250        | 41.262<br>1.6245 | 50.787<br>1.9995 | 50.813<br>2.0005 | 50.787<br>1.9995  | 41.288<br>1.6255 | 41.318<br>1.6267 |                         |               |
| 0.103<br>0.226         | —              | 41.275<br>1.6250        | 41.262<br>1.6245 | 50.787<br>1.9995 | 50.813<br>2.0005 | 50.787<br>1.9995  | 41.288<br>1.6255 | 41.318<br>1.6267 |                         |               |
| 0.128<br>0.282         | 0.145<br>0.32  | 41.275<br>1.6250        | 41.262<br>1.6245 | 50.787<br>1.9995 | 50.813<br>2.0005 | 50.787<br>1.9995  | 41.288<br>1.6255 | 41.318<br>1.6267 | IR-2220                 |               |
| 0.082<br>0.181         | 0.093<br>0.205 | 44.450<br>1.7500        | 44.437<br>1.7495 | 53.962<br>2.1245 | 53.988<br>2.1255 | 53.962<br>2.1245  | 44.463<br>1.7505 | 44.496<br>1.7518 |                         | 1 3/4         |
| 0.110<br>0.242         | 0.124<br>0.274 | 44.450<br>1.7500        | 44.437<br>1.7495 | 53.962<br>2.1245 | 53.988<br>2.1255 | 53.962<br>2.1245  | 44.463<br>1.7505 | 44.496<br>1.7518 | IR-2316                 |               |
| 0.137<br>0.302         | —              | 44.450<br>1.7500        | 44.437<br>1.7495 | 53.962<br>2.1245 | 53.988<br>2.1255 | 53.962<br>2.1245  | 44.463<br>1.7505 | 44.496<br>1.7518 |                         |               |
| 0.165<br>0.363         | 0.186<br>0.411 | 44.450<br>1.7500        | 44.437<br>1.7495 | 53.962<br>2.1245 | 53.988<br>2.1255 | 53.962<br>2.1245  | 44.463<br>1.7505 | 44.496<br>1.7518 | IR-2324                 |               |
| 0.059<br>0.129         | 0.066<br>0.146 | 47.625<br>1.8750        | 47.612<br>1.8745 | 57.137<br>2.2495 | 57.163<br>2.2505 | 57.137<br>2.2495  | 47.638<br>1.8755 | 47.671<br>1.8768 |                         | 1 7/8         |
| 0.073<br>0.161         | —              | 47.625<br>1.8750        | 47.612<br>1.8745 | 57.137<br>2.2495 | 57.163<br>2.2505 | 57.137<br>2.2495  | 47.638<br>1.8755 | 47.671<br>1.8768 |                         |               |
| 0.088<br>0.193         | —              | 47.625<br>1.8750        | 47.612<br>1.8745 | 57.137<br>2.2495 | 57.163<br>2.2505 | 57.137<br>2.2495  | 47.638<br>1.8755 | 47.671<br>1.8768 |                         |               |
| 0.117<br>0.258         | 0.132<br>0.292 | 47.625<br>1.8750        | 47.612<br>1.8745 | 57.137<br>2.2495 | 57.163<br>2.2505 | 57.137<br>2.2495  | 47.638<br>1.8755 | 47.671<br>1.8768 |                         |               |
| 0.062<br>0.136         | 0.070<br>0.154 | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         | 2             |
| 0.078<br>0.171         | —              | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.335<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.108<br>0.239         | —              | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.124<br>0.273         | 0.140<br>0.309 | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.155<br>0.341         | 0.175<br>0.386 | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.186<br>0.410         | 0.211<br>0.465 | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.217<br>0.478         | 0.245<br>0.541 | 50.800<br>2.0000        | 50.785<br>1.9994 | 60.312<br>2.3745 | 60.338<br>2.3755 | 60.312<br>2.3745  | 50.815<br>2.0006 | 50.848<br>2.0019 |                         |               |
| 0.122<br>0.269         | —              | 52.388<br>2.0625        | 52.372<br>2.0619 | 64.280<br>2.5307 | 64.305<br>2.5317 | 64.280<br>2.5307  | 50.815<br>2.0006 | 50.848<br>2.0019 | IR-2916                 | 2 1/16        |

\* Further reduces shaft diameter.

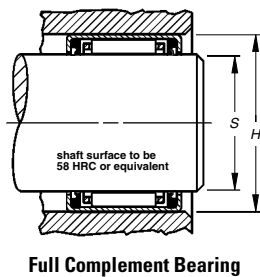
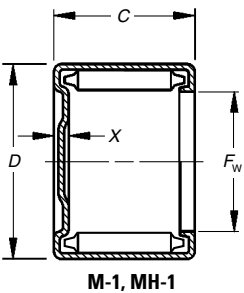
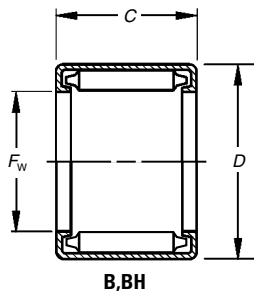
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# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT BEARINGS, OPEN ENDS, CLOSED ONE END — *continued*

### INCH SERIES



| Shaft Dia.<br>in. | Dimensions mm/in.<br>+0 +0.000<br>-0.3 -0.100 |         |       |      | Bearing Designation |          | Load Ratings<br>kN/lbf. |                          | Limiting Speed |            | C <sub>g</sub> |
|-------------------|-----------------------------------------------|---------|-------|------|---------------------|----------|-------------------------|--------------------------|----------------|------------|----------------|
|                   | F <sub>w</sub>                                | D       | C     | Y    |                     |          | Dynamic<br>C            | Static<br>C <sub>0</sub> | Grease<br>RPM  | Oil<br>RPM |                |
|                   | 52.388                                        | 64.292  | 25.40 | 3.56 | BH-3316             | MH-33161 | 64.0                    | 133                      | 2600           | 4100       | 0.0639         |
|                   | 2.0625                                        | 2.5312  | 1.000 | 0.14 |                     |          | 14400                   | 29900                    |                |            |                |
|                   | 52.388                                        | 64.292  | 38.10 | 3.56 | BH-3324             | MH-33241 | 97.0                    | 226                      | 2600           | 4100       | 0.0728         |
|                   | 2.0625                                        | 2.5312  | 1.500 | 0.14 |                     |          | 21800                   | 50700                    |                |            |                |
| 2 1/8             | 53.975                                        | 63.500  | 12.70 | —    | B-348               | —        | 26.1                    | 51.2                     | 2000           | 3100       | 0.0531         |
|                   | 2.1250                                        | 2.5000  | 0.500 | —    |                     |          | 5870                    | 11500                    |                |            |                |
|                   | 53.975                                        | 63.500  | 19.05 | —    | B-3412              | —        | 43.6                    | 99.2                     | 2100           | 3100       | N/A            |
|                   | 2.1250                                        | 2.5000  | 0.750 | —    |                     |          | 9790                    | 22300                    |                |            |                |
|                   | 53.975                                        | 63.500  | 25.40 | 3.05 | B-3416              | M-34161  | 59.2                    | 147                      | 2000           | 3100       | 0.069          |
|                   | 2.1250                                        | 2.5000  | 1.000 | 0.12 |                     |          | 13300                   | 33000                    |                |            |                |
|                   | 53.975                                        | 63.500  | 31.75 | —    | B-3420              | —        | 73.4                    | 194                      | 2000           | 3100       | 0.074          |
|                   | 2.1250                                        | 2.5000  | 1.250 | —    |                     |          | 16500                   | 43700                    |                |            |                |
|                   | 53.975                                        | 63.500  | 38.10 | 3.05 | B-3424              | M-34241  | 87.2                    | 242                      | 2000           | 3100       | 0.0781         |
|                   | 2.1250                                        | 2.5000  | 1.500 | 0.12 |                     |          | 19600                   | 54400                    |                |            |                |
| 2 1/4             | 57.150                                        | 66.675  | 19.05 | 3.30 | B-3612              | M-36121  | 45.8                    | 105                      | 2000           | 3000       | 0.0648         |
|                   | 2.2500                                        | 2.6250  | 0.750 | 0.13 |                     |          | 10300                   | 23700                    |                |            |                |
|                   | 57.150                                        | 66.675  | 31.75 | —    | B-3620              | —        | 77.4                    | 206                      | 2000           | 3000       | 0.0766         |
|                   | 2.2500                                        | 2.6250  | 1.250 | —    |                     |          | 17400                   | 46400                    |                |            |                |
|                   | 57.150                                        | 66.675  | 38.10 | 3.30 | B-3624              | M-36241  | 92.1                    | 257                      | 2000           | 3000       | 0.0809         |
|                   | 2.2500                                        | 2.6250  | 1.500 | 0.13 |                     |          | 20700                   | 57700                    |                |            |                |
| 2 5/8             | 66.675                                        | 76.200  | 25.40 | 3.30 | B-4216              | M-42161  | 66.7                    | 182                      | 1700           | 2500       | 0.0799         |
|                   | 2.6250                                        | 3.0000  | 1.000 | 0.13 |                     |          | 15000                   | 40900                    |                |            |                |
| 2 3/4             | 69.850                                        | 79.375  | 15.88 | —    | B-4410              | —        | 41.0                    | 98                       | 1600           | 2500       | 0.0698         |
|                   | 2.7500                                        | 3.1250  | 0.625 | —    |                     |          | 9210                    | 22000                    |                |            |                |
|                   | 69.850                                        | 79.375  | 25.40 | —    | B-4416              | —        | 69.0                    | 190                      | 1600           | 2500       | 0.0824         |
|                   | 2.7500                                        | 3.1250  | 1.000 | —    |                     |          | 15500                   | 42800                    |                |            |                |
|                   | 69.850                                        | 79.375  | 31.75 | 3.30 | B-4420              | M-44201  | 85.4                    | 252                      | 1600           | 2500       | 0.0883         |
|                   | 2.7500                                        | 3.1250  | 1.250 | 0.13 |                     |          | 19200                   | 56700                    |                |            |                |
| 3 1/2             | 88.900                                        | 101.600 | 19.05 | —    | B-5612              | —        | 64.9                    | 150                      | 1800           | 2700       | N/A            |
|                   | 3.5000                                        | 4.0000  | 0.750 | —    |                     |          | 14600                   | 33700                    |                |            |                |
| 5 1/2             | 139.700                                       | 152.400 | 19.05 | —    | B-8812              | —        | 77.00                   | 231                      | 1000           | 1600       | 0.114          |
|                   | 5.5000                                        | 6.0000  | 0.750 | —    |                     |          | 17300                   | 52000                    |                |            |                |

Drawn cup bearings of nominal inch dimensions, with one closed end, that are not tabulated, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design.

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |             | Bearing Mounting mm/in. |         |         |         | Inspection mm/in. |         |            | Matching<br>Inner Ring* | Shaft<br>Dia. |
|------------------------|-------------|-------------------------|---------|---------|---------|-------------------|---------|------------|-------------------------|---------------|
| Open Ends              | Closed Ends | Max.                    | Min.    | Min.    | Max.    | Ring Gage         | Plug-GO | Plug-NO-Go |                         |               |
|                        |             | S                       |         | H       |         |                   |         |            |                         | in.           |
| 0.162                  | 0.184       | 52.388                  | 52.372  | 64.280  | 64.305  | 64.280            | 50.815  | 50.848     | IR-2916                 |               |
| 0.358                  | 0.406       | 2.0625                  | 2.0619  | 2.5307  | 2.5317  | 2.5307            | 2.0006  | 2.0019     |                         |               |
| 0.244                  | 0.276       | 52.388                  | 52.372  | 64.280  | 64.305  | 64.280            | 50.815  | 50.848     | IR-2724                 |               |
| 0.537                  | 0.609       | 2.0625                  | 2.0619  | 2.5307  | 2.5317  | 2.5307            | 2.0006  | 2.0019     |                         |               |
| 0.065                  | —           | 53.975                  | 53.960  | 63.487  | 63.513  | 63.487            | 53.990  | 54.028     |                         | 2 1/8         |
| 0.144                  | —           | 2.1250                  | 2.1244  | 2.4995  | 2.5005  | 2.4995            | 2.1256  | 2.1271     |                         |               |
| 0.098                  | —           | 53.975                  | 53.960  | 63.487  | 63.513  | 63.487            | 53.990  | 54.028     |                         |               |
| 0.216                  | —           | 2.1250                  | 2.1244  | 2.4995  | 2.5005  | 2.4995            | 2.1256  | 2.1271     |                         |               |
| 0.131                  | 0.148       | 53.975                  | 53.960  | 63.487  | 63.513  | 63.487            | 53.990  | 54.028     |                         |               |
| 0.289                  | 0.327       | 2.1250                  | 2.1244  | 2.4995  | 2.5005  | 2.4995            | 2.1256  | 2.1271     |                         |               |
| 0.164                  | —           | 53.975                  | 53.960  | 63.487  | 63.513  | 63.487            | 53.990  | 54.028     |                         |               |
| 0.361                  | —           | 2.1250                  | 2.1244  | 2.4995  | 2.5005  | 2.4995            | 2.1256  | 2.1271     |                         |               |
| 0.196                  | 0.223       | 53.975                  | 53.960  | 63.487  | 63.513  | 63.487            | 53.990  | 54.028     | IR-3024                 |               |
| 0.433                  | 0.491       | 2.1250                  | 2.1244  | 2.4995  | 2.5005  | 2.4995            | 2.1256  | 2.1271     |                         |               |
| 0.103                  | 0.117       | 57.150                  | 57.135  | 66.662  | 66.688  | 66.662            | 57.165  | 57.203     |                         | 2 1/4         |
| 0.228                  | 0.258       | 2.2500                  | 2.2494  | 2.6245  | 2.6255  | 2.6245            | 2.2506  | 2.2521     |                         |               |
| 0.172                  | —           | 57.150                  | 57.135  | 66.662  | 66.688  | 66.662            | 57.165  | 57.203     |                         |               |
| 0.380                  | —           | 2.2500                  | 2.2494  | 2.6245  | 2.6255  | 2.6245            | 2.2506  | 2.2521     |                         |               |
| 0.207                  | 0.235       | 57.150                  | 57.135  | 66.662  | 66.688  | 66.662            | 57.165  | 57.203     |                         |               |
| 0.456                  | 0.517       | 2.2500                  | 2.2494  | 2.6245  | 2.6255  | 2.6245            | 2.2506  | 2.2521     |                         |               |
| 0.159                  | 0.181       | 66.675                  | 66.660  | 76.187  | 76.213  | 76.187            | 66.700  | 66.739     |                         | 2 5/8         |
| 0.351                  | 0.398       | 2.6250                  | 2.6244  | 2.9995  | 3.0005  | 2.9995            | 2.6260  | 2.6275     |                         |               |
| 0.104                  | —           | 69.850                  | 69.835  | 79.362  | 79.388  | 79.362            | 69.875  | 69.914     |                         | 2 3/4         |
| 0.229                  | —           | 2.7500                  | 2.7494  | 3.1245  | 3.1255  | 3.1245            | 2.7510  | 2.7525     |                         |               |
| 0.166                  | —           | 69.850                  | 69.835  | 79.362  | 79.388  | 79.362            | 69.875  | 69.914     | IR-4016                 |               |
| 0.366                  | —           | 2.7500                  | 2.7494  | 3.1245  | 3.1255  | 3.1245            | 2.7510  | 2.7525     |                         |               |
| 0.208                  | 0.235       | 69.850                  | 69.835  | 79.362  | 79.388  | 79.362            | 69.875  | 69.914     |                         |               |
| 0.458                  | 0.519       | 2.7500                  | 2.7494  | 3.1245  | 3.1255  | 3.1245            | 2.7510  | 2.7525     |                         |               |
| 0.212                  | —           | 88.900                  | 88.885  | 101.587 | 101.613 | 101.587           | 88.925  | 88.964     |                         | 3 1/2         |
| 0.468                  | —           | 3.5000                  | 3.4994  | 3.9995  | 4.0005  | 3.9995            | 3.5010  | 3.5025     |                         |               |
| 0.325                  | —           | 139.700                 | 139.682 | 152.375 | 152.425 | 152.375           | 139.725 | 139.776    |                         | 5 1/2         |
| 0.717                  | —           | 5.5000                  | 5.4993  | 5.9990  | 6.0010  | 5.9990            | 5.5010  | 5.5030     |                         |               |

\* Further reduces shaft diameter.





## NEEDLE ROLLER BEARINGS

### EXTRA-PRECISION BEARINGS –

#### INCH SERIES

Open end full complement mechanically retained drawn cup needle roller bearings, manufactured to inch standards, are offered with extra-precision specifications. The manufacturing tolerance of these bearings is one-third that of the precision bearings. In production operations using closer tolerances on shaft and housing, they will assemble with consistently lower radial internal clearances than can be expected with the precision series bearings.

Extra-precision bearings are suitable for those applications requiring close control of radial play and eccentricity. They are also preferred when two bearings are mounted adjacent to each other since the greater accuracy in manufacture will provide better load distribution between the bearings.

Nominal dimensions, load ratings, limiting speeds and other general specifications for extra-precision bearings are the same as for the corresponding “B” or “BH” sizes of drawn cup needle bearings. Consequently, the data on pages C66 to C79 can be used in bearing size selection.

When ordering an extra-precision bearing, add the prefix letter “G” to the bearing designation. For example, after following the size selection procedure outlined in the engineering section, bearing B-1212 is selected, but extra-precision tolerances are required. These are designated by ordering a GB-1212 bearing.

To realize the advantages of the expected closer radial internal clearance of the extra-precision bearing, the user must have the capability of producing housing bore and shaft raceway diameters to the close tolerances indicated by the tabular data on the facing page.

The resulting total radial internal clearance within the installed GB-1212 extra-precision drawn cup needle roller bearing will lie in the range from 0.0002 in. to 0.0012 in.

Inspection dimensions for the extra-precision bearings are given in the table at the right. Note that these bearings must be inspected while mounted in the specified ring gage. Bearing bores are checked with “GO” and “NO GO” plug gages. The “GO” gage size is the minimum diameter inside the needle rollers. The “NO GO” gage size is 0.0001 in. larger than the maximum diameter inside the needle rollers.

Procedures for selecting ring and plug gage dimensions are the same as for those involving precision needle bearings, except that the ring gage diameters and diameters inside the needle rollers must be drawn from the table on this page.

| Nominal Inch Shaft Diameter | Gaging    |                                |        |
|-----------------------------|-----------|--------------------------------|--------|
|                             | Ring Gage | Diameter Inside Needle Rollers |        |
|                             |           | Min.                           | Max.   |
| 1/8                         | 0.2473    | 0.1256                         | 0.1260 |
| 5/32                        | 0.2785    | 0.1569                         | 0.1573 |
| 3/16                        | 0.3390    | 0.1881                         | 0.1885 |
| 1/4                         | 0.4328    | 0.2506                         | 0.2510 |
| 5/16                        | 0.4953    | 0.3131                         | 0.3135 |
| <b>H</b> 5/16               | 0.5578    | 0.3131                         | 0.3135 |
| 3/8                         | 0.5578    | 0.3756                         | 0.3760 |
| <b>H</b> 3/8                | 0.6203    | 0.3756                         | 0.3760 |
| 7/16                        | 0.6203    | 0.4381                         | 0.4385 |
| <b>H</b> 7/16               | 0.6828    | 0.4381                         | 0.4385 |
| 1/2                         | 0.6828    | 0.5006                         | 0.5010 |
| <b>H</b> 1/2                | 0.7453    | 0.5006                         | 0.5010 |
| 9/16                        | 0.7453    | 0.5631                         | 0.5635 |
| <b>H</b> 9/16               | 0.8078    | 0.5631                         | 0.5635 |
| 5/8                         | 0.8078    | 0.6256                         | 0.6260 |
| <b>H</b> 5/8                | 0.8703    | 0.6256                         | 0.6260 |
| 11/16                       | 0.8703    | 0.6881                         | 0.6885 |
| <b>H</b> 11/16              | 0.9328    | 0.6881                         | 0.6885 |
| 3/4                         | 0.9950    | 0.7503                         | 0.7507 |
| <b>H</b> 3/4                | 1.0575    | 0.7503                         | 0.7507 |
| 13/16                       | 1.0575    | 0.8128                         | 0.8132 |
| <b>H</b> 13/16              | 1.1200    | 0.8128                         | 0.8132 |
| 7/8                         | 1.1200    | 0.8753                         | 0.8757 |
| <b>H</b> 7/8                | 1.1825    | 0.8753                         | 0.8757 |
| 15/16                       | 1.1825    | 0.9378                         | 0.9382 |
| <b>1</b>                    | 1.2450    | 1.0003                         | 1.0007 |
| <b>H 1</b>                  | 1.3075    | 1.0003                         | 1.0007 |
| 1 1/16                      | 1.3075    | 1.0628                         | 1.0632 |
| 1 1/8                       | 1.3700    | 1.1253                         | 1.1257 |
| <b>H 1 1/8</b>              | 1.4950    | 1.1253                         | 1.1257 |
| 1 3/16                      | 1.4950    | 1.1878                         | 1.1882 |
| 1 1/4                       | 1.4950    | 1.2503                         | 1.2507 |
| <b>H 1 1/4</b>              | 1.6200    | 1.2503                         | 1.2507 |
| 1 5/16                      | 1.6200    | 1.3128                         | 1.3132 |
| 1 3/8                       | 1.6200    | 1.3753                         | 1.3757 |
| <b>H 1 3/8</b>              | 1.7450    | 1.3753                         | 1.3757 |
| 1 1/2                       | 1.8700    | 1.5003                         | 1.5008 |
| 1 5/8                       | 1.9950    | 1.6253                         | 1.6258 |
| 1 3/4                       | 2.1200    | 1.7503                         | 1.7508 |
| 1 7/8                       | 2.2450    | 1.8753                         | 1.8758 |
| <b>2</b>                    | 2.3700    | 2.0003                         | 2.0008 |
| <b>H 2 1/16</b>             | 2.5262    | 2.0628                         | 2.0633 |
| 2 1/8                       | 2.4950    | 2.1253                         | 2.1258 |
| 2 1/4                       | 2.6200    | 2.2503                         | 2.2508 |
| 2 5/8                       | 2.9950    | 2.6254                         | 2.6260 |
| 2 3/4                       | 3.1200    | 2.7504                         | 2.7510 |
| 3 1/2                       | 3.9950    | 3.5004                         | 3.5010 |



## Drawn Cup Needle Roller Bearings

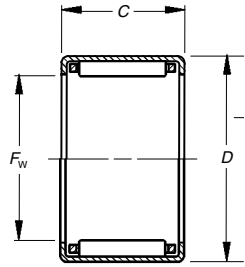
| Bearing Bore Designation | Mounting          |                   |                        |        |              |        |
|--------------------------|-------------------|-------------------|------------------------|--------|--------------|--------|
|                          | Nominal Bore Inch | Nominal O.D. Inch | Shaft Raceway Diameter |        | Housing Bore |        |
|                          |                   |                   | Max.                   | Min.   | Min.         | Max.   |
| <b>GB-2</b>              | .1250             | .2500             | 0.1251                 | 0.1248 | 0.2470       | 0.2473 |
| <b>GB-2 1/2</b>          | .1562             | .2812             | 0.1564                 | 0.1561 | 0.2782       | 0.2785 |
| <b>GB-3</b>              | .1875             | .3438             | 0.1876                 | 0.1873 | 0.3387       | 0.3390 |
| <b>GB-4</b>              | .2500             | .4375             | 0.2501                 | 0.2498 | 0.4325       | 0.4328 |
| <b>GB-5</b>              | .3125             | .5000             | 0.3126                 | 0.3123 | 0.4950       | 0.4953 |
| <b>GBH-5</b>             | .3125             | .5625             | 0.3126                 | 0.3123 | 0.5575       | 0.5578 |
| <b>GB-6</b>              | .3750             | .5625             | 0.3751                 | 0.3748 | 0.5575       | 0.5578 |
| <b>GBH-6</b>             | .3750             | .6250             | 0.3751                 | 0.3748 | 0.6200       | 0.6203 |
| <b>GB-7</b>              | .4375             | .6250             | 0.4376                 | 0.4373 | 0.6200       | 0.6203 |
| <b>GBH-7</b>             | .4375             | .6875             | 0.4376                 | 0.4373 | 0.6825       | 0.6828 |
| <b>GB-8</b>              | .5000             | .6875             | 0.5001                 | 0.4998 | 0.6825       | 0.6828 |
| <b>GBH-8</b>             | .5000             | .7500             | 0.5001                 | 0.4998 | 0.7450       | 0.7453 |
| <b>GB-9</b>              | .5625             | .7500             | 0.5626                 | 0.5623 | 0.7450       | 0.7453 |
| <b>GBH-9</b>             | .5625             | .8125             | 0.5626                 | 0.5623 | 0.8075       | 0.8078 |
| <b>GB-10</b>             | .6250             | .8125             | 0.6251                 | 0.6248 | 0.8075       | 0.8078 |
| <b>GBH-10</b>            | .6250             | .8750             | 0.6251                 | 0.6248 | 0.8700       | 0.8703 |
| <b>GB-11</b>             | .6875             | .8750             | 0.6876                 | 0.6873 | 0.8700       | 0.8703 |
| <b>GBH-11</b>            | .6875             | .9375             | 0.6876                 | 0.6873 | 0.9325       | 0.9328 |
| <b>GB-12</b>             | .7500             | 1.0000            | 0.7501                 | 0.7498 | 0.9950       | 0.9953 |
| <b>GBH-12</b>            | .7500             | 1.0625            | 0.7501                 | 0.7498 | 1.0575       | 1.0578 |
| <b>GB-13</b>             | .8125             | 1.0625            | 0.8126                 | 0.8123 | 1.0575       | 1.0578 |
| <b>GBH-13</b>            | .8125             | 1.1250            | 0.8126                 | 0.8123 | 1.1200       | 1.1203 |
| <b>GB-14</b>             | .8750             | 1.1250            | 0.8751                 | 0.8748 | 1.1200       | 1.1203 |
| <b>GBH-14</b>            | .8750             | 1.1875            | 0.8751                 | 0.8748 | 1.1825       | 1.1829 |
| <b>GB-15</b>             | .9375             | 1.1875            | 0.9376                 | 0.9373 | 1.1825       | 1.1829 |
| <b>GB-16</b>             | 1.0000            | 1.2500            | 1.0001                 | 0.9998 | 1.2450       | 1.2454 |
| <b>GBH-16</b>            | 1.0000            | 1.3125            | 1.0001                 | 0.9998 | 1.3075       | 1.3079 |
| <b>GB-17</b>             | 1.0625            | 1.3125            | 1.0626                 | 1.0623 | 1.3075       | 1.3079 |
| <b>GB-18</b>             | 1.1250            | 1.3750            | 1.1251                 | 1.1248 | 1.3700       | 1.3704 |
| <b>GBH-18</b>            | 1.1250            | 1.5000            | 1.1251                 | 1.1248 | 1.4950       | 1.4955 |
| <b>GB-19</b>             | 1.1875            | 1.5000            | 1.1876                 | 1.1873 | 1.4950       | 1.4955 |
| <b>GB-20</b>             | 1.2500            | 1.5000            | 1.2501                 | 1.2498 | 1.4950       | 1.4955 |
| <b>GBH-20</b>            | 1.2500            | 1.6250            | 1.2501                 | 1.2498 | 1.6200       | 1.6205 |
| <b>GB-21</b>             | 1.3125            | 1.6250            | 1.3126                 | 1.3123 | 1.6200       | 1.6205 |
| <b>GB-22</b>             | 1.3750            | 1.6250            | 1.3750                 | 1.3747 | 1.6200       | 1.6205 |
| <b>GBH-22</b>            | 1.3750            | 1.7500            | 1.3750                 | 1.3747 | 1.7450       | 1.7455 |
| <b>GB-24</b>             | 1.5000            | 1.8750            | 1.5000                 | 1.4997 | 1.8700       | 1.8705 |
| <b>GB-26</b>             | 1.6250            | 2.0000            | 1.6250                 | 1.6247 | 1.9950       | 1.9955 |
| <b>GB-28</b>             | 1.7500            | 2.1250            | 1.7500                 | 1.7497 | 2.1200       | 2.1205 |
| <b>GB-30</b>             | 1.8750            | 2.2500            | 1.8750                 | 1.8747 | 2.2450       | 2.2455 |
| <b>GB-32</b>             | 2.0000            | 2.3750            | 2.0000                 | 1.9997 | 2.3700       | 2.3705 |
| <b>GBH-33</b>            | 2.0625            | 2.5312            | 2.0624                 | 2.0621 | 2.5262       | 2.5267 |
| <b>GB-34</b>             | 2.1250            | 2.5000            | 2.1249                 | 2.1246 | 2.4950       | 2.4955 |
| <b>GB-36</b>             | 2.2500            | 2.6250            | 2.2499                 | 2.2496 | 2.6200       | 2.6205 |
| <b>GB-42</b>             | 2.6250            | 3.0000            | 2.6248                 | 2.6245 | 2.9950       | 2.9956 |
| <b>GB-44</b>             | 2.7500            | 3.1250            | 2.7498                 | 2.7495 | 3.1200       | 3.1206 |
| <b>GB-56</b>             | 3.5000            | 4.0000            | 3.4998                 | 3.4995 | 3.9950       | 3.9956 |

\* Check for availability as not every size may be in production.

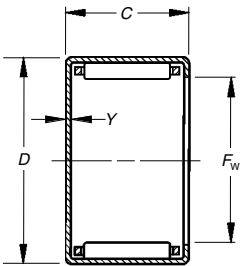


# NEEDLE ROLLER BEARINGS

## CAGED BEARINGS – OPEN ENDS, CLOSED ONE END INCH SERIES



J,JH



MJ-1, MJH-1

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design. See page C62 for mounting procedure.

| Shaft Diameter | Dimensions mm/in. |        |        |      | Bearing Designation | Load Ratings kN/lbf. |        | Limiting Speed |       | C <sub>g</sub> |
|----------------|-------------------|--------|--------|------|---------------------|----------------------|--------|----------------|-------|----------------|
|                | F <sub>w</sub>    | D      | C      | Y    |                     | Dynamic              | Static | Grease         | Oil   |                |
| in.            | F <sub>w</sub>    | D      | C      | Y    | C                   | C <sub>0</sub>       | RPM    |                |       |                |
| 1/8            | 3.175             | 6.350  | 4.780  | —    | JP-23-F —           | 0.89                 | 0.62   | 33000          | 51000 | 0.0064         |
|                | 0.1250            | 0.2500 | 0.188  | —    |                     | 200                  | 140    |                |       |                |
| 5/32           | 3.970             | 7.142  | 4.780  | —    | JP-2-1/2-3F —       | 0.93                 | 0.62   | 31000          | 47000 | 0.007          |
|                | 0.1563            | 0.2812 | 0.188  | —    |                     | 210                  | 140    |                |       |                |
| 3/16           | 4.763             | 8.733  | 9.530  | 1.02 | J-36 MJ-361         | 2.27                 | 1.91   | 25000          | 38000 | 0.0097         |
|                | 0.1875            | 0.3438 | 0.375  | 0.04 |                     | 510                  | 430    |                |       |                |
| 1/4            | 6.350             | 11.113 | 7.920  | 1.02 | J-45 MJ-451         | 2.22                 | 1.73   | 20000          | 30000 | 0.0103         |
|                | 0.2500            | 0.4375 | 0.312  | 0.04 |                     | 500                  | 390    |                |       |                |
| 5/16           | 7.938             | 12.700 | 7.920  | —    | J-55 —              | 2.40                 | 2.00   | 18000          | 28000 | 0.0117         |
|                | 0.3125            | 0.5000 | 0.312  | —    |                     | 540                  | 450    |                |       |                |
| 3/8            | 9.525             | 14.288 | 7.920  | 1.02 | J-65 MJ-651         | 2.76                 | 2.49   | 18000          | 27000 | 0.0133         |
|                | 0.3750            | 0.5625 | 0.312  | 0.04 |                     | 620                  | 560    |                |       |                |
| 7/16           | 11.113            | 15.875 | 12.700 | 1.02 | J-78 MJ-781         | 6.36                 | 7.70   | 17000          | 26000 | 0.0187         |
|                | 0.4375            | 0.6250 | 0.500  | 0.04 |                     | 1430                 | 1730   |                |       |                |
| 1/2            | 12.700            | 17.463 | 7.920  | 1.02 | J-85 MJ-851         | 3.47                 | 3.65   | 16000          | 25000 | 0.0164         |
|                | 0.5000            | 0.6875 | 0.312  | 0.04 |                     | 780                  | 820    |                |       |                |
| 9/16           | 14.288            | 19.050 | 11.130 | 1.02 | J-97 MJ-971         | 5.47                 | 6.81   | 16000          | 25000 | 0.0221         |
|                | 0.5625            | 0.7500 | 0.438  | 0.04 |                     | 1230                 | 1530   |                |       |                |
| 1 1/8          | 17.463            | 22.862 | 12.700 | 1.02 | J-98 MJ-981         | 6.23                 | 8.01   | 16000          | 25000 | 0.021          |
|                | 0.6875            | 0.9062 | 0.500  | 0.04 |                     | 1400                 | 1800   |                |       |                |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                 | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring | Shaft<br>Diameter |
|------------------------|-----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|------------------------|-------------------|
| Open Ends              | Closed Ends     | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                        |                   |
|                        |                 | S                       |                  | H                |                  |                   |                  |                  |                        | in.               |
| 0.0005<br>0.001        | —               | 3.175<br>0.1250         | 3.167<br>0.1247  | 6.350<br>0.2500  | 6.363<br>0.2505  | 6.363<br>0.2505   | 3.195<br>0.1258  | 3.221<br>0.1268  |                        | 1/8               |
| 0.0005<br>0.001        | —               | 3.970<br>0.1563         | 3.962<br>0.1560  | 7.142<br>0.2812  | 7.155<br>0.2817  | 7.155<br>0.2817   | 3.990<br>0.1571  | 4.016<br>0.1581  |                        | 5/32              |
| 0.0018<br>0.004        | 0.0023<br>0.005 | 4.763<br>0.1875         | 4.755<br>0.1872  | 8.717<br>0.3432  | 8.730<br>0.3437  | 8.730<br>0.3437   | 4.783<br>0.1883  | 4.808<br>0.1893  |                        | 3/16              |
| 0.0027<br>0.006        | 0.0032<br>0.007 | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                        | 1/4               |
| 0.0036<br>0.008        | 0.0041<br>0.009 | 6.350<br>0.2500         | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 11.125<br>0.4380  | 6.388<br>0.2515  | 6.414<br>0.2525  |                        |                   |
| 0.0032<br>0.007        | —               | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                        | 5/16              |
| 0.0041<br>0.009        | 0.0050<br>0.011 | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 12.713<br>0.5005  | 7.976<br>0.3140  | 8.001<br>0.3150  |                        |                   |
| 0.0059<br>0.013        | 0.0073<br>0.016 | 7.938<br>0.3125         | 7.925<br>0.3120  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 7.976<br>0.3140  | 8.001<br>0.3150  |                        |                   |
| 0.0036<br>0.008        | 0.0041<br>0.009 | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                        | 3/8               |
| 0.0041<br>0.009        | 0.0045<br>0.01  | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  |                        |                   |
| 0.0054<br>0.012        | 0.0059<br>0.013 | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 14.300<br>0.5630  | 9.563<br>0.3765  | 9.589<br>0.3775  | IRA-3                  |                   |
| 0.0077<br>0.017        | —               | 9.525<br>0.3750         | 9.512<br>0.3745  | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 9.563<br>0.3765  | 9.589<br>0.3775  | IRA-3                  |                   |
| 0.0064<br>0.014        | 0.0073<br>0.016 | 11.113<br>0.4375        | 11.100<br>0.4370 | 15.862<br>0.6245 | 15.888<br>0.6255 | 15.888<br>0.6255  | 11.151<br>0.4390 | 11.176<br>0.4400 |                        | 7/16              |
| 0.0086<br>0.019        | —               | 11.113<br>0.4375        | 11.100<br>0.4370 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 11.151<br>0.4390 | 11.176<br>0.4400 |                        |                   |
| 0.0045<br>0.01         | 0.0054<br>0.012 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        | 1/2               |
| 0.0050<br>0.011        | 0.0059<br>0.013 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        |                   |
| 0.0068<br>0.015        | 0.0082<br>0.018 | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 | IRA-5                  |                   |
| 0.0104<br>0.023        | —               | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 17.475<br>0.6880  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        |                   |
| 0.0086<br>0.019        | 0.0104<br>0.023 | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        |                   |
| 0.0100<br>0.022        | 0.0118<br>0.026 | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        |                   |
| 0.0145<br>0.032        | —               | 12.700<br>0.5000        | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 12.738<br>0.5015 | 12.764<br>0.5025 |                        |                   |
| 0.0073<br>0.016        | 0.0086<br>0.019 | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 |                        | 9/16              |
| 0.0077<br>0.017        | 0.0091<br>0.02  | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                  |                   |

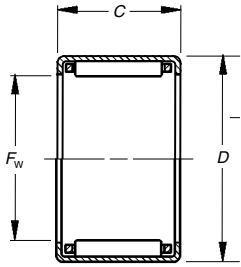
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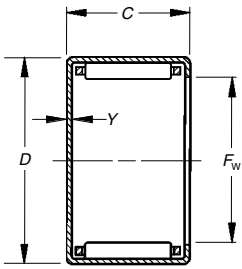
# NEEDLE ROLLER BEARINGS

## CAGED BEARINGS – OPEN ENDS, CLOSED ONE END – *continued*

### INCH SERIES



J, JH



MJ-1, MJH-1

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design. See page C62 for mounting procedure.

| Shaft Diameter | Dimensions mm/in. |        |        |      | Bearing Designation | Load Ratings kN/lbf. |        | Limiting Speed |                | C <sub>g</sub> |        |
|----------------|-------------------|--------|--------|------|---------------------|----------------------|--------|----------------|----------------|----------------|--------|
|                | F <sub>w</sub>    | D      | C      | Y    |                     | Dynamic              | Static | Grease         | Oil            |                |        |
| in.            | F <sub>w</sub>    | D      | C      | Y    | C                   | C <sub>0</sub>       | RPM    |                | C <sub>g</sub> |                |        |
|                | 14.288            | 19.050 | 15.880 | —    | J-910               | —                    | 5.83   | 7.21           | 16000          | 25000          | 0.0205 |
|                | 0.5625            | 0.7500 | 0.625  | —    |                     |                      | 1310   | 1620           |                |                |        |
|                | 14.288            | 20.638 | 12.700 | 1.02 | JH-98               | MJH-981              | 8.01   | 8.50           | 12000          | 18000          | N/A    |
|                | 0.5625            | 0.8125 | 0.500  | 0.04 |                     |                      | 1800   | 1910           |                |                |        |
| 5/8            | 15.875            | 20.638 | 12.700 | 1.02 | J-108               | MJ-1081              | 6.72   | 9.12           | 13000          | 21000          | 0.0227 |
|                | 0.6250            | 0.8125 | 0.500  | 0.04 |                     |                      | 1510   | 2050           |                |                |        |
|                | 15.875            | 20.638 | 15.880 | 1.02 | J-1010              | MJ-10101             | 8.81   | 12.94          | 13000          | 21000          | 0.0247 |
|                | 0.6250            | 0.8125 | 0.625  | 0.04 |                     |                      | 1980   | 2910           |                |                |        |
|                | 15.875            | 20.638 | 19.050 | 1.02 | J-1012              | MJ-10121             | 11.74  | 18.86          | 13000          | 21000          | 0.0272 |
|                | 0.6250            | 0.8125 | 0.750  | 0.04 |                     |                      | 2640   | 4240           |                |                |        |
|                | 15.875            | 22.212 | 15.880 | 1.02 | JH-1010             | MJH-10101            | 11.57  | 14.10          | 14000          | 21000          | 0.024  |
|                | 0.6250            | 0.8745 | 0.625  | 0.04 |                     |                      | 2600   | 3170           |                |                |        |
|                | 15.875            | 22.212 | 25.400 | 1.02 | JH-1016             | MJH-10161            | 19.79  | 28.11          | 14000          | 21000          | 0.0285 |
|                | 0.6250            | 0.8745 | 1.000  | 0.04 |                     |                      | 4450   | 6320           |                |                |        |
| 11/16          | 17.463            | 22.212 | 19.050 | 1.02 | J-1112              | MJ-11121             | 11.43  | 18.73          | 12000          | 19000          | 0.029  |
|                | 0.6875            | 0.8745 | 0.750  | 0.04 |                     |                      | 2570   | 4210           |                |                |        |
|                | 17.463            | 23.813 | 15.880 | 1.02 | JH-1110             | MJH-11101            | 12.05  | 15.21          | 13000          | 19000          | 0.0255 |
|                | 0.6875            | 0.9375 | 0.625  | 0.04 |                     |                      | 2710   | 3420           |                |                |        |
|                | 17.463            | 23.813 | 19.050 | —    | JH-1112             | —                    | 16.15  | 22.20          | 13000          | 19000          | 0.028  |
|                | 0.6875            | 0.9375 | 0.750  | —    |                     |                      | 3630   | 4990           |                |                |        |
| 3/4            | 19.050            | 25.400 | 9.530  | —    | J-126               | —                    | 6.49   | 7.03           | 11000          | 18000          | 0.0218 |
|                | 0.7500            | 1.0000 | 0.375  | —    |                     |                      | 1460   | 1580           |                |                |        |
|                | 19.050            | 25.400 | 12.700 | —    | J-128               | —                    | 9.92   | 12.19          | 11000          | 18000          | 0.025  |
|                | 0.7500            | 1.0000 | 0.500  | —    |                     |                      | 2230   | 2740           |                |                |        |
|                | 19.050            | 25.400 | 15.880 | 1.02 | J-1210              | MJ-12101             | 12.50  | 16.32          | 11000          | 18000          | 0.0269 |
|                | 0.7500            | 1.0000 | 0.625  | 0.04 |                     |                      | 2810   | 3670           |                |                |        |
|                | 19.050            | 25.400 | 19.050 | 1.02 | J-1212              | MJ-12121             | 15.52  | 21.62          | 11000          | 18000          | 0.0288 |
|                | 0.7500            | 1.0000 | 0.750  | 0.04 |                     |                      | 3490   | 4860           |                |                |        |
|                | 19.050            | 26.988 | 19.050 | 1.02 | JH-1212             | MJH-12121            | 19.08  | 23.58          | 12000          | 18000          | 0.0285 |
|                | 0.7500            | 1.0625 | 0.750  | 0.04 |                     |                      | 4290   | 5300           |                |                |        |
| 13/16          | 20.638            | 26.988 | 22.230 | —    | J-1314              | —                    | 19.31  | 29.31          | 10000          | 16000          | 0.0321 |
|                | 0.8125            | 1.0625 | 0.875  | —    |                     |                      | 4340   | 6590           |                |                |        |
|                | 20.638            | 28.575 | 19.050 | 1.27 | JH-1312             | MJH-13121            | 18.77  | 24.55          | 11000          | 16000          | 0.0299 |
|                | 0.8125            | 1.1250 | 0.750  | 0.05 |                     |                      | 4220   | 5520           |                |                |        |
| 7/8            | 22.225            | 28.575 | 9.530  | —    | J-146               | —                    | 7.21   | 8.41           | 9700           | 15000          | 0.0243 |
|                | 0.8750            | 1.1250 | 0.375  | —    |                     |                      | 1620   | 1890           |                |                |        |
|                | 22.225            | 28.575 | 12.700 | —    | J-148               | —                    | 10.94  | 14.50          | 9700           | 15000          | 0.027  |
|                | 0.8750            | 1.1250 | 0.500  | —    |                     |                      | 2460   | 3260           |                |                |        |
|                | 22.225            | 28.575 | 19.050 | 1.02 | J-1412              | MJ-14121             | 17.88  | 27.18          | 9700           | 15000          | 0.0325 |
|                | 0.8750            | 1.1250 | 0.750  | 0.04 |                     |                      | 4020   | 6110           |                |                |        |
|                | 22.225            | 28.575 | 25.400 | 1.02 | J-1416              | MJ-14161             | 23.66  | 38.97          | 9700           | 15000          | 0.0356 |
|                | 0.8750            | 1.1250 | 1.000  | 0.04 |                     |                      | 5320   | 8760           |                |                |        |
|                | 22.225            | 30.163 | 19.050 | 1.27 | JH-1412             | MJH-14121            | 18.33  | 24.55          | 9800           | 15000          | 0.0309 |
|                | 0.8750            | 1.1875 | 0.750  | 0.05 |                     |                      | 4120   | 5520           |                |                |        |
|                | 22.225            | 30.163 | 25.400 | 1.27 | JH-1416             | MJH-14161            | 25.40  | 37.37          | 9800           | 15000          | 0.0343 |
|                | 0.8750            | 1.1875 | 1.000  | 0.05 |                     |                      | 5710   | 8400           |                |                |        |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                 | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring | Shaft<br>Diameter |
|------------------------|-----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|------------------------|-------------------|
| Open Ends              | Closed Ends     | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                        |                   |
|                        |                 | S                       |                  | H                |                  |                   |                  |                  |                        | in.               |
| 0.0095<br>0.021        | —               | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 19.063<br>0.7505  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-612                 |                   |
| 0.0113<br>0.025        | 0.0136<br>0.03  | 14.288<br>0.5625        | 14.275<br>0.5620 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 14.326<br>0.5640 | 14.351<br>0.5650 | IR-68                  |                   |
| 0.0086<br>0.019        | 0.0104<br>0.023 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-68-1                | 5/8               |
| 0.0104<br>0.023        | 0.0127<br>0.028 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 |                        |                   |
| 0.0127<br>0.028        | 0.0150<br>0.033 | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 20.650<br>0.8130  | 15.913<br>0.6265 | 15.939<br>0.6275 | IR-612-1               |                   |
| 0.0145<br>0.032        | 0.0168<br>0.037 | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 |                        |                   |
| 0.0236<br>0.052        | 0.0281<br>0.062 | 15.875<br>0.6250        | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 15.913<br>0.6265 | 15.939<br>0.6275 |                        |                   |
| 0.0136<br>0.03         | 0.0163<br>0.036 | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 22.238<br>0.8755  | 17.501<br>0.6890 | 17.526<br>0.6900 |                        | 11/16             |
| 0.0159<br>0.035        | 0.0191<br>0.042 | 17.463<br>0.6875        | 17.450<br>0.6870 | 23.800<br>0.9370 | 23.825<br>0.9380 | 23.825<br>0.9380  | 17.501<br>0.6890 | 17.526<br>0.6900 |                        |                   |
| 0.0191<br>0.042        | —               | 17.463<br>0.6875        | 17.450<br>0.6870 | 23.800<br>0.9370 | 23.825<br>0.9380 | 23.825<br>0.9380  | 17.501<br>0.6890 | 17.526<br>0.6900 |                        |                   |
| 0.0100<br>0.022        | —               | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 |                        | 3/4               |
| 0.0136<br>0.03         | —               | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-88                  |                   |
| 0.0172<br>0.038        | 0.0204<br>0.045 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 |                        |                   |
| 0.0204<br>0.045        | 0.0245<br>0.054 | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 25.387<br>0.9995  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-812                 |                   |
| 0.0263<br>0.058        | 0.0313<br>0.069 | 19.050<br>0.7500        | 19.037<br>0.7495 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 19.063<br>0.7505 | 19.088<br>0.7515 | IR-812                 |                   |
| 0.0254<br>0.056        | —               | 20.638<br>0.8125        | 20.625<br>0.8120 | 26.975<br>1.0620 | 27.000<br>1.0630 | 26.975<br>1.0620  | 20.650<br>0.8130 | 20.676<br>0.8140 |                        | 13/16             |
| 0.0281<br>0.062        | 0.0336<br>0.074 | 20.638<br>0.8125        | 20.625<br>0.8120 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 20.650<br>0.8130 | 20.676<br>0.8140 |                        |                   |
| 0.0118<br>0.026        | —               | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 |                        | 7/8               |
| 0.0154<br>0.034        | —               | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 |                        |                   |
| 0.0236<br>0.052        | 0.0281<br>0.062 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1012                |                   |
| 0.0313<br>0.069        | 0.0585<br>0.129 | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 28.562<br>1.1245  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1016                |                   |
| 0.0299<br>0.066        | 0.0358<br>0.079 | 22.225<br>0.8750        | 22.212<br>0.8745 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1012                |                   |
| 0.0404<br>0.089        | 0.0481<br>0.106 | 22.225<br>0.8750        | 22.212<br>0.8745 | 30.150<br>1.1870 | 30.175<br>1.1880 | 30.150<br>1.1870  | 22.238<br>0.8755 | 22.263<br>0.8765 | IR-1016                |                   |

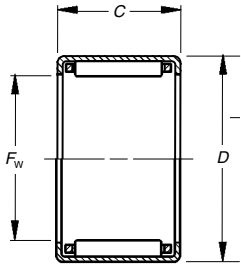
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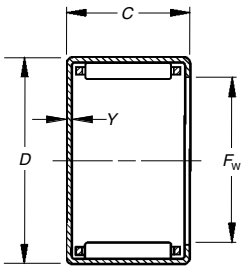
# NEEDLE ROLLER BEARINGS

## CAGED BEARINGS – OPEN ENDS, CLOSED ONE END – *continued*

### INCH SERIES



J, JH



MJ-1, MJH-1

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design. See page C62 for mounting procedure.

| Shaft Diameter | Dimensions mm/in. |        |        |      | Bearing Designation | Load Ratings kN/lbf. |                | Limiting Speed |      | C <sub>g</sub> |        |
|----------------|-------------------|--------|--------|------|---------------------|----------------------|----------------|----------------|------|----------------|--------|
|                | F <sub>w</sub>    | D      | C      | Y    |                     | Dynamic              | Static         | Grease         | Oil  |                |        |
| in.            | F <sub>w</sub>    | D      | C      | Y    |                     | C                    | C <sub>0</sub> | RPM            |      |                |        |
| 1              | 25.400            | 31.750 | 19.050 | —    | J-1612              | —                    | 18.15          | 28.82          | 8400 | 13000          | 0.035  |
|                | 1.0000            | 1.2500 | 0.750  | —    |                     |                      | 4080           | 6480           |      |                |        |
|                | 25.400            | 31.750 | 25.400 | 1.02 | J-1616              | MJ-16161             | 24.95          | 43.41          | 8400 | 13000          | 0.0387 |
|                | 1.0000            | 1.2500 | 1.000  | 0.04 |                     |                      | 5610           | 9760           |      |                |        |
|                | 25.400            | 33.338 | 19.050 | 1.27 | JH-1612             | MJH-16121            | 20.68          | 29.58          | 8500 | 13000          | 0.0342 |
|                | 1.0000            | 1.3125 | 0.750  | 0.05 |                     |                      | 4650           | 6650           |      |                |        |
|                | 25.400            | 33.338 | 25.400 | 1.27 | JH-1616             | MJH-16161            | 27.58          | 42.88          | 8500 | 13000          | 0.0375 |
|                | 1.0000            | 1.3125 | 1.000  | 0.05 |                     |                      | 6200           | 9640           |      |                |        |
| 1 1/8          | 28.575            | 34.925 | 12.700 | 1.02 | J-188               | MJ-1881              | 11.65          | 16.95          | 7400 | 11000          | 0.0323 |
|                | 1.1250            | 1.3750 | 0.500  | 0.04 |                     |                      | 2620           | 3810           |      |                |        |
|                | 28.575            | 34.925 | 19.050 | 1.02 | J-1812              | MJ-18121             | 19.04          | 31.76          | 7400 | 11000          | 0.0377 |
|                | 1.1250            | 1.3750 | 0.750  | 0.04 |                     |                      | 4280           | 7140           |      |                |        |
|                | 28.575            | 34.925 | 25.400 | 1.02 | J-1816              | MJ-18161             | 26.16          | 48.04          | 7400 | 11000          | 0.0418 |
|                | 1.1250            | 1.3750 | 1.000  | 0.04 |                     |                      | 5880           | 10800          |      |                |        |
|                | 28.575            | 38.100 | 19.050 | 1.27 | JH-1812             | MJH-18121            | 23.35          | 31.32          | 7600 | 12000          | 0.0356 |
|                | 1.1250            | 1.5000 | 0.750  | 0.05 |                     |                      | 5250           | 7040           |      |                |        |
|                | 28.575            | 38.100 | 25.400 | 1.27 | JH-1816             | MJH-18161            | 33.14          | 49.38          | 7600 | 12000          | 0.0398 |
|                | 1.1250            | 1.5000 | 1.000  | 0.05 |                     |                      | 7450           | 11100          |      |                |        |
|                | 28.575            | 38.100 | 28.580 | 1.27 | JH-1818             | MJH-18181            | 36.30          | 55.16          | 7600 | 12000          | 0.041  |
|                | 1.1250            | 1.5000 | 1.125  | 0.05 |                     |                      | 8160           | 12400          |      |                |        |
| 1 1/4          | 31.750            | 38.100 | 19.050 | 1.02 | J-2012              | MJ-20121             | 19.84          | 34.70          | 6600 | 10000          | 0.0404 |
|                | 1.2500            | 1.5000 | 0.750  | 0.04 |                     |                      | 4460           | 7800           |      |                |        |
|                | 31.750            | 38.100 | 25.400 | 1.02 | J-2016              | MJ-20161             | 28.82          | 56.49          | 6600 | 10000          | 0.0455 |
|                | 1.2500            | 1.5000 | 1.000  | 0.04 |                     |                      | 6480           | 12700          |      |                |        |
|                | 31.750            | 41.275 | 19.050 | —    | JH-2012             | —                    | 24.11          | 33.94          | 6800 | 10000          | 0.038  |
|                | 1.2500            | 1.6250 | 0.750  | —    |                     |                      | 5420           | 7630           |      |                |        |
|                | 31.750            | 41.275 | 25.400 | —    | JH-2016             | —                    | 33.94          | 52.93          | 6800 | 10000          | 0.0424 |
|                | 1.2500            | 1.6250 | 1.000  | —    |                     |                      | 7630           | 11900          |      |                |        |
|                | 31.750            | 41.275 | 31.750 | —    | JH-2020             | —                    | 43.37          | 72.51          | 6800 | 10000          | 0.0459 |
|                | 1.2500            | 1.6250 | 1.250  | —    |                     |                      | 9750           | 16300          |      |                |        |
| 1 3/8          | 34.925            | 41.275 | 12.700 | 1.02 | J-228               | MJ-2281              | 13.97          | 22.91          | 6000 | 9200           | 0.038  |
|                | 1.3750            | 1.6250 | 0.500  | 0.04 |                     |                      | 3140           | 5150           |      |                |        |
|                | 34.925            | 41.275 | 19.050 | —    | J-2212              | —                    | 22.82          | 42.97          | 6000 | 9200           | 0.0444 |
|                | 1.3750            | 1.6250 | 0.750  | —    |                     |                      | 5130           | 9660           |      |                |        |
|                | 34.925            | 44.450 | 19.050 | 1.27 | JH-2212             | MJH-22121            | 26.24          | 38.43          | 6100 | 9400           | 0.0407 |
|                | 1.3750            | 1.7500 | 0.750  | 0.05 |                     |                      | 5900           | 8640           |      |                |        |
|                | 34.925            | 44.450 | 25.400 | 1.27 | JH-2216             | MJH-22161            | 36.52          | 58.72          | 6100 | 9400           | 0.0452 |
|                | 1.3750            | 1.7500 | 1.000  | 0.05 |                     |                      | 8210           | 13200          |      |                |        |
| 1 1/2          | 38.100            | 47.625 | 19.050 | 1.27 | J-2412              | MJ-24121             | 29.89          | 47.15          | 5600 | 8600           | 0.0445 |
|                | 1.5000            | 1.8750 | 0.750  | 0.05 |                     |                      | 6720           | 10600          |      |                |        |
|                | 38.100            | 47.625 | 25.400 | 1.27 | J-2416              | MJ-24161             | 39.32          | 66.72          | 5600 | 8600           | 0.0486 |
|                | 1.5000            | 1.8750 | 1.000  | 0.05 |                     |                      | 8840           | 15000          |      |                |        |
|                | 38.100            | 47.625 | 31.750 | —    | J-2420              | —                    | 49.38          | 89.85          | 5600 | 8600           | 0.0523 |
|                | 1.5000            | 1.8750 | 1.250  | —    |                     |                      | 11100          | 20200          |      |                |        |
| 1 5/8          | 41.275            | 50.800 | 15.880 | —    | J-2610              | —                    | 26.11          | 40.97          | 5100 | 7900           | 0.0446 |
|                | 1.6250            | 2.0000 | 0.625  | —    |                     |                      | 5870           | 9210           |      |                |        |

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                 | Bearing Mounting mm/in. |                  |                  |                  | Inspection mm/in. |                  |                  | Matching<br>Inner Ring | Shaft<br>Diameter |
|------------------------|-----------------|-------------------------|------------------|------------------|------------------|-------------------|------------------|------------------|------------------------|-------------------|
| Open Ends              | Closed Ends     | Max.                    | Min.             | Min.             | Max.             | Ring Gage         | Plug-GO          | Plug-NO-Go       |                        |                   |
|                        |                 | S                       |                  | H                |                  |                   |                  |                  |                        | in.               |
| 0.0263<br>0.058        | —               | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                | 1                 |
| 0.0349<br>0.077        | 0.0417<br>0.092 | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 31.737<br>1.2495  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1216                |                   |
| 0.0336<br>0.074        | 0.0399<br>0.088 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1212                |                   |
| 0.0449<br>0.099        | 0.0540<br>0.119 | 25.400<br>1.0000        | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 33.325<br>1.3120  | 25.413<br>1.0005 | 25.438<br>1.0015 | IR-1216                |                   |
| 0.0195<br>0.043        | 0.0227<br>0.05  | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                        | 1 1/8             |
| 0.0290<br>0.064        | 0.0345<br>0.076 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 |                        |                   |
| 0.0390<br>0.086        | 0.0467<br>0.103 | 28.575<br>1.1250        | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 34.912<br>1.3745  | 28.588<br>1.1255 | 28.613<br>1.1265 | IR-1416                |                   |
| 0.0458<br>0.101        | 0.0549<br>0.121 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 |                        |                   |
| 0.0612<br>0.135        | 0.0735<br>0.162 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 | IR-1416                |                   |
| 0.0689<br>0.152        | 0.0821<br>0.181 | 28.575<br>1.1250        | 28.562<br>1.1245 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 28.588<br>1.1255 | 28.613<br>1.1265 |                        |                   |
| 0.0363<br>0.08         | 0.0431<br>0.095 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1612                | 1 1/4             |
| 0.0426<br>0.094        | 0.0513<br>0.113 | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 38.087<br>1.4995  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1616                |                   |
| 0.0503<br>0.111        | —               | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1612                |                   |
| 0.0671<br>0.148        | —               | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 | IR-1616                |                   |
| 0.0839<br>0.185        | —               | 31.750<br>1.2500        | 31.737<br>1.2495 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 31.763<br>1.2505 | 31.788<br>1.2515 |                        |                   |
| 0.0236<br>0.052        | 0.0281<br>0.062 | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 |                        | 1 3/8             |
| 0.0349<br>0.077        | —               | 34.925<br>1.3750        | 34.912<br>1.3745 | 41.262<br>1.6245 | 41.288<br>1.6255 | 41.262<br>1.6245  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1812                |                   |
| 0.0549<br>0.121        | 0.0653<br>0.144 | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1812                |                   |
| 0.0730<br>0.161        | 0.0871<br>0.192 | 34.925<br>1.3750        | 34.912<br>1.3745 | 44.437<br>1.7495 | 44.463<br>1.7505 | 44.437<br>1.7495  | 34.938<br>1.3755 | 34.966<br>1.3766 | IR-1816                |                   |
| 0.0594<br>0.131        | 0.0943<br>0.208 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 |                        | 1 1/2             |
| 0.0789<br>0.174        | 0.0943<br>0.208 | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 | IR-1916                |                   |
| 0.0989<br>0.218        | —               | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 47.612<br>1.8745  | 38.113<br>1.5005 | 38.143<br>1.5017 | IR-1920                |                   |
| 0.0531<br>0.117        | —               | 41.275<br>1.6250        | 41.262<br>1.6245 | 50.787<br>1.9995 | 50.813<br>2.0005 | 50.787<br>1.9995  | 41.288<br>1.6255 | 41.318<br>1.6267 |                        | 1 5/8             |

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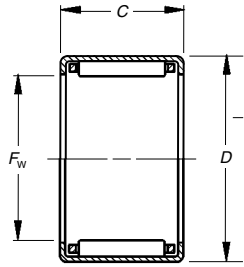




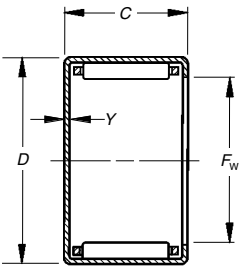
# NEEDLE ROLLER BEARINGS

## CAGED BEARINGS – OPEN ENDS, CLOSED ONE END – *continued*

### INCH SERIES



**J, JH**



**MJ-1, MJH-1**

| Shaft Diameter | Dimensions mm/in. |                  |                 |              | Bearing Designation | Load Ratings kN/lbf. |                 | Limiting Speed |      | C <sub>g</sub> |
|----------------|-------------------|------------------|-----------------|--------------|---------------------|----------------------|-----------------|----------------|------|----------------|
|                | F <sub>w</sub>    | D                | C               | Y            |                     | Dynamic              | Static          | Grease         | Oil  |                |
| in.            |                   |                  |                 |              |                     |                      | RPM             |                |      |                |
|                | 41.275<br>1.6250  | 50.800<br>2.0000 | 25.400<br>1.000 | 1.27<br>0.05 | J-2616 M-26161      | 39.28<br>8830        | 68.95<br>15500  | 5100           | 7900 | 0.0508         |
| 1 3/4          | 44.450<br>1.7500  | 53.975<br>2.1250 | 19.050<br>0.750 | 1.27<br>0.05 | J-2812 MJ-28121     | 29.58<br>6650        | 49.38<br>11100  | 4700           | 7300 | 0.0483         |
|                | 44.450<br>1.7500  | 53.975<br>2.1250 | 25.400<br>1.000 | 1.27<br>0.05 | J-2816 MJ-28161     | 40.08<br>9010        | 72.95<br>16400  | 4700           | 7300 | 0.0532         |
|                | 44.450<br>1.7500  | 53.975<br>2.1250 | 38.100<br>1.500 | 1.27<br>0.05 | J-2824 MJ-28241     | 59.61<br>13400       | 121.88<br>27400 | 4700           | 7300 | 0.0605         |
| 1 7/8          | 47.625<br>1.8750  | 57.150<br>2.2500 | 25.400<br>1.000 | 1.27<br>0.05 | J-3016 MJ-30161     | 41.10<br>9240        | 76.06<br>17100  | 4400           | 6800 | 0.0553         |
| 2              | 50.800<br>2.0000  | 60.325<br>2.3750 | 25.400<br>1.000 | 1.27<br>0.05 | J-3216 MJ-32161     | 42.39<br>9530        | 81.40<br>18300  | 4100           | 6300 | 0.0579         |
| 2 1/4          | 57.150<br>2.2500  | 66.675<br>2.6250 | 19.050<br>0.750 | —            | J-3612 —            | 35.41<br>7960        | 65.83<br>14800  | 3600           | 5600 | 0.0577         |
|                | 57.150<br>2.2500  | 66.675<br>2.6250 | 25.400<br>1.000 | —            | J-3616 —            | 46.26<br>10400       | 92.52<br>20800  | 3600           | 5600 | 0.0628         |
| 2 3/4          | 69.850<br>2.7500  | 79.375<br>3.1250 | 19.050<br>0.750 | —            | J-4412 —            | 36.25<br>8150        | 72.95<br>16400  | 2900           | 4500 | 0.0649         |

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design. See page C62 for mounting procedure.

## Drawn Cup Needle Roller Bearings

| Wt. kg/lbs.<br>Approx. |                        | Bearing Mounting mm/in. |                         |                         |                         | Inspection mm/in.       |                         |                         | Matching<br>Inner Ring | Shaft<br>Diameter |
|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------|
| Open Ends              | Closed Ends            | Max.                    | Min.                    | Min.                    | Max.                    | Ring Gage               | Plug-GO                 | Plug-NO-Go              |                        |                   |
|                        |                        | S                       |                         | H                       |                         |                         |                         |                         |                        | in.               |
| <b>0.0848</b><br>0.187 | <b>0.1012</b><br>0.223 | <b>41.275</b><br>1.6250 | <b>41.262</b><br>1.6245 | <b>50.787</b><br>1.9995 | <b>50.813</b><br>2.0005 | <b>50.787</b><br>1.9995 | <b>41.288</b><br>1.6255 | <b>41.318</b><br>1.6267 |                        |                   |
| <b>0.0680</b><br>0.15  | <b>0.0812</b><br>0.179 | <b>44.450</b><br>1.7500 | <b>44.437</b><br>1.7495 | <b>53.962</b><br>2.1245 | <b>53.988</b><br>2.1255 | <b>53.962</b><br>2.1245 | <b>44.463</b><br>1.7505 | <b>44.496</b><br>1.7518 |                        | 1 3/4             |
| <b>0.0907</b><br>0.2   | <b>0.1084</b><br>0.239 | <b>44.450</b><br>1.7500 | <b>44.437</b><br>1.7495 | <b>53.962</b><br>2.1245 | <b>53.988</b><br>2.1255 | <b>53.962</b><br>2.1245 | <b>44.463</b><br>1.7505 | <b>44.496</b><br>1.7518 | IR-2316                |                   |
| <b>0.1361</b><br>0.3   | <b>0.1624</b><br>0.358 | <b>44.450</b><br>1.7500 | <b>44.437</b><br>1.7495 | <b>53.962</b><br>2.1245 | <b>53.988</b><br>2.1255 | <b>53.962</b><br>2.1245 | <b>44.463</b><br>1.7505 | <b>44.496</b><br>1.7518 | IR-2324                |                   |
| <b>0.0966</b><br>0.213 | <b>0.1152</b><br>0.254 | <b>47.625</b><br>1.8750 | <b>47.612</b><br>1.8745 | <b>57.137</b><br>2.2495 | <b>57.163</b><br>2.2505 | <b>57.137</b><br>2.2495 | <b>47.638</b><br>1.8755 | <b>47.671</b><br>1.8768 |                        | 1 7/8             |
| <b>0.1025</b><br>0.226 | <b>0.1365</b><br>0.301 | <b>50.800</b><br>2.0000 | <b>50.785</b><br>1.9994 | <b>60.312</b><br>2.3745 | <b>60.338</b><br>2.3755 | <b>60.312</b><br>2.3745 | <b>50.815</b><br>2.0006 | <b>50.848</b><br>2.0019 |                        | 2                 |
| <b>0.0857</b><br>0.189 | —                      | <b>57.150</b><br>2.2500 | <b>57.135</b><br>2.2494 | <b>66.662</b><br>2.6245 | <b>66.688</b><br>2.6255 | <b>66.662</b><br>2.6245 | <b>57.165</b><br>2.2506 | <b>57.203</b><br>2.2521 |                        | 2 1/4             |
| <b>0.1143</b><br>0.252 | —                      | <b>57.150</b><br>2.2500 | <b>57.135</b><br>2.2494 | <b>66.662</b><br>2.6245 | <b>66.688</b><br>2.6255 | <b>66.662</b><br>2.6245 | <b>57.165</b><br>2.2506 | <b>57.203</b><br>2.2521 |                        |                   |
| <b>0.1030</b><br>0.227 | —                      | <b>69.850</b><br>2.7500 | <b>69.835</b><br>2.7494 | <b>79.362</b><br>3.1245 | <b>79.388</b><br>3.1255 | <b>79.362</b><br>3.1245 | <b>69.875</b><br>2.7510 | <b>69.914</b><br>2.7525 | IR-4016                | 2 3/4             |

C



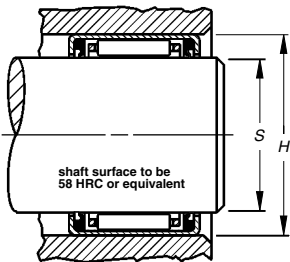
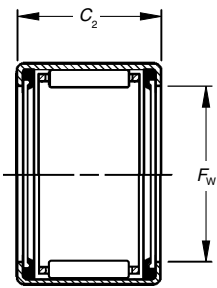
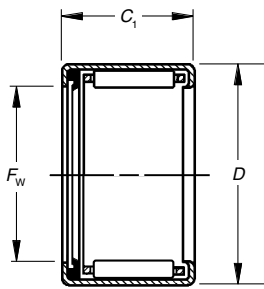


# NEEDLE ROLLER BEARINGS

## SEALED DRAWN CUP BEARINGS

### INCH SERIES

- Check for availability. Not all bearings are in production.
- Prepacked with general purpose ball and roller bearing grease unless otherwise specified.
- Bearing operating temperature limited between -25° F and +225° F.
- Consult your Timken representative for operating temperatures outside the above range or if seals exposed to unusual fluids.
- Limiting speed based on shaft contact speed of 2000 RPM.
- Reduce the listed limiting speed by one-half for outer ring rotation.



Drawn cup bearings of nominal inch dimensions, with one seal and one end closed, may be made available upon request.

Mounting dimensions are based on the inner ring rotating and the outer ring being stationary relative to the load. The housing should be of high strength material. See engineering section for discussion of shaft and housing design. See page C62 for mounting procedure.

| Shaft Diameter | Dimensions mm/in.       |                         |                       | Bearings With One Seal mm/in. |                       | Bearings With Two Seals mm/in. |                     |                       |
|----------------|-------------------------|-------------------------|-----------------------|-------------------------------|-----------------------|--------------------------------|---------------------|-----------------------|
|                | $F_w$                   | $D$                     | $C_1$                 | Bearing Designation Open End  | Wt. Approx. kg/lbs.   | $C_2$                          | Bearing Designation | Wt. Approx. kg/lbs.   |
| <b>5/16</b>    | <b>7.938</b><br>0.3125  | <b>12.700</b><br>0.5000 | <b>9.53</b><br>0.375  | <b>JT-56</b>                  | <b>0.004</b><br>0.008 | <b>11.13</b><br>0.438          | <b>JTT-57</b>       | <b>0.004</b><br>0.009 |
|                | <b>7.938</b><br>0.3125  | <b>12.700</b><br>0.5000 | —                     | —                             | —                     | <b>14.27</b><br>0.562          | <b>JTT-59</b>       | <b>0.005</b><br>0.012 |
| <b>3/8</b>     | <b>9.525</b><br>0.3750  | <b>14.288</b><br>0.5625 | <b>9.53</b><br>0.375  | <b>JT-66</b>                  | <b>0.004</b><br>0.009 | <b>11.13</b><br>0.438          | <b>JTT-67</b>       | <b>0.005</b><br>0.011 |
|                | <b>9.525</b><br>0.3750  | <b>14.288</b><br>0.5625 | <b>14.27</b><br>0.562 | <b>JT-69</b>                  | <b>0.006</b><br>0.014 | —                              | —                   | —                     |
| <b>1/2</b>     | <b>12.700</b><br>0.5000 | <b>17.463</b><br>0.6875 | <b>9.53</b><br>0.375  | <b>JT-86</b>                  | <b>0.005</b><br>0.012 | <b>11.13</b><br>0.438          | <b>JTT-87</b>       | <b>0.006</b><br>0.013 |
|                | <b>12.700</b><br>0.5000 | <b>17.463</b><br>0.6875 | <b>14.27</b><br>0.562 | <b>JT-89</b>                  | <b>0.008</b><br>0.017 | <b>15.88</b><br>0.625          | <b>JTT-810</b>      | <b>0.009</b><br>0.019 |
|                | <b>12.700</b><br>0.5000 | <b>17.463</b><br>0.6875 | —                     | —                             | —                     | <b>22.23</b><br>0.875          | <b>JTT-814</b>      | <b>0.012</b><br>0.027 |
| <b>9/16</b>    | <b>14.288</b><br>0.5625 | <b>19.050</b><br>0.7500 | <b>14.27</b><br>0.562 | <b>JT-99</b>                  | <b>0.009</b><br>0.019 | <b>15.88</b><br>0.625          | <b>JTT-910</b>      | <b>0.010</b><br>0.021 |
|                | <b>14.288</b><br>0.5625 | <b>19.050</b><br>0.7500 | —                     | —                             | —                     | <b>19.05</b><br>0.75           | <b>JTT-912</b>      | <b>0.011</b><br>0.025 |
| <b>5/8</b>     | <b>15.875</b><br>0.6250 | <b>20.638</b><br>0.8125 | <b>14.27</b><br>0.562 | <b>JT-109</b>                 | <b>0.010</b><br>0.021 | <b>15.88</b><br>0.625          | <b>JTT-1010</b>     | <b>0.010</b><br>0.023 |
|                | <b>15.875</b><br>0.6250 | <b>20.638</b><br>0.8125 | —                     | —                             | —                     | <b>19.05</b><br>0.75           | <b>JTT-1012</b>     | <b>0.013</b><br>0.028 |
|                | <b>15.875</b><br>0.6250 | <b>20.638</b><br>0.8125 | —                     | —                             | —                     | <b>22.23</b><br>0.875          | <b>JTT-1014</b>     | <b>0.015</b><br>0.032 |
| <b>11/16</b>   | <b>17.463</b><br>0.6875 | <b>22.225</b><br>0.8750 | —                     | —                             | —                     | <b>22.23</b><br>0.875          | <b>JTT-1114</b>     | <b>0.016</b><br>0.035 |
| <b>3/4</b>     | <b>19.050</b><br>0.7500 | <b>25.400</b><br>1.0000 | <b>14.27</b><br>0.562 | <b>JT-129</b>                 | <b>0.015</b><br>0.034 | <b>15.88</b><br>0.625          | <b>JTT-1210</b>     | <b>0.017</b><br>0.038 |
|                | <b>19.050</b><br>0.7500 | <b>25.400</b><br>1.0000 | <b>17.48</b><br>0.688 | <b>JT-1211</b>                | <b>0.019</b><br>0.041 | —                              | —                   | —                     |
|                | <b>19.050</b><br>0.7500 | <b>25.400</b><br>1.0000 | <b>20.62</b><br>0.812 | <b>JT-1213</b>                | <b>0.022</b><br>0.049 | <b>22.23</b><br>0.875          | <b>JTT-1214</b>     | <b>0.024</b><br>0.053 |
| <b>7/4</b>     | <b>22.225</b><br>0.8750 | <b>28.575</b><br>1.1250 | <b>14.27</b><br>0.562 | <b>JT-149</b>                 | <b>0.018</b><br>0.039 | <b>15.88</b><br>0.625          | <b>JTT-1410</b>     | <b>0.020</b><br>0.043 |
|                | <b>22.225</b><br>0.8750 | <b>28.575</b><br>1.1250 | <b>26.97</b><br>1.062 | <b>JT-1417</b>                | <b>0.033</b><br>0.073 | —                              | —                   | —                     |
| <b>1</b>       | <b>25.400</b><br>1.0000 | <b>31.750</b><br>1.2500 | <b>20.62</b><br>0.812 | <b>JT-1613</b>                | <b>0.029</b><br>0.063 | <b>22.23</b><br>0.875          | <b>JTT-1614</b>     | <b>0.031</b><br>0.068 |
| <b>1 1/8</b>   | <b>28.575</b><br>1.1250 | <b>34.925</b><br>1.3750 | <b>20.62</b><br>0.812 | <b>JT-1813</b>                | <b>0.032</b><br>0.070 | <b>22.23</b><br>0.875          | <b>JTT-1814</b>     | <b>0.034</b><br>0.075 |
| <b>1 1/4</b>   | <b>31.750</b><br>1.2500 | <b>38.100</b><br>1.5000 | <b>20.62</b><br>0.812 | <b>JT-2013</b>                | <b>0.035</b><br>0.077 | —                              | —                   | —                     |
|                | <b>31.750</b><br>1.2500 | <b>38.100</b><br>1.500  | —                     | —                             | —                     | <b>28.58</b><br>1.125          | <b>JTT-2018</b>     | <b>0.048</b><br>0.106 |
| <b>1 1/2</b>   | <b>38.100</b><br>1.500  | <b>47.625</b><br>1.875  | <b>33.32</b><br>1.312 | <b>JT-2421</b>                | <b>0.104</b><br>0.229 | —                              | —                   | —                     |

## Drawn Cup Needle Roller Bearings

| Load Ratings KN/bf.<br>Dynamic      Static |                | Limiting<br>Speed<br>Approx. | C <sub>9</sub> | Bearing Mounting mm/in. |                  |                  |                  | Shaft<br>Diameter<br>in. |
|--------------------------------------------|----------------|------------------------------|----------------|-------------------------|------------------|------------------|------------------|--------------------------|
| C                                          | C <sub>0</sub> |                              |                | RPM                     | Max.             | Min.             | Min.             |                          |
|                                            |                |                              |                | S                       | H                |                  |                  |                          |
| 2.40<br>540                                | 2.00<br>450    | 18000                        | 0.0117         | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 | 5/16                     |
| 4.05<br>910                                | 3.91<br>880    | 18000                        | 0.0138         | 7.938<br>0.3125         | 7.925<br>0.3120  | 12.687<br>0.4995 | 12.713<br>0.5005 |                          |
| 2.74<br>615                                | 2.49<br>560    | 18000                        | 0.0133         | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 | 3/8                      |
| 5.20<br>1170                               | 5.74<br>1290   | 18000                        | 0.0163         | 9.525<br>0.3750         | 9.512<br>0.3745  | 14.275<br>0.5620 | 14.300<br>0.5630 |                          |
| 3.47<br>780                                | 3.65<br>820    | 15000                        | 0.0164         | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 | 1/2                      |
| 6.32<br>1420                               | 7.92<br>1780   | 15000                        | 0.0199         | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 |                          |
| 10.2<br>2300                               | 14.7<br>3310   | 15000                        | 0.0232         | 12.700<br>0.5000        | 12.687<br>0.4995 | 17.450<br>0.6870 | 17.475<br>0.6880 |                          |
| 6.23<br>1400                               | 8.01<br>1800   | 14000                        | 0.0210         | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 | 9/16                     |
| 8.18<br>1840                               | 11.4<br>2560   | 14000                        | 0.0229         | 14.288<br>0.5625        | 14.275<br>0.5620 | 19.037<br>0.7495 | 19.063<br>0.7505 |                          |
| 6.72<br>1510                               | 9.12<br>2050   | 12000                        | 0.0227         | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 | 5/8                      |
| 8.81<br>1980                               | 12.9<br>2910   | 12000                        | 0.0247         | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 |                          |
| 11.7<br>2640                               | 18.9<br>4240   | 12000                        | 0.0272         | 15.875<br>0.6250        | 15.862<br>0.6245 | 20.625<br>0.8120 | 20.650<br>0.8130 |                          |
| 12.5<br>2800                               | 20.9<br>4700   | 11000                        | 0.0290         | 17.463<br>0.6875        | 17.450<br>0.6870 | 22.212<br>0.8745 | 22.238<br>0.8755 | 11/16                    |
| 9.92<br>2230                               | 12.2<br>2740   | 10000                        | 0.0250         | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 3/4                      |
| 12.5<br>2810                               | 16.3<br>3670   | 10000                        | 0.0269         | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 |                          |
| 15.5<br>3490                               | 21.6<br>4860   | 10000                        | 0.0288         | 19.050<br>0.7500        | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 |                          |
| 10.9<br>2460                               | 14.5<br>3260   | 8700                         | 0.0278         | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 | 7/8                      |
| 23.7<br>5320                               | 39.0<br>8760   | 8700                         | 0.0356         | 22.225<br>0.8750        | 22.212<br>0.8745 | 28.562<br>1.1245 | 28.588<br>1.1255 |                          |
| 18.1<br>4080                               | 28.8<br>6480   | 7600                         | 0.035          | 25.400<br>1.0000        | 25.387<br>0.9995 | 31.737<br>1.2495 | 31.763<br>1.2505 | 1                        |
| 19.0<br>4280                               | 31.8<br>7140   | 6800                         | 0.0377         | 28.575<br>1.125         | 28.562<br>1.1245 | 34.912<br>1.3745 | 34.938<br>1.3755 | 1 1/8                    |
| 19.8<br>4460                               | 34.7<br>7800   | 6100                         | 0.0404         | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 | 1 1/4                    |
| 28.8<br>6480                               | 56.5<br>12700  | 6100                         | 0.0455         | 31.750<br>1.2500        | 31.737<br>1.2495 | 38.087<br>1.4995 | 38.113<br>1.5005 |                          |
| 49.4<br>11100                              | 89.9<br>20200  | 5100                         | 0.0523         | 38.100<br>1.5000        | 38.087<br>1.4995 | 47.612<br>1.8745 | 47.638<br>1.8755 | 1 1/2                    |





# NEEDLE ROLLER BEARINGS

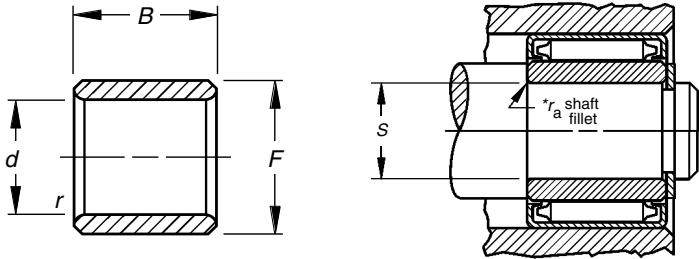
## INNER RINGS FOR INCH SERIES DRAWN CUP BEARINGS

- Check for availability.
- Ideal choice where shaft not practical to use as inner raceway.
- Provided in inch (IR, IRA) nominal dimensions for use with inch series drawn cup bearings.
- Designed to meet established inch tolerances.
- Designed to be wider than matching drawn cup bearing.
- Maximum shaft fillet radius ( $r_{as-max}$ ) cannot exceed inner ring bore chamfer ( $r_{s-min}$ ) as shown.
- Optional centralized lubrication groove (bore) or thru-hole available – specify when ordering.
- Designed to be axially clamped against shoulder for loose transition fit on shaft.
- After mounting, for tight transition fit (keeping inner ring from rotating relative to shaft), inner ring O.D. must not exceed raceway diameter on matching bearing.
- See tables for required bearing dimensions raceway diameter.
- After mounting, if O.D. of inner ring exceeds required raceway diameter for matching bearing, ring should be ground to proper diameter while mounted on shaft.
- Unmarked end of inner ring to be assembled against shaft shoulder to assure clearing maximum allowable shaft fillet ( $r_{as max}$ ) as indicated in tables shown.

| Shaft Diameter | Dimensions mm/in. |        |        |        |        |        |             | Inner Ring Designation | Transition Fit |            |            |            | Wt. mm/lbs. Approx. |
|----------------|-------------------|--------|--------|--------|--------|--------|-------------|------------------------|----------------|------------|------------|------------|---------------------|
|                | Min.              | Max.   | Max.   | Min.   | Max.   | Min.   | Min.        |                        | Loose Max.     | Loose Min. | Tight Max. | Tight Min. |                     |
| in.            | d                 |        | F      |        | B      |        | $r_{s min}$ | S                      |                |            |            |            |                     |
| 3/16           | 4.813             | 4.826  | 9.525  | 9.512  | 13.614 | 13.360 | 0.64        | IRA-3                  | 4.818          | 4.806      | 4.829      | 4.816      | 0.053               |
|                | 0.1895            | 0.1900 | 0.3750 | 0.3745 | 0.5360 | 0.5260 | 0.025       |                        | 0.1897         | 0.1892     | 0.1901     | 0.1896     |                     |
| 1/4            | 6.337             | 6.350  | 11.113 | 11.100 | 13.614 | 13.360 | 0.64        | IRA-4                  | 6.342          | 6.330      | 6.353      | 6.340      | 0.062               |
|                | 0.2495            | 0.2500 | 0.4375 | 0.4370 | 0.5360 | 0.5260 | 0.025       |                        | 0.2497         | 0.2492     | 0.2501     | 0.2496     |                     |
| 5/16           | 7.925             | 7.938  | 12.700 | 12.687 | 13.614 | 13.360 | 0.64        | IRA-5                  | 7.930          | 7.917      | 7.940      | 7.927      | 0.076               |
|                | 0.3120            | 0.3125 | 0.5000 | 0.4995 | 0.5360 | 0.5260 | 0.025       |                        | 0.3122         | 0.3117     | 0.3126     | 0.3121     |                     |
| 3/8            | 9.512             | 9.525  | 14.288 | 14.275 | 13.081 | 12.827 | 0.64        | IR-68                  | 9.517          | 9.505      | 9.528      | 9.515      | 0.085               |
|                | 0.3745            | 0.3750 | 0.5625 | 0.5620 | 0.5150 | 0.5050 | 0.025       |                        | 0.3747         | 0.3742     | 0.3751     | 0.3746     |                     |
|                | 9.512             | 9.525  | 14.288 | 14.275 | 19.431 | 19.177 | 0.64        | IR-612                 | 9.517          | 9.505      | 9.528      | 9.515      | 0.125               |
|                | 0.3745            | 0.3750 | 0.5625 | 0.5620 | 0.7650 | 0.7550 | 0.025       |                        | 0.3747         | 0.3742     | 0.3751     | 0.3746     |                     |
|                | 9.512             | 9.525  | 14.288 | 14.275 | 19.964 | 19.710 | 0.64        | IRA-6                  | 9.517          | 9.505      | 9.528      | 9.515      | 0.129               |
|                | 0.3745            | 0.3750 | 0.5625 | 0.5620 | 0.7860 | 0.7760 | 0.025       |                        | 0.3747         | 0.3742     | 0.3751     | 0.3746     |                     |
|                | 9.512             | 9.525  | 15.875 | 15.862 | 13.081 | 12.827 | 0.64        | IR-68-1                | 9.517          | 9.505      | 9.528      | 9.515      | 0.120               |
|                | 0.3745            | 0.3750 | 0.6250 | 0.6245 | 0.5150 | 0.5050 | 0.025       |                        | 0.3747         | 0.3742     | 0.3751     | 0.3746     |                     |
|                | 9.512             | 9.525  | 15.875 | 15.862 | 19.431 | 19.177 | 0.64        | IR-612-1               | 9.517          | 9.505      | 9.528      | 9.515      | 0.178               |
|                | 0.3745            | 0.3750 | 0.6250 | 0.6245 | 0.7650 | 0.7550 | 0.025       |                        | 0.3747         | 0.3742     | 0.3751     | 0.3746     |                     |
| 7/16           | 11.100            | 11.113 | 15.875 | 15.862 | 19.964 | 19.710 | 0.64        | IRA-7                  | 11.105         | 11.092     | 11.115     | 11.102     | 0.147               |
|                | 0.4370            | 0.4375 | 0.6250 | 0.6245 | 0.7860 | 0.7760 | 0.025       |                        | 0.4372         | 0.4367     | 0.4376     | 0.4371     |                     |
| 1/2            | 12.687            | 12.700 | 19.050 | 19.037 | 13.081 | 12.827 | 1.02        | IR-88                  | 12.692         | 12.680     | 12.703     | 12.690     | 0.147               |
|                | 0.4995            | 0.5000 | 0.7500 | 0.7495 | 0.5150 | 0.5050 | 0.040       |                        | 0.4997         | 0.4992     | 0.5001     | 0.4996     |                     |
|                | 12.687            | 12.700 | 19.050 | 19.037 | 19.431 | 19.177 | 1.02        | IR-812                 | 12.692         | 12.680     | 12.703     | 12.690     | 0.222               |
|                | 0.4995            | 0.5000 | 0.7500 | 0.7495 | 0.7650 | 0.7550 | 0.040       |                        | 0.4997         | 0.4992     | 0.5001     | 0.4996     |                     |
|                | 12.687            | 12.700 | 19.050 | 19.037 | 19.964 | 19.710 | 1.02        | IRA-8                  | 12.692         | 12.680     | 12.703     | 12.690     | 0.227               |
|                | 0.4995            | 0.5000 | 0.7500 | 0.7495 | 0.7860 | 0.7760 | 0.040       |                        | 0.4997         | 0.4992     | 0.5001     | 0.4996     |                     |
| 5/8            | 15.862            | 15.875 | 22.225 | 22.212 | 19.431 | 19.177 | 1.02        | IR-1012                | 15.867         | 15.855     | 15.878     | 15.865     | 0.267               |
|                | 0.6245            | 0.6250 | 0.8750 | 0.8745 | 0.7650 | 0.7550 | 0.040       |                        | 0.6247         | 0.6242     | 0.6251     | 0.6246     |                     |
|                | 15.862            | 15.875 | 22.225 | 22.212 | 19.964 | 19.710 | 1.02        | IRA-10                 | 15.867         | 15.855     | 15.878     | 15.865     | 0.276               |
|                | 0.6245            | 0.6250 | 0.8750 | 0.8745 | 0.7860 | 0.7760 | 0.040       |                        | 0.6247         | 0.6242     | 0.6251     | 0.6246     |                     |
|                | 15.862            | 15.875 | 22.225 | 22.212 | 25.781 | 25.527 | 1.02        | IR-1016                | 15.867         | 15.855     | 15.878     | 15.865     | 0.356               |
|                | 0.6245            | 0.6250 | 0.8750 | 0.8745 | 1.0150 | 1.0050 | 0.040       |                        | 0.6247         | 0.6242     | 0.6251     | 0.6246     |                     |
| 3/4            | 19.037            | 19.050 | 25.400 | 25.387 | 13.081 | 12.827 | 1.02        | IR-128                 | 19.042         | 19.030     | 19.053     | 19.040     | 0.209               |
|                | 0.7495            | 0.7500 | 1.0000 | 0.9995 | 0.5150 | 0.5050 | 0.040       |                        | 0.7497         | 0.7492     | 0.7501     | 0.7496     |                     |
|                | 19.037            | 19.050 | 25.400 | 25.387 | 19.431 | 19.177 | 1.02        | IR-1212                | 19.042         | 19.030     | 19.053     | 19.040     | 0.311               |
|                | 0.7495            | 0.7500 | 1.0000 | 0.9995 | 0.7650 | 0.7550 | 0.040       |                        | 0.7497         | 0.7492     | 0.7501     | 0.7496     |                     |
|                | 19.037            | 19.050 | 25.400 | 25.387 | 25.781 | 25.527 | 1.02        | IR-1216                | 19.042         | 19.030     | 19.053     | 19.040     | 0.414               |
|                | 0.7495            | 0.7500 | 1.0000 | 0.9995 | 1.0150 | 1.0050 | 0.040       |                        | 0.7497         | 0.7492     | 0.7501     | 0.7496     |                     |
|                | 19.037            | 19.050 | 25.400 | 25.387 | 26.314 | 26.060 | 1.02        | IRA-12                 | 19.042         | 19.030     | 19.053     | 19.040     | 0.423               |
|                | 0.7495            | 0.7500 | 1.0000 | 0.9995 | 1.0360 | 1.0260 | 0.040       |                        | 0.7497         | 0.7492     | 0.7501     | 0.7496     |                     |
|                | 19.037            | 19.050 | 25.400 | 25.387 | 32.131 | 31.877 | 1.02        | IR-1220                | 19.042         | 19.030     | 19.053     | 19.040     | 0.516               |
|                | 0.7495            | 0.7500 | 1.0000 | 0.9995 | 1.2650 | 1.2550 | 0.040       |                        | 0.7497         | 0.7492     | 0.7501     | 0.7496     |                     |

Bore and O.D. tolerance limits correspond to the single mean diameter (the arithmetical mean of the largest and smallest diameters in a single radial plane).  
 \* $r_{as max}$  is equal to minimum inner ring bore chamfer ( $r_{s min}$ ) at unmarked end.

## Drawn Cup Needle Roller Bearings



| Shaft Diameter | Dimensions mm/in. |                  |                  |                  |                  |                  |                     | Inner Ring Designation | Transition Fit   |                  |                  |                  | Wt. mm/lbs. Approx. |
|----------------|-------------------|------------------|------------------|------------------|------------------|------------------|---------------------|------------------------|------------------|------------------|------------------|------------------|---------------------|
|                | Min.              | Max.             | Max.             | Min.             | Max.             | Min.             | Min.                |                        | Loose Max.       | Loose Min.       | Tight Max.       | Tight Min.       |                     |
| in.            | d                 |                  | F                |                  | B                |                  | r <sub>s</sub> min. | S                      |                  |                  |                  |                  |                     |
|                | 19.037<br>0.7495  | 19.050<br>0.7500 | 25.400<br>1.0000 | 25.387<br>0.9995 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.02<br>0.040       | IR-1224                | 19.042<br>0.7497 | 19.030<br>0.7492 | 19.053<br>0.7501 | 19.040<br>0.7496 | 0.618<br>0.139      |
| 13/16          | 20.625<br>0.8120  | 20.638<br>0.8125 | 25.400<br>1.0000 | 25.387<br>0.9995 | 19.431<br>0.7650 | 19.177<br>0.7550 | 1.02<br>0.040       | IR-1312                | 20.630<br>0.8122 | 20.617<br>0.8117 | 20.640<br>0.8126 | 20.627<br>0.8121 | 0.240<br>0.054      |
|                | 20.625<br>0.8120  | 20.638<br>0.8125 | 25.400<br>1.0000 | 25.387<br>0.9995 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1316                | 20.630<br>0.8122 | 20.617<br>0.8117 | 20.640<br>0.8126 | 20.627<br>0.8121 | 0.320<br>0.072      |
| 7/8            | 22.212<br>0.8745  | 22.225<br>0.8750 | 28.575<br>1.1250 | 28.562<br>1.1245 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1416                | 22.217<br>0.8747 | 22.205<br>0.8742 | 22.228<br>0.8751 | 22.215<br>0.8746 | 0.494<br>0.111      |
|                | 22.212<br>0.8745  | 22.225<br>0.8750 | 28.575<br>1.1250 | 28.562<br>1.1245 | 26.314<br>1.0360 | 26.060<br>1.0260 | 1.02<br>0.040       | IRA-14                 | 22.217<br>0.8747 | 22.205<br>0.8742 | 22.228<br>0.8751 | 22.215<br>0.8746 | 0.480<br>0.108      |
| 15/16          | 23.800<br>0.9370  | 23.813<br>0.9375 | 28.575<br>1.1250 | 28.562<br>1.1245 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1516                | 23.805<br>0.9372 | 23.792<br>0.9367 | 23.815<br>0.9376 | 23.802<br>0.9371 | 0.365<br>0.082      |
| 1              | 25.387<br>0.9995  | 25.400<br>1.0000 | 31.750<br>1.2500 | 31.737<br>1.2495 | 19.431<br>0.7650 | 19.177<br>0.7550 | 1.02<br>0.040       | IR-1612                | 25.392<br>0.9997 | 25.380<br>0.9992 | 25.403<br>1.0001 | 25.390<br>0.9996 | 0.400<br>0.090      |
|                | 25.387<br>0.9995  | 25.400<br>1.0000 | 31.750<br>1.2500 | 31.737<br>1.2495 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1616                | 25.392<br>0.9997 | 25.380<br>0.9992 | 25.403<br>1.0001 | 25.390<br>0.9996 | 0.556<br>0.125      |
|                | 25.387<br>0.9995  | 25.400<br>1.0000 | 31.750<br>1.2500 | 31.737<br>1.2495 | 26.314<br>1.0360 | 26.060<br>1.0260 | 1.02<br>0.040       | IRA-16                 | 25.392<br>0.9997 | 25.380<br>0.9992 | 25.403<br>1.0001 | 25.390<br>0.9996 | 0.543<br>0.122      |
| 1 1/8          | 28.562<br>1.1245  | 28.575<br>1.1250 | 34.925<br>1.3750 | 34.912<br>1.3745 | 19.431<br>0.7650 | 19.177<br>0.7550 | 1.02<br>0.040       | IR-1812                | 28.567<br>1.1247 | 28.555<br>1.1242 | 28.578<br>1.1251 | 28.565<br>1.1246 | 0.445<br>0.100      |
|                | 28.562<br>1.1245  | 28.575<br>1.1250 | 34.925<br>1.3750 | 34.912<br>1.3745 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1816                | 28.567<br>1.1247 | 28.555<br>1.1242 | 28.578<br>1.1251 | 28.565<br>1.1246 | 0.592<br>0.133      |
|                | 28.562<br>1.1245  | 28.575<br>1.1250 | 34.925<br>1.3750 | 34.912<br>1.3745 | 32.131<br>1.2650 | 31.877<br>1.2550 | 1.02<br>0.040       | IR-1820                | 28.567<br>1.1247 | 28.555<br>1.1242 | 28.578<br>1.1251 | 28.565<br>1.1246 | 0.738<br>0.166      |
| 1 3/16         | 30.150<br>1.1870  | 30.163<br>1.1875 | 38.100<br>1.5000 | 38.087<br>1.4995 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.02<br>0.040       | IR-1916                | 30.155<br>1.1872 | 30.142<br>1.1867 | 30.165<br>1.1876 | 30.152<br>1.1871 | 0.827<br>0.186      |
|                | 30.150<br>1.1870  | 30.163<br>1.1875 | 38.100<br>1.5000 | 38.087<br>1.4995 | 32.131<br>1.2650 | 31.877<br>1.2550 | 1.02<br>0.040       | IR-1920                | 30.155<br>1.1872 | 30.142<br>1.1867 | 30.165<br>1.1876 | 30.152<br>1.1871 | 0.992<br>0.223      |
| 1 1/4          | 31.737<br>1.2495  | 31.750<br>1.2500 | 38.100<br>1.5000 | 38.087<br>1.4995 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.52<br>0.060       | IR-2016                | 31.742<br>1.2497 | 31.730<br>1.2492 | 31.753<br>1.2501 | 31.740<br>1.2496 | 0.676<br>0.152      |
|                | 31.737<br>1.2495  | 31.750<br>1.2500 | 38.100<br>1.5000 | 38.087<br>1.4995 | 32.131<br>1.2650 | 31.877<br>1.2550 | 1.52<br>0.060       | IR-2020                | 31.742<br>1.2497 | 31.730<br>1.2492 | 31.753<br>1.2501 | 31.740<br>1.2496 | 0.845<br>0.190      |
|                | 31.737<br>1.2495  | 31.750<br>1.2500 | 38.100<br>1.5000 | 38.087<br>1.4995 | 32.664<br>1.2860 | 32.410<br>1.2760 | 1.52<br>0.060       | IRA-20                 | 31.742<br>1.2497 | 31.730<br>1.2492 | 31.753<br>1.2501 | 31.740<br>1.2496 | 0.845<br>0.190      |
| 1 3/8          | 34.912<br>1.3745  | 34.925<br>1.3750 | 41.275<br>1.6250 | 41.262<br>1.6245 | 32.131<br>1.2650 | 31.877<br>1.2550 | 1.52<br>0.060       | IR-2220                | 34.917<br>1.3747 | 34.905<br>1.3742 | 34.928<br>1.3751 | 34.915<br>1.3746 | 0.925<br>0.208      |
| 1 7/16         | 36.500<br>1.4370  | 36.513<br>1.4375 | 44.450<br>1.7500 | 44.437<br>1.7495 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.52<br>0.060       | IR-2316                | 36.505<br>1.4372 | 36.492<br>1.4367 | 36.515<br>1.4376 | 36.502<br>1.4371 | 0.979<br>0.220      |

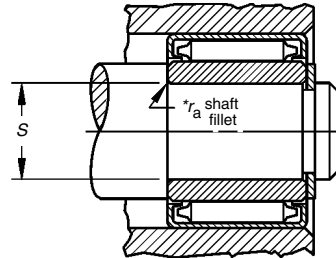
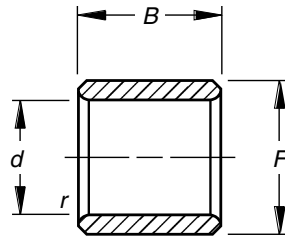
Continued on next page.



# NEEDLE ROLLER BEARINGS

## INNER RINGS FOR INCH SERIES DRAWN CUP BEARINGS

- Check for availability.
- Ideal choice where shaft not practical to use as inner raceway.
- Provided in inch (IR, IRA) nominal dimensions for use with inch series drawn cup bearings.
- Designed to meet established inch tolerances.
- Designed to be wider than matching drawn cup bearing.
- Maximum shaft fillet radius ( $r_{as-max}$ ) cannot exceed inner ring bore chamfer ( $r_{s-min}$ ) as shown.
- Optional centralized lubrication groove (bore) or thru-hole available – specify when ordering.
- Designed to be axially clamped against shoulder for loose transition fit on shaft.
- After mounting, for tight transition fit (keeping inner ring from rotating relative to shaft), inner ring O.D. must not exceed raceway diameter on matching bearing.
- See tables for required bearing dimensions raceway diameter.
- After mounting, if O.D. of inner ring exceeds required raceway diameter for matching bearing, ring should be ground to proper diameter while mounted on shaft.
- Unmarked end of inner ring to be assembled against shaft shoulder to assure clearing maximum allowable shaft fillet ( $r_{as max}$ ) as indicated in tables shown.



| Shaft Diameter | Dimensions mm/in. |                  |                  |                  |                  |                  |               | Inner Ring Designation | Transition Fit   |                  |                  |                  | Wt. mm/lbs. Approx. |
|----------------|-------------------|------------------|------------------|------------------|------------------|------------------|---------------|------------------------|------------------|------------------|------------------|------------------|---------------------|
|                | Min.              | Max.             | Max.             | Min.             | Max.             | Min.             | Min.          |                        | Loose Max.       | Min.             | Tight Max.       | Min.             |                     |
| in.            | d                 |                  | F                |                  | B                |                  | $r_{s min}$   | S                      |                  |                  |                  |                  |                     |
|                | 36.500<br>1.4370  | 36.513<br>1.4375 | 44.450<br>1.7500 | 44.437<br>1.7495 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-2324                | 36.505<br>1.4372 | 36.492<br>1.4367 | 36.515<br>1.4376 | 36.502<br>1.4371 | 1.472<br>0.331      |
| 1 1/2          | 38.087<br>1.4995  | 38.100<br>1.5000 | 44.450<br>1.7500 | 44.437<br>1.7495 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.52<br>0.060 | IR-2416                | 38.092<br>1.4997 | 38.080<br>1.4992 | 38.103<br>1.5001 | 38.090<br>1.4996 | 0.770<br>0.173      |
|                | 38.087<br>1.4995  | 38.100<br>1.5000 | 44.450<br>1.7500 | 44.437<br>1.7495 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-2424                | 38.092<br>1.4997 | 38.080<br>1.4992 | 38.103<br>1.5001 | 38.090<br>1.4996 | 1.201<br>0.270      |
| 1 11/16        | 42.850<br>1.6870  | 42.863<br>1.6875 | 52.388<br>2.0625 | 52.375<br>2.0620 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-2724                | 42.855<br>1.6872 | 42.842<br>1.6867 | 42.865<br>1.6876 | 42.852<br>1.6871 | 2.082<br>0.468      |
| 1 3/4          | 44.437<br>1.7495  | 44.450<br>1.7500 | 52.388<br>2.0625 | 52.375<br>2.0620 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-2824                | 44.442<br>1.7497 | 44.430<br>1.7492 | 44.453<br>1.7501 | 44.440<br>1.7496 | 1.761<br>0.396      |
| 1 13/16        | 46.025<br>1.8120  | 46.038<br>1.8125 | 52.388<br>2.0625 | 52.375<br>2.0620 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.52<br>0.060 | IR-2916                | 46.030<br>1.8122 | 46.017<br>1.8117 | 46.040<br>1.8126 | 46.027<br>1.8121 | 0.952<br>0.214      |
|                | 46.025<br>1.8120  | 46.038<br>1.8125 | 52.388<br>2.0625 | 52.375<br>2.0620 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-2924                | 46.030<br>1.8122 | 46.017<br>1.8117 | 46.040<br>1.8126 | 46.027<br>1.8121 | 1.432<br>0.322      |
| 1 7/8          | 47.612<br>1.8745  | 47.625<br>1.8750 | 53.975<br>2.1250 | 53.962<br>2.1245 | 38.481<br>1.5150 | 38.227<br>1.5050 | 1.52<br>0.060 | IR-3024                | 47.617<br>1.8747 | 47.605<br>1.8742 | 47.628<br>1.8751 | 47.615<br>1.8746 | 1.419<br>0.319      |
| 2 1/2          | 63.487<br>2.4995  | 63.500<br>2.5000 | 69.850<br>2.7500 | 69.837<br>2.7495 | 25.781<br>1.0150 | 25.527<br>1.0050 | 1.52<br>0.060 | IR-4016                | 63.495<br>2.4998 | 63.477<br>2.4991 | 63.505<br>2.5002 | 63.487<br>2.4995 | 1.290<br>0.290      |

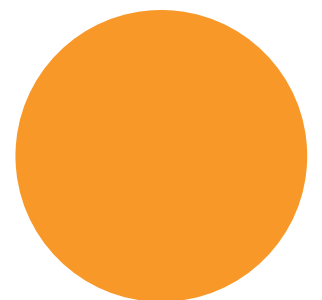
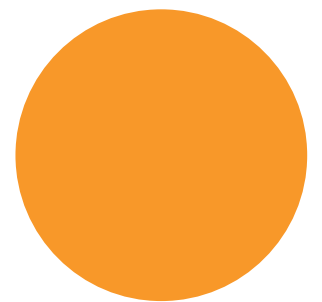
Bore and O.D. tolerance limits correspond to the single mean diameter (the arithmetical mean of the largest and smallest diameters in a single radial plane).  
 $r_{as max}$  is equal to minimum inner ring bore chamfer ( $r_{s min}$ ) at unmarked end.



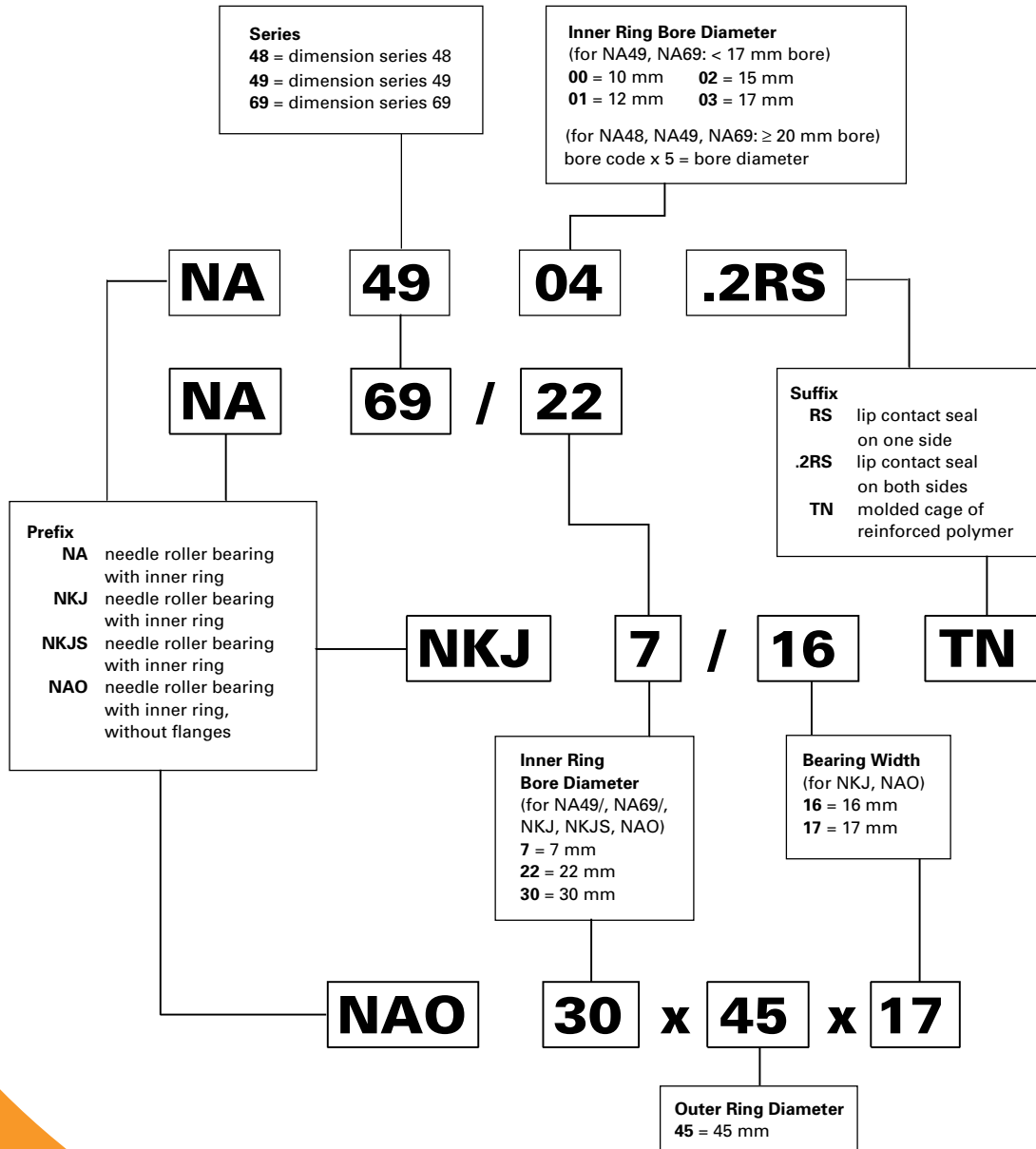
## HEAVY-DUTY NEEDLE ROLLER BEARINGS

**Overview:** Heavy-duty needle roller bearings consist of a machined and ground channel-shaped outer ring with a complement of needle rollers retained and guided by a cage. The high-strength cage retains and guides the rollers. An optional lubrication groove and hole in the outer ring facilitate relubrication. These bearings can be used with or without a machined and ground inner ring, depending on the suitability of the shaft as a raceway surface.

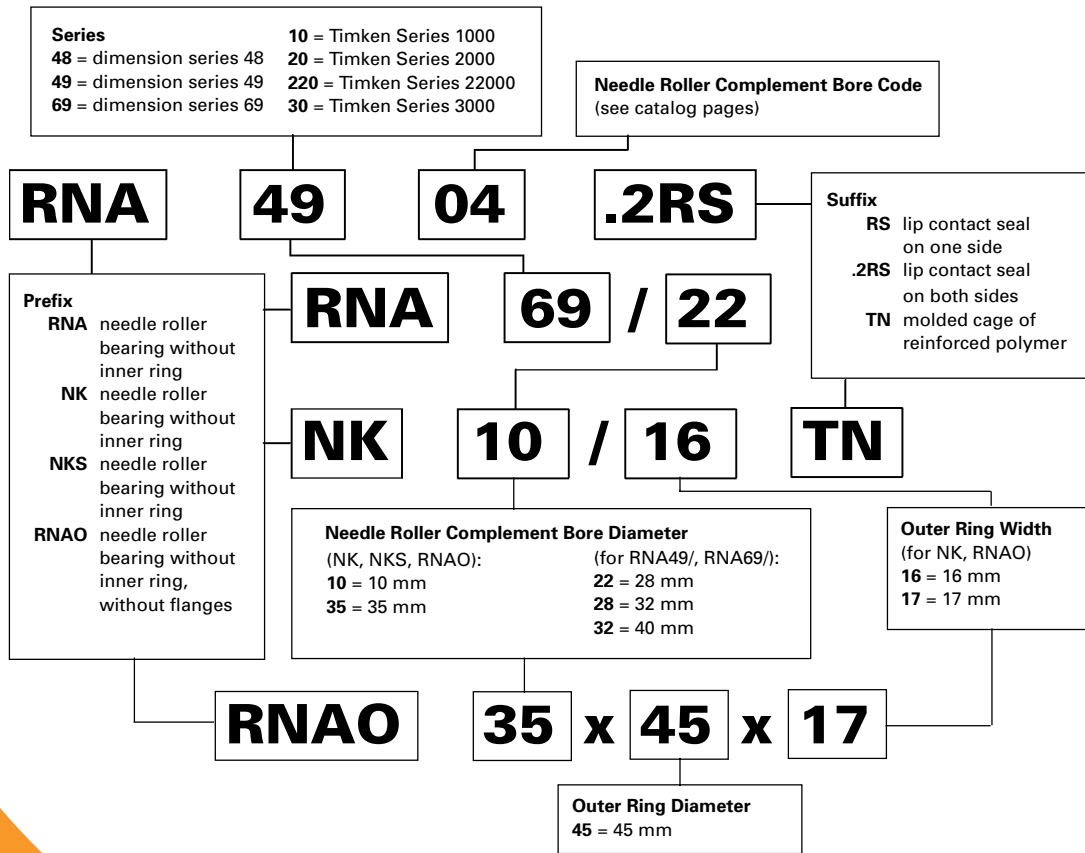
- **Sizes: Metric:** 5 mm - 175 mm bore (0.19685 in. - 6.88976 in.).
- **Markets:** Gear pumps, sheaves, automotive transmissions and two-cycle engines.
- **Features:** Thick outer ring provides maximum load capacity and shock resistance with a relatively small radial cross section.
- **Benefits:** Optimum speed and lubrication-retention capability.



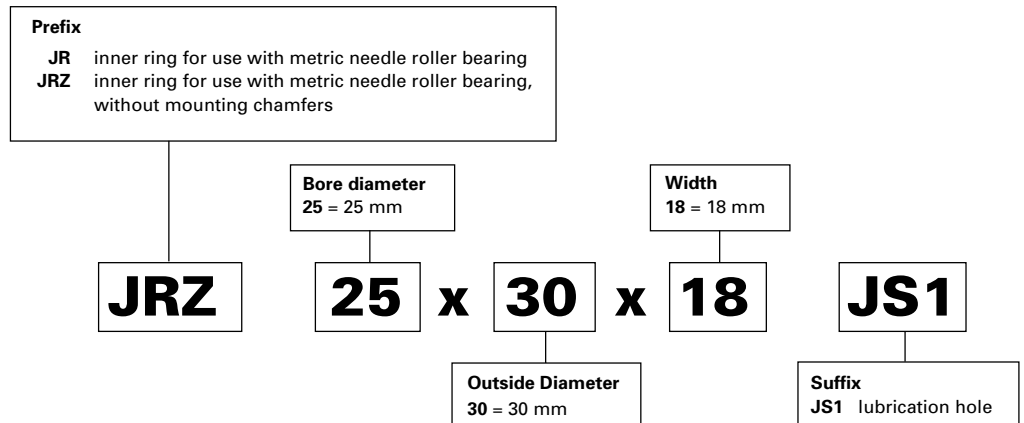
## Needle Roller Bearings with Inner Rings – Metric Nominal Dimensions



## Needle Roller Bearings without Inner Rings – Metric Nominal Dimensions



## Inner Rings for Needle Roller Bearings – Metric Nominal Dimensions



C



# Heavy-Duty Needle Roller

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# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS

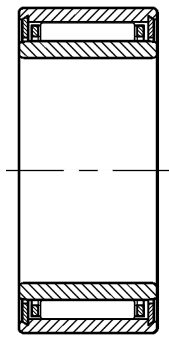
### METRIC SERIES

When applications involve very heavy dynamic, static or even shock load conditions the needle roller bearing may be found to give best results.

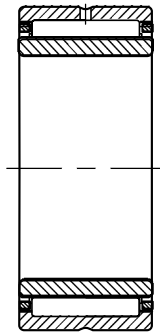
### REFERENCE STANDARDS ARE:

- ISO 1206 – Needle roller bearings – Light and medium series – Dimensions and tolerances.
- DIN 617 – Rolling bearings – Needle roller bearings with cage – Dimension Series 48 and 49.

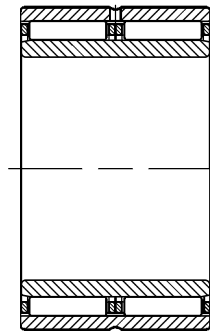
### TYPES OF METRIC SERIES NEEDLE ROLLER BEARINGS Needle roller bearings with inner rings



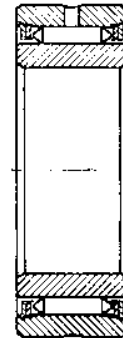
**NKJ**  
( $d \leq 7$  mm)



**NKJ, NKJS**  
( $d \geq 9$  mm)  
NA48, NA49  
NA69 ( $d \leq 30$  mm)

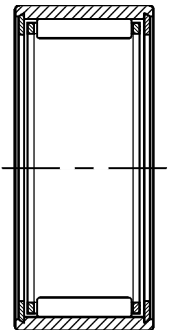


**NA69**  
( $d \geq 32$  mm)

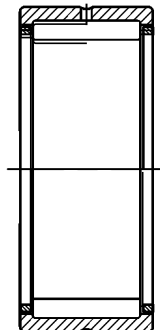


**Full Complement**

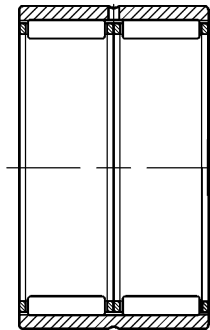
### Needle roller bearings without inner rings



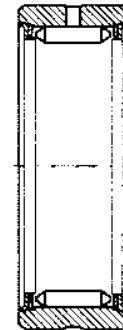
**NK**  
( $F_w \leq 10$  mm)



**NK** ( $F_w \geq 12$  mm)  
NKS, RNA48, RNA49  
RNA69 ( $F_w \leq 35$  mm)

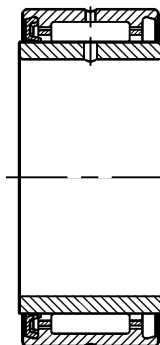


**RNA69**  
( $F_w \geq 40$  mm)

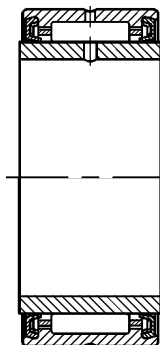


**Full Complement**

### Sealed needle roller bearings with inner rings

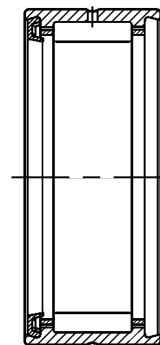


**NA49RS**

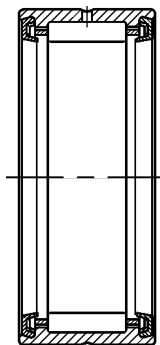


**NA49.2RS**

### Sealed needle roller bearings without inner rings

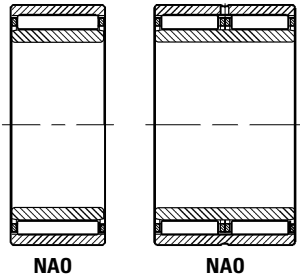


**RNA49RS**

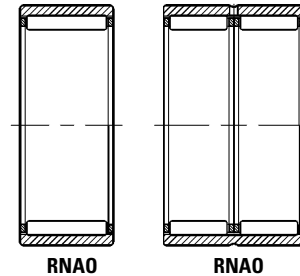


**RNA49.2RS**

**Needle roller bearings  
without flanges,  
with inner rings**



**Needle roller bearings  
without flanges, without  
inner rings**



**Suffixes**

|             |                                              |
|-------------|----------------------------------------------|
| <b>RS</b>   | One Seal                                     |
| <b>.2RS</b> | Two Seals                                    |
| <b>TN</b>   | Molded Cage of Engineered Reinforced Polymer |

**CONSTRUCTION**

The basic constructions of metric series needle roller bearings are:

- with integral end flanges on the one piece channel-shaped outer rings. ( $F_w \geq 12$  mm)
- with inserted end washers to provide axial retention of the needle roller and cage assemblies. ( $F_w \leq 10$  mm)
- without flanges where separate end washers or housing shoulders are required to provide axial retention of the needle roller and cage assemblies.
- full, outer ring-piloted complement of needle rollers (with or without inner ring).

**METRIC SERIES NEEDLE ROLLER BEARINGS WITH INNER RINGS**

When it is impractical to finish the shaft to meet the desired raceway design requirements, an inner ring may be used. Standard needle roller bearings are available with inner rings (such as the NA Series) forming complete bearings. Bearings furnished with inner rings meet the quality requirements in accordance with ISO standards.

- For inner and outer ring tolerances the metric series bearings follow the normal tolerance class in ISO Standard 492 covering radial bearings. Bearings to more precise tolerance classes P6 and P5 may be obtained upon request (see the engineering section).
- The metric series bearings may be obtained with radial internal clearance in accordance with ISO Standard 5753 also specified for cylindrical roller bearings. Mostly, they follow the normal (C0) radial clearance group although bearings to clearance groups C2, C3, and C4 may be made available on request (see the engineering section).
- Inner ring and outer ring chamfer dimensions meet the requirements of ISO Standard 582.

**METRIC SERIES NEEDLE ROLLER BEARINGS WITHOUT INNER RINGS**

Whenever the shaft can be used as the inner raceway, needle roller bearings without inner rings provide advantages of economy and close control of radial internal clearance in operation. Tolerance class F6 is the normal specification for the metric series needle roller complement bore diameter of an unmounted bearing as shown in Table 1. In the case of needle roller bearings of series RNAO, without flanges and without inner rings, the outer rings and needle roller and cage assemblies are not interchangeable.

TABLE 1 – METRIC SERIES CAGED NEEDLE ROLLER COMPLEMENT BORE DIAMETER FOR BEARINGS WITHOUT INNER RINGS.

| mm    |     | μm               |      |
|-------|-----|------------------|------|
| >     | ≤   | low              | high |
| $F_w$ |     | $\Delta F_w$ min |      |
| 3     | 6   | +10              | +18  |
| 6     | 10  | +13              | +22  |
| 10    | 18  | +16              | +27  |
| 18    | 30  | +20              | +33  |
| 30    | 50  | +25              | +41  |
| 50    | 80  | +30              | +49  |
| 80    | 120 | +36              | +58  |
| 120   | 180 | +43              | +68  |
| 180   | 250 | +50              | +79  |
| 250   | 315 | +56              | +88  |
| 315   | 400 | +62              | +98  |





## NEEDLE ROLLER BEARINGS

TABLE 1. A –  
FULL COMPLEMENT METRIC NEEDLE ROLLER COMPLEMENT  
BORE DIAMETER FOR BEARINGS WITHOUT INNER RINGS

| mm    |     | µm                          |      |
|-------|-----|-----------------------------|------|
| >     | ≤   | low                         | high |
| $F_w$ |     | $\Delta F_{us} \text{ min}$ |      |
| 5     | 15  | +20                         | +40  |
| 15    | 25  | +20                         | +43  |
| 25    | 30  | +25                         | +48  |
| 30    | 35  | +30                         | +53  |
| 35    | 60  | +35                         | +58  |
| 60    | 80  | +45                         | +73  |
| 80    | 115 | +50                         | +78  |
| 115   | 180 | +60                         | +88  |
| 180   | 220 | +70                         | +103 |
| 220   | 270 | +80                         | +113 |
| 270   | 350 | +90                         | +128 |

### METRIC SERIES NEEDLE ROLLER BEARINGS WITH INTEGRAL FLANGES

The Timken® Torrington® needle roller bearing has a one-piece channel-shaped outer ring of bearing quality steel, heat treated to yield maximum load rating. The integral end flanges provide axial location for the needle rollers. The bores of the end flanges serve as piloting surfaces for the cage.

A steel cage provides inward retention for the needle rollers and the design assures roller stability and minimizes friction between the cage and the needle rollers. The cage has maximum strength consistent with the inherent high load ratings of needle roller bearings.

Needle roller bearings of series NKJ, NKJS, NA48, and NA49 contain one needle roller and cage assembly, bearings of series NA69 with bearing bores of 32 mm and above have two needle roller and cage assemblies.

The outer ring has a lubricating groove and a lubricating hole for more convenient lubrication of the bearing. However, the smaller bearings of series NKJ and NK do not have a lubricating groove or a lubricating hole. ( $F_w \leq 10 \text{ mm}$ )

### METRIC SERIES NEEDLE ROLLER BEARINGS WITH INSERTED END WASHERS

Some metric series needle roller bearings have inserted end washers to provide axial retention of the needle roller and cage assembly. The needle roller and cage radial assemblies, consistent with other Timken Torrington designs, provide inward and outward retention for the needle rollers.

### METRIC SERIES NEEDLE ROLLER BEARINGS WITHOUT FLANGES

The needle roller and cage radial assembly used in the metric series needle roller bearings without flanges is slightly narrower than the inner and outer rings to ensure unobstructed operation. Separate end washers are required to provide axial retention of the needle roller and cage radial assembly. Wide needle roller bearings using two needle roller and cage assemblies have a lubricating

groove and one lubricating hole in the outer ring to facilitate relubrication of the bearing. Narrow needle roller bearings do not have a lubricating groove or a lubricating hole in the outer ring.

### SEALED METRIC SERIES NEEDLE ROLLER BEARINGS OF DIMENSION SERIES 49

Needle roller bearings of Series 49 are available with one or two integral lip contact seals as listed on page C118. One seal is designated by suffix letters RS. Two seals are designated by .2RS. When combining sealed metric series needle roller bearings with inner rings it is suggested to use inner rings shown on page C340 with designation JRZ because they are wider than the outer rings to ensure positive seal contact.

These seals limit the bearing operating temperature between  $-30^\circ \text{C}$  and  $110^\circ \text{C}$ . If the operating temperature must be outside the above range or if the seals are exposed to unusual fluids, external seals using suitable seal materials or other solutions should be investigated. Sealed bearings are normally packed with a high quality lithium soap base grease suitable up to  $120^\circ \text{C}$  for short periods of operation.

The limiting speeds specified for sealed bearings listed in the bearing tables are based on operating conditions determined by testing. Optimum performance may be expected providing the bearing is properly installed, with appropriate internal clearances, and be subjected to a load of low magnitude. Care should be taken that overheating will not occur, thus preventing breakdown of the grease and eventual bearing failure.

### METRIC SERIES FULL COMPLEMENT NEEDLE ROLLER BEARINGS

Series NA and RNA 1000, 2000, 22000 and 3000 are available with possible options of extra wide and/or crowned inner ring raceways. Consult your local Timken representative for application details.

## BEARING MOUNTING

### MOUNTING DIMENSIONS

It is suggested that needle roller bearings are mounted in their housings with a clearance fit if the load is stationary relative to the housing, or with a tight transition fit if the load rotates relative to the housing. Table 2 lists the suggested tolerances for the housing bore and the shaft raceway for metric series bearings without inner rings. Table 3 lists the suggested shaft tolerances for the above two mounting conditions when the metric series bearings are used with inner rings. The suggested housing bore tolerances for metric series bearings with inner rings is the same as the housing bore tolerance listed in Table 2 for metric series bearings without inner rings. Other quality requirements for shafts and housings are given in the engineering section of this catalog.

Other mounting dimensions may be required for special operating conditions such as:

1. Extremely heavy radial loads
2. Shock loads
3. Temperature gradient across bearing
4. Housing material with heat expansion coefficient different than that of the bearing
5. Oscillating motion applications

## Heavy-Duty Needle Roller Bearings

Regardless of the fit of the bearing outer ring in the housing, the outer ring should be axially located by housing shoulders or other positive means. The bearing rings should closely fit against the shaft and housing shoulders and must not contact the fillet radius. The maximum shaft or housing fillet  $r_{as\ max}$  should be no greater than the minimum bearing chamfer  $r_{s\ min}$  as shown in Table 4.

In order to permit mounting and dismounting of the shaft, the maximum diameter  $D_1$  in Table 5 must not be exceeded.  $F_w$  is shown in the bearing tables.

**TABLE 2 – MOUNTING TOLERANCES FOR METRIC SERIES BEARINGS WITHOUT INNER RING**

| Rotation conditions                 | Nominal housing bore diameter D<br>mm | ISO tolerance zone for housing |      | Nominal shaft diameter F<br>mm | ISO tolerance zone for shaft |      |
|-------------------------------------|---------------------------------------|--------------------------------|------|--------------------------------|------------------------------|------|
|                                     |                                       | caged                          | full |                                | caged                        | full |
| Load stationary relative to housing | all diameters                         | H7                             | J6   | all diameters                  | h6                           | h5   |
| General work with larger clearance  | all diameters                         | K7                             | —    | all diameters                  | g6                           | —    |
| Load rotates relative to housing    | all diameters                         | N7                             | M6   | all diameters                  | f6                           | g5   |

NOTE: Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions. Details of shaft and housing quality requirements are given in the engineering section of this catalog.

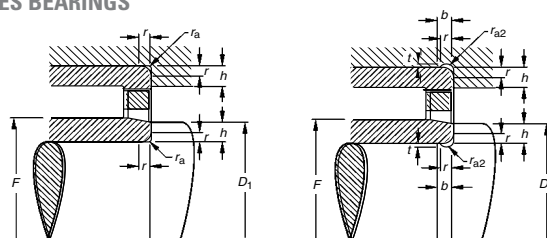
**TABLE 3 – SHAFT TOLERANCES FOR METRIC SERIES BEARINGS WITH INNER RINGS (USE HOUSING TOLERANCE SHOWN IN TABLE 2)**

| Rotation conditions                 | Nominal shaft diameter d, mm |      | ISO tolerance zone for shaft |         |
|-------------------------------------|------------------------------|------|------------------------------|---------|
|                                     | caged                        | full | caged                        | full    |
| load rotates relative to housing    | all diameters                |      | g6                           | h5 (h6) |
| load stationary relative to housing | >                            | ≤    |                              |         |
|                                     | 40                           | 100  | k6                           | k5      |
|                                     | 100                          | 140  | M6                           | M5      |
|                                     | 140                          |      | n6                           | n6      |

NOTE: Care should be taken that the selected bearing internal clearance is appropriate for the operating conditions. Details of shaft and housing quality requirements are given in the engineering section of this catalog.

Needle roller bearings without flanges of series RNAO and NAO must have the needle roller and cage radial assembly properly end guided by shoulders as shown in Table 6, or other suitable means such as the spring steel washers (SNSH) shown on page C349. These end guiding surfaces should be hardened and precision turned or ground to minimize wear and should properly fit against the outer rings and the inner rings to provide the desired end clearance for the needle roller and cage assembly.

**TABLE 4 – FILLETS, UNDERCUTS, AND SHOULDER HEIGHTS FOR METRIC SERIES BEARINGS**



| $r_s$<br>Min.<br>mm | $r_{as}$<br>Max. | t   | $r_{a2s}$<br>Min. | b   | h<br>Min. |
|---------------------|------------------|-----|-------------------|-----|-----------|
| 0.15                | 0.15             |     |                   |     | 0.6       |
| 0.3                 | 0.3              |     |                   |     | 1         |
| 0.6                 | 0.6              |     |                   |     | 2         |
| 1                   | 1                | 0.2 | 1.3               | 2   | 2.5       |
| 1.1                 | 1                | 0.3 | 2                 | 3   | 3.25      |
| 1.5                 | 1.5              | 0.4 | 2                 | 3.2 | 4         |
| 2                   | 2                | 0.5 | 2.5               | 4   | 5         |
| 2.1                 | 2.1              | 0.5 | 3                 | 4.7 | 5.5       |
| 3                   | 2.5              | 0.5 | 3.5               | 5.3 | 6         |

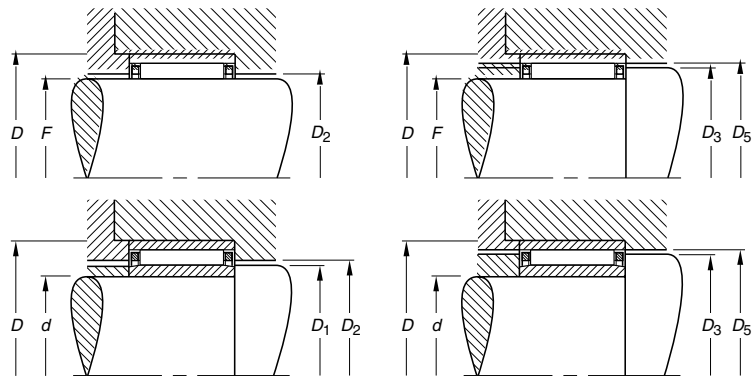
**TABLE 5 – SHOULDER DIAMETER  $D_{1\max}$  FOR METRIC SERIES BEARINGS**

| Needle roller complement bore diameter $F_w$ |  | Dimensions in mm |             |             |             |           |             |
|----------------------------------------------|--|------------------|-------------|-------------|-------------|-----------|-------------|
|                                              |  | $D_{1\max}$      | $F_w - 0.3$ | $F_w - 0.5$ | $F_w - 0.7$ | $F_w - 1$ | $F_w - 1.5$ |
| >                                            |  |                  | 20          | 55          | 100         | 250       |             |
| ≤                                            |  | 20               | 55          | 100         | 250         |           |             |



## NEEDLE ROLLER BEARINGS

TABLE 6 –  
MOUNTING DIMENSIONS FOR  
METRIC SERIES NEEDLE ROLLER  
BEARINGS WITHOUT FLANGES



Guidance in the housing

Guidance on the shaft

| Dimensions mm | Bearing Series RNAO  |                      |                      |
|---------------|----------------------|----------------------|----------------------|
|               | Min.                 | Max.                 | Min.                 |
| <b>FxD</b>    | <b>D<sub>2</sub></b> | <b>D<sub>3</sub></b> | <b>D<sub>5</sub></b> |
| 10x17         | 10.3                 | 12.7                 | 13.3                 |
| 12x19         | 12.3                 | 14.7                 | 15.3                 |
| 14x22         | 14.4                 | 17.6                 | 18.3                 |
| 15x23         | 15.4                 | 18.6                 | 19.3                 |
| 16x24         | 16.4                 | 19.6                 | 20.3                 |
| 17x25         | 17.4                 | 20.6                 | 21.3                 |
| 18x26         | 18.4                 | 21.6                 | 22.3                 |
| 18x30         | 18.6                 | 23.6                 | 24.5                 |
| 20x28         | 20.4                 | 23.6                 | 24.3                 |
| 20x32         | 20.6                 | 25.6                 | 26.5                 |
| 22x30         | 22.4                 | 25.6                 | 26.3                 |
| 22x35         | 22.8                 | 28.4                 | 29.5                 |
| 25x35         | 25.6                 | 29.4                 | 30.5                 |
| 25x37         | 25.8                 | 31.4                 | 32.5                 |
| 28x40         | 28.8                 | 34.4                 | 35.5                 |
| 30x40         | 30.6                 | 34.4                 | 35.5                 |
| 30x42         | 30.8                 | 36.4                 | 37.5                 |
| 35x45         | 35.6                 | 39.4                 | 40.5                 |
| 35x47         | 35.8                 | 41.4                 | 42.5                 |
| 40x50         | 40.6                 | 44.4                 | 45.5                 |
| 40x55         | 41                   | 47.2                 | 48.5                 |
| 45x55         | 45.6                 | 49.4                 | 50.5                 |
| 45x62         | 46                   | 52.2                 | 53.5                 |
| 50x62         | 50.6                 | 54.4                 | 55.8                 |
| 50x65         | 51                   | 57.2                 | 58.5                 |
| 55x68         | 55.6                 | 59.4                 | 60.8                 |
| 55x72         | 56                   | 62.2                 | 63.8                 |
| 60x78         | 61                   | 67.2                 | 68.8                 |
| 65x85         | 66                   | 72.2                 | 73.8                 |
| 70x90         | 71                   | 77.2                 | 78.8                 |
| 75x95         | 76                   | 82.2                 | 84                   |
| 80x100        | 81                   | 87.2                 | 89                   |
| 85x105        | 86                   | 92.2                 | 94                   |
| 90x110        | 91                   | 97.2                 | 99                   |
| 95x115        | 96                   | 102.2                | 104                  |
| 100x120       | 101                  | 107.2                | 109                  |

| Dimensions mm | Bearing Series NAO   |                      |                      |                      |
|---------------|----------------------|----------------------|----------------------|----------------------|
|               | Max.                 | Min.                 | Max.                 | Min.                 |
| <b>dxD</b>    | <b>D<sub>1</sub></b> | <b>D<sub>2</sub></b> | <b>D<sub>3</sub></b> | <b>D<sub>5</sub></b> |
| 6x17          | 9.7                  | 10.3                 | 12.7                 | 13.3                 |
| 8x19          | 11.7                 | 12.3                 | 14.7                 | 15.3                 |
| 10x22         | 13.7                 | 14.4                 | 17.6                 | 18.3                 |
| 10x26         | 13.7                 | 14.6                 | 19.6                 | 20.3                 |
| 12x24         | 15.7                 | 16.4                 | 19.6                 | 20.3                 |
| 12x28         | 15.7                 | 16.6                 | 21.6                 | 22.3                 |
| 15x28         | 19.5                 | 20.4                 | 23.6                 | 24.3                 |
| 15x32         | 19.5                 | 20.6                 | 25.6                 | 26.5                 |
| 17x30         | 21.5                 | 22.4                 | 25.6                 | 26.3                 |
| 17x35         | 21.5                 | 22.8                 | 28.4                 | 29.5                 |
| 20x35         | 24.5                 | 25.6                 | 29.4                 | 30.5                 |
| 20x37         | 24.5                 | 25.8                 | 31.4                 | 32.5                 |
| 25x40         | 29.5                 | 30.6                 | 34.4                 | 35.5                 |
| 25x42         | 29.5                 | 30.8                 | 36.4                 | 37.5                 |
| 30x45         | 34.5                 | 35.6                 | 39.4                 | 40.5                 |
| 30x47         | 34.5                 | 35.8                 | 41.4                 | 42.5                 |
| 35x50         | 39.5                 | 40.6                 | 44.4                 | 45.5                 |
| 35x55         | 39.5                 | 41                   | 47.2                 | 48.5                 |
| 40x55         | 44.5                 | 45.6                 | 49.4                 | 50.5                 |
| 40x62         | 44.5                 | 46                   | 52.2                 | 53.5                 |
| 45x62         | 49.5                 | 50.6                 | 54.4                 | 55.8                 |
| 45x72         | 54.5                 | 56                   | 62.2                 | 63.8                 |
| 50x68         | 54.5                 | 55.6                 | 59.4                 | 60.8                 |
| 50x78         | 59.3                 | 61                   | 67.2                 | 68.8                 |
| 55x85         | 64.3                 | 66                   | 72.2                 | 73.8                 |
| 60x90         | 69.3                 | 71                   | 77.2                 | 78.8                 |
| 65x95         | 74.3                 | 76                   | 82.2                 | 84                   |
| 70x100        | 79.3                 | 81                   | 87.2                 | 89                   |
| 75x105        | 84.3                 | 86                   | 92.2                 | 94                   |
| 80x110        | 89.3                 | 91                   | 97.2                 | 99                   |
| 85x115        | 94.3                 | 96                   | 102.2                | 104                  |
| 90x120        | 99.3                 | 101                  | 107.2                | 109                  |

## LOAD RATING FACTORS

### DYNAMIC LOADS

Needle roller bearings can accommodate only radial loads.

$$P = F_r \quad (\text{kN})$$

P = The maximum dynamic radial load that may be applied to a needle roller bearing based on the dynamic load rating C given in the tabular pages. This load should be  $\leq C/3$ .

### STATIC LOADS

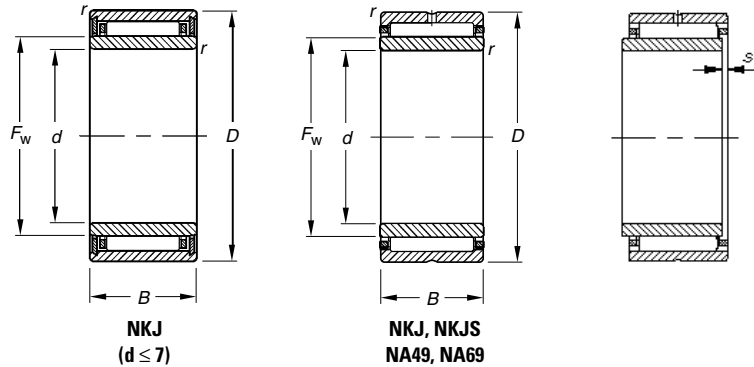
Needle roller bearings can accommodate only radial loads.

$$P_0 = F_r \quad (\text{kN})$$

### MOUNTING IN SETS

Needle roller bearings which are mounted side by side or must have the same cross-section and radial internal clearances, after mounting.

**NEEDLE ROLLER BEARINGS  
WITH INNER RINGS  
METRIC SERIES**



| Shaft Diameter | Dimensions mm/in. |        |       |        |                |                    | Bearing Designation | Load Ratings kN/bf. |           | Limiting Speeds       |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|--------|-------|--------|----------------|--------------------|---------------------|---------------------|-----------|-----------------------|---------|---------------------|------------|
|                | mm                | d      | D     | B      | F <sub>w</sub> | r <sub>s min</sub> |                     | s <sup>1</sup>      | Dynamic C | Static C <sub>0</sub> | Oil RPM |                     | Grease RPM |
| 5              | 5                 | 15     | 12    | 8      | 0.3            | 1.5                | NKJ5/12             | 4.57                | 4.89      | 41000                 | 26000   | 0.0148              | 0.014      |
|                | 0.1969            | 0.5906 | 0.472 | 0.3150 | 0.012          | 0.059              |                     | 1030                | 1100      |                       |         |                     |            |
| 5              | 5                 | 15     | 16    | 8      | 0.3            | 1.5                | NKJ5/16             | 5.22                | 5.78      | 41000                 | 26000   | 0.0154              | 0.017      |
|                | 0.1969            | 0.5906 | 0.630 | 0.3150 | 0.012          | 0.059              |                     | 1170                | 1300      |                       |         |                     |            |
| 6              | 6                 | 16     | 12    | 9      | 0.3            | 1.5                | NKJ6/12             | 4.27                | 4.60      | 40000                 | 26000   | 0.0153              | 0.015      |
|                | 0.2362            | 0.6299 | 0.472 | 0.3543 | 0.012          | 0.059              |                     | 960                 | 1030      |                       |         |                     |            |
| 6              | 6                 | 16     | 16    | 9      | 0.3            | 1.5                | NKJ6/16             | 5.57                | 6.47      | 40000                 | 26000   | 0.0167              | 0.019      |
|                | 0.2362            | 0.6299 | 0.630 | 0.3543 | 0.012          | 0.059              |                     | 1250                | 1450      |                       |         |                     |            |
| 7              | 7                 | 17     | 12    | 11.5   | 0.3            | 1.5                | NKJ7/12             | 5.40                | 6.43      | 39000                 | 25000   | 0.0174              | 0.017      |
|                | 0.2756            | 0.6693 | 0.472 | 0.4528 | 0.012          | 0.059              |                     | 1210                | 1450      |                       |         |                     |            |
| 7              | 7                 | 17     | 16    | 11.5   | 0.3            | 1.5                | NKJ7/16TN           | 5.30                | 6.27      | 39000                 | 25000   | 0.0173              | 0.021      |
|                | 0.2756            | 0.6693 | 0.630 | 0.4528 | 0.012          | 0.059              |                     | 1190                | 1410      |                       |         |                     |            |
| 9              | 9                 | 19     | 12    | 12     | 0.3            | 1.5                | NKJ9/12             | 6.86                | 7.60      | 30000                 | 19000   | 0.0189              | 0.018      |
|                | 0.3543            | 0.7480 | 0.472 | 0.4724 | 0.012          | 0.059              |                     | 1540                | 1710      |                       |         |                     |            |
| 9              | 9                 | 19     | 16    | 12     | 0.3            | 1.5                | NKJ9/16             | 6.78                | 9.03      | 30000                 | 19000   | 0.0204              | 0.024      |
|                | 0.3543            | 0.7480 | 0.630 | 0.4724 | 0.012          | 0.059              |                     | 1520                | 2030      |                       |         |                     |            |
| 10             | 10                | 22     | 13    | 14     | 0.3            | 1.0                | NA4900              | 9.39                | 10.3      | 24000                 | 16000   | 0.0211              | 0.025      |
|                | 0.3937            | 0.8661 | 0.512 | 0.5512 | 0.012          | 0.039              |                     | 2110                | 2320      |                       |         |                     |            |
| 10             | 10                | 22     | 16    | 14     | 0.6            | 1.5                | NKJ10/16            | 12.4                | 14.8      | 24000                 | 16000   | 0.0231              | 0.032      |
|                | 0.3937            | 0.8661 | 0.630 | 0.5512 | 0.024          | 0.059              |                     | 2790                | 3330      |                       |         |                     |            |
| 10             | 10                | 22     | 20    | 14     | 0.3            | 1.5                | NKJ10/20            | 14.7                | 18.4      | 24000                 | 16000   | 0.0244              | 0.040      |
|                | 0.3937            | 0.8661 | 0.787 | 0.5512 | 0.012          | 0.059              |                     | 3300                | 4140      |                       |         |                     |            |
| 12             | 12                | 24     | 13    | 16     | 0.3            | 1.0                | NA4901              | 10.5                | 12.0      | 28000                 | 18000   | 0.0233              | 0.028      |
|                | 0.4724            | 0.9449 | 0.512 | 0.6299 | 0.012          | 0.039              |                     | 2360                | 2700      |                       |         |                     |            |
| 12             | 12                | 24     | 16    | 16     | 0.3            | 1.5                | NKJ12/16            | 13.0                | 16.2      | 28000                 | 18000   | 0.0250              | 0.036      |
|                | 0.4724            | 0.9449 | 0.630 | 0.6299 | 0.012          | 0.059              |                     | 2920                | 3640      |                       |         |                     |            |
| 12             | 12                | 24     | 20    | 16     | 0.3            | 1.5                | NKJ12/20            | 15.4                | 20.2      | 28000                 | 18000   | 0.0264              | 0.046      |
|                | 0.4724            | 0.9449 | 0.787 | 0.6299 | 0.012          | 0.059              |                     | 3460                | 4540      |                       |         |                     |            |
| 12             | 12                | 24     | 22    | 16     | 0.3            | 1.0                | NA6901              | 16.1                | 21.3      | 28000                 | 18000   | 0.0267              | 0.051      |
|                | 0.4724            | 0.9449 | 0.866 | 0.6299 | 0.012          | 0.039              |                     | 3620                | 4790      |                       |         |                     |            |
| 15             | 15                | 27     | 16    | 19     | 0.3            | 1.5                | NKJ15/16            | 14.1                | 19.0      | 24000                 | 15000   | 0.0279              | 0.042      |
|                | 0.5906            | 1.0630 | 0.630 | 0.7480 | 0.012          | 0.059              |                     | 3170                | 4270      |                       |         |                     |            |
| 15             | 15                | 27     | 20    | 19     | 0.3            | 1.5                | NKJ15/20            | 16.8                | 23.6      | 24000                 | 15000   | 0.0295              | 0.054      |
|                | 0.5906            | 1.0630 | 0.787 | 0.7480 | 0.012          | 0.059              |                     | 3780                | 5310      |                       |         |                     |            |
| 15             | 15                | 28     | 13    | 20     | 0.3            | 1.0                | NA4902              | 11.8                | 15.3      | 22000                 | 14000   | 0.0270              | 0.037      |
|                | 0.5906            | 1.1024 | 0.512 | 0.7874 | 0.012          | 0.039              |                     | 2650                | 3440      |                       |         |                     |            |
| 15             | 15                | 28     | 23    | 20     | 0.3            | 1.5                | NA6902              | 18.4                | 26.9      | 22000                 | 14000   | 0.0311              | 0.067      |
|                | 0.5906            | 1.1024 | 0.906 | 0.7874 | 0.012          | 0.059              |                     | 4140                | 6050      |                       |         |                     |            |
| 17             | 17                | 29     | 16    | 21     | 0.3            | 2.0                | NKJ17/16            | 15.3                | 21.6      | 21000                 | 14000   | 0.0301              | 0.047      |
|                | 0.6693            | 1.1417 | 0.630 | 0.8268 | 0.012          | 0.079              |                     | 3440                | 4860      |                       |         |                     |            |
| 17             | 17                | 29     | 20    | 21     | 0.3            | 1.5                | NKJ17/20            | 18.1                | 23.9      | 21000                 | 14000   | 0.0317              | 0.059      |
|                | 0.6693            | 1.1417 | 0.787 | 0.8268 | 0.012          | 0.059              |                     | 4070                | 5370      |                       |         |                     |            |
| 17             | 17                | 30     | 13    | 22     | 0.3            | 1.0                | NA4903              | 12.2                | 16.4      | 20000                 | 13000   | 0.0286              | 0.040      |
|                | 0.6693            | 1.1811 | 0.512 | 0.8661 | 0.012          | 0.039              |                     | 2740                | 3690      |                       |         |                     |            |

<sup>(1)</sup> Max. axial displacement

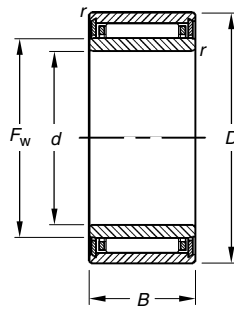
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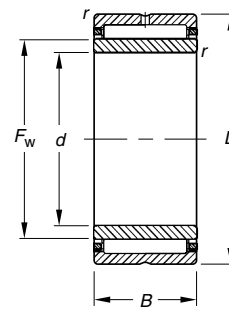
# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITH INNER RINGS — *continued*

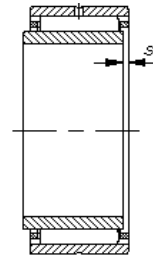
### METRIC SERIES



**NKJ**  
( $d \leq 7$ )



**NKJ, NKJS**  
**NA49, NA69**



| Shaft Diameter | Dimensions mm/in. |        |       |                |                    |                | Bearing Designation | Load Ratings kN/bf. |                       | Limiting Speeds |            | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|--------|-------|----------------|--------------------|----------------|---------------------|---------------------|-----------------------|-----------------|------------|---------------------|----------------|
|                | d                 | D      | B     | F <sub>w</sub> | r <sub>s min</sub> | s <sup>1</sup> |                     | Dynamic C           | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                     | C <sub>g</sub> |
|                | 17                | 30     | 23    | 22             | 0.6                | 1.0            | NA6903              | 19.8                | 30.6                  | 20000           | 13000      | 0.0334              | 0.084          |
|                | 0.6693            | 1.1811 | 0.906 | 0.8661         | 0.024              | 0.039          |                     | 4450                | 6880                  |                 |            |                     | 0.185          |
|                | 17                | 37     | 20    | 24             | 0.6                | 1.0            | NKJS17              | 29.1                | 32.8                  | 20000           | 13000      | 0.0325              | 0.108          |
|                | 0.6693            | 1.4567 | 0.787 | 0.9449         | 0.024              | 0.039          |                     | 6540                | 7370                  |                 |            |                     | 0.238          |
| 20             | 20                | 32     | 16    | 24             | 0.3                | 1.5            | NKJ20/16            | 16.2                | 24.3                  | 18000           | 12000      | 0.0328              | 0.053          |
|                | 0.7874            | 1.2598 | 0.630 | 0.9449         | 0.012              | 0.059          |                     | 3640                | 5460                  |                 |            |                     | 0.117          |
|                | 20                | 32     | 20    | 24             | 0.3                | 1.5            | NKJ20/20            | 19.3                | 30.3                  | 18000           | 12000      | 0.0346              | 0.067          |
|                | 0.7874            | 1.2598 | 0.787 | 0.9449         | 0.012              | 0.059          |                     | 4340                | 6810                  |                 |            |                     | 0.148          |
|                | 20                | 37     | 17    | 25             | 0.3                | 1.5            | NA4904              | 21.3                | 25.5                  | 18000           | 12000      | 0.0318              | 0.084          |
|                | 0.7874            | 1.4567 | 0.669 | 0.9843         | 0.012              | 0.059          |                     | 4790                | 5730                  |                 |            |                     | 0.185          |
|                | 20                | 37     | 30    | 25             | 0.3                | 1.5            | NA6904              | 36.6                | 51.0                  | 18000           | 12000      | 0.0378              | 0.133          |
|                | 0.7874            | 1.4567 | 1.181 | 0.9843         | 0.012              | 0.059          |                     | 8230                | 11500                 |                 |            |                     | 0.293          |
|                | 20                | 42     | 20    | 28             | 0.6                | 1.0            | NKJS20              | 30.3                | 38.4                  | 16000           | 11000      | 0.0364              | 0.130          |
|                | 0.7874            | 1.6535 | 0.787 | 1.1024         | 0.024              | 0.039          |                     | 6810                | 8630                  |                 |            |                     | 0.287          |
| 22             | 22                | 34     | 16    | 26             | 0.3                | 1.5            | NKJ22/16            | 16.6                | 25.7                  | 17000           | 11000      | 0.0344              | 0.058          |
|                | 0.8661            | 1.3386 | 0.630 | 1.0236         | 0.012              | 0.059          |                     | 3730                | 5780                  |                 |            |                     | 0.128          |
|                | 22                | 34     | 20    | 26             | 0.3                | 2.0            | NKJ22/20            | 19.7                | 32.0                  | 17000           | 11000      | 0.0363              | 0.071          |
|                | 0.8661            | 1.3386 | 0.787 | 1.0236         | 0.012              | 0.079          |                     | 4430                | 7190                  |                 |            |                     | 0.157          |
|                | 22                | 39     | 17    | 28             | 0.3                | 1.5            | NA49/22             | 23.3                | 29.6                  | 16000           | 10000      | 0.0346              | 0.089          |
|                | 0.8661            | 1.5354 | 0.669 | 1.1024         | 0.012              | 0.059          |                     | 5240                | 6650                  |                 |            |                     | 0.196          |
|                | 22                | 39     | 30    | 28             | 0.3                | 1.0            | NA69/22             | 30.6                | 50.7                  | 16000           | 10000      | 0.0487              | 0.163          |
|                | 0.8661            | 1.5354 | 1.181 | 1.1024         | 0.012              | 0.039          |                     | 6880                | 11400                 |                 |            |                     | 0.359          |
| 25             | 25                | 38     | 20    | 29             | 0.3                | 2.0            | NKJ25/20            | 23.4                | 36.4                  | 15000           | 9800       | 0.0383              | 0.086          |
|                | 0.9843            | 1.4961 | 0.787 | 1.1417         | 0.012              | 0.079          |                     | 5260                | 8180                  |                 |            |                     | 0.190          |
|                | 25                | 38     | 30    | 29             | 0.3                | 2.0            | NKJ25/30            | 29.8                | 56.4                  | 15000           | 9800       | 0.0438              | 0.130          |
|                | 0.9843            | 1.4961 | 1.181 | 1.1417         | 0.012              | 0.079          |                     | 6700                | 12700                 |                 |            |                     | 0.287          |
|                | 25                | 42     | 17    | 30             | 0.3                | 1.5            | NA4905              | 24.3                | 31.7                  | 15000           | 9700       | 0.0362              | 0.099          |
|                | 0.9843            | 1.6535 | 0.669 | 1.1811         | 0.012              | 0.059          |                     | 5460                | 7130                  |                 |            |                     | 0.218          |
|                | 25                | 42     | 30    | 30             | 0.3                | 1.5            | NA6905              | 39.7                | 59.6                  | 15000           | 9700       | 0.0424              | 0.178          |
|                | 0.9843            | 1.6535 | 1.181 | 1.1811         | 0.012              | 0.059          |                     | 8920                | 13400                 |                 |            |                     | 0.392          |
|                | 25                | 47     | 22    | 32             | 0.6                | 1.5            | NKJS25              | 36.0                | 36.2                  | 14000           | 9200       | 0.0398              | 0.174          |
|                | 0.9843            | 1.8504 | 0.866 | 1.2598         | 0.024              | 0.059          |                     | 8090                | 8140                  |                 |            |                     | 0.384          |
| 28             | 28                | 42     | 20    | 32             | 0.3                | 2.0            | NKJ28/20            | 24.8                | 40.4                  | 14000           | 8800       | 0.0411              | 0.104          |
|                | 1.1024            | 1.6535 | 0.787 | 1.2598         | 0.012              | 0.079          |                     | 5580                | 9080                  |                 |            |                     | 0.229          |
|                | 28                | 42     | 30    | 32             | 0.3                | 2.0            | NKJ28/30            | 35.6                | 64.3                  | 14000           | 8800       | 0.0461              | 0.156          |
|                | 1.1024            | 1.6535 | 1.181 | 1.2598         | 0.012              | 0.079          |                     | 8000                | 14500                 |                 |            |                     | 0.344          |
|                | 28                | 45     | 17    | 32             | 0.3                | 1.5            | NA49/28             | 25.1                | 33.8                  | 14000           | 9000       | 0.0378              | 0.108          |
|                | 1.1024            | 1.7717 | 0.669 | 1.2598         | 0.012              | 0.059          |                     | 5640                | 7600                  |                 |            |                     | 0.238          |
|                | 28                | 45     | 30    | 32             | 0.3                | 1.5            | NA69/28             | 37.1                | 55.4                  | 14000           | 9000       | 0.0434              | 0.190          |
|                | 1.1024            | 1.7717 | 1.181 | 1.2598         | 0.012              | 0.059          |                     | 8340                | 12500                 |                 |            |                     | 0.419          |
| 30             | 30                | 45     | 20    | 35             | 0.3                | 1.5            | NKJ30/20            | 26.1                | 44.4                  | 12000           | 8000       | 0.0437              | 0.120          |
|                | 1.1811            | 1.7717 | 0.787 | 1.3780         | 0.012              | 0.059          |                     | 5870                | 9980                  |                 |            |                     | 0.265          |
|                | 30                | 45     | 30    | 35             | 0.3                | 1.5            | NKJ30/30            | 37.4                | 70.6                  | 12000           | 8000       | 0.0491              | 0.179          |
|                | 1.1811            | 1.7717 | 1.181 | 1.3780         | 0.012              | 0.059          |                     | 8410                | 15900                 |                 |            |                     | 0.395          |

<sup>(1)</sup> Max. axial displacement

*Continued on next page.*

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |        |       |        |                |                    | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|--------|-------|--------|----------------|--------------------|---------------------|----------------------|-----------|-----------------------|---------|---------------------|------------|
|                | mm                | d      | D     | B      | F <sub>w</sub> | r <sub>s min</sub> |                     | s <sup>1</sup>       | Dynamic C | Static C <sub>0</sub> | Oil RPM |                     | Grease RPM |
|                | 30                | 47     | 17    | 35     | 0.3            | 1.5                | NA4906              | 25.9                 | 36.0      | 13000                 | 8200    | 0.0399              | 0.114      |
|                | 1.1811            | 1.8504 | 0.669 | 1.3780 | 0.012          | 0.059              |                     | 5820                 | 8090      |                       |         |                     |            |
|                | 30                | 47     | 30    | 35     | 0.3            | 1.0                | NA6906              | 42.6                 | 68.2      | 13000                 | 8200    | 0.0467              | 0.205      |
|                | 1.1811            | 1.8504 | 1.181 | 1.3780 | 0.012          | 0.039              |                     | 9580                 | 15300     |                       |         |                     |            |
|                | 30                | 52     | 22    | 37     | 0.6            | 1.5                | NKJS30              | 39.0                 | 53.4      | 12000                 | 7900    | 0.0438              | 0.198      |
|                | 1.1811            | 2.0472 | 0.866 | 1.4567 | 0.024          | 0.059              |                     | 8770                 | 12000     |                       |         |                     |            |
| 32             | 32                | 47     | 20    | 37     | 0.3            | 2.0                | NKJ32/20            | 26.6                 | 46.4      | 12000                 | 7600    | 0.0453              | 0.127      |
|                | 1.2598            | 1.8504 | 0.787 | 1.4567 | 0.012          | 0.079              |                     | 5980                 | 10400     |                       |         |                     |            |
|                | 32                | 47     | 30    | 37     | 0.3            | 1.5                | NKJ32/30            | 38.2                 | 73.9      | 12000                 | 7600    | 0.0508              | 0.192      |
|                | 1.2598            | 1.8504 | 1.181 | 1.4567 | 0.012          | 0.059              |                     | 8590                 | 16600     |                       |         |                     |            |
|                | 32                | 52     | 20    | 40     | 0.6            | 1.5                | NA49/32             | 32.0                 | 49.3      | 11000                 | 7100    | 0.0457              | 0.169      |
|                | 1.2598            | 2.0472 | 0.787 | 1.5748 | 0.024          | 0.059              |                     | 7190                 | 11100     |                       |         |                     |            |
|                | 32                | 52     | 36    | 40     | 0.6            | 1.0                | NA69/32             | 48.6                 | 84.5      | 11000                 | 7100    | 0.0620              | 0.313      |
|                | 1.2598            | 2.0472 | 1.417 | 1.5748 | 0.024          | 0.039              |                     | 10900                | 19000     |                       |         |                     |            |
| 35             | 35                | 50     | 20    | 40     | 0.3            | 2.0                | NKJ35/20            | 27.8                 | 50.4      | 11000                 | 7000    | 0.0479              | 0.135      |
|                | 1.3780            | 1.9685 | 0.787 | 1.5748 | 0.012          | 0.079              |                     | 6250                 | 11300     |                       |         |                     |            |
|                | 35                | 50     | 30    | 40     | 0.3            | 1.5                | NKJ35/30            | 40.0                 | 80.2      | 11000                 | 7000    | 0.0537              | 0.208      |
|                | 1.3780            | 1.9685 | 1.181 | 1.5748 | 0.012          | 0.059              |                     | 8990                 | 18000     |                       |         |                     |            |
|                | 35                | 55     | 20    | 42     | 0.6            | 1.5                | NA4907              | 32.8                 | 51.7      | 10000                 | 6700    | 0.0472              | 0.179      |
|                | 1.3780            | 2.1654 | 0.787 | 1.6535 | 0.024          | 0.059              |                     | 7370                 | 11600     |                       |         |                     |            |
|                | 35                | 55     | 36    | 42     | 0.6            | 1.0                | NA6907              | 49.9                 | 88.7      | 10000                 | 6700    | 0.0540              | 0.340      |
|                | 1.3780            | 2.1654 | 1.417 | 1.6535 | 0.024          | 0.039              |                     | 11200                | 19900     |                       |         |                     |            |
|                | 35                | 58     | 22    | 43     | 0.6            | 1.0                | NKJS35              | 41.6                 | 60.7      | 10000                 | 6700    | 0.0481              | 0.235      |
|                | 1.3780            | 2.2835 | 0.866 | 1.6929 | 0.024          | 0.039              |                     | 9350                 | 13600     |                       |         |                     |            |
| 38             | 38                | 53     | 20    | 43     | 0.3            | 2.0                | NKJ38/20            | 29.0                 | 54.4      | 9900                  | 6400    | 0.0504              | 0.146      |
|                | 1.4961            | 2.0866 | 0.787 | 1.6929 | 0.012          | 0.079              |                     | 6520                 | 12200     |                       |         |                     |            |
|                | 38                | 53     | 30    | 43     | 0.3            | 1.5                | NKJ38/30            | 41.6                 | 86.6      | 9900                  | 6400    | 0.0565              | 0.196      |
|                | 1.4961            | 2.0866 | 1.181 | 1.6929 | 0.012          | 0.059              |                     | 9350                 | 19500     |                       |         |                     |            |
| 40             | 40                | 55     | 20    | 45     | 0.3            | 2.0                | NKJ40/20            | 29.5                 | 56.4      | 9400                  | 6100    | 0.0519              | 0.152      |
|                | 1.5748            | 2.1654 | 0.787 | 1.7717 | 0.012          | 0.079              |                     | 6630                 | 12700     |                       |         |                     |            |
|                | 40                | 55     | 30    | 45     | 0.3            | 1.5                | NKJ40/30            | 42.3                 | 89.8      | 9400                  | 6100    | 0.0582              | 0.229      |
|                | 1.5748            | 2.1654 | 1.181 | 1.7717 | 0.012          | 0.059              |                     | 9510                 | 20200     |                       |         |                     |            |
|                | 40                | 62     | 22    | 48     | 0.6            | 1.5                | NA4908              | 44.2                 | 67.8      | 9100                  | 5900    | 0.0519              | 0.248      |
|                | 1.5748            | 2.4409 | 0.866 | 1.8898 | 0.024          | 0.059              |                     | 9940                 | 15200     |                       |         |                     |            |
|                | 40                | 62     | 40    | 48     | 0.6            | 1.5                | NA6908              | 70.8                 | 124       | 9100                  | 5900    | 0.0717              | 0.473      |
|                | 1.5748            | 2.4409 | 1.575 | 1.8898 | 0.024          | 0.059              |                     | 15900                | 27900     |                       |         |                     |            |
|                | 40                | 65     | 22    | 50     | 1.0            | 1.0                | NKJS40              | 45.5                 | 71.3      | 8700                  | 5700    | 0.0535              | 0.292      |
|                | 1.5748            | 2.5591 | 0.866 | 1.9685 | 0.039          | 0.039              |                     | 10200                | 16000     |                       |         |                     |            |
| 42             | 42                | 57     | 20    | 47     | 0.3            | 2.0                | NKJ42/20            | 30.0                 | 58.5      | 9000                  | 5900    | 0.0534              | 0.159      |
|                | 1.6535            | 2.2441 | 0.787 | 1.8504 | 0.012          | 0.079              |                     | 6740                 | 13200     |                       |         |                     |            |
|                | 42                | 57     | 30    | 47     | 0.3            | 1.5                | NKJ42/30            | 39.9                 | 84.1      | 9000                  | 5900    | 0.0584              | 0.241      |
|                | 1.6535            | 2.2441 | 1.181 | 1.8504 | 0.012          | 0.059              |                     | 8970                 | 18900     |                       |         |                     |            |
| 45             | 45                | 62     | 25    | 50     | 0.6            | 3.0                | NKJ45/25            | 40.7                 | 79.3      | 8500                  | 5500    | 0.0580              | 0.223      |
|                | 1.7717            | 2.4409 | 0.984 | 1.9685 | 0.024          | 0.118              |                     | 9150                 | 17800     |                       |         |                     |            |
|                | 45                | 62     | 35    | 50     | 0.6            | 3.0                | NKJ45/35            | 55.0                 | 117       | 8500                  | 5500    | 0.0636              | 0.345      |
|                | 1.7717            | 2.4409 | 1.378 | 1.9685 | 0.024          | 0.118              |                     | 12400                | 26300     |                       |         |                     |            |
|                | 45                | 68     | 22    | 52     | 0.6            | 2.0                | NA4909              | 46.8                 | 74.8      | 8400                  | 5400    | 0.0550              | 0.291      |
|                | 1.7717            | 2.6772 | 0.866 | 2.0472 | 0.024          | 0.079              |                     | 10500                | 16800     |                       |         |                     |            |
|                | 45                | 68     | 40    | 52     | 0.6            | 1.5                | NA6909              | 74.7                 | 137       | 8400                  | 5400    | 0.0759              | 0.55       |
|                | 1.7717            | 2.6772 | 1.575 | 2.0472 | 0.024          | 0.059              |                     | 16800                | 30800     |                       |         |                     |            |
|                | 45                | 72     | 22    | 55     | 1.0            | 1.0                | NKJS45              | 47.9                 | 78.4      | 7900                  | 5100    | 0.0571              | 0.360      |
|                | 1.7717            | 2.8346 | 0.866 | 2.1654 | 0.039          | 0.039              |                     | 10800                | 17600     |                       |         |                     |            |
| 50             | 50                | 68     | 25    | 55     | 0.6            | 3.0                | NKJ50/25            | 46.1                 | 87.3      | 7800                  | 5000    | 0.0605              | 0.288      |
|                | 1.9685            | 2.6772 | 0.984 | 2.1654 | 0.024          | 0.118              |                     | 10400                | 19600     |                       |         |                     |            |
|                | 50                | 68     | 35    | 55     | 0.6            | 3.0                | NKJ50/35            | 62.3                 | 129       | 7800                  | 5000    | 0.0667              | 0.406      |
|                | 1.9685            | 2.6772 | 1.378 | 2.1654 | 0.024          | 0.118              |                     | 14000                | 29000     |                       |         |                     |            |
|                | 50                | 72     | 22    | 58     | 0.6            | 2.0                | NA4910              | 48.9                 | 82.0      | 7400                  | 4800    | 0.0591              | 0.296      |
|                | 1.9685            | 2.8346 | 0.866 | 2.2835 | 0.024          | 0.079              |                     | 11000                | 18400     |                       |         |                     |            |

<sup>(1)</sup> Max. axial displacement

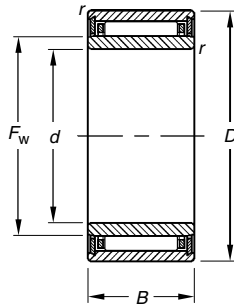
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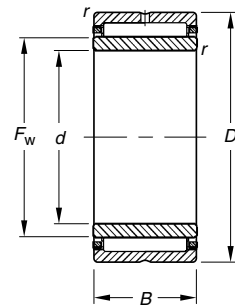
# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITH INNER RINGS — *continued*

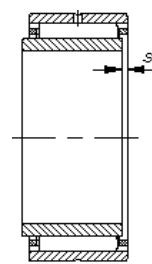
### METRIC SERIES



**NKJ**  
( $d \leq 7$ )



**NKJ, NKJS**  
**NA49, NA69**



| Shaft Diameter | Dimensions mm/in. |        |       |        |                |                    | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |                | Approx. Wt. kg/lbs. |
|----------------|-------------------|--------|-------|--------|----------------|--------------------|---------------------|----------------------|-----------|-----------------------|----------------|---------------------|
|                | mm                | d      | D     | B      | F <sub>w</sub> | r <sub>s min</sub> |                     | s <sup>1</sup>       | Dynamic C | Static C <sub>0</sub> | Oil Grease RPM |                     |
|                | 50                | 72     | 40    | 58     | 0.6            | 1.5                | NA6910              | 75.7                 | 144       | 7400                  | 4800           | 0.577               |
|                | 1.9685            | 2.8346 | 1.575 | 2.2835 | 0.024          | 0.059              |                     | 17000                | 32400     |                       |                | 1.272               |
|                | 50                | 80     | 28    | 60     | 1.1            | 1.5                | NKJS50              | 66.9                 | 103       | 7300                  | 4800           | 0.523               |
|                | 1.9685            | 3.1496 | 1.102 | 2.3622 | 0.043          | 0.059              |                     | 15000                | 23200     |                       |                | 1.153               |
| 55             | 55                | 72     | 25    | 60     | 0.6            | 3.0                | NKJ55/25            | 44.3                 | 94.0      | 7000                  | 4600           | 0.290               |
|                | 2.1654            | 2.8346 | 0.984 | 2.3622 | 0.024          | 0.118              |                     | 9960                 | 21100     |                       |                | 0.639               |
|                | 55                | 72     | 35    | 60     | 0.6            | 3.0                | NKJ55/35            | 59.9                 | 139       | 7000                  | 4600           | 0.410               |
|                | 2.1654            | 2.8346 | 1.378 | 2.3622 | 0.024          | 0.118              |                     | 13500                | 31200     |                       |                | 0.904               |
|                | 55                | 80     | 25    | 63     | 1.0            | 2.5                | NA4911              | 62.0                 | 107       | 6900                  | 4500           | 0.426               |
|                | 2.1654            | 3.1496 | 0.984 | 2.4803 | 0.039          | 0.098              |                     | 13900                | 24100     |                       |                | 0.939               |
|                | 55                | 80     | 45    | 63     | 1.0            | 2.5                | NA6911              | 94.2                 | 172       | 6900                  | 4500           | 0.800               |
|                | 2.1654            | 3.1496 | 1.772 | 2.4803 | 0.039          | 0.098              |                     | 21200                | 38700     |                       |                | 1.764               |
|                | 55                | 85     | 28    | 65     | 1.1            | 1.5                | NKJS55              | 71.0                 | 114       | 6700                  | 4400           | 0.569               |
|                | 2.1654            | 3.3465 | 1.102 | 2.5591 | 0.043          | 0.059              |                     | 16000                | 25600     |                       |                | 1.254               |
| 60             | 60                | 82     | 25    | 68     | 0.6            | 2.0                | NKJ60/25            | 49.0                 | 101       | 6200                  | 4000           | 0.440               |
|                | 2.3622            | 3.2283 | 0.984 | 2.6772 | 0.024          | 0.079              |                     | 11000                | 22700     |                       |                | 0.970               |
|                | 60                | 82     | 35    | 68     | 0.6            | 2.5                | NKJ60/35            | 66.2                 | 149       | 6200                  | 4000           | 0.520               |
|                | 2.3622            | 3.2283 | 1.378 | 2.6772 | 0.024          | 0.098              |                     | 14900                | 33500     |                       |                | 1.146               |
|                | 60                | 85     | 25    | 68     | 1.0            | 1.5                | NA4912              | 64.8                 | 116       | 6300                  | 4100           | 0.457               |
|                | 2.3622            | 3.3465 | 0.984 | 2.6772 | 0.039          | 0.059              |                     | 14600                | 26100     |                       |                | 1.008               |
|                | 60                | 85     | 45    | 68     | 1.0            | 2.0                | NA6912              | 99.3                 | 189       | 6400                  | 4100           | 0.829               |
|                | 2.3622            | 3.3465 | 1.772 | 2.6772 | 0.039          | 0.079              |                     | 22300                | 42500     |                       |                | 1.828               |
|                | 60                | 90     | 28    | 70     | 1.1            | 1.5                | NKJS60              | 72.6                 | 120       | 6200                  | 4000           | 0.607               |
|                | 2.3622            | 3.5433 | 1.102 | 2.7559 | 0.043          | 0.059              |                     | 16300                | 27000     |                       |                | 1.338               |
| 65             | 65                | 90     | 25    | 72     | 1.0            | 1.5                | NA4913              | 66.0                 | 121       | 5900                  | 3900           | 0.489               |
|                | 2.5591            | 3.5433 | 0.984 | 2.8346 | 0.039          | 0.059              |                     | 14800                | 27200     |                       |                | 1.078               |
|                | 65                | 90     | 25    | 73     | 0.6            | 2.0                | NKJ65/25            | 61.5                 | 119       | 5800                  | 3800           | 0.500               |
|                | 2.5591            | 3.5433 | 0.984 | 2.8740 | 0.024          | 0.079              |                     | 13800                | 26800     |                       |                | 1.102               |
|                | 65                | 90     | 35    | 73     | 0.6            | 2.0                | NKJ65/35            | 82.5                 | 173       | 5800                  | 3800           | 0.690               |
|                | 2.5591            | 3.5433 | 1.378 | 2.8740 | 0.024          | 0.079              |                     | 18500                | 38900     |                       |                | 1.521               |
|                | 65                | 90     | 45    | 72     | 1.0            | 2.0                | NA6913              | 107                  | 213       | 6000                  | 3900           | 0.945               |
|                | 2.5591            | 3.5433 | 1.772 | 2.8346 | 0.039          | 0.079              |                     | 24100                | 47900     |                       |                | 2.083               |
|                | 65                | 95     | 28    | 75     | 1.1            | 1.5                | NKJS65              | 76.5                 | 132       | 5800                  | 3700           | 0.655               |
|                | 2.5591            | 3.7402 | 1.102 | 2.9528 | 0.043          | 0.059              |                     | 17200                | 29700     |                       |                | 1.444               |
| 70             | 70                | 95     | 25    | 80     | 1.0            | 2.0                | NKJ70/25            | 65.0                 | 131       | 5300                  | 3400           | 0.561               |
|                | 2.7559            | 3.7402 | 0.984 | 3.1496 | 0.039          | 0.079              |                     | 14600                | 29400     |                       |                | 1.237               |
|                | 70                | 95     | 35    | 80     | 1.0            | 3.5                | NKJ70/35            | 79.7                 | 184       | 5300                  | 3400           | 0.779               |
|                | 2.7559            | 3.7402 | 1.378 | 3.1496 | 0.039          | 0.138              |                     | 17900                | 41400     |                       |                | 1.717               |
|                | 70                | 100    | 28    | 80     | 1.1            | 1.5                | NKJS70              | 80.1                 | 143       | 5400                  | 3500           | 0.772               |
|                | 2.7559            | 3.9370 | 1.102 | 3.1496 | 0.043          | 0.059              |                     | 18000                | 32100     |                       |                | 1.702               |
|                | 70                | 100    | 30    | 80     | 1.0            | 2.5                | NA4914              | 86.3                 | 157       | 5400                  | 3500           | 0.772               |
|                | 2.7559            | 3.9370 | 1.181 | 3.1496 | 0.039          | 0.098              |                     | 19400                | 35300     |                       |                | 1.702               |
|                | 70                | 100    | 54    | 80     | 1.0            | 2.0                | NA6914              | 137                  | 286       | 5400                  | 3500           | 1.450               |
|                | 2.7559            | 3.9370 | 2.126 | 3.1496 | 0.039          | 0.079              |                     | 30800                | 64300     |                       |                | 3.197               |

<sup>(1)</sup> Max. axial displacement

*Continued on next page.*



## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |        |       |        |                |                    | Bearing Designation | Load Ratings kN/bf. |           | Limiting Speeds       |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|--------|-------|--------|----------------|--------------------|---------------------|---------------------|-----------|-----------------------|---------|---------------------|------------|
|                | mm                | d      | D     | B      | F <sub>w</sub> | r <sub>s min</sub> |                     | s <sup>1</sup>      | Dynamic C | Static C <sub>0</sub> | Oil RPM |                     | Grease RPM |
| 75             | 75                | 105    | 25    | 85     | 1.0            | 2.0                | NKJ75/25            | 76.4                | 137       | 5000                  | 3300    | 0.0764              | 0.640      |
|                | 2.9528            | 4.1339 | 0.984 | 3.3465 | 0.039          | 0.079              |                     | 17200               | 30800     |                       |         |                     |            |
|                | 75                | 105    | 30    | 85     | 1.0            | 2.5                | NA4915              | 92.4                | 175       | 5000                  | 3300    | 0.0812              | 0.817      |
|                | 2.9528            | 4.1339 | 1.181 | 3.3465 | 0.039          | 0.098              |                     | 20800               | 39300     |                       |         |                     |            |
|                | 75                | 105    | 32    | 90     | 1.1            | 1.5                | NKJS75              | 91.5                | 176       | 4700                  | 3100    | 0.0834              | 1.060      |
|                | 2.9528            | 4.1339 | 1.260 | 3.5433 | 0.043          | 0.059              |                     | 20600               | 39600     |                       |         |                     |            |
|                | 75                | 105    | 35    | 85     | 1.0            | 2.0                | NKJ75/35            | 108                 | 214       | 5000                  | 3300    | 0.0854              | 1.050      |
|                | 2.9528            | 4.1339 | 1.378 | 3.3465 | 0.039          | 0.079              |                     | 24300               | 48100     |                       |         |                     |            |
|                | 75                | 105    | 54    | 85     | 1.0            | 2.0                | NA6915              | 143                 | 308       | 5000                  | 3300    | 0.1110              | 1.554      |
|                | 2.9528            | 4.1339 | 2.126 | 3.3465 | 0.039          | 0.079              |                     | 32100               | 69200     |                       |         |                     |            |
| 80             | 80                | 110    | 25    | 90     | 1.0            | 2.0                | NKJ80/25            | 79.5                | 147       | 4700                  | 3100    | 0.0798              | 0.790      |
|                | 3.1496            | 4.3307 | 0.984 | 3.5433 | 0.039          | 0.079              |                     | 17900               | 33000     |                       |         |                     |            |
|                | 80                | 110    | 30    | 90     | 1.0            | 2.5                | NA4916              | 91.5                | 176       | 4700                  | 3100    | 0.0834              | 0.862      |
|                | 3.1496            | 4.3307 | 1.181 | 3.5433 | 0.039          | 0.098              |                     | 20600               | 39600     |                       |         |                     |            |
|                | 80                | 110    | 32    | 95     | 1.1            | 2.0                | NKJS80              | 95.1                | 188       | 4500                  | 2900    | 0.0869              | 1.140      |
|                | 3.1496            | 4.3307 | 1.260 | 3.7402 | 0.043          | 0.079              |                     | 21400               | 42300     |                       |         |                     |            |
|                | 80                | 110    | 35    | 90     | 1.0            | 2.0                | NKJ80/35            | 113                 | 230       | 4700                  | 3100    | 0.0891              | 0.980      |
|                | 3.1496            | 4.3307 | 1.378 | 3.5433 | 0.039          | 0.079              |                     | 25400               | 51700     |                       |         |                     |            |
|                | 80                | 110    | 54    | 90     | 1.0            | 2.0                | NA6916              | 126                 | 320       | 4700                  | 3000    | 0.1197              | 1.615      |
|                | 3.1496            | 4.3307 | 2.126 | 3.5433 | 0.039          | 0.079              |                     | 28300               | 71900     |                       |         |                     |            |
| 85             | 85                | 115    | 26    | 95     | 1.0            | 3.0                | NKJ85/26            | 49.3                | 114       | 4400                  | 2800    | 0.0839              | 0.862      |
|                | 3.3465            | 4.5276 | 1.024 | 3.7402 | 0.039          | 0.118              |                     | 11100               | 25600     |                       |         |                     |            |
|                | 85                | 115    | 36    | 95     | 1.0            | 2.0                | NKJ85/36            | 114                 | 238       | 4400                  | 2800    | 0.0921              | 1.040      |
|                | 3.3465            | 4.5276 | 1.417 | 3.7402 | 0.039          | 0.079              |                     | 25600               | 53500     |                       |         |                     |            |
|                | 85                | 120    | 30    | 100    | 1.1            | 2.5                | NA4917              | 110                 | 230       | 4200                  | 2800    | 0.0935              | 1.310      |
|                | 3.3465            | 4.7244 | 1.181 | 3.9370 | 0.043          | 0.098              |                     | 24700               | 51700     |                       |         |                     |            |
|                | 85                | 120    | 63    | 100    | 1.1            | 2.0                | NA6917              | 150                 | 416       | 4200                  | 2700    | 0.1340              | 2.427      |
|                | 3.3465            | 4.7244 | 2.480 | 3.9370 | 0.043          | 0.079              |                     | 33700               | 93500     |                       |         |                     |            |
| 90             | 90                | 120    | 26    | 100    | 1.0            | 3.0                | NKJ90/26            | 83.6                | 163       | 4200                  | 2800    | 0.0857              | 0.780      |
|                | 3.5433            | 4.7244 | 1.024 | 3.9370 | 0.039          | 0.118              |                     | 18800               | 36600     |                       |         |                     |            |
|                | 90                | 120    | 36    | 100    | 1.0            | 2.5                | NKJ90/36            | 118                 | 254       | 4200                  | 2800    | 0.0958              | 1.080      |
|                | 3.5433            | 4.7244 | 1.417 | 3.9370 | 0.039          | 0.098              |                     | 26500               | 57100     |                       |         |                     |            |
|                | 90                | 125    | 35    | 105    | 1.1            | 2.5                | NA4918              | 114                 | 245       | 4000                  | 2600    | 0.0970              | 1.370      |
|                | 3.5433            | 4.9213 | 1.378 | 4.1339 | 0.043          | 0.098              |                     | 25600               | 55100     |                       |         |                     |            |
|                | 90                | 125    | 63    | 105    | 1.1            | 2.0                | NA6918              | 175                 | 427       | 4000                  | 2600    | 0.1323              | 2.640      |
|                | 3.5433            | 4.9213 | 2.480 | 4.1339 | 0.043          | 0.079              |                     | 39300               | 96000     |                       |         |                     |            |
| 95             | 95                | 125    | 26    | 105    | 1.0            | 2.5                | NKJ95/26            | 52.2                | 127       | 3900                  | 2600    | 0.0892              | 0.935      |
|                | 3.7402            | 4.9213 | 1.024 | 4.1339 | 0.039          | 0.098              |                     | 11700               | 28600     |                       |         |                     |            |
|                | 95                | 125    | 36    | 105    | 1.0            | 3.5                | NKJ95/36            | 72.8                | 195       | 3900                  | 2600    | 0.0992              | 1.300      |
|                | 3.7402            | 4.9213 | 1.417 | 4.1339 | 0.039          | 0.138              |                     | 16400               | 43800     |                       |         |                     |            |
|                | 95                | 130    | 35    | 110    | 1.1            | 2.5                | NA4919              | 115                 | 253       | 3800                  | 2500    | 0.0999              | 1.430      |
|                | 3.7402            | 5.1181 | 1.378 | 4.3307 | 0.043          | 0.098              |                     | 25900               | 56900     |                       |         |                     |            |
|                | 95                | 130    | 63    | 110    | 1.1            | 2.0                | NA6919              | 158                 | 458       | 3800                  | 2500    | 0.1434              | 2.670      |
|                | 3.7402            | 5.1181 | 2.480 | 4.3307 | 0.043          | 0.079              |                     | 35500               | 103000    |                       |         |                     |            |
| 100            | 100               | 130    | 30    | 110    | 1.1            | 2.0                | NKJ100/30           | 103                 | 220       | 3800                  | 2500    | 0.0965              | 0.984      |
|                | 3.9370            | 5.1181 | 1.181 | 4.3307 | 0.043          | 0.079              |                     | 23200               | 49500     |                       |         |                     |            |
|                | 100               | 130    | 40    | 110    | 1.1            | 2.0                | NKJ100/40           | 132                 | 301       | 3800                  | 2500    | 0.1043              | 1.410      |
|                | 3.9370            | 5.1181 | 1.575 | 4.3307 | 0.043          | 0.079              |                     | 29700               | 67700     |                       |         |                     |            |
|                | 100               | 135    | 32    | 115    | 1.1            | 2.0                | NKJS100             | 104                 | 226       | 3700                  | 2400    | 0.0991              | 2.010      |
|                | 3.9370            | 5.3150 | 1.260 | 4.5276 | 0.043          | 0.079              |                     | 23400               | 50800     |                       |         |                     |            |
|                | 100               | 140    | 40    | 115    | 1.1            | 3.5                | NA4920              | 139                 | 296       | 3700                  | 2400    | 0.1037              | 2.010      |
|                | 3.9370            | 5.5118 | 1.575 | 4.5276 | 0.043          | 0.138              |                     | 31200               | 66500     |                       |         |                     |            |
| 110            | 110               | 140    | 30    | 120    | 1.0            | 0.5                | NA4822              | 90.3                | 230       | 3500                  | 2300    | 0.1059              | 1.210      |
|                | 4.3307            | 5.5118 | 1.181 | 4.7244 | 0.039          | 0.020              |                     | 20300               | 51700     |                       |         |                     |            |
|                | 110               | 150    | 40    | 125    | 1.1            | 3.5                | NA4922              | 147                 | 325       | 3400                  | 2200    | 0.1101              | 2.190      |
|                | 4.3307            | 5.9055 | 1.575 | 4.9213 | 0.043          | 0.138              |                     | 33000               | 73100     |                       |         |                     |            |
| 120            | 120               | 150    | 30    | 130    | 1.0            | 0.5                | NA4824              | 94.2                | 249       | 3200                  | 2100    | 0.1121              | 1.310      |
|                | 4.7244            | 5.9055 | 1.181 | 5.1181 | 0.039          | 0.020              |                     | 21200               | 56000     |                       |         |                     |            |

<sup>(1)</sup> Max. axial displacement

Continued on next page.

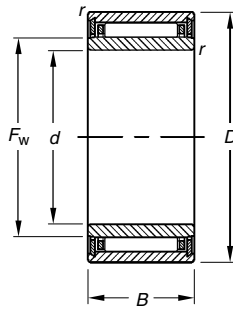




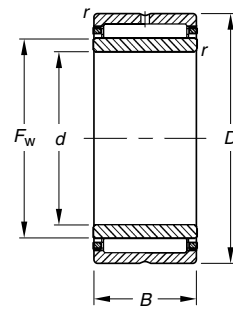
# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITH INNER RINGS — *continued*

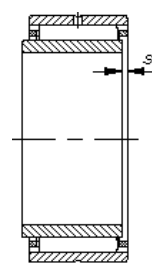
### METRIC SERIES



**NKJ**  
( $d \leq 7$ )



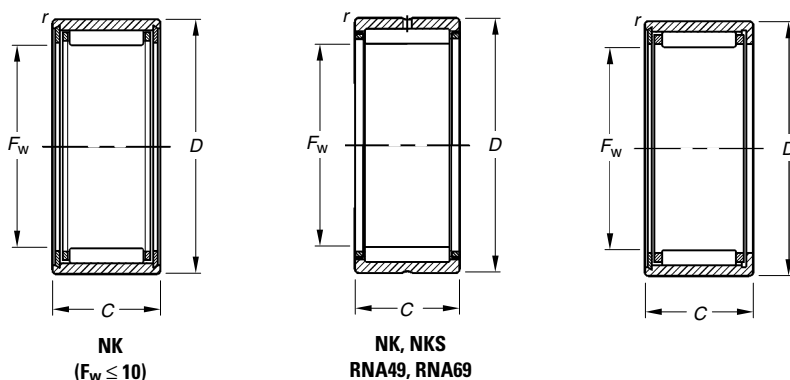
**NKJ, NKJS**  
**NA49, NA69**



| Shaft Diameter | Dimensions mm/in. |        |       |        |                |                    | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |                | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|--------|-------|--------|----------------|--------------------|---------------------|----------------------|-----------|-----------------------|----------------|---------------------|----------------|
|                | mm                | d      | D     | B      | F <sub>w</sub> | r <sub>s min</sub> |                     | s <sup>1</sup>       | Dynamic C | Static C <sub>0</sub> | Oil Grease RPM |                     | C <sub>g</sub> |
| 120            | 120               | 165    | 45    | 135    | 1.1            | 3.5                | NA4924              | 177                  | 407       | 3100                  | 2000           | 0.1193              | 3.040          |
|                | 4.7244            | 6.4961 | 1.772 | 5.3150 | 0.043          | 0.138              |                     | 39800                | 91500     |                       |                |                     |                |
| 130            | 130               | 165    | 35    | 145    | 1.1            | 1.0                | NA4826              | 112                  | 323       | 2900                  | 1900           | 0.1258              | 1.990          |
|                | 5.1181            | 6.4961 | 1.378 | 5.7087 | 0.043          | 0.039              |                     | 25200                | 72600     |                       |                |                     |                |
| 130            | 130               | 180    | 45    | 150    | 1.5            | 3.0                | NA4926              | 201                  | 495       | 2800                  | 1800           | 0.1314              | 4.140          |
|                | 5.1181            | 7.0866 | 1.772 | 5.9055 | 0.059          | 0.118              |                     | 45200                | 111000    |                       |                |                     |                |
| 140            | 140               | 175    | 35    | 155    | 1.1            | 1.0                | NA4828              | 116                  | 346       | 2700                  | 1700           | 0.1320              | 2.120          |
|                | 5.5118            | 6.8898 | 1.378 | 6.1024 | 0.043          | 0.039              |                     | 26100                | 77800     |                       |                |                     |                |
| 140            | 140               | 190    | 50    | 160    | 1.5            | 3.0                | NA4928              | 214                  | 549       | 2600                  | 1700           | 0.1389              | 4.410          |
|                | 5.5118            | 7.4803 | 1.969 | 6.2992 | 0.059          | 0.118              |                     | 48100                | 123000    |                       |                |                     |                |
| 150            | 150               | 190    | 40    | 165    | 1.1            | 2.0                | NA4830              | 142                  | 402       | 2500                  | 1600           | 0.1367              | 2.700          |
|                | 5.9055            | 7.4803 | 1.575 | 6.4961 | 0.043          | 0.079              |                     | 31900                | 90400     |                       |                |                     |                |
| 160            | 160               | 200    | 40    | 175    | 1.1            | 2.0                | NA4832              | 146                  | 425       | 2400                  | 1500           | 0.1425              | 3.150          |
|                | 6.2992            | 7.8740 | 1.575 | 6.8898 | 0.043          | 0.079              |                     | 32800                | 95500     |                       |                |                     |                |

<sup>(1)</sup> Max. axial displacement

**NEEDLE ROLLER BEARINGS  
WITHOUT INNER RINGS** — *continued*  
**METRIC SERIES**



| Shaft Diameter | Dimensions mm/in. |                |        |       | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |                | Approx. Wt. kg/lbs. |
|----------------|-------------------|----------------|--------|-------|---------------------|----------------------|-----------|-----------------------|----------------|---------------------|
|                | mm                | F <sub>w</sub> | D      | C     |                     | r <sub>s</sub> min   | Dynamic C | Static C <sub>0</sub> | Oil Grease RPM |                     |
| 5              | 5                 | 5              | 10     | 10    | NK5/10TN            | 2.18                 | 1.71      | 47000 31000           | 0.0095         | 0.004               |
|                | 0.1969            | 0.1969         | 0.3937 | 0.394 |                     | 490                  | 384       |                       |                |                     |
| 5              | 5                 | 5              | 10     | 12    | NK5/12TN            | 3.04                 | 2.63      | 47000 31000           | 0.0106         | 0.004               |
|                | 0.1969            | 0.1969         | 0.3937 | 0.472 |                     | 683                  | 591       |                       |                |                     |
| 6              | 6                 | 6              | 12     | 10    | NK6/10              | 3.19                 | 2.90      | 44000 29000           | 0.0116         | 0.005               |
|                | 0.2362            | 0.2362         | 0.4724 | 0.394 |                     | 717                  | 652       |                       |                |                     |
| 6              | 6                 | 6              | 12     | 12    | NK6/12TN            | 3.07                 | 2.74      | 44000 29000           | 0.0115         | 0.006               |
|                | 0.2362            | 0.2362         | 0.4724 | 0.472 |                     | 690                  | 616       |                       |                |                     |
| 7              | 7                 | 7              | 14     | 10    | NK7/10TN            | 2.74                 | 2.44      | 42000 28000           | 0.0118         | 0.007               |
|                | 0.2756            | 0.2756         | 0.5512 | 0.394 |                     | 616                  | 549       |                       |                |                     |
| 7              | 7                 | 7              | 14     | 12    | NK7/12TN            | 3.40                 | 3.22      | 42000 28000           | 0.0127         | 0.009               |
|                | 0.2756            | 0.2756         | 0.5512 | 0.472 |                     | 764                  | 724       |                       |                |                     |
| 8              | 8                 | 8              | 15     | 12    | NK8/12              | 4.57                 | 4.89      | 41000 26000           | 0.0148         | 0.011               |
|                | 0.3150            | 0.3150         | 0.5906 | 0.472 |                     | 1030                 | 1100      |                       |                |                     |
| 8              | 8                 | 8              | 15     | 12    | NK8/12ASR1          | 4.57                 | 4.89      | 41000 26000           | 0.0148         | 0.011               |
|                | 0.3150            | 0.3150         | 0.5906 | 0.472 |                     | 1030                 | 1100      |                       |                |                     |
| 8              | 8                 | 8              | 15     | 16    | NK8/16              | 5.22                 | 5.78      | 41000 26000           | 0.0154         | 0.013               |
|                | 0.3150            | 0.3150         | 0.5906 | 0.630 |                     | 1170                 | 1300      |                       |                |                     |
| 9              | 9                 | 9              | 16     | 12    | NK9/12              | 4.27                 | 4.60      | 40000 26000           | 0.0153         | 0.012               |
|                | 0.3543            | 0.3543         | 0.6299 | 0.472 |                     | 960                  | 1030      |                       |                |                     |
| 9              | 9                 | 9              | 16     | 16    | NK9/16              | 5.57                 | 6.47      | 40000 26000           | 0.0170         | 0.015               |
|                | 0.3543            | 0.3543         | 0.6299 | 0.630 |                     | 1250                 | 1450      |                       |                |                     |
| 10             | 10                | 10             | 17     | 12    | NK10/12             | 5.40                 | 6.43      | 39000 25000           | 0.0174         | 0.013               |
|                | 0.3937            | 0.3937         | 0.6693 | 0.472 |                     | 1210                 | 1450      |                       |                |                     |
| 10             | 10                | 10             | 17     | 16    | NK10/16TN           | 5.30                 | 6.27      | 39000 25000           | 0.0173         | 0.015               |
|                | 0.3937            | 0.3937         | 0.6693 | 0.630 |                     | 1190                 | 1410      |                       |                |                     |
| 12             | 12                | 12             | 19     | 12    | NK12/12             | 6.86                 | 7.60      | 30000 19000           | 0.0195         | 0.013               |
|                | 0.4724            | 0.4724         | 0.7480 | 0.472 |                     | 1540                 | 1710      |                       |                |                     |
| 12             | 12                | 12             | 19     | 12    | NK12/16             | 6.78                 | 9.03      | 37000 24000           | 0.0204         | 0.018               |
|                | 0.4724            | 0.4724         | 0.7480 | 0.472 |                     | 1520                 | 2030      |                       |                |                     |
| 14             | 14                | 14             | 22     | 13    | RNA4900             | 9.39                 | 10.3      | 24000 16000           | 0.0211         | 0.018               |
|                | 0.5512            | 0.5512         | 0.8661 | 0.512 |                     | 2110                 | 2320      |                       |                |                     |
| 14             | 14                | 14             | 22     | 16    | NK14/16             | 12.4                 | 14.8      | 24000 16000           | 0.0231         | 0.023               |
|                | 0.5512            | 0.5512         | 0.8661 | 0.630 |                     | 2790                 | 3330      |                       |                |                     |
| 14             | 14                | 14             | 22     | 20    | NK14/20             | 14.7                 | 18.4      | 24000 16000           | 0.0244         | 0.028               |
|                | 0.5512            | 0.5512         | 0.8661 | 0.787 |                     | 3300                 | 4140      |                       |                |                     |
| 15             | 15                | 15             | 23     | 16    | NK15/16             | 12.4                 | 15.0      | 24000 15000           | 0.0238         | 0.024               |
|                | 0.5906            | 0.5906         | 0.9055 | 0.630 |                     | 2790                 | 3370      |                       |                |                     |
| 15             | 15                | 15             | 23     | 20    | NK15/20             | 14.7                 | 18.6      | 24000 15000           | 0.0252         | 0.031               |
|                | 0.5906            | 0.5906         | 0.9055 | 0.787 |                     | 3300                 | 4180      |                       |                |                     |
| 16             | 16                | 16             | 24     | 13    | RNA4901             | 10.5                 | 12.3      | 28000 18000           | 0.0233         | 0.020               |
|                | 0.6299            | 0.6299         | 0.9449 | 0.512 |                     | 2360                 | 2770      |                       |                |                     |
| 16             | 16                | 16             | 24     | 16    | NK16/16             | 15.4                 | 20.2      | 28000 18000           | 0.0250         | 0.025               |
|                | 0.6299            | 0.6299         | 0.9449 | 0.630 |                     | 3460                 | 4540      |                       |                |                     |

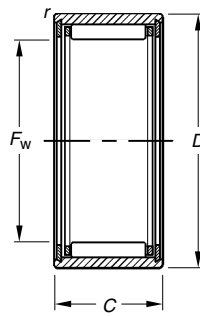
(1) Max. axial displacement

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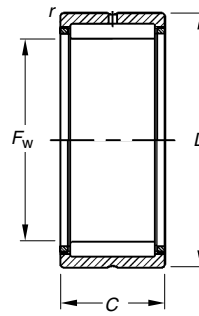


# NEEDLE ROLLER BEARINGS

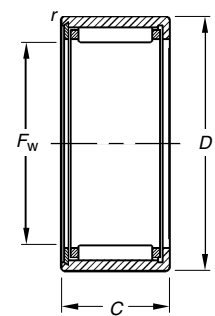
## NEEDLE ROLLER BEARINGS WITHOUT INNER RINGS — *continued* METRIC SERIES



**NK**  
( $F_w \leq 10$ )



**NK, NKS**  
RNA49, RNA69



**NKTN**

| Shaft Diameter | Dimensions mm/in. |        |       |           | Bearing Designation | Load Ratings kN/bf. |       | Limiting Speeds |            | Approx. Wt. kg/lbs. |       |
|----------------|-------------------|--------|-------|-----------|---------------------|---------------------|-------|-----------------|------------|---------------------|-------|
|                | $F_w$             | D      | C     | $r_s$ min |                     | C                   | $C_0$ | Oil RPM         | Grease RPM |                     |       |
| 16             | 16                | 24     | 20    | 0.3       | NK16/20             | 16.1                | 21.3  | 28000           | 18000      | 0.0264              | 0.036 |
|                | 0.6299            | 0.9449 | 0.787 | 0.012     |                     | 3620                | 4790  |                 |            |                     | 0.079 |
| 17             | 16                | 24     | 22    | 0.3       | RNA6901             | 16.1                | 21.3  | 28000           | 18000      | 0.0267              | 0.036 |
|                | 0.6299            | 0.9449 | 0.866 | 0.012     |                     | 3620                | 4790  |                 |            |                     | 0.079 |
| 17             | 17                | 25     | 16    | 0.3       | NK17/16             | 13.6                | 17.5  | 27000           | 17000      | 0.0261              | 0.027 |
|                | 0.6693            | 0.9843 | 0.630 | 0.012     |                     | 3060                | 3930  |                 |            |                     | 0.060 |
| 18             | 17                | 25     | 20    | 0.3       | NK17/20             | 15.4                | 20.4  | 27000           | 17000      | 0.0271              | 0.034 |
|                | 0.6693            | 0.9843 | 0.787 | 0.012     |                     | 3460                | 4590  |                 |            |                     | 0.075 |
| 18             | 18                | 26     | 16    | 0.3       | NK18/16             | 13.6                | 17.7  | 25000           | 16000      | 0.0268              | 0.028 |
|                | 0.7087            | 1.0236 | 0.630 | 0.012     |                     | 3060                | 3980  |                 |            |                     | 0.062 |
| 19             | 18                | 26     | 20    | 0.3       | NK18/20             | 16.1                | 22.0  | 25000           | 16000      | 0.0283              | 0.035 |
|                | 0.7087            | 1.0236 | 0.787 | 0.012     |                     | 3620                | 4950  |                 |            |                     | 0.077 |
| 19             | 19                | 27     | 16    | 0.3       | NK19/16             | 14.1                | 19.0  | 24000           | 15000      | 0.0279              | 0.029 |
|                | 0.7480            | 1.0630 | 0.630 | 0.012     |                     | 3170                | 4270  |                 |            |                     | 0.064 |
| 20             | 19                | 27     | 20    | 0.3       | NK19/20             | 18.8                | 23.6  | 24000           | 15000      | 0.0295              | 0.037 |
|                | 0.7480            | 1.0630 | 0.787 | 0.012     |                     | 4230                | 5310  |                 |            |                     | 0.082 |
| 20             | 19                | 30     | 16    | 0.3       | NKS18               | 15.9                | 16.2  | 26000           | 17000      | 0.0255              | 0.045 |
|                | 0.7480            | 1.1811 | 0.630 | 0.012     |                     | 3570                | 3640  |                 |            |                     | 0.099 |
| 20             | 20                | 28     | 13    | 0.3       | RNA4902             | 11.8                | 15.3  | 22000           | 14000      | 0.0270              | 0.023 |
|                | 0.7874            | 1.1024 | 0.512 | 0.012     |                     | 2650                | 3440  |                 |            |                     | 0.051 |
| 20             | 20                | 28     | 16    | 0.3       | NK20/16             | 14.1                | 19.1  | 22000           | 14000      | 0.0285              | 0.030 |
|                | 0.7874            | 1.1024 | 0.630 | 0.012     |                     | 3170                | 4290  |                 |            |                     | 0.066 |
| 20             | 20                | 28     | 20    | 0.3       | NK20/20             | 17.5                | 25.3  | 22000           | 14000      | 0.0306              | 0.038 |
|                | 0.7874            | 1.1024 | 0.787 | 0.012     |                     | 3930                | 5690  |                 |            |                     | 0.084 |
| 20             | 20                | 28     | 23    | 0.3       | RNA6902             | 18.4                | 26.9  | 22000           | 14000      | 0.0311              | 0.042 |
|                | 0.7874            | 1.1024 | 0.906 | 0.012     |                     | 4140                | 6050  |                 |            |                     | 0.093 |
| 20             | 20                | 32     | 20    | 0.6       | NKS20               | 24.4                | 26.7  | 24000           | 15000      | 0.0290              | 0.058 |
|                | 0.7874            | 1.2598 | 0.787 | 0.024     |                     | 5490                | 6000  |                 |            |                     | 0.128 |
| 21             | 21                | 29     | 16    | 0.3       | NK21/16             | 15.3                | 21.6  | 21000           | 14000      | 0.0301              | 0.032 |
|                | 0.8268            | 1.1417 | 0.630 | 0.012     |                     | 3440                | 4860  |                 |            |                     | 0.071 |
| 21             | 21                | 29     | 20    | 0.3       | NK21/20             | 18.1                | 26.9  | 21000           | 14000      | 0.0317              | 0.040 |
|                | 0.8268            | 1.1417 | 0.787 | 0.012     |                     | 4070                | 6050  |                 |            |                     | 0.088 |
| 22             | 22                | 30     | 13    | 0.3       | RNA4903             | 12.2                | 16.4  | 20000           | 13000      | 0.0286              | 0.025 |
|                | 0.8661            | 1.1811 | 0.512 | 0.012     |                     | 2740                | 3690  |                 |            |                     | 0.055 |
| 22             | 22                | 30     | 16    | 0.3       | NK22/16             | 15.2                | 21.7  | 20000           | 13000      | 0.0307              | 0.033 |
|                | 0.8661            | 1.1811 | 0.630 | 0.012     |                     | 3420                | 4880  |                 |            |                     | 0.073 |
| 22             | 22                | 30     | 20    | 0.3       | NK22/20             | 18.0                | 27.0  | 20000           | 13000      | 0.0324              | 0.041 |
|                | 0.8661            | 1.1811 | 0.787 | 0.012     |                     | 4050                | 6070  |                 |            |                     | 0.090 |
| 22             | 22                | 30     | 23    | 0.3       | RNA6903             | 19.8                | 30.6  | 20000           | 13000      | 0.0334              | 0.056 |
|                | 0.8661            | 1.1811 | 0.906 | 0.012     |                     | 4450                | 6880  |                 |            |                     | 0.123 |
| 22             | 22                | 35     | 20    | 0.6       | NKS22               | 22.9                | 27.1  | 21000           | 14000      | 0.0310              | 0.069 |
|                | 0.8661            | 1.3780 | 0.787 | 0.024     |                     | 5150                | 6090  |                 |            |                     | 0.152 |
| 24             | 24                | 32     | 16    | 0.3       | NK24/16             | 16.2                | 24.3  | 18000           | 12000      | 0.0328              | 0.035 |
|                | 0.9449            | 1.2598 | 0.630 | 0.012     |                     | 3640                | 5460  |                 |            |                     | 0.077 |

(1) Max. axial displacement

*Continued on next page.*

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |           |           |                    | Bearing Designation | Load Ratings kN/lbf. |                       | Limiting Speeds |              | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|-----------|-----------|--------------------|---------------------|----------------------|-----------------------|-----------------|--------------|---------------------|----------------|
|                | F <sub>w</sub>    | D         | C         | r <sub>s min</sub> |                     | Dynamic C            | Static C <sub>0</sub> | Oil RPM         | Grease RPM   |                     | C <sub>g</sub> |
|                | <b>24</b>         | <b>32</b> | <b>20</b> | <b>0.3</b>         | <b>NK24/20</b>      | <b>19.3</b>          | <b>30.3</b>           | <b>18000</b>    | <b>12000</b> | <b>0.0346</b>       | <b>0.045</b>   |
|                | 0.9449            | 1.2598    | 0.787     | 0.012              |                     | 4340                 | 6810                  |                 |              |                     |                |
|                | <b>24</b>         | <b>37</b> | <b>20</b> | <b>0.6</b>         | <b>NKS24</b>        | <b>29.1</b>          | <b>32.8</b>           | <b>20000</b>    | <b>13000</b> | <b>0.0325</b>       | <b>0.073</b>   |
|                | 0.9449            | 1.4567    | 0.787     | 0.024              |                     | 6540                 | 7370                  |                 |              |                     |                |
| <b>25</b>      | <b>25</b>         | <b>33</b> | <b>16</b> | <b>0.3</b>         | <b>NK25/16</b>      | <b>16.1</b>          | <b>24.4</b>           | <b>17000</b>    | <b>11000</b> | <b>0.0334</b>       | <b>0.037</b>   |
|                | 0.9843            | 1.2992    | 0.630     | 0.012              |                     | 3620                 | 5490                  |                 |              |                     |                |
|                | <b>25</b>         | <b>33</b> | <b>20</b> | <b>0.3</b>         | <b>NK25/20</b>      | <b>19.1</b>          | <b>30.4</b>           | <b>17000</b>    | <b>11000</b> | <b>0.0353</b>       | <b>0.047</b>   |
|                | 0.9843            | 1.2992    | 0.787     | 0.012              |                     | 4290                 | 6830                  |                 |              |                     |                |
|                | <b>25</b>         | <b>37</b> | <b>17</b> | <b>0.3</b>         | <b>RNA4904</b>      | <b>21.3</b>          | <b>25.5</b>           | <b>18000</b>    | <b>12000</b> | <b>0.0318</b>       | <b>0.061</b>   |
|                | 0.9843            | 1.4567    | 0.669     | 0.012              |                     | 4790                 | 5730                  |                 |              |                     |                |
|                | <b>25</b>         | <b>37</b> | <b>30</b> | <b>0.3</b>         | <b>RNA6904</b>      | <b>36.6</b>          | <b>51.0</b>           | <b>18000</b>    | <b>12000</b> | <b>0.0378</b>       | <b>0.091</b>   |
|                | 0.9843            | 1.4567    | 1.181     | 0.012              |                     | 8230                 | 11500                 |                 |              |                     |                |
|                | <b>25</b>         | <b>38</b> | <b>20</b> | <b>0.6</b>         | <b>NKS25</b>        | <b>29.1</b>          | <b>33.0</b>           | <b>19000</b>    | <b>12000</b> | <b>0.0331</b>       | <b>0.076</b>   |
|                | 0.9843            | 1.4961    | 0.787     | 0.024              |                     | 6540                 | 7420                  |                 |              |                     |                |
| <b>26</b>      | <b>26</b>         | <b>34</b> | <b>16</b> | <b>0.3</b>         | <b>NK26/16</b>      | <b>16.6</b>          | <b>25.7</b>           | <b>17000</b>    | <b>11000</b> | <b>0.0344</b>       | <b>0.039</b>   |
|                | 1.0236            | 1.3386    | 0.630     | 0.012              |                     | 3730                 | 5780                  |                 |              |                     |                |
|                | <b>26</b>         | <b>34</b> | <b>20</b> | <b>0.3</b>         | <b>NK26/20</b>      | <b>19.7</b>          | <b>32.0</b>           | <b>17000</b>    | <b>11000</b> | <b>0.0363</b>       | <b>0.048</b>   |
|                | 1.0236            | 1.3386    | 0.787     | 0.012              |                     | 4430                 | 7190                  |                 |              |                     |                |
| <b>28</b>      | <b>28</b>         | <b>37</b> | <b>20</b> | <b>0.3</b>         | <b>NK28/20</b>      | <b>22.6</b>          | <b>34.4</b>           | <b>16000</b>    | <b>10000</b> | <b>0.0373</b>       | <b>0.057</b>   |
|                | 1.1024            | 1.4567    | 0.787     | 0.012              |                     | 5080                 | 7730                  |                 |              |                     |                |
|                | <b>28</b>         | <b>37</b> | <b>30</b> | <b>0.3</b>         | <b>NK28/30</b>      | <b>29.0</b>          | <b>53.8</b>           | <b>16000</b>    | <b>10000</b> | <b>0.0427</b>       | <b>0.088</b>   |
|                | 1.1024            | 1.4567    | 1.181     | 0.012              |                     | 6520                 | 12100                 |                 |              |                     |                |
|                | <b>28</b>         | <b>39</b> | <b>17</b> | <b>0.3</b>         | <b>RNA49/22</b>     | <b>23.3</b>          | <b>29.6</b>           | <b>16000</b>    | <b>10000</b> | <b>0.0346</b>       | <b>0.059</b>   |
|                | 1.1024            | 1.5354    | 0.669     | 0.012              |                     | 5240                 | 6650                  |                 |              |                     |                |
|                | <b>28</b>         | <b>39</b> | <b>30</b> | <b>0.3</b>         | <b>RNA69/22</b>     | <b>30.6</b>          | <b>50.7</b>           | <b>16000</b>    | <b>10000</b> | <b>0.0487</b>       | <b>0.107</b>   |
|                | 1.1024            | 1.5354    | 1.181     | 0.012              |                     | 6880                 | 11400                 |                 |              |                     |                |
|                | <b>28</b>         | <b>42</b> | <b>20</b> | <b>0.6</b>         | <b>NKS28</b>        | <b>30.3</b>          | <b>38.4</b>           | <b>16000</b>    | <b>11000</b> | <b>0.0364</b>       | <b>0.094</b>   |
|                | 1.1024            | 1.6535    | 0.787     | 0.024              |                     | 6810                 | 8630                  |                 |              |                     |                |
| <b>29</b>      | <b>29</b>         | <b>38</b> | <b>20</b> | <b>0.3</b>         | <b>NK29/20</b>      | <b>23.4</b>          | <b>36.4</b>           | <b>15000</b>    | <b>9800</b>  | <b>0.0383</b>       | <b>0.059</b>   |
|                | 1.1417            | 1.4961    | 0.787     | 0.012              |                     | 5260                 | 8180                  |                 |              |                     |                |
|                | <b>29</b>         | <b>38</b> | <b>30</b> | <b>0.3</b>         | <b>NK29/30</b>      | <b>29.8</b>          | <b>56.4</b>           | <b>15000</b>    | <b>9700</b>  | <b>0.0438</b>       | <b>0.090</b>   |
|                | 1.1417            | 1.4961    | 1.181     | 0.012              |                     | 6700                 | 12700                 |                 |              |                     |                |
| <b>30</b>      | <b>30</b>         | <b>40</b> | <b>20</b> | <b>0.3</b>         | <b>NK30/20</b>      | <b>24.2</b>          | <b>38.3</b>           | <b>15000</b>    | <b>9500</b>  | <b>0.0394</b>       | <b>0.071</b>   |
|                | 1.1811            | 1.5748    | 0.787     | 0.012              |                     | 5440                 | 8610                  |                 |              |                     |                |
|                | <b>30</b>         | <b>40</b> | <b>30</b> | <b>0.3</b>         | <b>NK30/30</b>      | <b>34.7</b>          | <b>61.0</b>           | <b>15000</b>    | <b>9500</b>  | <b>0.0442</b>       | <b>0.107</b>   |
|                | 1.1811            | 1.5748    | 1.181     | 0.012              |                     | 7800                 | 13700                 |                 |              |                     |                |
|                | <b>30</b>         | <b>42</b> | <b>17</b> | <b>0.3</b>         | <b>RNA4905</b>      | <b>24.3</b>          | <b>31.7</b>           | <b>15000</b>    | <b>9700</b>  | <b>0.0362</b>       | <b>0.071</b>   |
|                | 1.1811            | 1.6535    | 0.669     | 0.012              |                     | 5460                 | 7130                  |                 |              |                     |                |
|                | <b>30</b>         | <b>42</b> | <b>30</b> | <b>0.3</b>         | <b>RNA6905</b>      | <b>39.7</b>          | <b>59.6</b>           | <b>15000</b>    | <b>9700</b>  | <b>0.0424</b>       | <b>0.127</b>   |
|                | 1.1811            | 1.6535    | 1.181     | 0.012              |                     | 8920                 | 13400                 |                 |              |                     |                |
|                | <b>30</b>         | <b>45</b> | <b>20</b> | <b>0.6</b>         | <b>NKS30</b>        | <b>34.3</b>          | <b>42.8</b>           | <b>15000</b>    | <b>9900</b>  | <b>0.0380</b>       | <b>0.114</b>   |
|                | 1.1811            | 1.7717    | 0.787     | 0.024              |                     | 7710                 | 9620                  |                 |              |                     |                |
| <b>32</b>      | <b>32</b>         | <b>42</b> | <b>20</b> | <b>0.3</b>         | <b>NK32/20</b>      | <b>24.8</b>          | <b>40.4</b>           | <b>14000</b>    | <b>8800</b>  | <b>0.0411</b>       | <b>0.074</b>   |
|                | 1.2598            | 1.6535    | 0.787     | 0.012              |                     | 5580                 | 9080                  |                 |              |                     |                |
|                | <b>32</b>         | <b>42</b> | <b>30</b> | <b>0.3</b>         | <b>NK32/30</b>      | <b>35.6</b>          | <b>64.3</b>           | <b>14000</b>    | <b>8800</b>  | <b>0.0461</b>       | <b>0.112</b>   |
|                | 1.2598            | 1.6535    | 1.181     | 0.012              |                     | 8000                 | 14500                 |                 |              |                     |                |
|                | <b>32</b>         | <b>45</b> | <b>17</b> | <b>0.3</b>         | <b>RNA49/28</b>     | <b>25.1</b>          | <b>33.8</b>           | <b>14000</b>    | <b>9000</b>  | <b>0.0378</b>       | <b>0.080</b>   |
|                | 1.2598            | 1.7717    | 0.669     | 0.012              |                     | 5640                 | 7600                  |                 |              |                     |                |
|                | <b>32</b>         | <b>45</b> | <b>30</b> | <b>0.3</b>         | <b>RNA69/28</b>     | <b>43.2</b>          | <b>62.5</b>           | <b>14000</b>    | <b>9100</b>  | <b>0.0612</b>       | <b>0.140</b>   |
|                | 1.2598            | 1.7717    | 1.181     | 0.012              |                     | 9710                 | 14100                 |                 |              |                     |                |
|                | <b>32</b>         | <b>47</b> | <b>22</b> | <b>0.6</b>         | <b>NKS32</b>        | <b>36.0</b>          | <b>46.2</b>           | <b>14000</b>    | <b>9200</b>  | <b>0.0398</b>       | <b>0.120</b>   |
|                | 1.2598            | 1.8504    | 0.866     | 0.024              |                     | 8090                 | 10400                 |                 |              |                     |                |
| <b>35</b>      | <b>35</b>         | <b>45</b> | <b>20</b> | <b>0.3</b>         | <b>NK35/20</b>      | <b>26.1</b>          | <b>44.4</b>           | <b>12000</b>    | <b>8000</b>  | <b>0.0437</b>       | <b>0.081</b>   |
|                | 1.3780            | 1.7717    | 0.787     | 0.012              |                     | 5870                 | 9980                  |                 |              |                     |                |
|                | <b>35</b>         | <b>45</b> | <b>30</b> | <b>0.3</b>         | <b>NK35/30</b>      | <b>37.4</b>          | <b>70.6</b>           | <b>12000</b>    | <b>8000</b>  | <b>0.0491</b>       | <b>0.122</b>   |
|                | 1.3780            | 1.7717    | 1.181     | 0.012              |                     | 8410                 | 15900                 |                 |              |                     |                |
|                | <b>35</b>         | <b>47</b> | <b>18</b> | <b>0.3</b>         | <b>RNA4906</b>      | <b>25.9</b>          | <b>36.0</b>           | <b>13000</b>    | <b>8200</b>  | <b>0.0399</b>       | <b>0.081</b>   |
|                | 1.3780            | 1.8504    | 0.709     | 0.012              |                     | 5820                 | 8090                  |                 |              |                     |                |

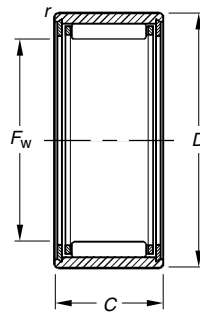
(1) Max. axial displacement

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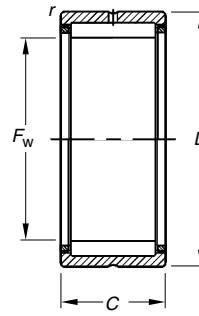


# NEEDLE ROLLER BEARINGS

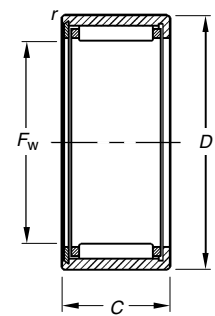
## NEEDLE ROLLER BEARINGS WITHOUT INNER RINGS — continued METRIC SERIES



**NK**  
( $F_w \leq 10$ )



**NK, NKS**  
RNA49, RNA69



**NKTN**

| Shaft Diameter | Dimensions mm/in. |           |           |            | Bearing Designation | Load Ratings kN/lbf. |             | Limiting Speeds |             | Approx. Wt. kg/lbs. |              |
|----------------|-------------------|-----------|-----------|------------|---------------------|----------------------|-------------|-----------------|-------------|---------------------|--------------|
|                | $F_w$             | D         | C         | $r_s$ min  |                     | C                    | $C_0$       | Oil RPM         | Grease RPM  |                     |              |
|                | <b>35</b>         | <b>47</b> | <b>30</b> | <b>0.3</b> | <b>RNA6906</b>      | <b>42.6</b>          | <b>68.2</b> | <b>13000</b>    | <b>8200</b> | <b>0.0467</b>       | <b>0.148</b> |
|                | 1.3780            | 1.8504    | 1.181     | 0.012      |                     | 9580                 | 15300       |                 |             |                     |              |
|                | <b>35</b>         | <b>50</b> | <b>22</b> | <b>0.6</b> | <b>NKS35</b>        | <b>37.5</b>          | <b>49.9</b> | <b>13000</b>    | <b>8400</b> | <b>0.0421</b>       | <b>0.130</b> |
|                | 1.3780            | 1.9685    | 0.866     | 0.024      |                     | 8430                 | 11200       |                 |             |                     |              |
| <b>37</b>      | <b>37</b>         | <b>47</b> | <b>20</b> | <b>0.3</b> | <b>NK37/20</b>      | <b>26.6</b>          | <b>46.4</b> | <b>12000</b>    | <b>7600</b> | <b>0.0453</b>       | <b>0.084</b> |
|                | 1.4567            | 1.8504    | 0.787     | 0.012      |                     | 5980                 | 10400       |                 |             |                     |              |
|                | <b>37</b>         | <b>47</b> | <b>30</b> | <b>0.3</b> | <b>NK37/30</b>      | <b>38.2</b>          | <b>73.9</b> | <b>12000</b>    | <b>7600</b> | <b>0.0508</b>       | <b>0.128</b> |
|                | 1.4567            | 1.8504    | 1.181     | 0.012      |                     | 8590                 | 16600       |                 |             |                     |              |
|                | <b>37</b>         | <b>52</b> | <b>22</b> | <b>0.6</b> | <b>NKS37</b>        | <b>39.0</b>          | <b>53.4</b> | <b>12000</b>    | <b>7900</b> | <b>0.0438</b>       | <b>0.134</b> |
|                | 1.4567            | 2.0472    | 0.866     | 0.024      |                     | 8770                 | 12000       |                 |             |                     |              |
| <b>38</b>      | <b>38</b>         | <b>48</b> | <b>20</b> | <b>0.3</b> | <b>NK38/20</b>      | <b>21.7</b>          | <b>40.9</b> | <b>11000</b>    | <b>7300</b> | <b>0.0456</b>       | <b>0.087</b> |
|                | 1.4961            | 1.8898    | 0.787     | 0.012      |                     | 4880                 | 9190        |                 |             |                     |              |
|                | <b>38</b>         | <b>48</b> | <b>30</b> | <b>0.3</b> | <b>NK38/30</b>      | <b>31.9</b>          | <b>67.0</b> | <b>11000</b>    | <b>7300</b> | <b>0.0516</b>       | <b>0.131</b> |
|                | 1.4961            | 1.8898    | 1.181     | 0.012      |                     | 7170                 | 15100       |                 |             |                     |              |
| <b>40</b>      | <b>40</b>         | <b>50</b> | <b>20</b> | <b>0.3</b> | <b>NK40/20</b>      | <b>27.8</b>          | <b>50.4</b> | <b>11000</b>    | <b>7000</b> | <b>0.0479</b>       | <b>0.089</b> |
|                | 1.5748            | 1.9685    | 0.787     | 0.012      |                     | 6250                 | 11300       |                 |             |                     |              |
|                | <b>40</b>         | <b>50</b> | <b>30</b> | <b>0.3</b> | <b>NK40/30</b>      | <b>40.0</b>          | <b>80.2</b> | <b>11000</b>    | <b>7000</b> | <b>0.0537</b>       | <b>0.137</b> |
|                | 1.5748            | 1.9685    | 1.181     | 0.012      |                     | 8990                 | 18000       |                 |             |                     |              |
|                | <b>40</b>         | <b>52</b> | <b>20</b> | <b>0.6</b> | <b>RNA49/32</b>     | <b>32.0</b>          | <b>49.3</b> | <b>11000</b>    | <b>7100</b> | <b>0.0457</b>       | <b>0.100</b> |
|                | 1.5748            | 2.0472    | 0.787     | 0.024      |                     | 7190                 | 11100       |                 |             |                     |              |
|                | <b>40</b>         | <b>52</b> | <b>36</b> | <b>0.6</b> | <b>RNA69/32</b>     | <b>48.6</b>          | <b>84.5</b> | <b>11000</b>    | <b>7100</b> | <b>0.0620</b>       | <b>0.185</b> |
|                | 1.5748            | 2.0472    | 1.417     | 0.024      |                     | 10900                | 19000       |                 |             |                     |              |
|                | <b>40</b>         | <b>55</b> | <b>22</b> | <b>0.6</b> | <b>NKS40</b>        | <b>40.3</b>          | <b>57.0</b> | <b>11000</b>    | <b>7200</b> | <b>0.0460</b>       | <b>0.140</b> |
|                | 1.5748            | 2.1654    | 0.866     | 0.024      |                     | 9060                 | 12800       |                 |             |                     |              |
| <b>42</b>      | <b>42</b>         | <b>52</b> | <b>20</b> | <b>0.3</b> | <b>NK42/20</b>      | <b>28.3</b>          | <b>52.4</b> | <b>10000</b>    | <b>6600</b> | <b>0.0494</b>       | <b>0.085</b> |
|                | 1.6535            | 2.0472    | 0.787     | 0.012      |                     | 6360                 | 11800       |                 |             |                     |              |
|                | <b>42</b>         | <b>52</b> | <b>30</b> | <b>0.3</b> | <b>NK42/30</b>      | <b>40.7</b>          | <b>83.5</b> | <b>10000</b>    | <b>6600</b> | <b>0.0554</b>       | <b>0.141</b> |
|                | 1.6535            | 2.0472    | 1.181     | 0.012      |                     | 9150                 | 18800       |                 |             |                     |              |
|                | <b>42</b>         | <b>55</b> | <b>20</b> | <b>0.6</b> | <b>RNA4907</b>      | <b>32.8</b>          | <b>51.7</b> | <b>10000</b>    | <b>6700</b> | <b>0.0454</b>       | <b>0.114</b> |
|                | 1.6535            | 2.1654    | 0.787     | 0.024      |                     | 7370                 | 11600       |                 |             |                     |              |
|                | <b>42</b>         | <b>55</b> | <b>36</b> | <b>0.6</b> | <b>RNA6907</b>      | <b>49.9</b>          | <b>88.7</b> | <b>10000</b>    | <b>6700</b> | <b>0.0641</b>       | <b>0.218</b> |
|                | 1.6535            | 2.1654    | 1.417     | 0.024      |                     | 11200                | 19900       |                 |             |                     |              |
| <b>43</b>      | <b>43</b>         | <b>53</b> | <b>20</b> | <b>0.3</b> | <b>NK43/20</b>      | <b>29.0</b>          | <b>54.4</b> | <b>9900</b>     | <b>6400</b> | <b>0.0504</b>       | <b>0.096</b> |
|                | 1.6929            | 2.0866    | 0.787     | 0.012      |                     | 6520                 | 12200       |                 |             |                     |              |
|                | <b>43</b>         | <b>53</b> | <b>30</b> | <b>0.3</b> | <b>NK43/30</b>      | <b>41.6</b>          | <b>86.6</b> | <b>9900</b>     | <b>6400</b> | <b>0.0565</b>       | <b>0.134</b> |
|                | 1.6929            | 2.0866    | 1.181     | 0.012      |                     | 9350                 | 19500       |                 |             |                     |              |
|                | <b>43</b>         | <b>58</b> | <b>22</b> | <b>0.6</b> | <b>NKS43</b>        | <b>41.6</b>          | <b>60.7</b> | <b>10000</b>    | <b>6700</b> | <b>0.0481</b>       | <b>0.150</b> |
|                | 1.6929            | 2.2835    | 0.866     | 0.024      |                     | 9350                 | 13600       |                 |             |                     |              |
| <b>45</b>      | <b>45</b>         | <b>55</b> | <b>20</b> | <b>0.3</b> | <b>NK45/20</b>      | <b>29.5</b>          | <b>56.4</b> | <b>9400</b>     | <b>6100</b> | <b>0.0519</b>       | <b>0.100</b> |
|                | 1.7717            | 2.1654    | 0.787     | 0.012      |                     | 6630                 | 12700       |                 |             |                     |              |
|                | <b>45</b>         | <b>55</b> | <b>30</b> | <b>0.3</b> | <b>NK45/30</b>      | <b>42.3</b>          | <b>89.8</b> | <b>9400</b>     | <b>6100</b> | <b>0.0582</b>       | <b>0.151</b> |
|                | 1.7717            | 2.1654    | 1.181     | 0.012      |                     | 9510                 | 20200       |                 |             |                     |              |
|                | <b>45</b>         | <b>60</b> | <b>22</b> | <b>0.6</b> | <b>NKS45</b>        | <b>43.0</b>          | <b>64.2</b> | <b>9800</b>     | <b>6400</b> | <b>0.0498</b>       | <b>0.156</b> |
|                | 1.7717            | 2.3622    | 0.866     | 0.024      |                     | 9670                 | 14400       |                 |             |                     |              |

(1) Max. axial displacement

Continued on next page.

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |        |       |                    | Bearing Designation | Load Ratings kN/bf. |                       | Limiting Speeds |            | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|--------|-------|--------------------|---------------------|---------------------|-----------------------|-----------------|------------|---------------------|----------------|
|                | F <sub>w</sub>    | D      | C     | r <sub>s min</sub> |                     | Dynamic C           | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                     | C <sub>g</sub> |
| 47             | 47                | 57     | 20    | 0.3                | NK47/20             | 30.0                | 58.5                  | 9000            | 5900       | 0.0534              | 0.104          |
|                | 1.8504            | 2.2441 | 0.787 | 0.012              |                     | 6740                | 13200                 |                 |            |                     |                |
| 47             | 47                | 57     | 30    | 0.3                | NK47/30             | 43.0                | 93.1                  | 9000            | 5900       | 0.0599              | 0.158          |
|                | 1.8504            | 2.2441 | 1.181 | 0.012              |                     | 9670                | 20900                 |                 |            |                     |                |
| 48             | 48                | 62     | 22    | 0.6                | RNA4908             | 44.2                | 67.8                  | 9100            | 5900       | 0.0519              | 0.154          |
|                | 1.8898            | 2.4409 | 0.866 | 0.024              |                     | 9940                | 15200                 |                 |            |                     |                |
| 48             | 48                | 62     | 40    | 0.6                | RNA6908             | 70.8                | 124                   | 9100            | 5900       | 0.0717              | 0.300          |
|                | 1.8898            | 2.4409 | 1.575 | 0.024              |                     | 15900               | 27900                 |                 |            |                     |                |
| 50             | 50                | 62     | 25    | 0.3                | NK50/25             | 40.7                | 79.3                  | 8500            | 5500       | 0.0578              | 0.171          |
|                | 1.9685            | 2.4409 | 0.984 | 0.012              |                     | 9150                | 17800                 |                 |            |                     |                |
| 50             | 50                | 62     | 35    | 0.6                | NK50/35             | 55.0                | 117                   | 8500            | 5500       | 0.0636              | 0.242          |
|                | 1.9685            | 2.4409 | 1.378 | 0.024              |                     | 12400               | 26300                 |                 |            |                     |                |
| 50             | 50                | 65     | 22    | 1.0                | NKS50               | 45.5                | 71.3                  | 8700            | 5700       | 0.0535              | 0.170          |
|                | 1.9685            | 2.5591 | 0.866 | 0.039              |                     | 10200               | 16000                 |                 |            |                     |                |
| 52             | 52                | 68     | 22    | 0.6                | RNA4909             | 46.8                | 74.8                  | 8400            | 5400       | 0.0550              | 0.201          |
|                | 2.0472            | 2.6772 | 0.866 | 0.024              |                     | 10500               | 16800                 |                 |            |                     |                |
| 52             | 52                | 68     | 40    | 0.6                | RNA6909             | 74.7                | 137                   | 8400            | 5400       | 0.0759              | 0.392          |
|                | 2.0472            | 2.6772 | 1.575 | 0.024              |                     | 16800               | 30800                 |                 |            |                     |                |
| 55             | 55                | 68     | 25    | 0.6                | NK55/25             | 46.1                | 87.3                  | 7800            | 5000       | 0.0605              | 0.207          |
|                | 2.1654            | 2.6772 | 0.984 | 0.024              |                     | 10400               | 19600                 |                 |            |                     |                |
| 55             | 55                | 68     | 35    | 0.6                | NK55/35             | 62.3                | 129                   | 7800            | 5000       | 0.0667              | 0.293          |
|                | 2.1654            | 2.6772 | 1.378 | 0.024              |                     | 14000               | 29000                 |                 |            |                     |                |
| 55             | 55                | 72     | 22    | 1.0                | NKS55               | 47.9                | 78.4                  | 7900            | 5100       | 0.0571              | 0.225          |
|                | 2.1654            | 2.8346 | 0.866 | 0.039              |                     | 10800               | 17600                 |                 |            |                     |                |
| 58             | 58                | 72     | 22    | 0.6                | RNA4910             | 48.9                | 82.0                  | 7400            | 4800       | 0.0591              | 0.179          |
|                | 2.2835            | 2.8346 | 0.866 | 0.024              |                     | 11000               | 18400                 |                 |            |                     |                |
| 58             | 58                | 72     | 40    | 0.6                | RNA6910             | 75.7                | 144                   | 7400            | 4800       | 0.0806              | 0.364          |
|                | 2.2835            | 2.8346 | 1.575 | 0.024              |                     | 17000               | 32400                 |                 |            |                     |                |
| 60             | 60                | 72     | 25    | 0.6                | NK60/25             | 44.3                | 94.0                  | 7000            | 4400       | 0.0654              | 0.202          |
|                | 2.3622            | 2.8346 | 0.984 | 0.024              |                     | 9960                | 21100                 |                 |            |                     |                |
| 60             | 60                | 72     | 35    | 0.6                | NK60/35             | 59.9                | 139                   | 7000            | 4400       | 0.0721              | 0.286          |
|                | 2.3622            | 2.8346 | 1.378 | 0.024              |                     | 13500               | 31200                 |                 |            |                     |                |
| 60             | 60                | 80     | 28    | 1.1                | NKS60               | 66.9                | 103                   | 7300            | 4800       | 0.0612              | 0.337          |
|                | 2.3622            | 3.1496 | 1.102 | 0.043              |                     | 15000               | 23200                 |                 |            |                     |                |
| 63             | 63                | 80     | 25    | 1.0                | RNA4911             | 62.0                | 107                   | 6900            | 4500       | 0.0645              | 0.285          |
|                | 2.4803            | 3.1496 | 0.984 | 0.039              |                     | 13900               | 24100                 |                 |            |                     |                |
| 63             | 63                | 80     | 45    | 1.0                | RNA6911             | 94.2                | 172                   | 6900            | 4500       | 0.0852              | 0.540          |
|                | 2.4803            | 3.1496 | 1.772 | 0.039              |                     | 21200               | 38700                 |                 |            |                     |                |
| 65             | 65                | 78     | 25    | 0.6                | NK65/25             | 48.2                | 97.7                  | 6500            | 4200       | 0.0671              | 0.257          |
|                | 2.5591            | 3.0709 | 0.984 | 0.024              |                     | 10800               | 22000                 |                 |            |                     |                |
| 65             | 65                | 78     | 35    | 0.6                | NK65/35             | 65.2                | 144                   | 6500            | 4200       | 0.0739              | 0.298          |
|                | 2.5591            | 3.0709 | 1.378 | 0.024              |                     | 14700               | 32400                 |                 |            |                     |                |
| 65             | 65                | 85     | 28    | 1.1                | NKS65               | 71.0                | 114                   | 6700            | 4200       | 0.0650              | 0.362          |
|                | 2.5591            | 3.3465 | 1.102 | 0.043              |                     | 16000               | 25600                 |                 |            |                     |                |
| 68             | 68                | 82     | 25    | 0.6                | NK68/25             | 49.0                | 101                   | 6200            | 4000       | 0.0691              | 0.287          |
|                | 2.6772            | 3.2283 | 0.984 | 0.024              |                     | 11000               | 22700                 |                 |            |                     |                |
| 68             | 68                | 82     | 35    | 0.6                | NK68/35             | 66.2                | 149                   | 6200            | 4000       | 0.0760              | 0.350          |
|                | 2.6772            | 3.2283 | 1.378 | 0.024              |                     | 14900               | 33500                 |                 |            |                     |                |
| 68             | 68                | 85     | 25    | 1.0                | RNA4912             | 64.8                | 116                   | 6300            | 4100       | 0.0681              | 0.304          |
|                | 2.6772            | 3.3465 | 0.984 | 0.039              |                     | 14600               | 26100                 |                 |            |                     |                |
| 68             | 68                | 85     | 45    | 1.0                | RNA6912             | 99.3                | 189                   | 6300            | 4100       | 0.0901              | 0.546          |
|                | 2.6772            | 3.3465 | 1.772 | 0.039              |                     | 22300               | 42500                 |                 |            |                     |                |
| 70             | 70                | 85     | 25    | 0.6                | NK70/25             | 43.6                | 87.9                  | 6000            | 3900       | 0.0705              | 0.298          |
|                | 2.7559            | 3.3465 | 0.984 | 0.024              |                     | 9800                | 19800                 |                 |            |                     |                |
| 70             | 70                | 85     | 35    | 0.6                | NK70/35             | 62.2                | 139                   | 6000            | 3900       | 0.0757              | 0.411          |
|                | 2.7559            | 3.3465 | 1.378 | 0.024              |                     | 14000               | 31200                 |                 |            |                     |                |
| 70             | 70                | 90     | 28    | 1.1                | NKS70               | 72.6                | 120                   | 6200            | 4000       | 0.0679              | 0.383          |
|                | 2.7559            | 3.5433 | 1.102 | 0.043              |                     | 16300               | 27000                 |                 |            |                     |                |

(1) Max. axial displacement

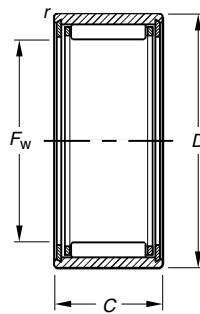
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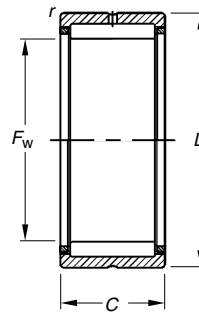
# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITHOUT INNER RINGS — *continued*

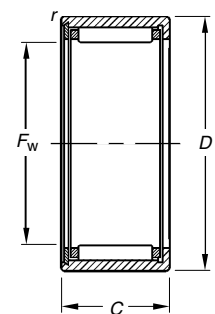
### METRIC SERIES



**NK**  
( $F_w \leq 10$ )



**NK, NKS**  
RNA49, RNA69



**NKTN**

| Shaft Diameter | Dimensions mm/in. |        |        |       | Bearing Designation | Load Ratings kN/lbf. |       | Limiting Speeds |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|--------|--------|-------|---------------------|----------------------|-------|-----------------|---------|---------------------|------------|
|                | mm                | $F_w$  | D      | C     |                     | $r_s$ min            | C     | $C_0$           | Oil RPM |                     | Grease RPM |
| 72             | 72                | 72     | 90     | 25    | RNA4913             | 66.0                 | 121   | 5900            | 3900    | 0.0705              | 0.346      |
|                | 2.8346            | 2.8346 | 3.5433 | 0.984 |                     | 14800                | 27200 |                 |         |                     |            |
| 72             | 72                | 72     | 90     | 45    | RNA6913             | 107                  | 213   | 5900            | 3900    | 0.0952              | 0.679      |
|                | 2.8346            | 2.8346 | 3.5433 | 1.772 |                     | 24100                | 47900 |                 |         |                     |            |
| 73             | 73                | 73     | 90     | 25    | NK73/25             | 61.5                 | 119   | 5800            | 3800    | 0.0717              | 0.320      |
|                | 2.8740            | 2.8740 | 3.5433 | 0.984 |                     | 13800                | 26800 |                 |         |                     |            |
| 73             | 73                | 73     | 90     | 35    | NK73/35             | 82.5                 | 173   | 5800            | 3800    | 0.0787              | 0.450      |
|                | 2.8740            | 2.8740 | 3.5433 | 1.378 |                     | 18500                | 38900 |                 |         |                     |            |
| 75             | 75                | 75     | 92     | 25    | NK75/25             | 43.7                 | 90.2  | 5600            | 3600    | 0.0702              | 0.364      |
|                | 2.9528            | 2.9528 | 3.6220 | 0.984 |                     | 9820                 | 20300 |                 |         |                     |            |
| 75             | 75                | 75     | 92     | 35    | NK75/35             | 60.9                 | 138   | 5600            | 3600    | 0.0780              | 0.518      |
|                | 2.9528            | 2.9528 | 3.6220 | 1.378 |                     | 13700                | 31000 |                 |         |                     |            |
| 75             | 75                | 75     | 95     | 28    | NKS75               | 76.5                 | 132   | 5800            | 3700    | 0.0716              | 0.413      |
|                | 2.9528            | 2.9528 | 3.7402 | 1.102 |                     | 17200                | 29700 |                 |         |                     |            |
| 80             | 80                | 80     | 95     | 25    | NK80/25             | 65.0                 | 131   | 5300            | 3400    | 0.0766              | 0.331      |
|                | 3.1496            | 3.1496 | 3.7402 | 0.984 |                     | 14600                | 29400 |                 |         |                     |            |
| 80             | 80                | 80     | 95     | 35    | NK80/35             | 79.7                 | 184   | 5300            | 3400    | 0.0846              | 0.380      |
|                | 3.1496            | 3.1496 | 3.7402 | 1.378 |                     | 17900                | 41400 |                 |         |                     |            |
| 80             | 80                | 80     | 100    | 30    | RNA4914             | 86.3                 | 157   | 5400            | 3500    | 0.0770              | 0.502      |
|                | 3.1496            | 3.1496 | 3.9370 | 1.181 |                     | 19400                | 35300 |                 |         |                     |            |
| 80             | 80                | 80     | 100    | 54    | RNA6914             | 137                  | 286   | 5400            | 6500    | 0.1061              | 0.946      |
|                | 3.1496            | 3.1496 | 3.9370 | 2.126 |                     | 30800                | 64300 |                 |         |                     |            |
| 85             | 85                | 85     | 105    | 25    | NK85/25             | 76.4                 | 137   | 5000            | 3300    | 0.0764              | 0.506      |
|                | 3.3465            | 3.3465 | 4.1339 | 0.984 |                     | 17200                | 30800 |                 |         |                     |            |
| 85             | 85                | 85     | 105    | 30    | RNA4915             | 92.4                 | 175   | 5000            | 3300    | 0.0812              | 0.528      |
|                | 3.3465            | 3.3465 | 4.1339 | 1.181 |                     | 20800                | 39300 |                 |         |                     |            |
| 85             | 85                | 85     | 105    | 35    | NK85/35             | 108                  | 214   | 5000            | 3300    | 0.0854              | 0.610      |
|                | 3.3465            | 3.3465 | 4.1339 | 1.378 |                     | 24300                | 48100 |                 |         |                     |            |
| 85             | 85                | 85     | 105    | 54    | RNA6915             | 143                  | 308   | 5000            | 3300    | 0.1110              | 1.020      |
|                | 3.3465            | 3.3465 | 4.1339 | 2.126 |                     | 32100                | 69200 |                 |         |                     |            |
| 90             | 90                | 90     | 110    | 25    | NK90/25             | 79.5                 | 147   | 4700            | 3100    | 0.0798              | 0.450      |
|                | 3.5433            | 3.5433 | 4.3307 | 0.984 |                     | 17900                | 33000 |                 |         |                     |            |
| 90             | 90                | 90     | 110    | 30    | RNA4916             | 91.5                 | 176   | 4700            | 3100    | 0.0834              | 0.556      |
|                | 3.5433            | 3.5433 | 4.3307 | 1.181 |                     | 20600                | 39600 |                 |         |                     |            |
| 90             | 90                | 90     | 110    | 35    | NK90/35             | 113                  | 230   | 4700            | 3100    | 0.0891              | 0.745      |
|                | 3.5433            | 3.5433 | 4.3307 | 1.378 |                     | 25400                | 51700 |                 |         |                     |            |
| 90             | 90                | 90     | 110    | 54    | RNA6916             | 126                  | 320   | 4700            | 3100    | 0.1197              | 1.050      |
|                | 3.5433            | 3.5433 | 4.3307 | 2.126 |                     | 28300                | 71900 |                 |         |                     |            |
| 95             | 95                | 95     | 115    | 26    | NK95/26             | 49.3                 | 114   | 4400            | 2800    | 0.0829              | 0.572      |
|                | 3.7402            | 3.7402 | 4.5276 | 1.024 |                     | 11100                | 25600 |                 |         |                     |            |
| 95             | 95                | 95     | 115    | 36    | NK95/36             | 114                  | 238   | 4500            | 2900    | 0.0921              | 0.803      |
|                | 3.7402            | 3.7402 | 4.5276 | 1.417 |                     | 25600                | 53500 |                 |         |                     |            |
| 100            | 100               | 100    | 120    | 26    | NK100/26            | 83.6                 | 163   | 4200            | 2800    | 0.0857              | 0.530      |
|                | 3.9370            | 3.9370 | 4.7244 | 1.024 |                     | 18800                | 36600 |                 |         |                     |            |

(1) Max. axial displacement

Continued on next page.

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |                |       |       | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|----------------|-------|-------|---------------------|----------------------|-----------|-----------------------|---------|---------------------|------------|
|                | mm                | F <sub>w</sub> | D     | C     |                     | r <sub>s min</sub>   | Dynamic C | Static C <sub>0</sub> | Oil RPM |                     | Grease RPM |
| 100            | 100               | 120            | 35    | 1.1   | RNA4917             | 110                  | 230       | 4200                  | 2800    | 0.0935              | 0.715      |
|                | 3.9370            | 4.7244         | 1.378 | 0.043 |                     | 24700                | 51700     |                       |         |                     |            |
| 105            | 100               | 120            | 36    | 1.0   | NK100/36            | 118                  | 254       | 4200                  | 2800    | 0.0958              | 0.658      |
|                | 3.9370            | 4.7244         | 1.417 | 0.039 |                     | 26500                | 57100     |                       |         |                     |            |
| 105            | 100               | 120            | 63    | 1.1   | RNA6917             | 150                  | 416       | 4200                  | 2800    | 0.1340              | 1.350      |
|                | 3.9370            | 4.7244         | 2.480 | 0.043 |                     | 33700                | 93500     |                       |         |                     |            |
| 110            | 105               | 125            | 26    | 1.0   | NK105/26            | 52.2                 | 127       | 3900                  | 2600    | 0.0892              | 0.595      |
|                | 4.1339            | 4.9213         | 1.024 | 0.039 |                     | 11700                | 28600     |                       |         |                     |            |
| 110            | 105               | 125            | 35    | 1.1   | RNA4918             | 114                  | 245       | 4000                  | 2600    | 0.0970              | 0.746      |
|                | 4.1339            | 4.9213         | 1.378 | 0.043 |                     | 25600                | 55100     |                       |         |                     |            |
| 110            | 105               | 125            | 63    | 1.1   | RNA6918             | 154                  | 437       | 4000                  | 2600    | 0.1323              | 1.500      |
|                | 4.1339            | 4.9213         | 2.480 | 0.043 |                     | 34600                | 98200     |                       |         |                     |            |
| 110            | 110               | 130            | 30    | 1.1   | NK110/30            | 103                  | 220       | 3800                  | 2500    | 0.0965              | 0.660      |
|                | 4.3307            | 5.1181         | 1.181 | 0.043 |                     | 23200                | 49500     |                       |         |                     |            |
| 110            | 110               | 130            | 35    | 1.1   | RNA4919             | 115                  | 253       | 3800                  | 2500    | 0.0999              | 0.777      |
|                | 4.3307            | 5.1181         | 1.378 | 0.043 |                     | 25900                | 56900     |                       |         |                     |            |
| 110            | 110               | 130            | 40    | 1.1   | NK110/40            | 132                  | 132       | 3800                  | 2500    | 0.1043              | 0.900      |
|                | 4.3307            | 5.1181         | 1.575 | 0.043 |                     | 29700                | 29700     |                       |         |                     |            |
| 115            | 110               | 130            | 63    | 1.1   | RNA6919             | 158                  | 458       | 3800                  | 2500    | 0.1434              | 1.470      |
|                | 4.3307            | 5.1181         | 2.480 | 0.043 |                     | 35500                | 103000    |                       |         |                     |            |
| 115            | 115               | 140            | 40    | 1.1   | RNA4920             | 139                  | 296       | 3700                  | 2400    | 0.1037              | 1.220      |
|                | 4.5276            | 5.5118         | 1.575 | 0.043 |                     | 31200                | 66500     |                       |         |                     |            |
| 120            | 120               | 140            | 30    | 1.0   | RNA4822             | 90.3                 | 230       | 3500                  | 2300    | 0.1059              | 0.785      |
|                | 4.7244            | 5.5118         | 1.181 | 0.039 |                     | 20300                | 51700     |                       |         |                     |            |
| 125            | 125               | 150            | 40    | 1.1   | RNA4922             | 147                  | 325       | 3400                  | 2200    | 0.1101              | 1.320      |
|                | 4.9213            | 5.9055         | 1.575 | 0.043 |                     | 33000                | 73100     |                       |         |                     |            |
| 130            | 130               | 150            | 30    | 1.0   | RNA4824             | 94.1                 | 249       | 3200                  | 2100    | 0.1121              | 0.850      |
|                | 5.1181            | 5.9055         | 1.181 | 0.039 |                     | 21200                | 56000     |                       |         |                     |            |
| 135            | 135               | 165            | 45    | 1.1   | RNA4924             | 177                  | 407       | 3100                  | 2000    | 0.1193              | 1.980      |
|                | 5.3150            | 6.4961         | 1.772 | 0.043 |                     | 39800                | 91500     |                       |         |                     |            |
| 145            | 145               | 165            | 35    | 1.0   | RNA4826             | 112                  | 323       | 2900                  | 1900    | 0.1258              | 1.100      |
|                | 5.7087            | 6.4961         | 1.378 | 0.039 |                     | 25200                | 72600     |                       |         |                     |            |
| 150            | 150               | 180            | 50    | 1.5   | RNA4926             | 201                  | 495       | 2800                  | 1800    | 0.1314              | 2.420      |
|                | 5.9055            | 7.0866         | 1.969 | 0.059 |                     | 45200                | 111000    |                       |         |                     |            |
| 155            | 155               | 175            | 35    | 1.1   | RNA4828             | 116                  | 346       | 2700                  | 1700    | 0.1320              | 1.170      |
|                | 6.1024            | 6.8898         | 1.378 | 0.043 |                     | 26100                | 77800     |                       |         |                     |            |
| 160            | 160               | 190            | 50    | 1.5   | RNA4928             | 214                  | 549       | 2600                  | 1700    | 0.1389              | 2.560      |
|                | 6.2992            | 7.4803         | 1.969 | 0.059 |                     | 48100                | 123000    |                       |         |                     |            |
| 165            | 165               | 190            | 40    | 1.1   | RNA4830             | 142                  | 402       | 2500                  | 1600    | 0.1367              | 1.540      |
|                | 6.4961            | 7.4803         | 1.575 | 0.043 |                     | 31900                | 90400     |                       |         |                     |            |
| 175            | 175               | 200            | 40    | 1.1   | RNA4832             | 146                  | 425       | 2400                  | 1500    | 0.1425              | 1.910      |
|                | 6.8898            | 7.8740         | 1.575 | 0.043 |                     | 32800                | 95500     |                       |         |                     |            |

<sup>(1)</sup> Max. axial displacement

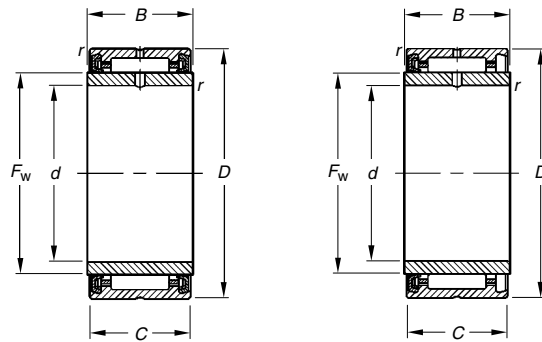




# NEEDLE ROLLER BEARINGS

## SEALED NEEDLE ROLLER BEARINGS WITH INNER RINGS

### METRIC SERIES

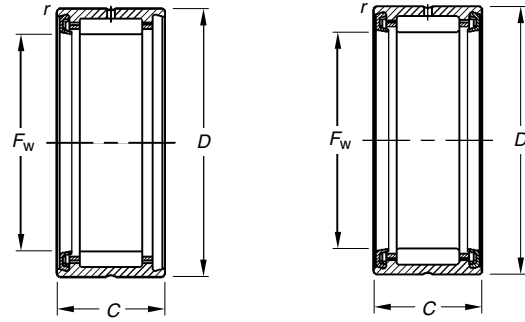


NA49RS

| Shaft Diameter | Dimensions mm/in. |        |       |       |                |       | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |                | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|--------|-------|-------|----------------|-------|---------------------|----------------------|-----------|-----------------------|----------------|---------------------|----------------|
|                | mm                | d      | D     | B     | F <sub>w</sub> | C     |                     | r <sub>s min</sub>   | Dynamic C | Static C <sub>0</sub> | Oil Grease RPM |                     | C <sub>g</sub> |
| 10             | 10                | 22     | 14    | 13    | 14             | 0.3   | NA4900RS            | 7.76                 | 8.06      | 28000                 | 18000          | 0.0199              | 0.027          |
|                | 0.3937            | 0.8661 | 0.551 | 0.512 | 0.5512         | 0.012 |                     | 1740                 | 1810      |                       |                |                     |                |
| 10             | 10                | 22     | 14    | 13    | 14             | 0.3   | NA4900.2RS          | 7.76                 | 8.06      | 24000                 | 16000          | 0.0199              | 0.027          |
|                | 0.3937            | 0.8661 | 0.551 | 0.512 | 0.5512         | 0.012 |                     | 1740                 | 1810      |                       |                |                     |                |
| 12             | 12                | 24     | 14    | 13    | 16             | 0.3   | NA4901RS            | 8.64                 | 9.59      | 28000                 | 18000          | 0.0219              | 0.031          |
|                | 0.4724            | 0.9449 | 0.551 | 0.512 | 0.6299         | 0.012 |                     | 1940                 | 2160      |                       |                |                     |                |
| 12             | 12                | 24     | 14    | 13    | 16             | 0.3   | NA4901.2RS          | 8.64                 | 9.59      | 28000                 | 18000          | 0.0219              | 0.031          |
|                | 0.4724            | 0.9449 | 0.551 | 0.512 | 0.6299         | 0.012 |                     | 1940                 | 2160      |                       |                |                     |                |
| 15             | 15                | 28     | 14    | 13    | 20             | 0.3   | NA4902RS            | 9.77                 | 12.0      | 22000                 | 14000          | 0.0254              | 0.041          |
|                | 0.5906            | 1.1024 | 0.551 | 0.512 | 0.7874         | 0.012 |                     | 2200                 | 2700      |                       |                |                     |                |
| 15             | 15                | 28     | 14    | 13    | 20             | 0.3   | NA4902.2RS          | 9.77                 | 12.0      | 22000                 | 14000          | 0.0254              | 0.041          |
|                | 0.5906            | 1.1024 | 0.551 | 0.512 | 0.7874         | 0.012 |                     | 2200                 | 2700      |                       |                |                     |                |
| 17             | 17                | 30     | 14    | 13    | 22             | 0.3   | NA4903RS            | 10.1                 | 12.8      | 20000                 | 13000          | 0.0269              | 0.044          |
|                | 0.6693            | 1.1811 | 0.551 | 0.512 | 0.8661         | 0.012 |                     | 2270                 | 2880      |                       |                |                     |                |
| 17             | 17                | 30     | 14    | 13    | 22             | 0.3   | NA4903.2RS          | 10.1                 | 12.8      | 20000                 | 13000          | 0.0269              | 0.044          |
|                | 0.6693            | 1.1811 | 0.551 | 0.512 | 0.8661         | 0.012 |                     | 2270                 | 2880      |                       |                |                     |                |
| 20             | 20                | 37     | 18    | 17    | 25             | 0.3   | NA4904RS            | 18.5                 | 21.2      | 18000                 | 12000          | 0.0309              | 0.087          |
|                | 0.7874            | 1.4567 | 0.709 | 0.669 | 0.9843         | 0.012 |                     | 4160                 | 4770      |                       |                |                     |                |
| 20             | 20                | 37     | 18    | 17    | 25             | 0.3   | NA4904.2RS          | 18.5                 | 21.2      | 18000                 | 12000          | 0.0304              | 0.087          |
|                | 0.7874            | 1.4567 | 0.709 | 0.669 | 0.9843         | 0.012 |                     | 4160                 | 4770      |                       |                |                     |                |
| 25             | 25                | 42     | 18    | 17    | 30             | 0.3   | NA4905RS            | 21.0                 | 26.4      | 15000                 | 9700           | 0.0346              | 0.106          |
|                | 0.9843            | 1.6535 | 0.709 | 0.669 | 1.1811         | 0.012 |                     | 4720                 | 5930      |                       |                |                     |                |
| 25             | 25                | 42     | 18    | 17    | 30             | 0.3   | NA4905.2RS          | 21.0                 | 26.4      | 15000                 | 9700           | 0.0346              | 0.106          |
|                | 0.9843            | 1.6535 | 0.709 | 0.669 | 1.1811         | 0.012 |                     | 4720                 | 5930      |                       |                |                     |                |
| 30             | 30                | 47     | 18    | 17    | 35             | 0.3   | NA4906RS            | 22.5                 | 30.0      | 13000                 | 8200           | 0.0381              | 0.119          |
|                | 1.1811            | 1.8504 | 0.709 | 0.669 | 1.3780         | 0.012 |                     | 5060                 | 6740      |                       |                |                     |                |
| 30             | 30                | 47     | 18    | 17    | 35             | 0.3   | NA4906.2RS          | 22.5                 | 30.0      | 13000                 | 8200           | 0.0381              | 0.119          |
|                | 1.1811            | 1.8504 | 0.709 | 0.669 | 1.3780         | 0.012 |                     | 5060                 | 6740      |                       |                |                     |                |
| 35             | 35                | 55     | 21    | 20    | 42             | 0.6   | NA4907RS            | 29.1                 | 44.4      | 10000                 | 6700           | 0.0454              | 0.198          |
|                | 1.3780            | 2.1654 | 0.827 | 0.787 | 1.6535         | 0.024 |                     | 6540                 | 9980      |                       |                |                     |                |
| 35             | 35                | 55     | 21    | 20    | 42             | 0.6   | NA4907.2RS          | 29.1                 | 44.4      | 10000                 | 6700           | 0.0454              | 0.198          |
|                | 1.3780            | 2.1654 | 0.827 | 0.787 | 1.6535         | 0.024 |                     | 6540                 | 9980      |                       |                |                     |                |
| 40             | 40                | 62     | 23    | 22    | 48             | 0.6   | NA4908RS            | 38.6                 | 57.0      | 9100                  | 5900           | 0.0497              | 0.263          |
|                | 1.5748            | 2.4409 | 0.906 | 0.866 | 1.8898         | 0.024 |                     | 8680                 | 12800     |                       |                |                     |                |
| 40             | 40                | 62     | 23    | 22    | 48             | 0.6   | NA4908.2RS          | 38.6                 | 57.0      | 9100                  | 5900           | 0.0497              | 0.263          |
|                | 1.5748            | 2.4409 | 0.906 | 0.866 | 1.8898         | 0.024 |                     | 8680                 | 12800     |                       |                |                     |                |
| 45             | 45                | 68     | 23    | 22    | 52             | 0.6   | NA4909.2RS          | 39.4                 | 60.0      | 8400                  | 5400           | 0.0521              | 0.303          |
|                | 1.7717            | 2.6772 | 0.906 | 0.866 | 2.0472         | 0.024 |                     | 8860                 | 13500     |                       |                |                     |                |
| 50             | 50                | 72     | 23    | 22    | 58             | 0.6   | NA4910RS            | 41.2                 | 65.8      | 7400                  | 4800           | 0.0559              | 0.309          |
|                | 1.9685            | 2.8346 | 0.906 | 0.866 | 2.2835         | 0.024 |                     | 9260                 | 14800     |                       |                |                     |                |
| 50             | 50                | 72     | 23    | 22    | 58             | 0.6   | NA4910.2RS          | 41.2                 | 65.8      | 7400                  | 4800           | 0.0559              | 0.309          |
|                | 1.9685            | 2.8346 | 0.906 | 0.866 | 2.2835         | 0.024 |                     | 9260                 | 14800     |                       |                |                     |                |

**SEALED NEEDLE ROLLER BEARINGS  
WITHOUT INNER RINGS**

**METRIC SERIES**



RNA49RS

RNA49.2RS

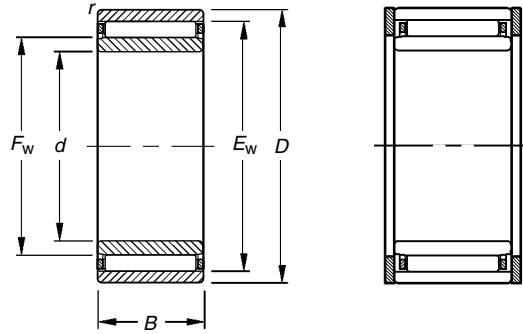
| Shaft Diameter | Dimensions mm/in. |        |       |              | Bearing Designation | Load Ratings kN/lbf. |              | Limiting Speeds | Approx. Wt. kg/lbs. |       |
|----------------|-------------------|--------|-------|--------------|---------------------|----------------------|--------------|-----------------|---------------------|-------|
|                | $F_w$             | D      | C     | $r_{s\ min}$ |                     | Dynamic C            | Static $C_0$ | Grease RPM      |                     |       |
| 14             | 14                | 22     | 13    | 0.3          | RNA4900RS           | 7.76                 | 8.06         | 14000           | 0.0199              | 0.019 |
|                | 0.5512            | 0.8661 | 0.512 | 0.012        |                     | 1740                 | 1810         |                 |                     |       |
|                | 14                | 22     | 13    | 0.3          | RNA4900.2RS         | 7.76                 | 8.06         | 14000           | 0.0199              | 0.019 |
|                | 0.5512            | 0.8661 | 0.512 | 0.012        |                     | 1740                 | 1810         |                 |                     |       |
| 16             | 16                | 24     | 13    | 0.3          | RNA4901RS           | 8.64                 | 9.59         | 12000           | 0.0219              | 0.021 |
|                | 0.6299            | 0.9449 | 0.512 | 0.012        |                     | 1940                 | 2160         |                 |                     |       |
|                | 16                | 24     | 13    | 0.3          | RNA4901.2RS         | 8.64                 | 9.59         | 12000           | 0.0219              | 0.021 |
|                | 0.6299            | 0.0449 | 0.512 | 0.012        |                     | 1940                 | 2160         |                 |                     |       |
| 20             | 20                | 28     | 13    | 0.3          | RNA4902RS           | 9.70                 | 12.0         | 9700            | 0.0254              | 0.026 |
|                | 0.7874            | 1.1024 | 0.512 | 0.012        |                     | 2180                 | 2700         |                 |                     |       |
|                | 20                | 28     | 13    | 0.3          | RNA4902.2RS         | 9.70                 | 12.0         | 9700            | 0.0254              | 0.026 |
|                | 0.7874            | 1.1024 | 0.512 | 0.012        |                     | 2180                 | 2700         |                 |                     |       |
| 22             | 22                | 30     | 13    | 0.3          | RNA4903RS           | 10.1                 | 12.8         | 8800            | 0.0269              | 0.027 |
|                | 0.8661            | 1.1811 | 0.512 | 0.012        |                     | 2270                 | 2880         |                 |                     |       |
|                | 22                | 30     | 13    | 0.3          | RNA4903.2RS         | 10.1                 | 12.8         | 8800            | 0.0269              | 0.027 |
|                | 0.8661            | 1.1811 | 0.512 | 0.012        |                     | 2270                 | 2880         |                 |                     |       |
| 25             | 25                | 37     | 17    | 0.3          | RNA4904RS           | 18.5                 | 21.2         | 7800            | 0.0318              | 0.062 |
|                | 0.9843            | 1.4567 | 0.669 | 0.012        |                     | 4160                 | 4770         |                 |                     |       |
|                | 25                | 37     | 17    | 0.3          | RNA4904.2RS         | 18.5                 | 21.2         | 7800            | 0.0318              | 0.062 |
|                | 0.9843            | 1.4567 | 0.669 | 0.012        |                     | 4160                 | 4770         |                 |                     |       |
| 30             | 30                | 42     | 17    | 0.3          | RNA4905RS           | 21.0                 | 26.4         | 6500            | 0.0362              | 0.075 |
|                | 1.1811            | 1.6535 | 0.669 | 0.012        |                     | 4720                 | 5930         |                 |                     |       |
|                | 30                | 42     | 17    | 0.3          | RNA4905.2RS         | 21.0                 | 26.4         | 6500            | 0.0362              | 0.075 |
|                | 1.1811            | 1.6535 | 0.669 | 0.012        |                     | 4720                 | 5930         |                 |                     |       |
| 35             | 35                | 47     | 18    | 0.3          | RNA4906RS           | 22.5                 | 30.0         | 5500            | 0.0399              | 0.083 |
|                | 1.3780            | 1.864  | 0.709 | 0.012        |                     | 5060                 | 6740         |                 |                     |       |
|                | 35                | 47     | 18    | 0.3          | RNA4906.2RS         | 22.5                 | 30.0         | 5500            | 0.0399              | 0.083 |
|                | 1.3780            | 1.8504 | 0.709 | 0.012        |                     | 5060                 | 6740         |                 |                     |       |
| 42             | 42                | 55     | 20    | 0.6          | RNA4907RS           | 29.1                 | 44.4         | 4600            | 0.0454              | 0.130 |
|                | 1.6535            | 2.1654 | 0.787 | 0.024        |                     | 6540                 | 9980         |                 |                     |       |
|                | 42                | 55     | 20    | 0.6          | RNA4907.2RS         | 29.1                 | 44.4         | 4600            | 0.0454              | 0.130 |
|                | 1.6535            | 2.1654 | 0.787 | 0.024        |                     | 6540                 | 9980         |                 |                     |       |
| 48             | 48                | 62     | 22    | 0.6          | RNA4908RS           | 38.6                 | 57.0         | 4000            | 0.0519              | 0.163 |
|                | 1.8898            | 2.4409 | 0.866 | 0.024        |                     | 8680                 | 12800        |                 |                     |       |
|                | 48                | 62     | 22    | 0.6          | RNA4908.2RS         | 38.6                 | 57.0         | 4000            | 0.0519              | 0.163 |
|                | 1.8898            | 2.4409 | 0.866 | 0.024        |                     | 8680                 | 12800        |                 |                     |       |
| 52             | 52                | 68     | 22    | 0.6          | RNA4909RS           | 39.4                 | 60.0         | 3700            | 0.0550              | 0.207 |
|                | 2.0472            | 2.6772 | 0.866 | 0.024        |                     | 8860                 | 13500        |                 |                     |       |
|                | 52                | 68     | 22    | 0.6          | RNA4909.2RS         | 39.4                 | 60.0         | 3700            | 0.0550              | 0.207 |
|                | 2.0472            | 2.6772 | 0.866 | 0.024        |                     | 8860                 | 13500        |                 |                     |       |
| 58             | 58                | 72     | 22    | 0.6          | RNA4910RS           | 41.2                 | 65.8         | 3300            | 0.0591              | 0.187 |
|                | 2.2835            | 2.8346 | 0.866 | 0.024        |                     | 9260                 | 14800        |                 |                     |       |
|                | 58                | 72     | 22    | 0.6          | RNA4910.2RS         | 41.2                 | 65.8         | 3300            | 0.0591              | 0.187 |
|                | 2.2835            | 2.8346 | 0.866 | 0.024        |                     | 9260                 | 14800        |                 |                     |       |





# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITHOUT FLANGES WITH INNER RINGS METRIC SERIES



NAO

SNSH

| Shaft Dia.<br>mm | Dimensions mm/in. |        |       |                |                |                    |                | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                       | Limiting Speeds RPM |        | Approx. Wt. kg/lbs. |                |
|------------------|-------------------|--------|-------|----------------|----------------|--------------------|----------------|---------------------|------------------------|----------------------|-----------------------|---------------------|--------|---------------------|----------------|
|                  | d                 | D      | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s min</sub> | s <sup>1</sup> |                     |                        | Dynamic C            | Static C <sub>0</sub> | Oil                 | Grease |                     | C <sub>g</sub> |
| 6                | 6                 | 17     | 10    | 10             | 13             | 0.3                | 0.5            | NAO6X17X10          | SNSH10,5X17X0,5        | 5.40                 | 6.43                  | 39000               | 25000  | 0.0174              | 0.014          |
|                  | 0.2362            | 0.6693 | 0.394 | 0.3937         | 0.5118         | 0.012              | 0.020          |                     |                        | 1210                 | 1450                  |                     |        |                     |                |
|                  | 8                 | 19     | 10    | 12             | 15             | 0.3                | 0.5            | NAO8X19X10          | SNSH12,5X19X0,5        | 5.85                 | 7.51                  | 37000               | 24000  | 0.0195              | 0.017          |
|                  | 0.3150            | 0.7480 | 0.394 | 0.4724         | 0.5906         | 0.012              | 0.020          |                     |                        | 1320                 | 1690                  |                     |        |                     |                |
| 10               | 10                | 22     | 13    | 14             | 18             | 0.3                | 1.0            | NAO10X22X13         | SNSH14,5X22X0,5        | 9.73                 | 12.5                  | 29000               | 19000  | 0.0227              | 0.026          |
|                  | 0.3937            | 0.8661 | 0.512 | 0.5512         | 0.7087         | 0.012              | 0.039          |                     |                        | 2190                 | 2810                  |                     |        |                     |                |
|                  | 10                | 22     | 20    | 14             | 18             | 0.3                | 0.5            | NAO10X22X20         | SNSH14,5X22X0,5        | 12.3                 | 16.8                  | 29000               | 19000  | 0.0291              | 0.041          |
|                  | 0.3937            | 0.8661 | 0.787 | 0.5512         | 0.7087         | 0.012              | 0.020          |                     |                        | 2770                 | 3780                  |                     |        |                     |                |
|                  | 10                | 26     | 12    | 14             | 20             | 0.3                | 0.7            | NAO10X26X12         | SNSH14,5X26X0,5        | 10.5                 | 10.6                  | 21000               | 14000  | 0.0209              | 0.036          |
|                  | 0.3937            | 1.0236 | 0.472 | 0.5512         | 0.7874         | 0.012              | 0.028          |                     |                        | 2360                 | 2380                  |                     |        |                     |                |
| 12               | 12                | 24     | 13    | 16             | 20             | 0.3                | 1.0            | NAO12X24X13         | SNSH16,5X24X0,5        | 10.1                 | 13.5                  | 28000               | 18000  | 0.0245              | 0.030          |
|                  | 0.4724            | 0.9449 | 0.512 | 0.6299         | 0.7874         | 0.012              | 0.039          |                     |                        | 2270                 | 3030                  |                     |        |                     |                |
|                  | 12                | 24     | 20    | 16             | 20             | 0.3                | 0.5            | NAO12X24X20         | SNSH16,5X24X0,5        | 13.4                 | 19.5                  | 28000               | 18000  | 0.0319              | 0.046          |
|                  | 0.4724            | 0.9449 | 0.787 | 0.6299         | 0.7874         | 0.012              | 0.020          |                     |                        | 3010                 | 4380                  |                     |        |                     |                |
|                  | 12                | 28     | 12    | 16             | 22             | 0.3                | 0.7            | NAO12X28X12         | SNSH16,5X28X0,5        | 11.2                 | 11.9                  | 29000               | 19000  | 0.0227              | 0.041          |
|                  | 0.4724            | 1.1024 | 0.472 | 0.6299         | 0.8661         | 0.012              | 0.028          |                     |                        | 2520                 | 2680                  |                     |        |                     |                |
| 15               | 15                | 28     | 13    | 20             | 24             | 0.3                | 1.0            | NAO15X28X13         | SNSH20,5X28X0,5        | 11.5                 | 17.3                  | 22000               | 14000  | 0.0287              | 0.039          |
|                  | 0.5906            | 1.1024 | 0.512 | 0.7874         | 0.9449         | 0.012              | 0.039          |                     |                        | 2590                 | 3890                  |                     |        |                     |                |
|                  | 15                | 28     | 26    | 20             | 24             | 0.3                | 1.0            | NAO15X28X26         | SNSH20,5X28X0,5        | 19.8                 | 34.6                  | 22000               | 14000  | 0.0405              | 0.078          |
|                  | 0.5906            | 1.1024 | 1.024 | 0.7874         | 0.9449         | 0.012              | 0.039          |                     |                        | 4450                 | 7780                  |                     |        |                     |                |
|                  | 15                | 32     | 12    | 20             | 26             | 0.3                | 0.7            | NAO15X32X12         | SNSH20,5X32X0,5        | 13.0                 | 15.0                  | 23000               | 15000  | 0.0264              | 0.050          |
|                  | 0.5906            | 1.2598 | 0.472 | 0.7874         | 1.0236         | 0.012              | 0.028          |                     |                        | 2920                 | 3370                  |                     |        |                     |                |
| 17               | 17                | 30     | 13    | 22             | 26             | 0.3                | 1.0            | NAO17X30X13         | SNSH22,5X30X0,5        | 11.8                 | 18.3                  | 20000               | 13000  | 0.0303              | 0.043          |
|                  | 0.6693            | 1.1811 | 0.512 | 0.8661         | 1.0236         | 0.012              | 0.039          |                     |                        | 2650                 | 4110                  |                     |        |                     |                |
|                  | 17                | 30     | 26    | 22             | 26             | 0.3                | 1.0            | NAO17X30X26         | SNSH22,5X30X0,5        | 20.2                 | 36.6                  | 20000               | 13000  | 0.0428              | 0.084          |
|                  | 0.6693            | 1.1811 | 1.024 | 0.8661         | 1.0236         | 0.012              | 0.039          |                     |                        | 4540                 | 8230                  |                     |        |                     |                |
|                  | 17                | 35     | 16    | 22             | 29             | 0.3                | 1.5            | NAO17X35X16         | SNSH22,5X35X0,5        | 19.0                 | 23.3                  | 20000               | 13000  | 0.0299              | 0.078          |
|                  | 0.6693            | 1.3780 | 0.630 | 0.8661         | 1.1417         | 0.012              | 0.059          |                     |                        | 4270                 | 5240                  |                     |        |                     |                |
|                  | 17                | 35     | 32    | 22             | 29             | 0.3                | 1.5            | NAO17X35X32         | SNSH22,5X35X0,5        | 32.7                 | 46.5                  | 20000               | 13000  | 0.0423              | 0.154          |
|                  | 0.6693            | 1.3780 | 1.260 | 0.8661         | 1.1417         | 0.012              | 0.059          |                     |                        | 7350                 | 10500                 |                     |        |                     |                |
| 20               | 20                | 35     | 17    | 25             | 30             | 0.3                | 1.2            | NAO20X35X17         | SNSH25,5X35X0,5        | 18.8                 | 29.8                  | 17000               | 11000  | 0.0351              | 0.073          |
|                  | 0.7874            | 1.3780 | 0.669 | 0.9843         | 1.1811         | 0.012              | 0.047          |                     |                        | 4230                 | 6700                  |                     |        |                     |                |
|                  | 20                | 35     | 26    | 25             | 30             | 0.3                | 1.2            | NAO20X35X26         | SNSH25,5X35X0,5        | 25.0                 | 42.8                  | 17000               | 11000  | 0.0456              | 0.112          |
|                  | 0.7874            | 1.3780 | 1.024 | 0.9843         | 1.1811         | 0.012              | 0.047          |                     |                        | 5620                 | 9620                  |                     |        |                     |                |
|                  | 20                | 37     | 16    | 25             | 32             | 0.3                | 1.5            | NAO20X37X16         | SNSH25,5X37X0,5        | 19.8                 | 25.3                  | 17000               | 11000  | 0.0323              | 0.080          |
|                  | 0.7874            | 1.4567 | 0.630 | 0.9843         | 1.2598         | 0.012              | 0.059          |                     |                        | 4450                 | 5690                  |                     |        |                     |                |
|                  | 20                | 37     | 32    | 25             | 32             | 0.3                | 1.5            | NAO20X37X32         | SNSH25,5X37X0,5        | 34.0                 | 50.7                  | 17000               | 11000  | 0.0455              | 0.162          |
|                  | 0.7874            | 1.4567 | 1.260 | 0.9843         | 1.2598         | 0.012              | 0.059          |                     |                        | 7640                 | 11400                 |                     |        |                     |                |
| 25               | 25                | 40     | 17    | 30             | 35             | 0.3                | 1.2            | NAO25X40X17         | SNSH30,5X40X0,5        | 20.2                 | 34.9                  | 14000               | 9300   | 0.0394              | 0.088          |
|                  | 0.9843            | 1.5748 | 0.669 | 1.1811         | 1.3780         | 0.012              | 0.047          |                     |                        | 4540                 | 7850                  |                     |        |                     |                |
|                  | 25                | 40     | 26    | 30             | 35             | 0.3                | 1.2            | NAO25X40X26         | SNSH30,5X40X0,5        | 26.8                 | 49.7                  | 14000               | 9300   | 0.0512              | 0.132          |
|                  | 0.9843            | 1.5748 | 1.024 | 1.1811         | 1.3780         | 0.012              | 0.047          |                     |                        | 6020                 | 11200                 |                     |        |                     |                |
|                  | 25                | 42     | 16    | 30             | 37             | 0.3                | 1.5            | NAO25X42X16         |                        | 22.4                 | 31.0                  | 15000               | 9600   | 0.0366              | 0.096          |
|                  | 0.9843            | 1.6535 | 0.630 | 1.1811         | 1.4567         | 0.012              | 0.059          |                     |                        | 5040                 | 6970                  |                     |        |                     |                |

(1) Max. axial displacement

Continued on next page.

## Heavy-Duty Needle Roller Bearings

| Shaft Dia. | Dimensions mm/in. |        |       |        |                |                |                    |                | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                       | Limiting Speeds |            | C <sub>9</sub> | Approx. Wt. kg/lbs. |
|------------|-------------------|--------|-------|--------|----------------|----------------|--------------------|----------------|---------------------|------------------------|----------------------|-----------------------|-----------------|------------|----------------|---------------------|
|            | mm                | d      | D     | B      | F <sub>w</sub> | E <sub>w</sub> | r <sub>s min</sub> | s <sup>1</sup> |                     |                        | Dynamic C            | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                |                     |
| 30         | 25                | 42     | 32    | 30     | 37             | 0.3            | 1.5                |                | NAO25X42X32         |                        | 38.2<br>8590         | 62.1<br>14000         | 15000           | 9600       | 0.0517         | 0.185<br>0.408      |
|            | 0.9843            | 1.6535 | 1.260 | 1.1811 | 1.4567         | 0.012          | 0.059              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 30                | 45     | 17    | 35     | 40             | 0.3            | 1.2                |                | NAO30X45X17         |                        | 22.1<br>4970         | 40.8<br>9170          | 12000           | 7900       | 0.0440         | 0.102<br>0.225      |
| 30         | 30                | 45     | 26    | 35     | 40             | 0.3            | 1.2                |                | NAO30X45X26         |                        | 27.7<br>6230         | 54.5<br>12300         | 12000           | 7900       | 0.0561         | 0.155<br>0.342      |
|            | 1.1811            | 1.7717 | 1.024 | 1.3780 | 1.5748         | 0.012          | 0.047              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 30                | 47     | 16    | 35     | 42             | 0.3            | 1.5                |                | NAO30X47X16         | SNSH35,5X47X0,5        | 24.5<br>5510         | 36.8<br>8270          | 12000           | 8100       | 0.0408         | 0.106<br>0.234      |
| 30         | 30                | 47     | 32    | 35     | 42             | 0.3            | 1.5                |                | NAO30X47X32         | SNSH35,5X47X0,5        | 42.0<br>9440         | 73.5<br>16500         | 12000           | 8100       | 0.0576         | 0.218<br>0.481      |
|            | 1.1811            | 1.8504 | 1.260 | 1.3780 | 1.6535         | 0.012          | 0.059              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 35                | 50     | 17    | 35     | 40             | 0.3            | 1.2                |                | NAO35X50X17         |                        | 23.8<br>5350         | 47.0<br>10600         | 11000           | 6900       | 0.0484         | 0.126<br>0.278      |
| 35         | 35                | 50     | 34    | 35     | 40             | 0.3            | 0.7                |                | NAO35X50X34         | SNSH40,5X50X0,5        | 40.9<br>9190         | 94.1<br>21200         | 11000           | 6900       | 0.0682         | 0.232<br>0.511      |
|            | 1.3780            | 1.9685 | 1.339 | 1.3780 | 1.5748         | 0.012          | 0.028              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 35                | 55     | 20    | 35     | 43             | 0.3            | 1.5                |                | NAO35X55X20         | SNSH41X55X1            | 35.5<br>7980         | 56.3<br>12700         | 11000           | 7100       | 0.0472         | 0.185<br>0.408      |
| 35         | 35                | 55     | 40    | 35     | 43             | 0.3            | 1.7                |                | NAO35X55X40         |                        | 60.8<br>13700        | 113<br>25400          | 11000           | 7100       | 0.0666         | 0.370<br>0.816      |
|            | 1.3780            | 2.1654 | 1.575 | 1.3780 | 1.6929         | 0.012          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 40                | 55     | 17    | 45     | 50             | 0.3            | 0.7                |                | NAO40X55X17         | SNSH45,5X55X0,5        | 24.9<br>5600         | 51.8<br>11600         | 9400            | 6100       | 0.0523         | 0.133<br>0.293      |
| 40         | 40                | 55     | 34    | 45     | 50             | 0.3            | 0.7                |                | NAO40X55X34         | SNSH45,5X55X0,5        | 42.7<br>9600         | 104<br>23400          | 9400            | 6100       | 0.0737         | 0.257<br>0.567      |
|            | 1.5748            | 2.1654 | 1.339 | 1.7717 | 1.9685         | 0.012          | 0.028              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 40                | 62     | 20    | 45     | 53             | 0.3            | 1.5                |                | NAO40X62X20         | SNSH46X62X1            | 36.0<br>8090         | 59.5<br>13400         | 9600            | 6200       | 0.0504         | 0.215<br>0.474      |
| 40         | 40                | 62     | 40    | 45     | 53             | 0.3            | 1.7                |                | NAO40X62X40         | SNSH46X62X1            | 61.7<br>13900        | 119<br>26800          | 9600            | 6200       | 0.0711         | 0.440<br>0.970      |
|            | 1.5748            | 2.4409 | 1.575 | 1.7717 | 2.0866         | 0.012          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 45                | 62     | 20    | 50     | 55             | 0.3            | 0.7                |                | NAO45X62X20         |                        | 30.2<br>6790         | 68.5<br>15400         | 8400            | 5400       | 0.0588         | 0.200<br>0.441      |
| 45         | 45                | 62     | 40    | 50     | 55             | 0.3            | 0.5                |                | NAO45X62X40         |                        | 50.7<br>11400        | 137<br>30800          | 8400            | 5400       | 0.0829         | 0.386<br>0.851      |
|            | 1.7717            | 2.4409 | 1.575 | 1.9685 | 2.1654         | 0.012          | 0.020              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 45                | 72     | 20    | 55     | 63             | 1.0            | 1.5                |                | NAO45X72X20         | SNSH56X72X1            | 40.3<br>9060         | 73.5<br>16500         | 7800            | 5000       | 0.0580         | 0.345<br>0.761      |
| 45         | 45                | 72     | 40    | 55     | 63             | 1.0            | 1.7                |                | NAO45X72X40         | SNSH56X72X1            | 69.1<br>15500        | 147<br>33000          | 7800            | 5000       | 0.0818         | 0.680<br>1.499      |
|            | 1.7717            | 2.8346 | 1.575 | 2.1654 | 2.4803         | 0.039          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 50                | 68     | 20    | 55     | 60             | 0.3            | 0.7                |                | NAO50X68X20         |                        | 30.7<br>6900         | 72.4<br>16300         | 7600            | 4900       | 0.0622         | 0.230<br>0.507      |
| 50         | 50                | 68     | 40    | 55     | 60             | 0.3            | 0.5                |                | NAO50X68X40         |                        | 52.7<br>11800        | 145<br>32600          | 7600            | 4900       | 0.0878         | 0.450<br>0.992      |
|            | 1.9685            | 2.6772 | 1.575 | 2.1654 | 2.3622         | 0.012          | 0.020              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 50                | 78     | 20    | 60     | 68             | 1.0            | 1.5                |                | NAO50X78X20         | SNSH61X78X1            | 41.8<br>9400         | 79.2<br>17800         | 7100            | 4600       | 0.0614         | 0.385<br>0.849      |
| 50         | 50                | 78     | 40    | 60     | 68             | 1.0            | 1.7                |                | NAO50X78X40         | SNSH61X78X1            | 71.7<br>16100        | 158<br>35500          | 7100            | 4600       | 0.0867         | 0.746<br>1.645      |
|            | 1.9685            | 3.0709 | 1.575 | 2.3622 | 2.6772         | 0.039          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 55                | 85     | 30    | 65     | 73             | 1.0            | 2.0                |                | NAO55X85X30         | SNSH66X85X1            | 60.1<br>13500        | 129<br>29000          | 6500            | 4200       | 0.0719         | 0.690<br>1.521      |
| 55         | 55                | 85     | 60    | 65     | 73             | 1.0            | 1.5                |                | NAO55X85X60         | SNSH66X85X1            | 103<br>23200         | 259<br>58200          | 6500            | 4200       | 0.1015         | 1.320<br>2.910      |
|            | 2.1654            | 3.3465 | 2.362 | 2.5591 | 2.8740         | 0.039          | 0.059              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 60                | 90     | 30    | 70     | 78             | 1.0            | 2.0                |                | NAO60X90X30         |                        | 62.2<br>14000        | 139<br>31200          | 6000            | 3900       | 0.0757         | 0.745<br>1.642      |
| 60         | 60                | 90     | 60    | 70     | 78             | 1.0            | 1.7                |                | NAO60X90X60         |                        | 107<br>24100         | 277<br>62300          | 6000            | 3900       | 0.1068         | 1.405<br>3.097      |
|            | 2.3622            | 3.5433 | 2.362 | 2.7559 | 3.0709         | 0.039          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 65                | 95     | 30    | 75     | 83             | 1.0            | 2.0                |                | NAO65X95X30         |                        | 60.9<br>13700        | 138<br>31000          | 5600            | 3600       | 0.0780         | 0.770<br>1.698      |
| 65         | 65                | 95     | 60    | 75     | 83             | 1.0            | 1.7                |                | NAO65X95X60         |                        | 116<br>26100         | 277<br>62300          | 5600            | 3600       | 0.1101         | 1.500<br>3.307      |
|            | 2.5591            | 3.7402 | 2.362 | 2.9528 | 3.2677         | 0.039          | 0.079              |                |                     |                        |                      |                       |                 |            |                |                     |
|            | 70                | 100    | 30    | 80     | 88             | 1.0            | 2.0                |                | NAO70X100X30        |                        | 67.5<br>15200        | 161<br>36200          | 5200            | 3400       | 0.0835         | 0.850<br>1.874      |
| 70         | 70                | 100    | 60    | 80     | 88             | 1.0            | 1.7                |                | NAO70X100X60        |                        | 116<br>26100         | 322<br>72400          | 5200            | 3400       | 0.1178         | 1.600<br>3.527      |
|            | 2.7559            | 3.9370 | 2.362 | 3.1496 | 3.4646         | 0.039          | 0.067              |                |                     |                        |                      |                       |                 |            |                |                     |

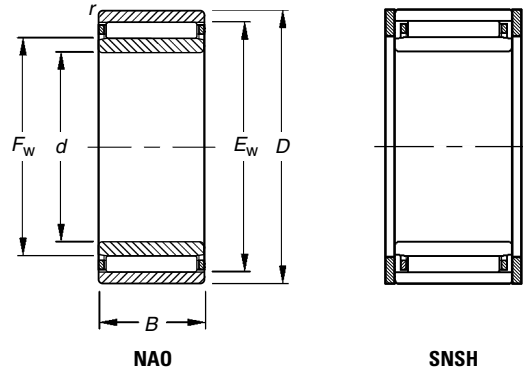
(1) Max. axial displacement

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# NEEDLE ROLLER BEARINGS

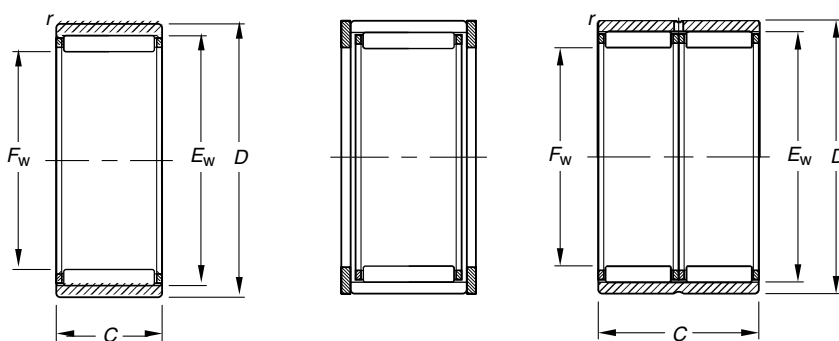
## NEEDLE ROLLER BEARINGS WITHOUT FLANGES WITH INNER RINGS — *continued* METRIC SERIES



| Shaft Dia. | Dimensions mm/in. |               |             |                |                |                    |                | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                       | Limiting Speeds |            | Approx. Wt. kg/lbs. |                |
|------------|-------------------|---------------|-------------|----------------|----------------|--------------------|----------------|---------------------|------------------------|----------------------|-----------------------|-----------------|------------|---------------------|----------------|
|            | d                 | D             | B           | F <sub>w</sub> | E <sub>w</sub> | r <sub>s min</sub> | s <sup>1</sup> |                     |                        | Dynamic C            | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                     | C <sub>g</sub> |
| 80         | 80<br>3.1496      | 110<br>4.3307 | 30<br>1.181 | 90<br>3.5433   | 98<br>3.8583   | 1.0<br>0.039       | 2.0<br>0.079   | NA080X110X30        |                        | 63.6<br>14300        | 155<br>34800          | 4600            | 3000       | 0.0873              | 0.920<br>2.028 |
| 85         | 85<br>3.3465      | 115<br>4.5276 | 30<br>1.181 | 95<br>3.7402   | 103<br>4.0551  | 1.0<br>0.039       | 2.0<br>0.079   | NA085X115X30        |                        | 71.0<br>16000        | 183<br>41100          | 4400            | 2800       | 0.0932              | 0.985<br>2.172 |
| 90         | 90<br>3.5433      | 120<br>4.7244 | 30<br>1.181 | 100<br>3.9370  | 108<br>4.2520  | 1.0<br>0.039       | 2.0<br>0.079   | NA090X120X30        |                        | 72.4<br>16300        | 191<br>42900          | 4200            | 2700       | 0.0965              | 1.010<br>2.22  |

<sup>(1)</sup> Max. axial displacement

**NEEDLE ROLLER BEARINGS  
WITHOUT FLANGES  
WITHOUT INNER RINGS  
METRIC SERIES**



RNAO

SNSH

RNAO

| Shaft Dia. | Dimensions mm/in. |              |             |                |                    | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                | Limiting Speeds |                | Approx. Wt. kg/lbs. |
|------------|-------------------|--------------|-------------|----------------|--------------------|---------------------|------------------------|----------------------|----------------|-----------------|----------------|---------------------|
|            | F <sub>w</sub>    | D            | C           | E <sub>w</sub> | r <sub>s</sub> min |                     |                        | Dynamic              | Static         | Oil             | Grease         |                     |
| mm         | F <sub>w</sub>    | D            | C           | E <sub>w</sub> | r <sub>s</sub> min |                     |                        | C                    | C <sub>0</sub> | RPM             | C <sub>g</sub> |                     |
| 6          | 6<br>0.2362       | 13<br>0.5118 | 8<br>0.315  | 9<br>0.3543    | 0.3<br>0.012       | RNA06X13X8TN        |                        | 2.47<br>560          | 2.07<br>470    | 44000 29000     | 0.0107         | 0.005<br>0.011      |
| 7          | 7<br>0.2756       | 14<br>0.5512 | 8<br>0.315  | 10<br>0.3937   | 0.3<br>0.012       | RNA07X14X8TN        |                        | 2.74<br>620          | 2.44<br>550    | 42000 28000     | 0.0118         | 0.007<br>0.015      |
| 8          | 8<br>0.3150       | 15<br>0.5906 | 10<br>0.394 | 11<br>0.4331   | 0.3<br>0.012       | RNA08X15X10         | SNSH8,5X15X0,5         | 4.57<br>1030         | 4.89<br>1100   | 41000 26000     | 0.0148         | 0.008<br>0.018      |
| 9          | 9<br>0.3543       | 16<br>0.6299 | 10<br>0.394 | 12<br>0.4724   | 0.3<br>0.012       | RNA09X16X10         |                        | 4.27<br>960          | 4.60<br>1030   | 40000 26000     | 0.0153         | 0.009<br>0.020      |
| 10         | 10<br>0.3937      | 17<br>0.6693 | 10<br>0.394 | 13<br>0.5118   | 0.3<br>0.012       | RNA010X17X10        | SNSH10,5X17X0,5        | 5.40<br>1210         | 6.43<br>1450   | 39000 25000     | 0.0174         | 0.010<br>0.022      |
|            | 10<br>0.3937      | 17<br>0.6693 | 20<br>0.787 | 13<br>0.5118   | 0.3<br>0.012       | RNA010X17X20        | SNSH10,5X17X0,5        | 9.25<br>2080         | 12.9<br>2900   | 39000 25000     | 0.0245         | 0.019<br>0.042      |
| 12         | 12<br>0.4724      | 19<br>0.7480 | 10<br>0.394 | 15<br>0.5906   | 0.3<br>0.012       | RNA012X19X10        | SNSH12,5X19X0,5        | 5.85<br>1320         | 7.51<br>1690   | 37000 24000     | 0.0195         | 0.012<br>0.026      |
| 14         | 14<br>0.5512      | 22<br>0.8661 | 13<br>0.512 | 18<br>0.7087   | 0.3<br>0.012       | RNA014X22X13        | SNSH14,5X22X0,5        | 9.73<br>2190         | 12.5<br>2810   | 29000 19000     | 0.0227         | 0.018<br>0.040      |
|            | 14<br>0.5512      | 22<br>0.8661 | 20<br>0.787 | 18<br>0.7087   | 0.3<br>0.012       | RNA014X22X20        | SNSH14,5X22X0,5        | 12.3<br>2770         | 16.8<br>3780   | 29000 19000     | 0.0291         | 0.029<br>0.064      |
|            | 14<br>0.5512      | 26<br>1.0236 | 12<br>0.472 | 20<br>0.7874   | 0.3<br>0.012       | RNA014X26X12        | SNSH14,5X26X0,5        | 10.5<br>2360         | 10.6<br>2380   | 21000 14000     | 0.0209         | 0.029<br>0.064      |
| 15         | 15<br>0.5906      | 23<br>0.9055 | 13<br>0.512 | 19<br>0.7480   | 0.3<br>0.012       | RNA015X23X13        | SNSH15,5X23X0,5        | 9.66<br>2170         | 12.6<br>2830   | 28000 18000     | 0.0235         | 0.019<br>0.042      |
|            | 15<br>0.5906      | 23<br>0.9055 | 20<br>0.787 | 19<br>0.7480   | 0.3<br>0.012       | RNA015X23X20        | SNSH15,5X23X0,5        | 13.5<br>3030         | 19.4<br>4360   | 28000 18000     | 0.0310         | 0.029<br>0.064      |
| 16         | 16<br>0.6299      | 24<br>0.9449 | 13<br>0.512 | 20<br>0.7874   | 0.3<br>0.012       | RNA016X24X13        | SNSH16,5X24X0,5        | 10.1<br>2270         | 13.5<br>3030   | 28000 18000     | 0.0245         | 0.022<br>0.049      |
|            | 16<br>0.6299      | 24<br>0.9449 | 20<br>0.787 | 20<br>0.7874   | 0.3<br>0.012       | RNA016X24X20        | SNSH16,5X24X0,5        | 13.4<br>3010         | 19.5<br>4380   | 28000 18000     | 0.0319         | 0.032<br>0.071      |
|            | 16<br>0.6299      | 28<br>1.1024 | 12<br>0.472 | 22<br>0.8661   | 0.3<br>0.012       | RNA016X28X12        | SNSH16,5X28X0,5        | 11.2<br>2520         | 11.9<br>2680   | 29000 19000     | 0.0227         | 0.033<br>0.073      |
| 17         | 17<br>0.6693      | 25<br>0.9843 | 13<br>0.512 | 21<br>0.8268   | 0.3<br>0.012       | RNA017X25X13        | SNSH17,5X25X0,5        | 10.5<br>2360         | 14.5<br>3260   | 26000 17000     | 0.0256         | 0.022<br>0.049      |
|            | 17<br>0.6693      | 25<br>0.9843 | 20<br>0.787 | 21<br>0.8268   | 0.3<br>0.012       | RNA017X25X20        | SNSH17,5X25X0,5        | 14.7<br>3300         | 22.5<br>5060   | 26000 17000     | 0.0333         | 0.032<br>0.071      |
| 18         | 18<br>0.7087      | 26<br>1.0236 | 13<br>0.512 | 22<br>0.8661   | 0.3<br>0.012       | RNA018X26X13        | SNSH18,5X26X0,5        | 10.8<br>2430         | 15.4<br>3460   | 24000 16000     | 0.0266         | 0.024<br>0.053      |
|            | 18<br>0.7087      | 26<br>1.0236 | 13<br>0.512 | 22<br>0.8661   | 0.3<br>0.012       | RNA018X26X13ASR1    | SNSH18,5X26X0,5        | 10.8<br>2430         | 15.4<br>3460   | 24000 16000     | 0.0266         | 0.024<br>0.053      |
|            | 18<br>0.7087      | 26<br>1.0236 | 20<br>0.787 | 22<br>0.8661   | 0.3<br>0.012       | RNA018X26X20        | SNSH18,5X26X0,5        | 14.4<br>3240         | 22.2<br>4990   | 24000 16000     | 0.0347         | 0.034<br>0.075      |
|            | 18<br>0.7087      | 30<br>1.1811 | 24<br>0.945 | 24<br>0.9449   | 0.3<br>0.012       | RNA018X30X24        |                        | 20.2<br>4540         | 26.2<br>5890   | 25000 17000     | 0.0343         | 0.070<br>0.154      |
| 20         | 20<br>0.7874      | 28<br>1.1024 | 13<br>0.512 | 24<br>0.9449   | 0.3<br>0.012       | RNA020X28X13        | SNSH20,5X28X0,5        | 11.5<br>2590         | 17.3<br>3890   | 22000 14000     | 0.0287         | 0.025<br>0.055      |

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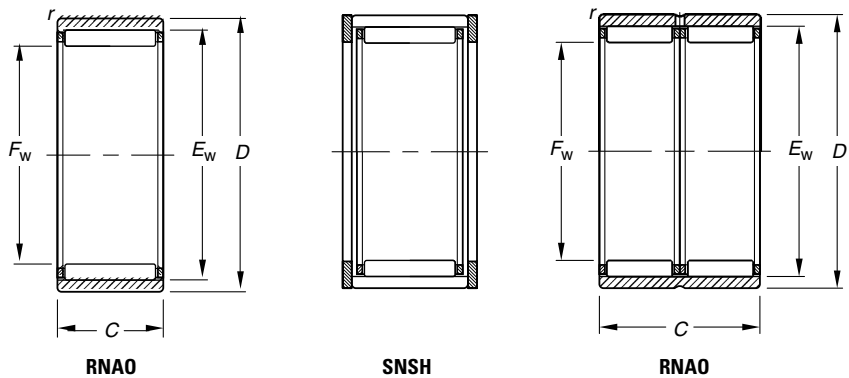


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS WITHOUT FLANGES WITHOUT INNER RINGS

### METRIC SERIES

continued



RNAO

SNSH

RNAO

| Shaft Dia. | Dimensions mm/in. |        |       |                |                    | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                | Limiting Speeds |                | Approx. Wt. kg/lbs. |       |
|------------|-------------------|--------|-------|----------------|--------------------|---------------------|------------------------|----------------------|----------------|-----------------|----------------|---------------------|-------|
|            | F <sub>w</sub>    | D      | C     | E <sub>w</sub> | r <sub>s min</sub> |                     |                        | Dynamic              | Static         | Oil             | Grease         |                     |       |
| mm         | F <sub>w</sub>    | D      | C     | E <sub>w</sub> | r <sub>s min</sub> |                     |                        | C                    | C <sub>0</sub> | RPM             | C <sub>g</sub> |                     |       |
|            | 20                | 28     | 26    | 24             | 0.3                | RNAO20X28X26        | SNSH20,5X28X0,5        | 19.8                 | 34.6           | 22000           | 14000          | 0.0405              | 0.050 |
|            | 0.7874            | 1.1024 | 1.024 | 0.9449         | 0.012              |                     |                        | 4450                 | 7780           |                 |                |                     | 0.110 |
|            | 20                | 32     | 12    | 26             | 0.3                | RNAO20X32X12        | SNSH20,5X32X0,5        | 13.0                 | 15.3           | 23000           | 15000          | 0.0264              | 0.038 |
|            | 0.7874            | 1.2598 | 0.472 | 1.0236         | 0.012              |                     |                        | 2920                 | 3440           |                 |                |                     | 0.084 |
|            | 20                | 32     | 24    | 26             | 0.3                | RNAO20X32X24        | SNSH20,5X32X0,5        | 22.3                 | 30.6           | 23000           | 15000          | 0.0373              | 0.080 |
|            | 0.7874            | 1.2598 | 0.945 | 1.0236         | 0.012              |                     |                        | 5010                 | 6880           |                 |                |                     | 0.176 |
|            | 22                | 30     | 13    | 26             | 0.3                | RNAO22X30X13        | SNSH22,5X30X0,5        | 11.8                 | 18.3           | 20000           | 13000          | 0.0303              | 0.028 |
|            | 0.8661            | 1.1811 | 0.512 | 1.0236         | 0.012              |                     |                        | 2650                 | 4110           |                 |                |                     | 0.062 |
|            | 22                | 30     | 26    | 26             | 0.3                | RNAO22X30X26        | SNSH22,5X30X0,5        | 20.2                 | 36.6           | 20000           | 13000          | 0.0428              | 0.053 |
|            | 0.8661            | 1.1811 | 1.024 | 1.0236         | 0.012              |                     |                        | 4540                 | 8230           |                 |                |                     | 0.117 |
|            | 22                | 35     | 16    | 29             | 0.3                | RNAO22X35X16        | SNSH22,5X35X0,5        | 19.1                 | 23.3           | 21000           | 13000          | 0.0299              | 0.059 |
|            | 0.8661            | 1.3780 | 0.630 | 1.1417         | 0.012              |                     |                        | 4290                 | 5240           |                 |                |                     | 0.130 |
|            | 22                | 35     | 32    | 29             | 0.3                | RNAO22X35X32        | SNSH22,5X35X0,5        | 32.7                 | 46.5           | 21000           | 13000          | 0.0423              | 0.116 |
|            | 0.8661            | 1.3780 | 1.260 | 1.1417         | 0.012              |                     |                        | 7350                 | 10500          |                 |                |                     | 0.256 |
|            | 25                | 35     | 17    | 30             | 0.3                | RNAO25X35X17        | SNSH25,5X35X0,5        | 18.8                 | 29.8           | 17000           | 11000          | 0.0351              | 0.050 |
|            | 0.9843            | 1.3780 | 0.669 | 1.1811         | 0.012              |                     |                        | 4230                 | 6700           |                 |                |                     | 0.110 |
|            | 25                | 35     | 26    | 30             | 0.3                | RNAO25X35X26        | SNSH25,5X35X0,5        | 25.0                 | 42.8           | 17000           | 11000          | 0.0456              | 0.076 |
|            | 0.9843            | 1.3780 | 1.024 | 1.1811         | 0.012              |                     |                        | 5620                 | 9620           |                 |                |                     | 0.168 |
|            | 25                | 37     | 16    | 32             | 0.3                | RNAO25X37X16        | SNSH25,5X37X0,5        | 19.8                 | 25.3           | 18000           | 12000          | 0.0323              | 0.058 |
|            | 0.9843            | 1.4567 | 0.630 | 1.2598         | 0.012              |                     |                        | 4450                 | 5690           |                 |                |                     | 0.128 |
|            | 25                | 37     | 32    | 32             | 0.3                | RNAO25X37X32        | SNSH25,5X37X0,5        | 19.2                 | 23.6           | 18000           | 12000          | 0.0455              | 0.118 |
|            | 0.9843            | 1.4567 | 1.260 | 1.2598         | 0.012              |                     |                        | 4320                 | 5310           |                 |                |                     | 0.260 |
|            | 28                | 40     | 16    | 35             | 0.3                | RNAO28X40X16        | SNSH28,5X40X0,5        | 20.9                 | 27.9           | 16000           | 10000          | 0.0347              | 0.063 |
|            | 1.1024            | 1.5748 | 0.630 | 1.3780         | 0.012              |                     |                        | 4700                 | 6270           |                 |                |                     | 0.139 |
|            | 28                | 40     | 32    | 35             | 0.3                | RNAO28X40X32        | SNSH28,5X40X0,5        | 35.8                 | 55.9           | 16000           | 10000          | 0.0489              | 0.128 |
|            | 1.1024            | 1.5748 | 1.260 | 1.3780         | 0.012              |                     |                        | 8050                 | 12600          |                 |                |                     | 0.282 |
|            | 30                | 40     | 17    | 35             | 0.3                | RNAO30X40X17        | SNSH30,5X40X0,5        | 20.2                 | 34.6           | 14000           | 9300           | 0.0394              | 0.060 |
|            | 1.1811            | 1.5748 | 0.669 | 1.3780         | 0.012              |                     |                        | 4540                 | 7780           |                 |                |                     | 0.132 |
|            | 30                | 40     | 26    | 35             | 0.3                | RNAO30X40X26        | SNSH30,5X40X0,5        | 26.8                 | 49.7           | 14000           | 9300           | 0.0512              | 0.088 |
|            | 1.1811            | 1.5748 | 1.024 | 1.3780         | 0.012              |                     |                        | 6020                 | 11200          |                 |                |                     | 0.194 |
|            | 30                | 42     | 16    | 37             | 0.3                | RNAO30X42X16        |                        | 22.3                 | 31.0           | 15000           | 9600           | 0.0366              | 0.069 |
|            | 1.1811            | 1.6535 | 0.630 | 1.4567         | 0.012              |                     |                        | 5010                 | 6970           |                 |                |                     | 0.152 |
|            | 30                | 42     | 32    | 37             | 0.3                | RNAO30X42X32        |                        | 38.2                 | 62.1           | 15000           | 9600           | 0.0517              | 0.131 |
|            | 1.1811            | 1.6535 | 1.260 | 1.4567         | 0.012              |                     |                        | 8590                 | 14000          |                 |                |                     | 0.289 |
|            | 35                | 45     | 17    | 40             | 0.3                | RNAO35X45X17        |                        | 22.1                 | 40.8           | 12000           | 7900           | 0.0440              | 0.069 |
|            | 1.3780            | 1.7717 | 0.669 | 1.5748         | 0.012              |                     |                        | 4970                 | 9170           |                 |                |                     | 0.152 |
|            | 35                | 45     | 26    | 40             | 0.3                | RNAO35X45X26        |                        | 27.7                 | 54.5           | 12000           | 7900           | 0.0561              | 0.091 |
|            | 1.3780            | 1.7717 | 1.024 | 1.5748         | 0.012              |                     |                        | 6230                 | 12300          |                 |                |                     | 0.201 |
|            | 35                | 47     | 16    | 41             | 0.3                | RNAO35X47X16        | SNSH35,5X47X0,5        | 24.5                 | 36.8           | 12000           | 8100           | 0.0404              | 0.075 |
|            | 1.3780            | 1.8504 | 0.630 | 1.6142         | 0.012              |                     |                        | 5510                 | 8270           |                 |                |                     | 0.165 |
|            | 35                | 47     | 32    | 42             | 0.3                | RNAO35X47X32        | SNSH35,5X47X0,5        | 42.0                 | 73.5           | 12000           | 8100           | 0.0576              | 0.156 |
|            | 1.3780            | 1.8504 | 1.260 | 1.6535         | 0.012              |                     |                        | 9440                 | 16500          |                 |                |                     | 0.344 |
|            | 40                | 50     | 17    | 45             | 0.3                | RNAO40X50X17        | SNSH40,5X50X0,5        | 23.8                 | 47.0           | 11000           | 6900           | 0.0484              | 0.086 |
|            | 1.5748            | 1.9685 | 0.669 | 1.7717         | 0.012              |                     |                        | 5350                 | 10600          |                 |                |                     | 0.190 |

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## Heavy-Duty Needle Roller Bearings

| Shaft Dia. | Dimensions mm/in. |        |       |                |                    | Bearing Designation | End Washer Designation | Load Ratings kN/lbf. |                | Limiting Speeds |        | C <sub>g</sub> | Approx. Wt. kg/lbs. |
|------------|-------------------|--------|-------|----------------|--------------------|---------------------|------------------------|----------------------|----------------|-----------------|--------|----------------|---------------------|
|            | F <sub>w</sub>    | D      | C     | E <sub>w</sub> | r <sub>s min</sub> |                     |                        | Dynamic              | Static         | Oil             | Grease |                |                     |
| mm         |                   |        |       |                |                    |                     |                        | C                    | C <sub>0</sub> |                 |        |                |                     |
|            | 40                | 50     | 34    | 45             | 0.3                | RNAO40X50X34        | SNSH40,5X50X0,5        | 40.9                 | 94.1           | 11000           | 6900   | 0.0575         | 0.152               |
|            | 1.5748            | 1.9685 | 1.339 | 1.7717         | 0.012              |                     |                        | 9190                 | 21200          |                 |        |                |                     |
|            | 40                | 55     | 20    | 48             | 0.3                | RNAO40X55X20        | SNSH41X55X1            | 35.5                 | 56.3           | 11000           | 7100   | 0.0472         | 0.139               |
|            | 1.5748            | 2.1654 | 0.787 | 1.8898         | 0.012              |                     |                        | 7980                 | 12700          |                 |        |                |                     |
|            | 40                | 55     | 40    | 48             | 0.3                | RNAO40X55X40        | SNSH41X55X1            | 60.8                 | 113            | 11000           | 7100   | 0.0666         | 0.276               |
|            | 1.5748            | 2.1654 | 1.575 | 1.8898         | 0.012              |                     |                        | 13700                | 25400          |                 |        |                |                     |
| 45         | 45                | 55     | 17    | 50             | 0.3                | RNAO45X55X17        | SNSH45,5X55X0,5        | 24.9                 | 51.8           | 9400            | 6100   | 0.0523         | 0.089               |
|            | 1.7717            | 2.1654 | 0.669 | 1.9685         | 0.012              |                     |                        | 5600                 | 11600          |                 |        |                |                     |
|            | 45                | 55     | 34    | 50             | 0.3                | RNAO45X55X34        | SNSH45,5X55X0,5        | 42.7                 | 104            | 9400            | 6100   | 0.0737         | 0.168               |
|            | 1.7717            | 2.1654 | 1.339 | 1.9685         | 0.012              |                     |                        | 9600                 | 23400          |                 |        |                |                     |
|            | 45                | 62     | 20    | 53             | 0.3                | RNAO45X62X20        | SNSH46X62X1            | 30.8                 | 68.1           | 9400            | 6100   | 0.0504         | 0.163               |
|            | 1.7717            | 2.4409 | 0.787 | 2.0866         | 0.012              |                     |                        | 6920                 | 15300          |                 |        |                |                     |
|            | 45                | 62     | 40    | 53             | 0.3                | RNAO45X62X40        | SNSH46X62X1            | 61.7                 | 119            | 9600            | 6200   | 0.0711         | 0.325               |
|            | 1.7717            | 2.4409 | 1.575 | 2.0866         | 0.012              |                     |                        | 13900                | 26800          |                 |        |                |                     |
| 50         | 50                | 62     | 20    | 55             | 0.3                | RNAO50X62X20        |                        | 30.2                 | 68.5           | 8400            | 5400   | 0.0588         | 0.142               |
|            | 1.9685            | 2.4409 | 0.787 | 2.1654         | 0.012              |                     |                        | 6790                 | 15400          |                 |        |                |                     |
|            | 50                | 62     | 40    | 55             | 0.3                | RNAO50X62X40        |                        | 51.7                 | 137            | 8400            | 5400   | 0.0829         | 0.269               |
|            | 1.9685            | 2.4409 | 1.575 | 2.1654         | 0.012              |                     |                        | 11600                | 30800          |                 |        |                |                     |
|            | 50                | 65     | 20    | 58             | 0.3                | RNAO50X65X20        | SNSH51X65X1            | 38.8                 | 67.8           | 8600            | 5600   | 0.0545         | 0.167               |
|            | 1.9685            | 2.5591 | 0.787 | 2.2835         | 0.012              |                     |                        | 8720                 | 15200          |                 |        |                |                     |
|            | 50                | 65     | 40    | 58             | 0.3                | RNAO50X65X40        |                        | 66.5                 | 136            | 8600            | 5600   | 0.0769         | 0.342               |
|            | 1.9685            | 2.5591 | 1.575 | 2.2835         | 0.012              |                     |                        | 14900                | 30600          |                 |        |                |                     |
| 55         | 55                | 68     | 20    | 60             | 0.3                | RNAO55X68X20        |                        | 30.7                 | 72.4           | 7600            | 4900   | 0.0622         | 0.165               |
|            | 2.1654            | 2.6772 | 0.787 | 2.3622         | 0.012              |                     |                        | 6900                 | 16300          |                 |        |                |                     |
|            | 55                | 68     | 40    | 60             | 0.3                | RNAO55X68X40        |                        | 52.7                 | 145            | 7600            | 4900   | 0.0878         | 0.320               |
|            | 2.1654            | 2.6772 | 1.575 | 2.3622         | 0.012              |                     |                        | 11800                | 32600          |                 |        |                |                     |
|            | 55                | 72     | 20    | 63             | 1.0                | RNAO55X72X20        | SNSH56X72X1            | 40.3                 | 73.5           | 7800            | 5000   | 0.0580         | 0.212               |
|            | 2.1654            | 2.8346 | 0.787 | 2.4803         | 0.039              |                     |                        | 9060                 | 16500          |                 |        |                |                     |
|            | 55                | 72     | 40    | 63             | 1.0                | RNAO55X72X40        | SNSH56X72X1            | 69.1                 | 127            | 7800            | 5000   | 0.0818         | 0.433               |
|            | 2.1654            | 2.8346 | 1.575 | 2.4803         | 0.039              |                     |                        | 15500                | 28600          |                 |        |                |                     |
| 60         | 60                | 78     | 20    | 68             | 1.0                | RNAO60X78X20        | SNSH61X78X1            | 41.8                 | 79.2           | 7100            | 4600   | 0.0614         | 0.230               |
|            | 2.3622            | 3.0709 | 0.787 | 2.6772         | 0.039              |                     |                        | 9400                 | 17800          |                 |        |                |                     |
|            | 60                | 78     | 40    | 68             | 1.0                | RNAO60X78X40        | SNSH61X78X1            | 71.7                 | 158            | 7100            | 4600   | 0.0867         | 0.436               |
|            | 2.3622            | 3.0709 | 1.575 | 2.6772         | 0.039              |                     |                        | 16100                | 35500          |                 |        |                |                     |
| 65         | 65                | 85     | 30    | 73             | 1.0                | RNAO65X85X30        | SNSH66X85X1            | 60.1                 | 129            | 6500            | 4200   | 0.0719         | 0.468               |
|            | 2.5591            | 3.3465 | 1.181 | 2.8740         | 0.039              |                     |                        | 13500                | 29000          |                 |        |                |                     |
|            | 65                | 85     | 60    | 73             | 1.0                | RNAO65X85X60        | SNSH66X85X1            | 103                  | 259            | 6500            | 4200   | 0.1015         | 0.876               |
|            | 2.5591            | 3.3465 | 2.362 | 2.8740         | 0.039              |                     |                        | 23200                | 58200          |                 |        |                |                     |
| 70         | 70                | 90     | 30    | 78             | 1.0                | RNAO70X90X30        |                        | 62.2                 | 139            | 6000            | 3900   | 0.0757         | 0.505               |
|            | 2.7559            | 3.5433 | 1.181 | 3.0709         | 0.039              |                     |                        | 14000                | 31200          |                 |        |                |                     |
|            | 70                | 90     | 60    | 78             | 1.0                | RNAO70X90X60        |                        | 107                  | 277            | 6000            | 3900   | 0.1068         | 0.925               |
|            | 2.7559            | 3.5433 | 2.362 | 3.0709         | 0.039              |                     |                        | 24100                | 62300          |                 |        |                |                     |
| 75         | 75                | 95     | 30    | 83             | 1.0                | RNAO75X95X30        |                        | 60.9                 | 138            | 5600            | 3600   | 0.0780         | 0.510               |
|            | 2.9528            | 3.7402 | 1.181 | 3.2677         | 0.039              |                     |                        | 13700                | 31000          |                 |        |                |                     |
|            | 75                | 95     | 60    | 83             | 1.0                | RNAO75X95X60        |                        | 104                  | 277            | 5600            | 3600   | 0.1101         | 0.980               |
|            | 2.9528            | 3.7402 | 2.362 | 3.2677         | 0.039              |                     |                        | 23400                | 62300          |                 |        |                |                     |
| 80         | 80                | 100    | 30    | 88             | 1.0                | RNAO80X100X30       |                        | 67.5                 | 161            | 5200            | 3400   | 0.0835         | 0.580               |
|            | 3.1496            | 3.9370 | 1.181 | 3.4646         | 0.039              |                     |                        | 15200                | 36200          |                 |        |                |                     |
|            | 80                | 100    | 60    | 88             | 1.0                | RNAO80X100X60       |                        | 116                  | 322            | 5200            | 3400   | 0.1178         | 1.044               |
|            | 3.1496            | 3.9370 | 2.362 | 3.4646         | 0.039              |                     |                        | 26100                | 72400          |                 |        |                |                     |
| 85         | 85                | 105    | 30    | 93             | 1.0                | RNAO85X105X30       |                        | 69.4                 | 170            | 4600            | 3000   | 0.0870         | 0.586               |
|            | 3.3465            | 4.1339 | 1.181 | 3.6614         | 0.039              |                     |                        | 15600                | 38200          |                 |        |                |                     |
| 100        | 100               | 120    | 30    | 108            | 1.0                | RNAO100X120X30      |                        | 72.4                 | 191            | 4200            | 2700   | 0.0965         | 0.660               |
|            | 3.9370            | 4.7244 | 1.181 | 4.2520         | 0.039              |                     |                        | 16300                | 42900          |                 |        |                |                     |



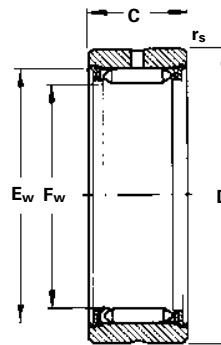


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS FULL COMPLEMENT WITHOUT INNER RINGS

### METRIC SERIES

- Check for availability.



| Shaft Diameter | Dimensions mm/in. |                |       |        |                | Bearing Designation | Load Ratings kN/lbf. |           | Limiting Speeds       |                | Approx. Wt. kg/lbs. |                |       |
|----------------|-------------------|----------------|-------|--------|----------------|---------------------|----------------------|-----------|-----------------------|----------------|---------------------|----------------|-------|
|                | mm                | F <sub>w</sub> | D     | C      | E <sub>w</sub> |                     | r <sub>s</sub> min   | Dynamic C | Static C <sub>0</sub> | Oil Grease RPM |                     | C <sub>g</sub> |       |
| 7.3            | 7.3               | 7.3            | 16    | 12     | 12.3           | 0.35                | RNA 1005             | 3.95      | 4.45                  | 34000          | 52000               | 0.0134         | 0.010 |
|                | 0.2874            | 0.6299         | 0.472 | 0.4843 | 0.014          |                     |                      |           |                       |                |                     |                |       |
| 9.7            | 9.7               | 9.7            | 19    | 12     | 14.7           | 0.35                | RNA 1007             | 4.80      | 5.90                  | 25000          | 39000               | 0.0160         | 0.013 |
|                | 0.3819            | 0.7480         | 0.472 | 0.5787 | 0.014          |                     |                      |           |                       |                |                     |                |       |
| 12.1           | 12.1              | 12.1           | 22    | 12     | 17.1           | 0.35                | RNA 1009             | 5.60      | 7.40                  | 20000          | 31000               | 0.0184         | 0.018 |
|                | 0.4764            | 0.8661         | 0.472 | 0.6732 | 0.014          |                     |                      |           |                       |                |                     |                |       |
| 14.4           | 14.4              | 14.4           | 24    | 12     | 19.4           | 0.35                | RNA 1010             | 6.35      | 8.90                  | 17000          | 26000               | 0.0206         | 0.020 |
|                | 0.5669            | 0.9449         | 0.472 | 0.7638 | 0.014          |                     |                      |           |                       |                |                     |                |       |
| 17.6           | 17.6              | 17.6           | 28    | 15     | 22.6           | 0.35                | RNA 1012             | 11.0      | 16.5                  | 14000          | 22000               | 0.0261         | 0.034 |
|                | 0.6929            | 1.1024         | 0.591 | 0.8898 | 0.014          |                     |                      |           |                       |                |                     |                |       |
| 20.8           | 20.8              | 20.8           | 32    | 15     | 25.8           | 0.65                | RNA 1015             | 12.4      | 19.5                  | 12000          | 18000               | 0.0292         | 0.044 |
|                | 0.8189            | 1.2598         | 0.591 | 1.0157 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 22.1           | 22.1              | 22.1           | 35    | 22     | 28.1           | 0.65                | RNA 2015             | 23.5      | 37.5                  | 11000          | 17000               | 0.0345         | 0.082 |
|                | 0.8701            | 1.3780         | 0.866 | 1.1063 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 23.9           | 23.9              | 23.9           | 35    | 15     | 28.9           | 0.65                | RNA 1017             | 13.7      | 22.5                  | 10000          | 16000               | 0.0321         | 0.047 |
|                | 0.9409            | 1.3780         | 0.591 | 1.1378 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 28.7           | 28.7              | 28.7           | 42    | 18     | 34.7           | 0.65                | RNA 1020             | 19.3      | 33.5                  | 8600           | 13000               | 0.0374         | 0.084 |
|                | 1.1299            | 1.6535         | 0.709 | 1.3661 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 33.5           | 28.7              | 28.7           | 42    | 22     | 34.7           | 0.65                | RNA 2020             | 28.5      | 49.0                  | 8600           | 13000               | 0.0411         | 0.104 |
|                | 1.1299            | 1.6535         | 0.866 | 1.3661 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 33.5           | 33.5              | 33.5           | 47    | 18     | 39.5           | 0.65                | RNA 1025             | 21.5      | 39.0                  | 7200           | 11000               | 0.0415         | 0.097 |
|                | 1.3189            | 1.8504         | 0.709 | 1.5551 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 33.5           | 33.5              | 33.5           | 47    | 22     | 39.5           | 0.65                | RNA 2025             | 33.0      | 60.0                  | 7200           | 11000               | 0.0457         | 0.122 |
|                | 1.3189            | 1.8504         | 0.866 | 1.5551 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 33.5           | 33.5              | 33.5           | 47    | 30     | 39.5           | 0.65                | RNA 22025            | 52.0      | 94.0                  | 7200           | 11000               | 0.0537         | 0.170 |
|                | 1.3189            | 1.8504         | 1.181 | 1.5551 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 38.2           | 38.2              | 38.2           | 52    | 18     | 44.2           | 0.65                | RNA 1030             | 23.5      | 44.5                  | 6500           | 10000               | 0.0455         | 0.107 |
|                | 1.5039            | 2.0472         | 0.709 | 1.7402 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 38.2           | 38.2              | 38.2           | 52    | 22     | 44.2           | 0.65                | RNA 2030             | 34.5      | 66.0                  | 6500           | 10000               | 0.0501         | 0.139 |
|                | 1.5039            | 2.0472         | 0.866 | 1.7402 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 38.2           | 38.2              | 38.2           | 52    | 30     | 44.2           | 0.65                | RNA 22030            | 57.0      | 108                   | 6500           | 10000               | 0.0588         | 0.193 |
|                | 1.5039            | 2.0472         | 1.181 | 1.7402 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 44             | 44                | 44             | 58    | 18     | 50.0           | 0.65                | RNA 1035             | 26.0      | 51.0                  | 5600           | 8600                | 0.0552         | 0.127 |
|                | 1.7323            | 2.2835         | 0.709 | 1.9685 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 44             | 44                | 44             | 58    | 22     | 50.0           | 0.65                | RNA 2035             | 38.0      | 75.0                  | 5600           | 8600                | 0.0552         | 0.160 |
|                | 1.7323            | 2.2835         | 0.866 | 1.9685 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 44             | 44                | 44             | 58    | 30     | 50.0           | 0.65                | RNA 22035            | 63.0      | 124                   | 5600           | 8600                | 0.0686         | 0.225 |
|                | 1.7323            | 2.2835         | 1.181 | 1.9685 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 44             | 44                | 44             | 62    | 30     | 51.0           | 0.65                | RNA 3030             | 64.0      | 125                   | 5600           | 8600                | 0.0607         | 0.309 |
|                | 1.7323            | 2.4409         | 1.181 | 2.0094 | 0.026          |                     |                      |           |                       |                |                     |                |       |
| 49.7           | 49.7              | 49.7           | 65    | 18     | 55.7           | 0.85                | RNA 1040             | 28.5      | 58.0                  | 4900           | 7600                | 0.0546         | 0.160 |
|                | 1.9567            | 2.5591         | 0.709 | 2.1929 | 0.033          |                     |                      |           |                       |                |                     |                |       |
| 49.7           | 49.7              | 49.7           | 65    | 22     | 55.7           | 0.65                | RNA 2040             | 41.5      | 85.0                  | 4900           | 7600                | 0.0601         | 0.200 |
|                | 1.9567            | 2.5591         | 0.866 | 2.1929 | 0.026          |                     |                      |           |                       |                |                     |                |       |

Continued on next page.

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |                |           |              |                | Bearing Designation | Load Ratings kN/bf. |             | Limiting Speeds       |             | Approx. Wt. kg/lbs. |              |
|----------------|-------------------|----------------|-----------|--------------|----------------|---------------------|---------------------|-------------|-----------------------|-------------|---------------------|--------------|
|                | mm                | F <sub>w</sub> | D         | C            | E <sub>w</sub> |                     | r <sub>s min</sub>  | Dynamic C   | Static C <sub>0</sub> | Oil RPM     |                     | Grease RPM   |
|                | <b>49.7</b>       | <b>65</b>      | <b>30</b> | <b>55.7</b>  | <b>0.65</b>    | <b>RNA 22040</b>    | <b>68.0</b>         | <b>140</b>  | <b>4900</b>           | <b>7600</b> | <b>0.0707</b>       | <b>0.278</b> |
|                | 1.9567            | 2.5591         | 1.181     | 2.1929       | 0.026          |                     | 15300               | 31500       |                       |             |                     |              |
|                | <b>49.7</b>       | <b>72</b>      | <b>36</b> | <b>56.8</b>  | <b>0.65</b>    | <b>RNA 3035</b>     | <b>90.0</b>         | <b>183</b>  | <b>4900</b>           | <b>7600</b> | <b>0.0704</b>       | <b>0.545</b> |
|                | 1.9567            | 2.8346         | 1.417     | 2.2346       | 0.026          |                     | 20200               | 41100       |                       |             |                     |              |
| <b>55.4</b>    | <b>55.4</b>       | <b>72</b>      | <b>18</b> | <b>61.4</b>  | <b>0.85</b>    | <b>RNA 1045</b>     | <b>30.5</b>         | <b>65.0</b> | <b>4500</b>           | <b>6900</b> | <b>0.0590</b>       | <b>0.193</b> |
|                | 2.1811            | 2.8346         | 0.709     | 2.4173       | 0.033          |                     | 6860                | 14600       |                       |             |                     |              |
|                | <b>55.4</b>       | <b>72</b>      | <b>22</b> | <b>61.4</b>  | <b>0.85</b>    | <b>RNA 2045</b>     | <b>45.0</b>         | <b>95.0</b> | <b>4500</b>           | <b>6900</b> | <b>0.0649</b>       | <b>0.242</b> |
|                | 2.1811            | 2.8346         | 0.866     | 2.4173       | 0.033          |                     | 10100               | 21400       |                       |             |                     |              |
|                | <b>55.4</b>       | <b>80</b>      | <b>36</b> | <b>62.5</b>  | <b>0.85</b>    | <b>RNA 3040</b>     | <b>97.0</b>         | <b>204</b>  | <b>4500</b>           | <b>6900</b> | <b>0.0759</b>       | <b>0.672</b> |
|                | 2.1811            | 3.1496         | 1.417     | 2.4591       | 0.033          |                     | 21800               | 45900       |                       |             |                     |              |
| <b>62.1</b>    | <b>62.1</b>       | <b>80</b>      | <b>20</b> | <b>68.1</b>  | <b>0.85</b>    | <b>RNA 1050</b>     | <b>33.0</b>         | <b>73.0</b> | <b>4000</b>           | <b>6100</b> | <b>0.0639</b>       | <b>0.255</b> |
|                | 2.4449            | 3.1496         | 0.787     | 2.6811       | 0.033          |                     | 7420                | 16400       |                       |             |                     |              |
|                | <b>62.1</b>       | <b>80</b>      | <b>28</b> | <b>68.1</b>  | <b>0.85</b>    | <b>RNA 2050</b>     | <b>64.0</b>         | <b>142</b>  | <b>4000</b>           | <b>6100</b> | <b>0.0754</b>       | <b>0.375</b> |
|                | 2.4449            | 3.1496         | 1.102     | 2.6811       | 0.033          |                     | 14400               | 31900       |                       |             |                     |              |
|                | <b>62.1</b>       | <b>85</b>      | <b>38</b> | <b>69.2</b>  | <b>0.85</b>    | <b>RNA 3045</b>     | <b>105</b>          | <b>230</b>  | <b>4000</b>           | <b>6100</b> | <b>0.0823</b>       | <b>0.710</b> |
|                | 2.4449            | 3.3465         | 1.496     | 2.7228       | 0.033          |                     | 23600               | 51700       |                       |             |                     |              |
| <b>68.8</b>    | <b>68.8</b>       | <b>85</b>      | <b>20</b> | <b>74.8</b>  | <b>0.85</b>    | <b>RNA 1055</b>     | <b>35.5</b>         | <b>80.0</b> | <b>3600</b>           | <b>5500</b> | <b>0.0687</b>       | <b>0.258</b> |
|                | 2.7087            | 3.3465         | 0.787     | 2.9449       | 0.033          |                     | 7980                | 18000       |                       |             |                     |              |
|                | <b>68.8</b>       | <b>85</b>      | <b>28</b> | <b>74.8</b>  | <b>0.85</b>    | <b>RNA 2055</b>     | <b>69.0</b>         | <b>157</b>  | <b>3600</b>           | <b>5500</b> | <b>0.0810</b>       | <b>0.361</b> |
|                | 2.7087            | 3.3465         | 1.102     | 2.9449       | 0.033          |                     | 15500               | 35300       |                       |             |                     |              |
|                | <b>68.8</b>       | <b>90</b>      | <b>38</b> | <b>75.9</b>  | <b>0.85</b>    | <b>RNA 3050</b>     | <b>113</b>          | <b>255</b>  | <b>3600</b>           | <b>5500</b> | <b>0.0885</b>       | <b>0.705</b> |
|                | 2.7087            | 3.5433         | 1.496     | 2.9866       | 0.033          |                     | 25400               | 57300       |                       |             |                     |              |
| <b>72.6</b>    | <b>72.6</b>       | <b>90</b>      | <b>20</b> | <b>78.6</b>  | <b>0.85</b>    | <b>RNA 1060</b>     | <b>37.0</b>         | <b>85.0</b> | <b>3400</b>           | <b>5200</b> | <b>0.0714</b>       | <b>0.283</b> |
|                | 2.8583            | 3.5433         | 0.787     | 3.0945       | 0.033          |                     | 8320                | 19100       |                       |             |                     |              |
|                | <b>72.6</b>       | <b>90</b>      | <b>28</b> | <b>78.6</b>  | <b>0.85</b>    | <b>RNA 2060</b>     | <b>72.0</b>         | <b>165</b>  | <b>3400</b>           | <b>5200</b> | <b>0.0842</b>       | <b>0.413</b> |
|                | 2.8583            | 3.5433         | 1.102     | 3.0945       | 0.033          |                     | 16200               | 37100       |                       |             |                     |              |
|                | <b>72.6</b>       | <b>95</b>      | <b>38</b> | <b>79.6</b>  | <b>0.85</b>    | <b>RNA 3055</b>     | <b>117</b>          | <b>268</b>  | <b>3400</b>           | <b>5200</b> | <b>0.0811</b>       | <b>0.782</b> |
|                | 2.8583            | 3.7402         | 1.496     | 3.1339       | 0.033          |                     | 26300               | 60200       |                       |             |                     |              |
| <b>78.3</b>    | <b>78.3</b>       | <b>95</b>      | <b>20</b> | <b>84.3</b>  | <b>0.85</b>    | <b>RNA 1065</b>     | <b>41.5</b>         | <b>97.0</b> | <b>3200</b>           | <b>4900</b> | <b>0.0751</b>       | <b>0.306</b> |
|                | 3.0827            | 3.7402         | 0.787     | 3.3189       | 0.033          |                     | 9330                | 21800       |                       |             |                     |              |
|                | <b>78.3</b>       | <b>95</b>      | <b>28</b> | <b>84.3</b>  | <b>0.85</b>    | <b>RNA 2065</b>     | <b>78.0</b>         | <b>184</b>  | <b>3200</b>           | <b>4900</b> | <b>0.0887</b>       | <b>0.433</b> |
|                | 3.0827            | 3.7402         | 1.102     | 3.3189       | 0.033          |                     | 17500               | 41400       |                       |             |                     |              |
|                | <b>78.3</b>       | <b>100</b>     | <b>38</b> | <b>85.3</b>  | <b>0.85</b>    | <b>RNA 3060</b>     | <b>123.0</b>        | <b>290</b>  | <b>3200</b>           | <b>4900</b> | <b>0.0966</b>       | <b>0.810</b> |
|                | 3.0827            | 3.9370         | 1.496     | 3.3583       | 0.033          |                     | 27700               | 65200       |                       |             |                     |              |
| <b>83.1</b>    | <b>83.1</b>       | <b>100</b>     | <b>20</b> | <b>89.1</b>  | <b>0.85</b>    | <b>RNA 1070</b>     | <b>43.0</b>         | <b>103</b>  | <b>2900</b>           | <b>4500</b> | <b>0.0784</b>       | <b>0.322</b> |
|                | 3.2717            | 3.9370         | 0.787     | 3.5079       | 0.033          |                     | 9670                | 23200       |                       |             |                     |              |
|                | <b>83.1</b>       | <b>100</b>     | <b>28</b> | <b>89.1</b>  | <b>0.85</b>    | <b>RNA 2070</b>     | <b>81.0</b>         | <b>195</b>  | <b>2900</b>           | <b>4500</b> | <b>0.0926</b>       | <b>0.470</b> |
|                | 3.2717            | 3.9370         | 1.102     | 3.5079       | 0.033          |                     | 18200               | 43800       |                       |             |                     |              |
|                | <b>83.1</b>       | <b>105</b>     | <b>38</b> | <b>90.2</b>  | <b>0.85</b>    | <b>RNA 3065</b>     | <b>129</b>          | <b>308</b>  | <b>2900</b>           | <b>4500</b> | <b>0.1012</b>       | <b>0.865</b> |
|                | 3.2717            | 4.1339         | 1.496     | 3.5496       | 0.033          |                     | 29000               | 69200       |                       |             |                     |              |
| <b>88</b>      | <b>88</b>         | <b>110</b>     | <b>24</b> | <b>95.0</b>  | <b>0.85</b>    | <b>RNA 1075</b>     | <b>64.0</b>         | <b>155</b>  | <b>2800</b>           | <b>4300</b> | <b>0.0864</b>       | <b>0.577</b> |
|                | 3.4646            | 4.3307         | 0.945     | 3.7402       | 0.033          |                     | 14400               | 34800       |                       |             |                     |              |
|                | <b>88</b>         | <b>110</b>     | <b>32</b> | <b>95.0</b>  | <b>0.85</b>    | <b>RNA 2075</b>     | <b>104</b>          | <b>253</b>  | <b>2800</b>           | <b>4300</b> | <b>0.0983</b>       | <b>0.767</b> |
|                | 3.4646            | 4.3307         | 1.260     | 3.7402       | 0.033          |                     | 23400               | 56900       |                       |             |                     |              |
|                | <b>88</b>         | <b>110</b>     | <b>38</b> | <b>95.0</b>  | <b>0.85</b>    | <b>RNA 3070</b>     | <b>134</b>          | <b>325</b>  | <b>2800</b>           | <b>4300</b> | <b>0.1050</b>       | <b>0.906</b> |
|                | 3.4646            | 4.3307         | 1.496     | 3.7402       | 0.033          |                     | 30100               | 73100       |                       |             |                     |              |
| <b>96</b>      | <b>96</b>         | <b>115</b>     | <b>24</b> | <b>103.0</b> | <b>0.85</b>    | <b>RNA 1080</b>     | <b>68.0</b>         | <b>170</b>  | <b>2600</b>           | <b>4000</b> | <b>0.0918</b>       | <b>0.510</b> |
|                | 3.7795            | 4.5276         | 0.945     | 4.0551       | 0.033          |                     | 15300               | 38200       |                       |             |                     |              |
|                | <b>96</b>         | <b>115</b>     | <b>32</b> | <b>103.0</b> | <b>0.85</b>    | <b>RNA 2080</b>     | <b>110</b>          | <b>275</b>  | <b>2600</b>           | <b>4000</b> | <b>0.1045</b>       | <b>0.694</b> |
|                | 3.7795            | 4.5276         | 1.254     | 4.0551       | 0.033          |                     | 24700               | 61800       |                       |             |                     |              |
|                | <b>96</b>         | <b>120</b>     | <b>38</b> | <b>103.0</b> | <b>0.85</b>    | <b>RNA 3075</b>     | <b>142</b>          | <b>355</b>  | <b>2600</b>           | <b>4000</b> | <b>0.1117</b>       | <b>1.098</b> |
|                | 3.7795            | 4.7244         | 1.496     | 4.0551       | 0.033          |                     | 31900               | 79800       |                       |             |                     |              |
| <b>99.5</b>    | <b>99.5</b>       | <b>120</b>     | <b>32</b> | <b>106.5</b> | <b>1.35</b>    | <b>RNA 2085</b>     | <b>113</b>          | <b>285</b>  | <b>2500</b>           | <b>3800</b> | <b>0.1072</b>       | <b>0.787</b> |
|                | 3.9173            | 4.7244         | 1.260     | 4.1929       | 0.053          |                     | 25400               | 64100       |                       |             |                     |              |
|                | <b>99.5</b>       | <b>125</b>     | <b>38</b> | <b>106.5</b> | <b>0.85</b>    | <b>RNA 3080</b>     | <b>145</b>          | <b>365</b>  | <b>2500</b>           | <b>3800</b> | <b>0.1145</b>       | <b>1.220</b> |
|                | 3.9173            | 4.9213         | 1.496     | 4.1929       | 0.033          |                     | 32600               | 82100       |                       |             |                     |              |
| <b>104.7</b>   | <b>104.7</b>      | <b>125</b>     | <b>32</b> | <b>111.7</b> | <b>1.35</b>    | <b>RNA 2090</b>     | <b>117</b>          | <b>300</b>  | <b>2300</b>           | <b>3600</b> | <b>0.1113</b>       | <b>0.837</b> |
|                | 4.1220            | 4.9213         | 1.260     | 4.3976       | 0.053          |                     | 26300               | 67400       |                       |             |                     |              |

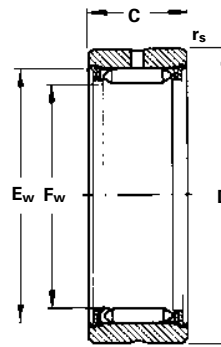
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# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS FULL COMPLEMENT WITHOUT INNER RINGS — *continued* METRIC SERIES

- Check for availability.



| Shaft Diameter | Dimensions mm/in. |                |           |              |                | Bearing Designation | Load Ratings kN/lbf. |            | Limiting Speeds |             | Approx. Wt. kg/lbs. |              |
|----------------|-------------------|----------------|-----------|--------------|----------------|---------------------|----------------------|------------|-----------------|-------------|---------------------|--------------|
|                | mm                | F <sub>w</sub> | D         | C            | E <sub>w</sub> |                     | r <sub>s</sub> min   | C          | C <sub>0</sub>  | Oil RPM     |                     | Grease RPM   |
|                | <b>104.7</b>      | <b>130</b>     | <b>38</b> | <b>111.7</b> | <b>1.35</b>    | <b>RNA 3085</b>     | <b>150</b>           | <b>390</b> | <b>2300</b>     | <b>3600</b> | <b>0.1189</b>       | <b>1.252</b> |
|                | 4.1220            | 5.1181         | 1.496     | 4.3976       | 0.053          |                     | 33700                | 87700      |                 |             |                     |              |
| <b>109.1</b>   | <b>109.1</b>      | <b>130</b>     | <b>32</b> | <b>116.1</b> | <b>1.35</b>    | <b>RNA 2095</b>     | <b>120</b>           | <b>315</b> | <b>2300</b>     | <b>3500</b> | <b>0.1225</b>       | <b>0.882</b> |
|                | 4.2953            | 5.1181         | 1.260     | 4.5709       | 0.053          |                     | 27000                | 70800      |                 |             |                     |              |
|                | <b>109.1</b>      | <b>135</b>     | <b>43</b> | <b>116.1</b> | <b>1.35</b>    | <b>RNA 3090</b>     | <b>185</b>           | <b>480</b> | <b>2300</b>     | <b>3500</b> | <b>0.1280</b>       | <b>1.522</b> |
|                | 4.2953            | 5.3150         | 1.693     | 4.5709       | 0.053          |                     | 41600                | 108000     |                 |             |                     |              |
| <b>114.7</b>   | <b>114.7</b>      | <b>135</b>     | <b>32</b> | <b>121.7</b> | <b>1.35</b>    | <b>RNA 2100</b>     | <b>125</b>           | <b>330</b> | <b>2100</b>     | <b>3300</b> | <b>0.1188</b>       | <b>0.677</b> |
|                | 4.5157            | 5.3150         | 1.260     | 4.7913       | 0.053          |                     | 28100                | 74200      |                 |             |                     |              |
|                | <b>114.7</b>      | <b>140</b>     | <b>43</b> | <b>121.7</b> | <b>1.35</b>    | <b>RNA 3095</b>     | <b>190</b>           | <b>505</b> | <b>2100</b>     | <b>3300</b> | <b>0.1327</b>       | <b>1.551</b> |
|                | 4.5157            | 5.5118         | 1.693     | 4.7913       | 0.053          |                     | 42700                | 114000     |                 |             |                     |              |
| <b>119.2</b>   | <b>119.2</b>      | <b>140</b>     | <b>32</b> | <b>126.2</b> | <b>1.35</b>    | <b>RNA 2105</b>     | <b>129</b>           | <b>340</b> | <b>2100</b>     | <b>3200</b> | <b>0.1221</b>       | <b>0.941</b> |
|                | 4.6929            | 5.5118         | 1.260     | 4.9685       | 0.053          |                     | 29000                | 76400      |                 |             |                     |              |
|                | <b>119.2</b>      | <b>145</b>     | <b>43</b> | <b>126.2</b> | <b>1.35</b>    | <b>RNA 3100</b>     | <b>195</b>           | <b>520</b> | <b>2100</b>     | <b>3200</b> | <b>0.1364</b>       | <b>1.645</b> |
|                | 4.6929            | 5.7087         | 1.693     | 4.9685       | 0.053          |                     | 43800                | 117000     |                 |             |                     |              |
| <b>124.5</b>   | <b>124.5</b>      | <b>145</b>     | <b>34</b> | <b>131.5</b> | <b>1.35</b>    | <b>RNA 2110</b>     | <b>133</b>           | <b>360</b> | <b>2000</b>     | <b>3000</b> | <b>0.1260</b>       | <b>1.015</b> |
|                | 4.9016            | 5.7087         | 1.339     | 5.1772       | 0.053          |                     | 29900                | 80900      |                 |             |                     |              |
|                | <b>124.5</b>      | <b>150</b>     | <b>45</b> | <b>131.5</b> | <b>1.35</b>    | <b>RNA 3105</b>     | <b>203</b>           | <b>550</b> | <b>2000</b>     | <b>3000</b> | <b>0.1408</b>       | <b>1.762</b> |
|                | 4.9016            | 5.9055         | 1.772     | 5.1772       | 0.053          |                     | 45600                | 124000     |                 |             |                     |              |
| <b>132.5</b>   | <b>132.5</b>      | <b>155</b>     | <b>34</b> | <b>139.5</b> | <b>1.35</b>    | <b>RNA 2115</b>     | <b>139</b>           | <b>380</b> | <b>1900</b>     | <b>2900</b> | <b>0.1318</b>       | <b>1.205</b> |
|                | 5.2165            | 6.1024         | 1.339     | 5.4921       | 0.053          |                     | 31200                | 85400      |                 |             |                     |              |
|                | <b>132.5</b>      | <b>160</b>     | <b>45</b> | <b>139.5</b> | <b>1.35</b>    | <b>RNA 3110</b>     | <b>210</b>           | <b>580</b> | <b>1900</b>     | <b>2900</b> | <b>0.1471</b>       | <b>2.037</b> |
|                | 5.2165            | 6.2992         | 1.772     | 5.4921       | 0.053          |                     | 47200                | 130000     |                 |             |                     |              |
| <b>137</b>     | <b>137</b>        | <b>160</b>     | <b>34</b> | <b>144.0</b> | <b>1.35</b>    | <b>RNA 2120</b>     | <b>142</b>           | <b>395</b> | <b>1800</b>     | <b>2800</b> | <b>0.1350</b>       | <b>1.265</b> |
|                | 5.3937            | 6.2992         | 1.339     | 5.6693       | 0.053          |                     | 31900                | 88800      |                 |             |                     |              |
|                | <b>137</b>        | <b>165</b>     | <b>45</b> | <b>144.0</b> | <b>1.35</b>    | <b>RNA 3115</b>     | <b>215</b>           | <b>600</b> | <b>1800</b>     | <b>2800</b> | <b>0.1507</b>       | <b>2.140</b> |
|                | 5.3937            | 6.4961         | 1.772     | 5.6693       | 0.053          |                     | 48300                | 135000     |                 |             |                     |              |
| <b>143.5</b>   | <b>143.5</b>      | <b>165</b>     | <b>34</b> | <b>150.5</b> | <b>1.35</b>    | <b>RNA 2125</b>     | <b>145</b>           | <b>410</b> | <b>1800</b>     | <b>2700</b> | <b>0.1403</b>       | <b>1.218</b> |
|                | 5.6496            | 6.4961         | 1.339     | 5.9268       | 0.053          |                     | 32600                | 92200      |                 |             |                     |              |
|                | <b>143.5</b>      | <b>170</b>     | <b>45</b> | <b>150.5</b> | <b>1.35</b>    | <b>RNA 3120</b>     | <b>224</b>           | <b>630</b> | <b>1800</b>     | <b>2700</b> | <b>0.1563</b>       | <b>2.107</b> |
|                | 5.6496            | 6.6929         | 1.772     | 5.9268       | 0.053          |                     | 50400                | 142000     |                 |             |                     |              |
| <b>148</b>     | <b>148</b>        | <b>170</b>     | <b>34</b> | <b>155.0</b> | <b>1.35</b>    | <b>RNA 2130</b>     | <b>150</b>           | <b>425</b> | <b>1700</b>     | <b>2600</b> | <b>0.1435</b>       | <b>1.292</b> |
|                | 5.8268            | 6.6929         | 1.339     | 6.1039       | 0.053          |                     | 33700                | 95500      |                 |             |                     |              |
| <b>158</b>     | <b>158</b>        | <b>180</b>     | <b>36</b> | <b>165.0</b> | <b>1.35</b>    | <b>RNA 2140</b>     | <b>157</b>           | <b>455</b> | <b>1600</b>     | <b>2400</b> | <b>0.1504</b>       | <b>1.478</b> |
|                | 6.2205            | 7.0866         | 1.417     | 6.4976       | 0.053          |                     | 35300                | 102000     |                 |             |                     |              |
|                | <b>158</b>        | <b>190</b>     | <b>52</b> | <b>166.0</b> | <b>1.35</b>    | <b>RNA 3130</b>     | <b>275</b>           | <b>790</b> | <b>1600</b>     | <b>2400</b> | <b>0.1691</b>       | <b>3.285</b> |
|                | 6.2205            | 7.4803         | 2.047     | 6.5354       | 0.053          |                     | 61800                | 178000     |                 |             |                     |              |
| <b>170.5</b>   | <b>170.5</b>      | <b>195</b>     | <b>36</b> | <b>177.5</b> | <b>1.35</b>    | <b>RNA 2150</b>     | <b>165</b>           | <b>490</b> | <b>1400</b>     | <b>2200</b> | <b>0.1591</b>       | <b>1.790</b> |
|                | 6.7126            | 7.6772         | 1.417     | 6.9882       | 0.053          |                     | 37100                | 110000     |                 |             |                     |              |
|                | <b>170.5</b>      | <b>205</b>     | <b>52</b> | <b>178.5</b> | <b>1.35</b>    | <b>RNA 3140</b>     | <b>290</b>           | <b>860</b> | <b>1400</b>     | <b>2200</b> | <b>0.1787</b>       | <b>3.840</b> |
|                | 6.7126            | 8.0709         | 2.047     | 7.0276       | 0.053          |                     | 65200                | 193000     |                 |             |                     |              |
| <b>179.3</b>   | <b>179.3</b>      | <b>205</b>     | <b>36</b> | <b>186.3</b> | <b>1.35</b>    | <b>RNA 2160</b>     | <b>170</b>           | <b>515</b> | <b>1400</b>     | <b>2100</b> | <b>0.1650</b>       | <b>1.970</b> |
|                | 7.0591            | 8.0709         | 1.417     | 7.3346       | 0.053          |                     | 38200                | 116000     |                 |             |                     |              |
|                | <b>179.3</b>      | <b>215</b>     | <b>52</b> | <b>187.3</b> | <b>1.35</b>    | <b>RNA 3150</b>     | <b>300</b>           | <b>900</b> | <b>1400</b>     | <b>2100</b> | <b>0.1904</b>       | <b>4.185</b> |
|                | 7.0591            | 8.4646         | 2.047     | 7.3756       | 0.053          |                     | 67400                | 202000     |                 |             |                     |              |

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## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |                |       |         |                | Bearing Designation | Load Ratings kN/lbf. |         | Limiting Speeds |      | Approx. Wt. kg/lbs. |        |
|----------------|-------------------|----------------|-------|---------|----------------|---------------------|----------------------|---------|-----------------|------|---------------------|--------|
|                | mm                | F <sub>w</sub> | D     | C       | E <sub>w</sub> |                     | r <sub>s</sub> min   | Dynamic | Static          | Oil  |                     | Grease |
| 193.8          | 193.8             | 220            | 42    | 200.8   | 1.85           | RNA 2170            | 233                  | 720     | 1300            | 2000 | 0.1852              | 2.570  |
|                | 7.6299            | 8.6614         | 1.654 | 7.9055  | 0.073          |                     | 52400                | 162000  |                 |      |                     |        |
| 193.8          | 193.8             | 230            | 57    | 201.9   | 1.35           | RNA 3160            | 360                  | 1110    | 1300            | 2000 | 0.2071              | 4.955  |
|                | 7.6299            | 9.0551         | 2.244 | 7.9496  | 0.053          |                     | 80900                | 250000  |                 |      |                     |        |
| 202.6          | 202.6             | 230            | 42    | 209.6   | 1.85           | RNA 2180            | 240                  | 750     | 1200            | 1900 | 0.2145              | 2.835  |
|                | 7.9764            | 9.0551         | 1.654 | 8.2520  | 0.073          |                     | 54000                | 169000  |                 |      |                     |        |
| 216            | 216               | 245            | 42    | 223.0   | 1.85           | RNA 2190            | 250                  | 800     | 1200            | 1800 | 0.2004              | 3.210  |
|                | 8.5039            | 9.6457         | 1.654 | 8.7795  | 0.073          |                     | 56200                | 180000  |                 |      |                     |        |
| 216            | 216               | 255            | 57    | 224.1   | 1.85           | RNA 3180            | 385                  | 1240    | 1200            | 1800 | 0.2239              | 6.040  |
|                | 8.5039            | 10.0394        | 2.244 | 8.8236  | 0.073          |                     | 86600                | 279000  |                 |      |                     |        |
| 224.1          | 224.1             | 255            | 42    | 231.1   | 1.85           | RNA 2200            | 257                  | 830     | 1100            | 1700 | 0.2057              | 3.560  |
|                | 8.8228            | 10.0394        | 1.654 | 9.0984  | 0.073          |                     | 57800                | 187000  |                 |      |                     |        |
| 236            | 236               | 265            | 42    | 243.1   | 1.85           | RNA 2210            | 279                  | 910     | 1000            | 1600 | 0.2129              | 3.470  |
|                | 9.2913            | 10.4331        | 1.654 | 9.5693  | 0.073          |                     | 62700                | 205000  |                 |      |                     |        |
| 258.4          | 258.4             | 300            | 64    | 268.4   | 1.85           | RNA 3220            | 490                  | 1650    | 980             | 1500 | 0.2519              | 8.570  |
|                | 10.1732           | 11.8110        | 2.520 | 10.5677 | 0.073          |                     | 110000               | 371000  |                 |      |                     |        |
| 269.6          | 269.6             | 300            | 49    | 276.6   | 1.85           | RNA 2240            | 345                  | 1190    | 910             | 1400 | 0.2460              | 4.985  |
|                | 10.6142           | 11.8110        | 1.929 | 10.8898 | 0.073          |                     | 77600                | 268000  |                 |      |                     |        |
| 281.9          | 281.9             | 325            | 64    | 291.9   | 1.85           | RNA 3240            | 520                  | 1800    | 850             | 1300 | 0.2684              | 9.480  |
|                | 11.0984           | 12.7953        | 2.520 | 11.4921 | 0.073          |                     | 117000               | 405000  |                 |      |                     |        |
| 335            | 335               | 375            | 54    | 343.0   | 1.85           | RNA 2300            | 460                  | 1690    | 720             | 1100 | 0.2915              | 8.600  |
|                | 13.1890           | 14.7638        | 2.126 | 13.5039 | 0.073          |                     | 103000               | 380000  |                 |      |                     |        |

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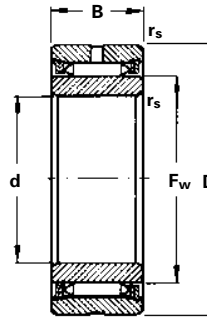




# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS FULL COMPLEMENT WITH INNER RINGS METRIC SERIES

- Check for availability.



| Shaft Diameter | Dimensions mm/in. |        |       |                |                    | Bearing Designation | Load Ratings kN/bf. |                       | Limiting Speeds |            | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|--------|-------|----------------|--------------------|---------------------|---------------------|-----------------------|-----------------|------------|---------------------|----------------|
|                | F <sub>w</sub>    | D      | B     | E <sub>w</sub> | r <sub>s min</sub> |                     | Dynamic C           | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                     | C <sub>g</sub> |
| 12             | 12                | 28     | 15    | 17.6           | 0.35               | NA 1012*            | 11.0                | 16.5                  | 14000           | 22000      | 0.0261              | 0.050          |
|                | 0.4724            | 1.1024 | 0.591 | 0.6929         | 0.014              |                     | 2470                | 3710                  |                 |            |                     |                |
| 15             | 15                | 32     | 15    | 20.8           | 0.65               | NA 1015*            | 12.4                | 19.5                  | 12000           | 18000      | 0.0292              | 0.044          |
|                | 0.5906            | 1.2598 | 0.591 | 0.8189         | 0.026              |                     | 2790                | 4380                  |                 |            |                     |                |
|                | 15                | 35     | 22    | 22.1           | 0.65               | NA 2015             | 23.5                | 37.5                  | 11000           | 17000      | 0.0345              | 0.082          |
|                | 0.5906            | 1.3780 | 0.866 | 0.8701         | 0.026              |                     | 5280                | 8430                  |                 |            |                     | 0.181          |
| 17             | 17                | 35     | 15    | 23.9           | 0.65               | NA 1017*            | 13.7                | 22.5                  | 10000           | 16000      | 0.0321              | 0.047          |
|                | 0.6693            | 1.3780 | 0.591 | 0.9409         | 0.026              |                     | 3080                | 5060                  |                 |            |                     |                |
| 20             | 20                | 42     | 18    | 28.7           | 0.65               | NA 1020             | 19.3                | 33.5                  | 8600            | 13000      | 0.0374              | 0.084          |
|                | 0.7874            | 1.6535 | 0.709 | 1.1299         | 0.026              |                     | 4340                | 7530                  |                 |            |                     |                |
|                | 20                | 42     | 22    | 28.7           | 0.65               | NA 2020             | 28.5                | 49.0                  | 8600            | 13000      | 0.0411              | 0.104          |
|                | 0.7874            | 1.6535 | 0.866 | 1.1299         | 0.026              |                     | 6410                | 11000                 |                 |            |                     | 0.229          |
| 25             | 25                | 47     | 18    | 33.5           | 0.65               | NA 1025             | 21.5                | 39.0                  | 7200            | 11000      | 0.0415              | 0.097          |
|                | 0.9843            | 1.8504 | 0.709 | 1.3189         | 0.026              |                     | 4830                | 8770                  |                 |            |                     |                |
|                | 25                | 47     | 22    | 33.5           | 0.65               | NA 2025             | 33.0                | 60.0                  | 7200            | 11000      | 0.0457              | 0.122          |
|                | 0.9843            | 1.8504 | 0.866 | 1.3189         | 0.026              |                     | 7420                | 13500                 |                 |            |                     | 0.269          |
|                | 25                | 47     | 30    | 33.5           | 0.65               | NA 22025            | 52.0                | 94.0                  | 7200            | 11000      | 0.0537              | 0.170          |
|                | 0.9843            | 1.8504 | 1.181 | 1.3189         | 0.026              |                     | 11700               | 21100                 |                 |            |                     | 0.375          |
| 30             | 30                | 52     | 18    | 38.2           | 0.65               | NA 1030             | 23.5                | 44.5                  | 6500            | 10000      | 0.0455              | 0.107          |
|                | 1.1811            | 2.0472 | 0.709 | 1.5039         | 0.026              |                     | 5280                | 10000                 |                 |            |                     |                |
|                | 30                | 52     | 22    | 38.2           | 0.65               | NA 2030             | 34.5                | 66.0                  | 6500            | 10000      | 0.0501              | 0.139          |
|                | 1.1811            | 2.0472 | 0.866 | 1.5039         | 0.026              |                     | 7760                | 14800                 |                 |            |                     | 0.306          |
|                | 30                | 52     | 30    | 38.2           | 0.65               | NA 22030            | 57.0                | 108                   | 6500            | 10000      | 0.0588              | 0.193          |
|                | 1.1811            | 2.0472 | 1.181 | 1.5039         | 0.026              |                     | 12800               | 24300                 |                 |            |                     | 0.425          |
|                | 30                | 62     | 30    | 44.0           | 0.65               | NA 3030             | 64.0                | 125                   | 5600            | 8600       | 0.0607              | 0.309          |
|                | 1.1811            | 2.4409 | 1.181 | 1.7323         | 0.026              |                     | 14400               | 28100                 |                 |            |                     | 0.681          |
| 35             | 35                | 58     | 18    | 44.0           | 0.65               | NA 1035             | 26.0                | 51.0                  | 5600            | 8600       | 0.0552              | 0.127          |
|                | 1.3780            | 2.2835 | 0.709 | 1.7323         | 0.026              |                     | 5850                | 11500                 |                 |            |                     |                |
|                | 35                | 58     | 22    | 44.0           | 0.65               | NA 2035             | 38.0                | 75.0                  | 5600            | 8600       | 0.0552              | 0.160          |
|                | 1.3780            | 2.2835 | 0.866 | 1.7323         | 0.026              |                     | 8540                | 16900                 |                 |            |                     | 0.353          |
|                | 35                | 58     | 30    | 44.0           | 0.65               | NA 22035            | 63.0                | 124                   | 5600            | 8600       | 0.0686              | 0.225          |
|                | 1.3780            | 2.2835 | 1.181 | 1.7323         | 0.026              |                     | 14200               | 27900                 |                 |            |                     | 0.496          |
|                | 35                | 72     | 36    | 50.0           | 0.65               | NA 3035             | 90.0                | 183                   | 4900            | 7600       | 0.0706              | 0.545          |
|                | 1.3780            | 2.8346 | 1.417 | 1.9685         | 0.026              |                     | 20200               | 41100                 |                 |            |                     | 1.202          |
| 40             | 40                | 65     | 18    | 49.7           | 0.85               | NA 1040             | 28.5                | 58.0                  | 4900            | 7600       | 0.0546              | 0.160          |
|                | 1.5748            | 2.5591 | 0.709 | 1.9567         | 0.033              |                     | 6410                | 13000                 |                 |            |                     |                |
|                | 40                | 65     | 22    | 49.7           | 0.85               | NA 2040             | 41.5                | 85.0                  | 4900            | 7600       | 0.0601              | 0.200          |
|                | 1.5748            | 2.5591 | 0.866 | 1.9567         | 0.033              |                     | 9330                | 19100                 |                 |            |                     | 0.441          |
|                | 40                | 65     | 30    | 49.7           | 0.85               | NA 22040            | 68.0                | 140                   | 4900            | 7600       | 0.0707              | 0.278          |
|                | 1.5748            | 2.5591 | 1.181 | 1.9567         | 0.033              |                     | 15300               | 31500                 |                 |            |                     | 0.613          |
|                | 40                | 80     | 36    | 55.4           | 0.85               | NA 3040             | 97.0                | 204                   | 4500            | 6900       | 0.0759              | 0.672          |
|                | 1.5748            | 3.1496 | 1.417 | 2.1811         | 0.033              |                     | 21800               | 45900                 |                 |            |                     | 1.482          |
| 45             | 45                | 72     | 18    | 55.4           | 0.85               | NA 1045             | 30.5                | 65.0                  | 4500            | 6900       | 0.0590              | 0.193          |
|                | 1.7717            | 2.8346 | 0.709 | 2.1811         | 0.033              |                     | 6860                | 14600                 |                 |            |                     |                |

\* No lubrication holes.

Continued on next page.

## Heavy-Duty Needle Roller Bearings

| Shaft Diameter | Dimensions mm/in. |                |       |        |                | Bearing Designation | Load Ratings kN/bf. |           | Limiting Speeds       |         | Approx. Wt. kg/lbs. |            |
|----------------|-------------------|----------------|-------|--------|----------------|---------------------|---------------------|-----------|-----------------------|---------|---------------------|------------|
|                | mm                | F <sub>w</sub> | D     | B      | E <sub>w</sub> |                     | r <sub>s min</sub>  | Dynamic C | Static C <sub>0</sub> | Oil RPM |                     | Grease RPM |
|                | 45                | 72             | 22    | 55.4   | 0.85           | NA 2045             | 45.0                | 95.0      | 4500                  | 6900    | 0.0649              | 0.242      |
|                | 1.7717            | 2.8346         | 0.866 | 2.1811 | 0.033          |                     | 10100               | 21400     |                       |         |                     |            |
|                | 45                | 85             | 38    | 62.1   | 0.85           | NA 3045             | 105.0               | 230       | 4000                  | 6100    | 0.0823              | 0.710      |
|                | 1.7717            | 3.3465         | 1.496 | 2.4449 | 0.033          |                     | 23600               | 51700     |                       |         |                     |            |
| 50             | 50                | 80             | 20    | 62.1   | 0.85           | NA 1050             | 33.0                | 73.0      | 4000                  | 6100    | 0.0639              | 0.255      |
|                | 1.9685            | 3.1496         | 0.787 | 2.4449 | 0.033          |                     | 7420                | 16400     |                       |         |                     |            |
|                | 50                | 80             | 28    | 62.1   | 0.85           | NA 2050             | 64.0                | 142       | 4000                  | 6100    | 0.0754              | 0.375      |
|                | 1.9685            | 3.1496         | 1.102 | 2.4449 | 0.033          |                     | 14400               | 31900     |                       |         |                     |            |
|                | 50                | 90             | 38    | 68.8   | 0.85           | NA 3050             | 113.0               | 255       | 3600                  | 5500    | 0.0885              | 0.705      |
|                | 1.9685            | 3.5433         | 1.496 | 2.7087 | 0.033          |                     | 25400               | 57300     |                       |         |                     |            |
| 55             | 55                | 85             | 20    | 68.8   | 0.85           | NA 1055             | 35.5                | 80.0      | 3600                  | 5500    | 0.0687              | 0.258      |
|                | 2.1654            | 3.3465         | 0.787 | 2.7087 | 0.033          |                     | 7980                | 18000     |                       |         |                     |            |
|                | 55                | 85             | 28    | 68.8   | 0.85           | NA 2055             | 69.0                | 157       | 3600                  | 5500    | 0.0810              | 0.361      |
|                | 2.1654            | 3.3465         | 1.102 | 2.7087 | 0.033          |                     | 15500               | 35300     |                       |         |                     |            |
|                | 55                | 95             | 38    | 72.6   | 0.85           | NA 3055             | 117.0               | 268       | 3400                  | 5200    | 0.0811              | 0.782      |
|                | 2.1654            | 3.7402         | 1.496 | 2.8583 | 0.033          |                     | 26300               | 60200     |                       |         |                     |            |
| 60             | 60                | 90             | 20    | 72.6   | 0.85           | NA 1060             | 37.0                | 85.0      | 3400                  | 5200    | 0.0714              | 0.283      |
|                | 2.3622            | 3.5433         | 0.787 | 2.8583 | 0.033          |                     | 8320                | 19100     |                       |         |                     |            |
|                | 60                | 90             | 28    | 72.6   | 0.85           | NA 2060             | 72.0                | 165       | 3400                  | 5200    | 0.0842              | 0.413      |
|                | 2.3622            | 3.5433         | 1.102 | 2.8583 | 0.033          |                     | 16200               | 37100     |                       |         |                     |            |
|                | 60                | 100            | 38    | 78.3   | 0.85           | NA 3060             | 123.0               | 290       | 3200                  | 4900    | 0.0966              | 0.810      |
|                | 2.3622            | 3.9370         | 1.496 | 3.0827 | 0.033          |                     | 27700               | 65200     |                       |         |                     |            |
| 65             | 65                | 95             | 28    | 78.3   | 0.85           | NA 2065             | 78.0                | 184       | 3200                  | 4900    | 0.0887              | 0.433      |
|                | 2.5591            | 3.7402         | 1.102 | 3.0827 | 0.033          |                     | 17500               | 41400     |                       |         |                     |            |
|                | 65                | 105            | 38    | 83.1   | 0.85           | NA 3065             | 129.0               | 308       | 2900                  | 4500    | 0.1012              | 0.865      |
|                | 2.5591            | 4.1339         | 1.496 | 3.2717 | 0.033          |                     | 29000               | 69200     |                       |         |                     |            |
| 70             | 70                | 100            | 20    | 83.1   | 0.85           | NA 1070             | 43.0                | 103       | 2900                  | 4500    | 0.0784              | 0.322      |
|                | 2.7559            | 3.9370         | 0.787 | 3.2717 | 0.033          |                     | 9670                | 23200     |                       |         |                     |            |
|                | 70                | 100            | 28    | 83.1   | 0.85           | NA 2070             | 81.0                | 195       | 2900                  | 4500    | 0.0926              | 0.470      |
|                | 2.7559            | 3.9370         | 1.102 | 3.2717 | 0.033          |                     | 18200               | 43800     |                       |         |                     |            |
|                | 70                | 110            | 38    | 88.0   | 0.85           | NA 3070             | 134.0               | 325       | 2800                  | 4300    | 0.1050              | 0.906      |
|                | 2.7559            | 4.3307         | 1.496 | 3.4646 | 0.033          |                     | 30100               | 73100     |                       |         |                     |            |
| 75             | 75                | 110            | 32    | 88.0   | 0.85           | NA 2075             | 104.0               | 253       | 2800                  | 4300    | 0.0983              | 0.767      |
|                | 2.9528            | 4.3307         | 1.260 | 3.4646 | 0.033          |                     | 23400               | 56900     |                       |         |                     |            |
|                | 75                | 120            | 38    | 96.0   | 0.85           | NA 3075             | 142.0               | 355       | 2600                  | 4000    | 0.1117              | 1.098      |
|                | 2.9528            | 4.7244         | 1.496 | 3.7795 | 0.033          |                     | 31900               | 79800     |                       |         |                     |            |
| 80             | 80                | 115            | 24    | 96.0   | 0.85           | NA 1080             | 68.0                | 170       | 2600                  | 4000    | 0.0918              | 0.510      |
|                | 3.1496            | 4.5276         | 0.945 | 3.7795 | 0.033          |                     | 15300               | 38200     |                       |         |                     |            |
|                | 80                | 115            | 32    | 96.0   | 0.85           | NA 2080             | 110.0               | 275       | 2600                  | 4000    | 0.1045              | 0.694      |
|                | 3.1496            | 4.5276         | 1.254 | 3.7795 | 0.033          |                     | 24700               | 61800     |                       |         |                     |            |
|                | 80                | 125            | 38    | 99.5   | 0.85           | NA 3080             | 145.0               | 365       | 2500                  | 3800    | 0.1145              | 1.220      |
|                | 3.1496            | 4.9213         | 1.496 | 3.9173 | 0.033          |                     | 32600               | 82100     |                       |         |                     |            |
| 85             | 85                | 120            | 32    | 99.5   | 1.35           | NA 2085             | 113.0               | 285       | 2500                  | 3800    | 0.1072              | 0.787      |
|                | 3.3465            | 4.7244         | 1.260 | 3.9173 | 0.053          |                     | 25400               | 64100     |                       |         |                     |            |
|                | 85                | 130            | 38    | 104.7  | 1.35           | NA 3085             | 150.0               | 390       | 2300                  | 3600    | 0.1189              | 1.252      |
|                | 3.3465            | 5.1181         | 1.496 | 4.1220 | 0.053          |                     | 33700               | 87700     |                       |         |                     |            |
| 90             | 90                | 125            | 32    | 104.7  | 1.35           | NA 2090             | 117.0               | 300       | 2300                  | 3600    | 0.1113              | 0.837      |
|                | 3.5433            | 4.9213         | 1.260 | 4.1220 | 0.053          |                     | 26300               | 67400     |                       |         |                     |            |
|                | 90                | 135            | 43    | 109.7  | 1.35           | NA 3090             | 185.0               | 480       | 2300                  | 3500    | 0.1283              | 1.522      |
|                | 3.5433            | 5.3150         | 1.693 | 4.3189 | 0.053          |                     | 41600               | 108000    |                       |         |                     |            |
| 95             | 95                | 130            | 32    | 109.1  | 1.35           | NA 2095             | 120.0               | 315       | 2300                  | 3500    | 0.1225              | 0.882      |
|                | 3.7402            | 5.1181         | 1.260 | 4.2953 | 0.053          |                     | 27000               | 70800     |                       |         |                     |            |
|                | 95                | 140            | 43    | 114.7  | 1.35           | NA 3095             | 190.0               | 505       | 2100                  | 3300    | 0.1327              | 1.551      |
|                | 3.7402            | 5.5118         | 1.693 | 4.5157 | 0.053          |                     | 42700               | 114000    |                       |         |                     |            |
| 100            | 100               | 135            | 32    | 114.7  | 1.35           | NA 2100             | 125.0               | 330       | 2100                  | 3300    | 0.1188              | 0.677      |
|                | 3.9370            | 5.3150         | 1.260 | 4.5157 | 0.053          |                     | 28100               | 74200     |                       |         |                     |            |
|                | 100               | 145            | 43    | 119.2  | 1.35           | NA 3100             | 195.0               | 520       | 2100                  | 3200    | 0.1364              | 1.645      |
|                | 3.9370            | 5.7087         | 1.693 | 4.6929 | 0.053          |                     | 43800               | 117000    |                       |         |                     |            |

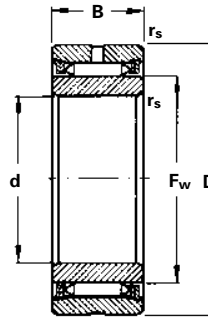
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# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER BEARINGS FULL COMPLEMENT WITH INNER RINGS — *continued* METRIC SERIES

- Check for availability.



| Shaft Diameter | Dimensions mm/in. |         |       |                |                    | Bearing Designation | Load Ratings kN/lbf. |                       | Limiting Speeds |            | Approx. Wt. kg/lbs. |                |
|----------------|-------------------|---------|-------|----------------|--------------------|---------------------|----------------------|-----------------------|-----------------|------------|---------------------|----------------|
|                | F <sub>w</sub>    | D       | B     | E <sub>w</sub> | r <sub>s min</sub> |                     | Dynamic C            | Static C <sub>0</sub> | Oil RPM         | Grease RPM |                     | C <sub>g</sub> |
| 105            | 105               | 140     | 32    | 119.2          | 1.35               | NA 2105             | 129.0                | 340                   | 2100            | 3200       | 0.1221              | 0.941          |
|                | 4.1339            | 5.5118  | 1.260 | 4.6929         | 0.053              |                     | 29000                | 76400                 |                 |            |                     |                |
| 110            | 105               | 150     | 45    | 124.7          | 1.35               | NA 3105             | 203.0                | 550                   | 2000            | 3000       | 0.1409              | 1.762          |
|                | 4.1339            | 5.9055  | 1.772 | 4.9094         | 0.053              |                     | 45600                | 124000                |                 |            |                     | 3.885          |
| 110            | 110               | 145     | 34    | 124.7          | 1.35               | NA 2110             | 133.0                | 360                   | 2000            | 3000       | 0.1261              | 1.015          |
|                | 4.3307            | 5.7087  | 1.339 | 4.9094         | 0.053              | 29900               | 80900                |                       |                 |            |                     |                |
| 115            | 110               | 160     | 45    | 132.5          | 1.35               | NA 3110             | 210.0                | 580                   | 1900            | 2900       | 0.1471              | 2.037          |
|                | 4.3307            | 6.2992  | 1.772 | 5.2165         | 0.053              |                     | 47200                | 130000                |                 |            |                     | 4.491          |
| 115            | 115               | 155     | 34    | 132.5          | 1.35               | NA 2115             | 139.0                | 380                   | 1900            | 2900       | 0.1318              | 1.205          |
|                | 4.5276            | 6.1024  | 1.339 | 5.2165         | 0.053              | 31200               | 85400                |                       |                 |            |                     |                |
| 120            | 115               | 165     | 45    | 137.0          | 1.35               | NA 3115             | 215.0                | 600                   | 1800            | 2800       | 0.1507              | 2.140          |
|                | 4.5276            | 6.4961  | 1.772 | 5.3937         | 0.053              |                     | 48300                | 135000                |                 |            |                     | 4.718          |
| 120            | 120               | 160     | 34    | 137.0          | 1.35               | NA 2120             | 142.0                | 395                   | 1800            | 2800       | 0.1350              | 1.265          |
|                | 4.7244            | 6.2992  | 1.339 | 5.3937         | 0.053              | 31900               | 88800                |                       |                 |            |                     |                |
| 125            | 120               | 170     | 45    | 143.5          | 1.35               | NA 3120             | 224.0                | 630                   | 1800            | 2700       | 0.1563              | 2.107          |
|                | 4.7244            | 6.6929  | 1.772 | 5.6496         | 0.053              |                     | 50400                | 142000                |                 |            |                     | 4.645          |
| 125            | 125               | 165     | 34    | 143.5          | 1.35               | NA 2125             | 145.0                | 410                   | 1800            | 2700       | 0.1403              | 1.218          |
|                | 4.9213            | 6.4961  | 1.339 | 5.6496         | 0.053              | 32600               | 92200                |                       |                 |            |                     |                |
| 130            | 130               | 170     | 34    | 148.0          | 1.35               | NA 2130             | 150.0                | 425                   | 1700            | 2600       | 0.1435              | 1.292          |
|                | 5.1181            | 6.6929  | 1.339 | 5.8268         | 0.053              | 33700               | 95500                |                       |                 |            |                     |                |
| 140            | 140               | 180     | 36    | 158.0          | 1.35               | NA 2140             | 157.0                | 455                   | 1600            | 2400       | 0.1504              | 1.478          |
|                | 5.5118            | 7.0866  | 1.417 | 6.2205         | 0.053              | 35300               | 102000               |                       |                 |            |                     |                |
| 150            | 140               | 205     | 52    | 170.5          | 1.35               | NA 3140             | 290.0                | 860                   | 1400            | 2200       | 0.1787              | 3.840          |
|                | 5.5118            | 8.0709  | 2.047 | 6.7126         | 0.053              |                     | 65200                | 193000                |                 |            |                     | 8.466          |
| 150            | 150               | 195     | 36    | 170.5          | 1.35               | NA 2150             | 165.0                | 490                   | 1400            | 2200       | 0.1591              | 1.790          |
|                | 5.9055            | 7.6772  | 1.417 | 6.7126         | 0.053              | 37100               | 110000               |                       |                 |            |                     |                |
| 160            | 160               | 205     | 36    | 179.3          | 1.35               | NA 2160             | 170.0                | 515                   | 1400            | 2100       | 0.1650              | 1.970          |
|                | 6.2992            | 8.0709  | 1.417 | 7.0591         | 0.053              | 38200               | 116000               |                       |                 |            |                     |                |
| 170            | 170               | 220     | 42    | 193.8          | 1.35               | NA 2170             | 233.0                | 720                   | 1300            | 2000       | 0.1852              | 2.570          |
|                | 6.6929            | 8.6614  | 1.654 | 7.6299         | 0.053              | 52400               | 162000               |                       |                 |            |                     |                |
| 180            | 180               | 230     | 42    | 202.6          | 1.35               | NA 2180             | 240.0                | 750                   | 1200            | 1900       | 0.2145              | 2.835          |
|                | 7.0866            | 9.0551  | 1.654 | 7.9764         | 0.053              | 54000               | 169000               |                       |                 |            |                     |                |
| 190            | 190               | 245     | 42    | 216.0          | 1.35               | NA 2190             | 250.0                | 800                   | 1200            | 1800       | 0.2004              | 3.210          |
|                | 7.4803            | 9.6457  | 1.654 | 8.5039         | 0.053              | 56200               | 180000               |                       |                 |            |                     |                |
| 200            | 200               | 255     | 42    | 224.1          | 1.35               | NA 2200             | 257.0                | 830                   | 1100            | 1700       | 0.2057              | 3.560          |
|                | 7.8740            | 10.0394 | 1.654 | 8.8228         | 0.053              | 57800               | 187000               |                       |                 |            |                     |                |

## SINGLE ROW RADIAL BEARINGS –

### METRIC SERIES

The cylindrical roller radial bearing has integral end ribs on the outer ring for end guiding the cylindrical rollers. The inner ring is separable for simplified mounting and removal.

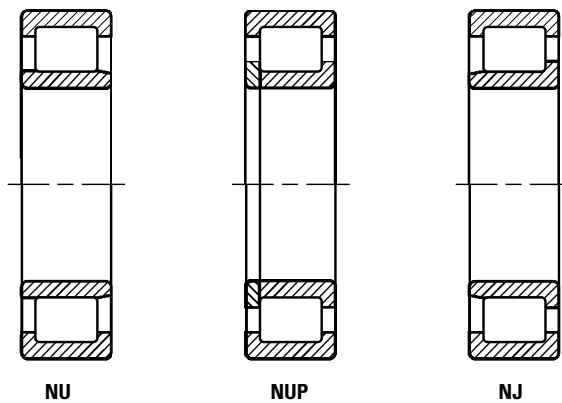
All NU design bearings are available on request without inner rings. For this requirement add letter R in the prefix.

The modified line contact between the cylindrical rollers and raceways reduces edge stressing.

### REFERENCE STANDARDS ARE:

- DIN 5412 single-row cylindrical roller bearings.
- ISO 246 & DIN 5412 Angle rings (thrust collar).

### TYPES OF METRIC SERIES CYLINDRICAL ROLLER RADIAL BEARINGS



#### Suffixes

|              |                                                                  |
|--------------|------------------------------------------------------------------|
| <b>E.TVP</b> | E-design bearing, molded window type cage of engineered polymer. |
| <b>M</b>     | Machined brass cages.                                            |

### CONSTRUCTION

Cylindrical roller radial bearings can be recognized by the arrangement of their end ribs. Bearings of NU design have two ribs on the outer ring, the inner ring being cylindrical, which makes them well-suited for use as floating bearings. They are separable, which simplifies mounting and removal. Cylindrical roller radial bearings of NJ design have two ribs on the outer ring and one rib on the inner ring. They can accept axial loading in one direction.

Bearings of NUP design have two ribs on the outer ring, and one fixed and one loose rib (a flat washer) on the inner ring. These cylindrical roller radial bearings are used for locating purposes and can accept reversing axial loading. A cylindrical radial roller bearing of NJ design with an HJ Type thrust collar forms a locating bearing similar to the NUP design.

Cylindrical roller bearings of RNU Type, available on request, are supplied without an inner ring so that the cylindrical rollers run directly on a hardened and ground shaft. For most general applications the shaft may be machined to g6 and the housing bore to K6 tolerances.

### CAGE DESIGNS

Cylindrical roller bearings of series 2..E, 22..E, 3..E and 23..E mostly use cages of glass fiber reinforced nylon. This cage construction allows for bearings to be designed with maximum load carrying capability. These cages can be used at operating temperatures of up to 120° C over extended periods. When bearings are lubricated with an oil, presence of additives may reduce operating life if the temperature exceeds 100° C over extended periods. Furthermore, stagnant oil may affect the performance of the cage at these temperatures, requiring oil change intervals to be strictly observed.

Suffix M indicates that the bearings use machined brass cages.

**FOR MORE INFORMATION ON  
CYLINDRICAL ROLLER TYPES NU, NUP AND NJ,  
SEE THE RADIAL CYLINDRICAL SECTION**





## NEEDLE ROLLER BEARINGS

### DIMENSIONAL ACCURACY

#### TOLERANCES AND BEARING CLEARANCE

Metric series cylindrical roller radial bearings are available in various tolerance classes and clearance groups. Single row cylindrical roller bearings are made to normal clearance group C0 although bearings with radial clearance groups C2, C3 and C4 may be obtained on request.

For tolerances of cylindrical roller radial bearings see page B336. For radial internal clearances of cylindrical roller radial bearings see page B336.

#### ALIGNMENT

The modified line contact between the cylindrical rollers and raceways of cylindrical roller bearings reduces stress concentration at ends of the rollers and provides some aligning capability. The angular alignment of single row cylindrical roller bearings must not exceed a maximum of 4 angular minutes at a load of  $P/C < 0.2$  ( $P$  = equivalent dynamic load, kN.) At higher applied loads, or with presence of greater misalignment, consultation with your Timken representative is strongly encouraged.

#### MOUNTING DIMENSIONS

The bearing inner and outer rings should be mounted against the stepped portion on the shaft and the shoulder of the housing. Under no circumstances should they interfere with the shaft or housing fillets. For this reason the maximum fillet radius  $r_{as\ max}$  of the mating component must be no greater than the minimum chamfer dimension of the corresponding cylindrical roller bearing ring corner  $r_{s\ min}$ .

The shoulder of the mating components must be such that, even with the maximum permissible single chamfer dimension of the corresponding bearing ring, there is an adequate contact surface area. Table 1 lists the maximum fillet radius  $r_{as\ max}$  and the minimum shoulder height. At high axial loads the ribs must be supported over half their height.

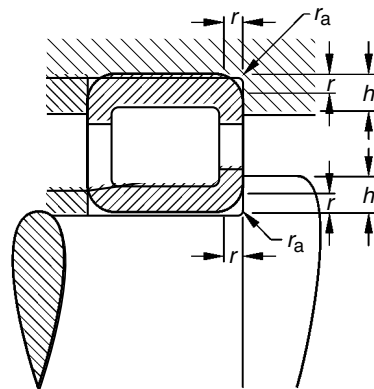
$$\left( \frac{H + E}{2} \text{ and } \frac{F + J}{2} \right)$$

where from bearing tables:

- F** raceway diameter of the inner ring
- E** raceway diameter of the outer ring
- J** rib diameter of the inner ring
- H** rib diameter of the outer ring

The shaft can be mounted and removed if the mounting dimensions shown in Table 2 on page C135 are observed.

TABLE 1 –  
ABUTMENT DIMENSIONS AS SPECIFIED IN DIN 5418 FOR  
METRIC SERIES BEARINGS



| mm           | Bearing series |           |       |       |
|--------------|----------------|-----------|-------|-------|
|              | 10             |           | 2..E  | 3..E  |
|              |                |           | 22..E | 23..E |
| $r_{s\ min}$ | $r_{as\ max}$  | $h_{min}$ |       |       |
| 0.3          | 0.3            | 1         | 1.2   |       |
| 0.6          | 0.6            | 1.6       | 2.1   |       |
| 1            | 1              | 2.3       | 2.8   |       |
| 1.1          | 1              | 3         | 3.5   |       |
| 1.5          | 1.5            | 3.5       | 4.5   |       |
| 2            | 2              | 4.4       | 5.5   |       |
| 2.1          | 2.1            | 5.1       | 6     |       |
| 3            | 2.5            | 6.2       | 7     |       |
| 4            | 3              | 7.3       | 8.5   |       |
| 5            | 4              | 9         | 10    |       |
| 6            | 5              | 11.5      | 13    |       |

See engineering section for shaft tolerances for cylindrical roller bearings with inner rings.

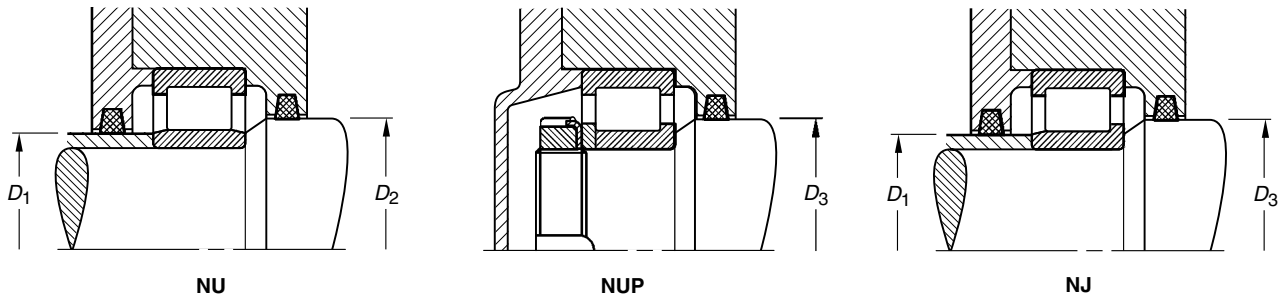


TABLE 2 – MOUNTING DIMENSIONS FOR METRIC SERIES SINGLE-ROW CYLINDRICAL ROLLER BEARINGS

| Bore Reference Number | Shaft Diameter<br>mm | Bearing Series 10 |                |                       |                |                |                       |                |                |
|-----------------------|----------------------|-------------------|----------------|-----------------------|----------------|----------------|-----------------------|----------------|----------------|
|                       |                      | Max.              | Min.           | 2..E<br>22..E<br>Max. | Min.           | Min.           | 3..E<br>23..E<br>Max. | Min.           | Min.           |
|                       |                      | D <sub>1</sub>    | D <sub>2</sub> | D <sub>1</sub>        | D <sub>2</sub> | D <sub>3</sub> | D <sub>1</sub>        | D <sub>2</sub> | D <sub>3</sub> |
| 02                    | 15                   |                   |                | 20                    | 23             | 26             |                       |                |                |
| 03                    | 17                   |                   |                | 21                    | 25             | 27             | 24                    | 27             | 30             |
| 04                    | 20                   | 25                | 27             | 26                    | 29             | 32             | 27                    | 30             | 33             |
| 05                    | 25                   | 30                | 32             | 31                    | 34             | 37             | 33                    | 37             | 40             |
| 06                    | 30                   | 35                | 38             | 37                    | 40             | 44             | 40                    | 44             | 48             |
| 07                    | 35                   | 41                | 44             | 43                    | 46             | 50             | 45                    | 48             | 53             |
| 08                    | 40                   | 46                | 49             | 49                    | 52             | 56             | 51                    | 55             | 60             |
| 09                    | 45                   | 52                | 54             | 54                    | 57             | 61             | 57                    | 60             | 66             |
| 10                    | 50                   | 57                | 59             | 58                    | 62             | 67             | 63                    | 67             | 73             |
| 11                    | 55                   | 63                | 66             | 65                    | 68             | 73             | 69                    | 72             | 80             |
| 12                    | 60                   | 68                | 71             | 71                    | 75             | 80             | 75                    | 79             | 86             |
| 13                    | 65                   | 73                | 76             | 77                    | 81             | 87             | 81                    | 85             | 93             |
| 14                    | 70                   | 78                | 82             | 82                    | 86             | 92             | 87                    | 92             | 100            |
| 15                    | 75                   | 83                | 87             | 87                    | 90             | 96             | 93                    | 97             | 106            |
| 16                    | 80                   | 90                | 94             | 94                    | 97             | 104            | 99                    | 105            | 114            |





## NEEDLE ROLLER BEARINGS

### LOAD RATINGS

#### MAXIMUM CAPACITY BEARINGS

The maximum capacity cylindrical roller radial bearings are designated with a letter E in the suffix. The cylindrical rollers are designed for maximum load carrying capability and are available in bearings of series 2, 22, 3 and 23.

#### EQUIVALENT DYNAMIC LOADS

For cylindrical roller bearings with purely radial applied load:

$$P = F_r \text{ (kN)}$$

$$P = \text{Equivalent dynamic load (kN)}$$

$F_r$  = The maximum dynamic radial load that may be applied to a cylindrical roller bearing based on the dynamic load rating C given in the tabular pages. This load should be  $\leq C/3$ .

If, in addition to the radial load, an axial load  $F_a$  acts on the bearing, this axial load is taken into consideration when calculating the life of a bearing (with  $F_a \leq F_{az}$ ;  $F_{az}$  is the allowable axial load).

| Dimension Series | Load Ratio                              | Equivalent Dynamic Load                            |
|------------------|-----------------------------------------|----------------------------------------------------|
| 10, 2..E, 3..E   | $F_a/F_r \leq 0.11$<br>$F_a/F_r > 0.11$ | $P = F_r$<br>$P = 0.93 \cdot F_r + 0.69 \cdot F_a$ |
| 22..E, 23..E     | $F_a/F_r \leq 0.17$<br>$F_a/F_r > 0.17$ | $P = F_r$<br>$P = 0.93 \cdot F_r + 0.45 \cdot F_a$ |

#### ALLOWABLE AXIAL LOAD

Metric series cylindrical roller bearings of NUP, NJ, as well as NU or NJ designs with a thrust collar can transmit axial loads if they are radially loaded at the same time. The allowable axial load ratio  $F_a/C$  of 0,1 maximum depends to a great extent on the magnitude of radial load, the operating speed, type of lubricant used, the operating temperature and heat transfer conditions at the bearing location. The heat balance achieved at the bearing location is used as a basis for determination of the allowable axial load.

The nomogram on page C137 should be used to determine the allowable axial load  $F_{az}$  based on the following operating conditions:

- The axial load is of constant direction and magnitude
- Radial load ratio  $F_r/C \leq 0.2$
- Ratio of axial load to radial load  $F_a/F_r < 0.4$
- The temperature of the bearing is 80° C at an ambient temperature of 20° C.
- Lubricating oil is ISO VG 100 using oil bath lubrication or circulating oil.
- As an alternative, the bearing may be lubricated with a grease using the above specified base oil and viscosity. Use of EP additives will be necessary, although considerably shorter relubrication intervals may be expected than with purely radially loaded cylindrical roller radial bearings.

#### EXAMPLE OF USING THE NOMOGRAM

From the lower part of the nomogram, determine the intersection point of the inner ring bore diameter and the dimension series of the bearing. From the upper part, the allowable axial load ratio  $F_{az}/C$  can be found as a function of the operating speed, n.

For a cylindrical roller radial bearing **NU2207E.TVP**

$$C = 63 \text{ kN}; d = 35 \text{ mm}$$

$$n = 2000 \text{ RPM}$$

$$F_r = 10 \text{ kN}$$

From the nomogram:

$$F_{az}/C = 0.06$$

$$\text{Then } F_{az} = 0.06 \cdot 63$$

The calculated allowable axial load  $F_{az}$  is 3.78 kN

It should be noted that an axial load as high as that determined by means of the nomogram should not be applied if an oil of rated kinematic viscosity lower than ISO VG 100 is used. Suitable EP additives, which are known for fatigue life improving qualities, may allow for an increase in applied axial load subject to thorough testing.

#### HIGHER APPLIED AXIAL LOADS

Axial loads greater than those determined by means of the nomogram may be considered, providing they are to be applied intermittently. Also, the bearing should be cooled using circulating oil lubrication and if the operating temperature, due to the internal friction and the higher axial load, exceeds 80° C, a more viscous oil must be used.

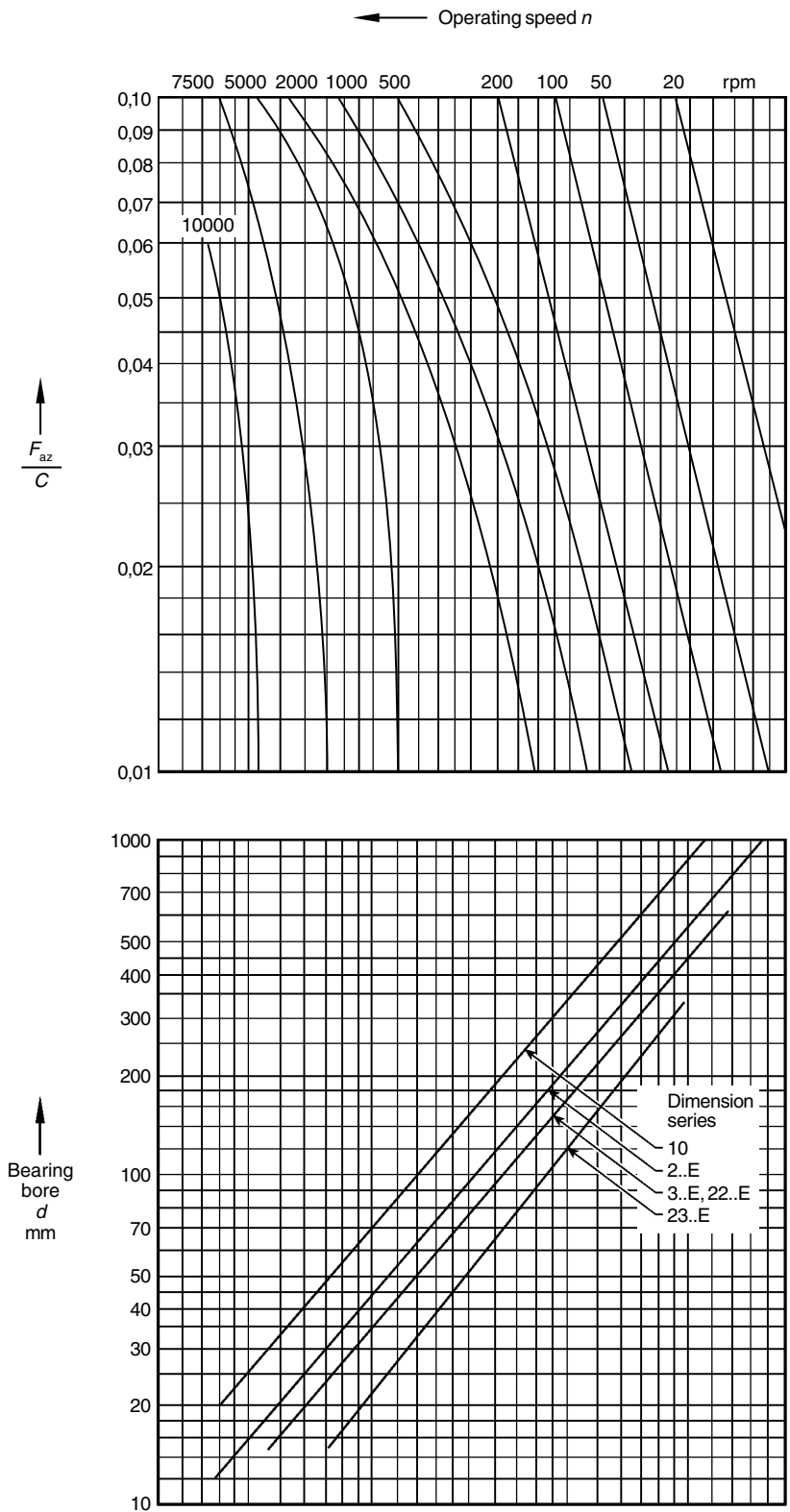
#### EQUIVALENT STATIC LOAD

For cylindrical roller radial bearings with radially applied static loads

$$P_0 = F_r \text{ (kN)}$$

**FOR MORE INFORMATION ON  
CYLINDRICAL ROLLER TYPES NU, NUP AND NJ,  
SEE THE RADIAL CYLINDRICAL SECTION**

**NOMOGRAM FOR DETERMINING THE ALLOWABLE AXIAL LOAD  $F_{AZ}$**



C





## NEEDLE ROLLER BEARINGS

### NEEDLE ROLLER BEARINGS –

#### INCH SERIES

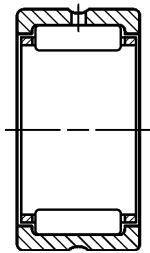
When there is a requirement for a rolling bearing to support very high dynamic, static or even shock loads with a restricted mounting space, the needle roller bearing may be found to give best results.

#### REFERENCE STANDARDS ARE:

- **ANSI/ABMA Standard 18.2** – Needle Roller Bearings – Radial, Inch Design.
- **ASTM Standard F 2246** – Standard Specification for Bearing, Roller, Needle: Thick Outer Ring with Rollers and Cage.
- **Military Standard MS 51961** – Bearing, Roller, Needle: Thick Outer Ring with Rollers and Cage.

## C

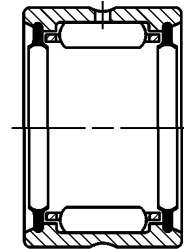
### IDENTIFICATION



HJ



IR



HJ – .2RS

The prefix letters HJ in the needle roller bearing designation denote that the bearing is manufactured to inch nominal dimensions.

Bearings are available with one or two lip contact seals as listed on pages C148-C149. One seal is designated by suffix letters RS. Two seals are designated by .2RS.

Inner rings can be used with HJ Series needle roller bearings for applications where it is impractical to use the shaft as the inner raceway. These inch series inner rings are identified by the prefix letters IR.

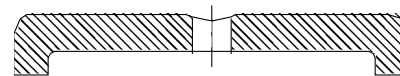
Since the entire identification code may not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for service or field replacement, to make certain that the correct bearing with the correct lubricant is used.

### CONSTRUCTION

The HJ Series needle roller bearing has a one-piece channel-shaped outer ring of bearing quality steel, heat treated to provide maximum load rating. The integral end flanges provide axial location for the needle rollers. The bores of the end flanges serve as piloting surfaces for the cage, locating it to prevent removal of the lubricant film on the raceway.

These bearings have a steel cage which provides inward retention for the needle rollers. The design assures roller stability and minimizes friction between the cage and the needle rollers. The cage has a maximum strength consistent with the inherent high load ratings of needle roller bearings.

The needle rollers are made from high carbon chrome steel, through-hardened, ground and lapped to close tolerance with controlled contour for optimum load distribution.



One Piece Channel-Shaped, Outer Ring



## DIMENSIONAL ACCURACY, BEARINGS – INCH SERIES

Tolerances for the HJ bearings are given in Tables 1 and 2.

Pages C142-C149 list the nominal outside diameter, width and needle roller complement bore diameter for the HJ bearings.

TABLE 1 – OUTSIDE DIAMETER AND WIDTH TOLERANCES, HJ BEARINGS

| D<br>Nominal Outside Diameter |         |         |         | Deviations from Nominal<br>of Single Mean Outside Diameter, $D_{mp}^{(1)}$ |        |      |         |      |        | of Width, C |        |      |        |      |        |
|-------------------------------|---------|---------|---------|----------------------------------------------------------------------------|--------|------|---------|------|--------|-------------|--------|------|--------|------|--------|
| mm                            |         | inch    |         | mm                                                                         |        | inch |         | mm   |        | inch        |        | mm   |        | inch |        |
| >                             | ≤       | >       | ≤       | high                                                                       | low    | high | low     | high | low    | high        | low    | high | low    | high | low    |
| 19.050                        | 50.800  | 0.7500  | 2.0000  | +0                                                                         | -0.013 | +0   | -0.0005 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |
| 50.800                        | 82.550  | 2.0000  | 3.2500  | +0                                                                         | -0.015 | +0   | -0.0006 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |
| 82.550                        | 120.650 | 3.2500  | 4.7500  | +0                                                                         | -0.020 | +0   | -0.0008 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |
| 120.650                       | 184.150 | 4.7500  | 7.2500  | +0                                                                         | -0.025 | +0   | -0.0010 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |
| 184.150                       | 260.350 | 7.2500  | 10.2500 | +0                                                                         | -0.030 | +0   | -0.0012 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |
| 260.350                       | 317.500 | 10.2500 | 12.5000 | +0                                                                         | -0.036 | +0   | -0.0014 | +0   | -0.013 | +0          | -0.005 | +0   | -0.005 | +0   | -0.005 |

<sup>(1)</sup> "Single mean diameter" is defined as the mean diameter in a single radial plane.

TABLE 2 – ROLLER COMPLEMENT BORE TOLERANCE, HJ BEARINGS

| $F_w$<br>Nominal Roller Complement Bore Diameter |         |        |        | Deviations from Nominal of the smallest Single Diameter <sup>(1)</sup><br>of the Roller Complement Bore, $F_{w \min}$ . |        |         |         |        |        |         |         |
|--------------------------------------------------|---------|--------|--------|-------------------------------------------------------------------------------------------------------------------------|--------|---------|---------|--------|--------|---------|---------|
| mm                                               |         | inch   |        | mm                                                                                                                      |        | inch    |         | mm     |        | inch    |         |
| >                                                | ≤       | >      | ≤      | low                                                                                                                     | high   | low     | high    | low    | high   | low     | high    |
| 12.700                                           | 15.875  | 0.5000 | 0.6250 | +0.020                                                                                                                  | +0.043 | +0.0008 | +0.0017 | +0.020 | +0.043 | +0.0008 | +0.0017 |
| 15.875                                           | 28.575  | 0.6250 | 1.1250 | +0.023                                                                                                                  | +0.046 | +0.0009 | +0.0018 | +0.023 | +0.046 | +0.0009 | +0.0018 |
| 28.575                                           | 41.275  | 1.1250 | 1.6250 | +0.025                                                                                                                  | +0.048 | +0.0010 | +0.0019 | +0.025 | +0.048 | +0.0010 | +0.0019 |
| 41.275                                           | 47.625  | 1.6250 | 1.8750 | +0.025                                                                                                                  | +0.050 | +0.0010 | +0.0020 | +0.025 | +0.050 | +0.0010 | +0.0020 |
| 47.625                                           | 69.850  | 1.8750 | 2.7500 | +0.028                                                                                                                  | +0.053 | +0.0011 | +0.0021 | +0.028 | +0.053 | +0.0011 | +0.0021 |
| 69.850                                           | 76.200  | 2.7500 | 3.0000 | +0.028                                                                                                                  | +0.058 | +0.0011 | +0.0023 | +0.028 | +0.058 | +0.0011 | +0.0023 |
| 76.200                                           | 101.600 | 3.0000 | 4.0000 | +0.030                                                                                                                  | +0.060 | +0.0012 | +0.0024 | +0.030 | +0.060 | +0.0012 | +0.0024 |
| 101.600                                          | 114.300 | 4.0000 | 4.5000 | +0.030                                                                                                                  | +0.066 | +0.0012 | +0.0026 | +0.030 | +0.066 | +0.0012 | +0.0026 |
| 114.300                                          | 152.400 | 4.5000 | 6.0000 | +0.033                                                                                                                  | +0.069 | +0.0013 | +0.0027 | +0.033 | +0.069 | +0.0013 | +0.0027 |
| 152.400                                          | 165.120 | 6.0000 | 6.5000 | +0.033                                                                                                                  | +0.074 | 0.0013  | +0.0029 | +0.033 | +0.074 | 0.0013  | +0.0029 |
| 165.100                                          | 195.850 | 6.5000 | 7.7500 | +0.036                                                                                                                  | +0.077 | 0.0014  | +0.0030 | +0.036 | +0.077 | 0.0014  | +0.0030 |
| 196.850                                          | 234.950 | 7.7500 | 9.2500 | +0.036                                                                                                                  | +0.082 | 0.0014  | +0.0032 | +0.036 | +0.082 | 0.0014  | +0.0032 |

<sup>(1)</sup> "The smallest single diameter of the roller complement bore" is defined as the diameter of the cylinder which, when used as a bearing inner ring, results in zero radial internal clearance in the bearing on at least one diameter.



# NEEDLE ROLLER BEARINGS

## DIMENSIONAL ACCURACY, INNER RINGS –

### INCH SERIES

Tolerances for the IR inner rings are given in Table 3 and 4. Pages C150-C153 list the nominal outside diameter, width and bore diameter for the IR series inner rings.

TABLE 3 – BORE AND WIDTH TOLERANCES, IR INNER RING

| d<br>Nominal Outside Diameter |         |        |        | Deviations from Nominal<br>of Single Mean Outside Diameter, $d_{mp}^{(1)}$ |        |      |          |       |       |        |        |
|-------------------------------|---------|--------|--------|----------------------------------------------------------------------------|--------|------|----------|-------|-------|--------|--------|
| mm                            |         | inch   |        | of Width, B                                                                |        |      |          |       |       |        |        |
| >                             | ≤       | >      | ≤      | high                                                                       | low    | high | low      | high  | low   | high   | low    |
| 7.938                         | 19.050  | 0.3125 | 0.7500 | +0                                                                         | -0.010 | +0   | -0.0004  | +0.25 | +0.12 | +0.010 | +0.005 |
| 19.050                        | 50.800  | 0.7500 | 2.0000 | +0                                                                         | -0.013 | +0   | -0.0005  | +0.25 | +0.12 | +0.010 | +0.005 |
| 50.800                        | 82.550  | 2.0000 | 3.2500 | +0                                                                         | -0.015 | +0   | -0.0006  | +0.25 | +0.12 | +0.010 | +0.005 |
| 82.550                        | 107.950 | 3.2500 | 4.2500 | +0                                                                         | -0.020 | +0   | -0.0008  | +0.25 | +0.12 | +0.010 | +0.005 |
| 107.950                       | 120.650 | 4.2500 | 4.7500 | +0                                                                         | -0.020 | +0   | -0.0009  | +0.38 | +0.25 | +0.015 | +0.010 |
| 120.650                       | 177.800 | 4.7500 | 7.0000 | +0                                                                         | -0.025 | +0   | -0.0010  | +0.38 | +0.25 | +0.015 | +0.010 |
| 177.800                       | 203.200 | 7.0000 | 8.0000 | +0                                                                         | -0.030 | +0   | -0.00012 | +0.38 | +0.25 | +0.015 | +0.010 |

(1) "Single mean diameter" is defined as the mean diameter in a single radial plane.

TABLE 4 – OUTSIDE DIAMETER TOLERANCE, IR INNER RINGS

| $F_w$<br>Nominal Bore Diameter |         |        |        | Deviations from Nominal<br>of Single Mean Outside Diameter, $F_{mp}^{(1)}$ |        |         |         |      |      |     |      |
|--------------------------------|---------|--------|--------|----------------------------------------------------------------------------|--------|---------|---------|------|------|-----|------|
| mm                             |         | inch   |        | mm                                                                         |        |         |         | inch |      |     |      |
| >                              | ≤       | >      | ≤      | low                                                                        | high   | low     | high    | low  | high | low | high |
| 12.700                         | 15.875  | 0.5000 | 0.6250 | -0.013                                                                     | -0.023 | -0.0005 | -0.0009 |      |      |     |      |
| 15.875                         | 25.400  | 0.6250 | 1.0000 | -0.018                                                                     | -0.031 | -0.0007 | -0.0012 |      |      |     |      |
| 25.400                         | 28.575  | 1.0000 | 1.1250 | -0.023                                                                     | -0.036 | -0.0009 | -0.0014 |      |      |     |      |
| 28.575                         | 34.925  | 1.1250 | 1.3750 | -0.023                                                                     | -0.036 | -0.0009 | -0.0015 |      |      |     |      |
| 34.925                         | 47.625  | 1.3750 | 1.8750 | -0.025                                                                     | -0.038 | -0.0010 | -0.0016 |      |      |     |      |
| 47.625                         | 76.200  | 1.8750 | 3.0000 | -0.028                                                                     | -0.040 | -0.0011 | -0.0018 |      |      |     |      |
| 76.200                         | 95.250  | 3.0000 | 3.7500 | -0.033                                                                     | -0.046 | -0.0013 | -0.0022 |      |      |     |      |
| 95.250                         | 114.300 | 3.7500 | 4.5000 | -0.038                                                                     | -0.056 | -0.0015 | -0.0024 |      |      |     |      |
| 114.300                        | 139.700 | 4.5000 | 5.5000 | -0.038                                                                     | -0.061 | -0.0015 | -0.0025 |      |      |     |      |
| 139.700                        | 165.100 | 5.5000 | 6.5000 | 0.043                                                                      | -0.063 | -0.0017 | -0.0027 |      |      |     |      |
| 165.100                        | 209.550 | 6.5000 | 8.2500 | -0.046                                                                     | -0.068 | -0.0019 | -0.0031 |      |      |     |      |
| 209.550                        | 234.950 | 8.2500 | 9.2500 | -0.051                                                                     | -0.078 | -0.0020 | -0.0032 |      |      |     |      |

(1) "Single mean diameter" is defined as the mean diameter in a single radial plane.

## LUBRICATION

The outer rings of the HJ bearings are supplied with a lubrication groove on the O.D. and a lubrication hole in this groove to facilitate relubrication through the outer ring. The IR inner rings have lubrication grooves in the bore and a relubrication hole to facilitate relubrication through the inner ring.

HJ Series bearings (with or without seals) are typically shipped protected with a corrosion preventive compound which is not a lubricant. When specified by the customer, HJ Series bearings may be ordered prelubricated with suitable greases and oils. For general information regarding lubrication of needle roller bearings, refer to the engineering section.

## SEALS

Shaft contact seals which fit into the same housing bore as the heavy-duty needle roller bearings may be obtained from recognized seal manufacturers. Bearings can also be made available with one or two integral seals — for information and listing of sealed bearings see pages C148-C149.

## SPECIAL BEARINGS

For needle roller bearings with special dimensions or special features such as split outer ring, consult the Timken automotive representative.

## MOUNTING DIMENSIONS

HJ needle roller bearings are normally mounted in their housings with a clearance fit if the load is stationary relative to the housing, and with a tight transition fit if the load rotates relative to the housing. Since the tight transition fit of the bearing in its housing may result in a reduction of the needle roller complement bore diameter, the shaft raceway diameter should be reduced a like amount.

The tables of dimensions list the suggested ISO H7 tolerances for the housing bore and the suggested ISO h6 tolerances for the shaft raceway when the outer ring is to be mounted with a clearance fit. They also list the suggested ISO N7 tolerances for the housing bore and the suggested ISO f6 tolerances for the shaft raceway when the outer ring is to be mounted with a tight transition fit.

Other mounting dimensions may be required for special conditions such as:

1. Extremely heavy radial loads
2. Shock loads
3. Load rotating relative to both inner and outer rings
4. Temperature gradient across bearing
5. Housing with heat expansion coefficient differing from that of the bearing.

If these conditions are expected, please consult your Timken

representative.

Regardless of the fit of the bearing outer ring in the housing, the outer rings should be axially located by housing shoulders or other positive means. The bearing rings should closely fit against shaft and housing shoulders and must not contact the fillet radius. The maximum shaft or housing fillet  $r_{as\ max}$  should be no greater than the minimum bearing chamfer  $r_{s\ min}$  shown in the bearing tables. The unmarked end of the outer ring should be assembled against the housing shoulder to assure clearing the maximum housing fillet. Similarly, the unmarked end of the inner ring should be assembled against the shaft shoulder to assure clearing the maximum shaft fillet.

## LOAD RATING FACTORS

### DYNAMIC LOADS

Needle roller bearings can accommodate only radial loads.

$$P = F_r$$

P = The maximum dynamic radial load that may be applied to a needle roller bearing based on the dynamic load rating C given in the tabular pages. This load should be  $\leq C/3$ .

### STATIC LOADS

Needle roller bearings can accommodate only radial loads.

$$P_0 = F_r$$

C





# NEEDLE ROLLER BEARINGS

## HJ TYPE

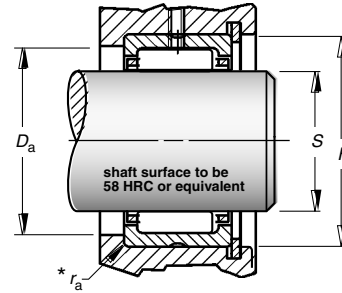
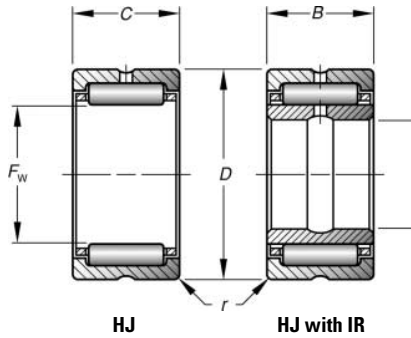
### INCH SERIES

- Check for availability.
- Nominal bearing diameters and widths shown.
- Tolerance tables found on page C139.
- Clearance fit suggested for outer ring when housing is stationary relative to load.
- Tight transition fit suggested if housing rotates relative to load.
- See page C141 for further discussion on mounting practices.
- Consult your Timken representative for oscillating applications (e.g., low radial clearance concerns).
- Unmarked end of outer ring should be assembled against housing shoulder to clear maximum allowed housing fillet ( $r_{as\ max}^*$ ).
- Meets Military Standard MS 51961.

| Shaft Diameter | Dimensions mm/in. |                |        |      | Bearing Designation | Used With Inner Ring Designation †  | Load Ratings kN/lbf. |       |                |                | Approx Wt. kg/lbs. |      |
|----------------|-------------------|----------------|--------|------|---------------------|-------------------------------------|----------------------|-------|----------------|----------------|--------------------|------|
|                | in.               | F <sub>w</sub> | D      | C/B  |                     |                                     | r <sub>s min</sub>   | C     | C <sub>0</sub> | Limiting Speed |                    |      |
|                |                   |                |        |      |                     |                                     |                      |       |                | Grease         |                    | Oil  |
| 5/8            | 15.875            | 28.575         | 19.050 | 0.64 | HJ-101812           | IR-061012                           | 19.3                 | 20.7  | 20000          | 30000          | 0.050              |      |
|                | 0.6250            | 1.1250         | 0.750  | 0.03 |                     |                                     | 4350                 | 4650  |                |                |                    | 0.11 |
| 3/4            | 19.050            | 31.750         | 19.050 | 1.02 | HJ-122012           | IR-081212                           | 20.7                 | 23.3  | 16000          | 25000          | 0.059              |      |
|                | 0.7500            | 1.2500         | 0.750  | 0.04 |                     |                                     | 4650                 | 5240  |                |                |                    | 0.13 |
|                | 19.050            | 31.750         | 25.400 | 1.02 | HJ-122016           | IR-081216                           | 27.5                 | 33.7  | 16000          | 25000          | 0.077              |      |
|                | 0.7500            | 1.2500         | 1.000  | 0.04 |                     |                                     | 6190                 | 7580  |                |                |                    | 0.17 |
| 7/8            | 22.225            | 34.925         | 19.050 | 1.02 | HJ-142212           | IR-101412                           | 23                   | 27.9  | 13000          | 21000          | 0.064              |      |
|                | 0.8750            | 1.3750         | 0.750  | 0.04 |                     |                                     | 5180                 | 6270  |                |                |                    | 0.14 |
|                | 22.225            | 34.925         | 25.400 | 1.02 | HJ-142216           | IR-101416                           | 30.7                 | 40.3  | 13000          | 21000          | 0.086              |      |
|                | 0.8750            | 1.3750         | 1.000  | 0.04 |                     |                                     | 6910                 | 9070  |                |                |                    | 0.19 |
| 1              | 25.400            | 38.100         | 19.050 | 1.02 | HJ-162412           | IR-121612                           | 25.3                 | 32.5  | 12000          | 18000          | 0.073              |      |
|                | 1.0000            | 1.5000         | 0.750  | 0.04 |                     |                                     | 5680                 | 7300  |                |                |                    | 0.16 |
|                | 25.400            | 38.100         | 25.400 | 1.02 | HJ-162416           | IR-121616<br>IR-131616              | 33.6                 | 47.2  | 12000          | 18000          | 0.095              |      |
|                | 1.0000            | 1.5000         | 1.000  | 0.04 |                     |                                     | 7560                 | 10600 |                |                |                    | 0.21 |
| 1 1/8          | 28.575            | 41.275         | 25.400 | 1.02 | HJ-182616           | IR-141816<br>IR-151816              | 36.3                 | 53.8  | 10000          | 16000          | 0.104              |      |
|                | 1.1250            | 1.6250         | 1.000  | 0.04 |                     |                                     | 8170                 | 12100 |                |                |                    | 0.23 |
|                | 28.575            | 41.275         | 31.750 | 1.02 | HJ-182620           | IR-141820<br>IR-151820              | 44.9                 | 70.3  | 10000          | 16000          | 0.132              |      |
|                | 1.1250            | 1.6250         | 1.250  | 0.04 |                     |                                     | 10100                | 15800 |                |                |                    | 0.29 |
| 1 1/4          | 31.750            | 44.450         | 25.400 | 1.02 | HJ-202816           | IR-162016                           | 37.4                 | 57.4  | 9100           | 14000          | 0.113              |      |
|                | 1.2500            | 1.7500         | 1.000  | 0.04 |                     |                                     | 8410                 | 12900 |                |                |                    | 0.25 |
|                | 31.750            | 44.450         | 31.750 | 1.02 | HJ-202820           | IR-162020                           | 46.3                 | 75.2  | 9100           | 14000          | 0.145              |      |
|                | 1.2500            | 1.7500         | 1.250  | 0.04 |                     |                                     | 10400                | 16900 |                |                |                    | 0.32 |
| 1 3/8          | 34.925            | 47.625         | 25.400 | 1.02 | HJ-223016           | IR-182216                           | 39.8                 | 64.1  | 8200           | 13000          | 0.127              |      |
|                | 1.3750            | 1.8750         | 1.000  | 0.04 |                     |                                     | 8950                 | 14400 |                |                |                    | 0.28 |
|                | 34.925            | 47.625         | 31.750 | 1.02 | HJ-223020           | IR-182220                           | 49.4                 | 84.1  | 8200           | 13000          | 0.159              |      |
|                | 1.3750            | 1.8750         | 1.250  | 0.04 |                     |                                     | 11100                | 18900 |                |                |                    | 0.35 |
| 1 1/2          | 38.100            | 52.388         | 25.400 | 1.52 | HJ-243316           | IR-202416                           | 47.6                 | 72.5  | 7600           | 12000          | 0.154              |      |
|                | 1.5000            | 2.0625         | 1.000  | 0.06 |                     |                                     | 10700                | 16300 |                |                |                    | 0.34 |
|                | 38.100            | 52.388         | 31.750 | 1.52 | HJ-243320           | IR-192420<br>IR-202420              | 58.7                 | 95.2  | 7600           | 12000          | 0.195              |      |
|                | 1.5000            | 2.0625         | 1.250  | 0.06 |                     |                                     | 13200                | 21400 |                |                |                    | 0.43 |
| 1 5/8          | 41.275            | 55.563         | 25.400 | 1.52 | HJ-263516           | IR-212616                           | 48.5                 | 76.5  | 7000           | 11000          | 0.163              |      |
|                | 1.6250            | 2.1875         | 1.000  | 0.06 |                     |                                     | 10900                | 17200 |                |                |                    | 0.36 |
|                | 41.275            | 55.563         | 31.750 | 1.52 | HJ-263520           | IR-212620<br>IR-222620              | 60.1                 | 100.5 | 7000           | 11000          | 0.209              |      |
|                | 1.6250            | 2.1875         | 1.250  | 0.06 |                     |                                     | 13500                | 22600 |                |                |                    | 0.46 |
| 1 3/4          | 44.450            | 58.738         | 25.400 | 1.52 | HJ-283716           | IR-232816<br>IR-242816              | 49.8                 | 81.0  | 6400           | 9900           | 0.177              |      |
|                | 1.7500            | 2.3125         | 1.000  | 0.06 |                     |                                     | 11200                | 18200 |                |                |                    | 0.39 |
|                | 44.450            | 58.738         | 31.750 | 1.52 | HJ-283720           | IR-222820<br>IR-232820<br>IR-242820 | 61.8                 | 106   | 6400           | 9900           | 0.222              |      |
|                | 1.7500            | 2.3125         | 1.250  | 0.06 |                     |                                     | 13900                | 23900 |                |                |                    | 0.49 |
| 1 7/8          | 47.625            | 61.913         | 31.750 | 1.52 | HJ-303920           | IR-253020                           | 65.4                 | 117   | 6000           | 9200           | 0.236              |      |
|                | 1.8750            | 2.4375         | 1.250  | 0.06 |                     |                                     | 14700                | 26300 |                |                | 0.52               |      |

† See pages C150-C153 for inch series inner rings. Order inner rings separately.

# Heavy-Duty Needle Roller Bearings



| C <sub>g</sub> <sup>(1)</sup> | Mounting Dimensions mm/in. |                  |                  |                  | Bearing Designation | Mounting Dimensions mm/in. |                  |                  |                  | Shoulder Dia. ±.38 ±.015 | Shaft Diameter |
|-------------------------------|----------------------------|------------------|------------------|------------------|---------------------|----------------------------|------------------|------------------|------------------|--------------------------|----------------|
|                               | Clearance Fit              |                  |                  |                  |                     | Tight Transition Fit       |                  |                  |                  |                          |                |
|                               | Max.                       | Min.             | Min.             | Max.             |                     | Max.                       | Min.             | Min.             | Max.             |                          |                |
|                               | S                          |                  | H                |                  | S                   |                            | H                |                  | Da               | in.                      |                |
| 0.0252                        | 15.875<br>0.6250           | 15.865<br>0.6246 | 28.575<br>1.1250 | 28.595<br>1.1258 | HJ-101812           | 15.860<br>0.6244           | 15.850<br>0.6240 | 28.547<br>1.1239 | 28.567<br>1.1247 | 23.83<br>0.938           | 5/8            |
| 0.0279                        | 19.050<br>0.7500           | 19.037<br>0.7495 | 31.750<br>1.2500 | 31.775<br>1.2510 | HJ-122012           | 19.030<br>0.7492           | 19.017<br>0.7487 | 31.717<br>1.2487 | 31.742<br>1.2497 | 26.97<br>1.062           | 3/4            |
| 0.0305                        | 19.050<br>0.7500           | 19.037<br>0.7495 | 31.750<br>1.2500 | 31.775<br>1.2510 | HJ-122016           | 19.030<br>0.7492           | 19.017<br>0.7487 | 31.717<br>1.2487 | 31.742<br>1.2497 | 26.97<br>1.062           |                |
| 0.0310                        | 22.225<br>0.8750           | 22.212<br>0.8745 | 34.925<br>1.3750 | 34.950<br>1.3760 | HJ-142212           | 22.205<br>0.8742           | 22.192<br>0.8737 | 34.892<br>1.3737 | 34.917<br>1.3747 | 30.18<br>1.188           | 7/8            |
| 0.0340                        | 22.225<br>0.8750           | 22.212<br>0.8745 | 34.925<br>1.3750 | 34.950<br>1.3760 | HJ-142216           | 22.205<br>0.8742           | 22.192<br>0.8737 | 34.892<br>1.3737 | 34.917<br>1.3747 | 30.18<br>1.188           |                |
| 0.0340                        | 25.400<br>1.0000           | 25.387<br>0.9995 | 38.100<br>1.5000 | 38.125<br>1.5010 | HJ-162412           | 25.380<br>0.9992           | 25.367<br>0.9987 | 38.067<br>1.4987 | 38.092<br>1.4997 | 33.32<br>1.312           | 1              |
| 0.0373                        | 25.400<br>1.0000           | 25.387<br>0.9995 | 38.100<br>1.5000 | 38.125<br>1.5010 | HJ-162416           | 25.380<br>0.9992           | 25.367<br>0.9987 | 38.067<br>1.4987 | 38.092<br>1.4997 | 33.32<br>1.312           |                |
| 0.0404                        | 28.575<br>1.1250           | 28.562<br>1.1245 | 41.275<br>1.6250 | 41.300<br>1.6260 | HJ-182616           | 28.555<br>1.1242           | 28.542<br>1.1237 | 41.242<br>1.6237 | 41.267<br>1.6247 | 36.53<br>1.438           | 1 1/8          |
| 0.0433                        | 28.575<br>1.1250           | 28.562<br>1.1245 | 41.275<br>1.6250 | 41.300<br>1.6260 | HJ-182620           | 28.555<br>1.1242           | 28.542<br>1.1237 | 41.242<br>1.6237 | 41.267<br>1.6247 | 36.53<br>1.438           |                |
| 0.0430                        | 31.750<br>1.2500           | 31.735<br>1.2494 | 44.450<br>1.7500 | 44.475<br>1.7510 | HJ-202816           | 31.725<br>1.2490           | 31.709<br>1.2484 | 44.417<br>1.7487 | 44.442<br>1.7497 | 39.67<br>1.562           | 1 1/4          |
| 0.0460                        | 31.750<br>1.2500           | 31.735<br>1.2494 | 44.450<br>1.7500 | 44.475<br>1.7510 | HJ-202820           | 31.725<br>1.2490           | 31.709<br>1.2484 | 44.417<br>1.7487 | 44.442<br>1.7497 | 39.67<br>1.562           |                |
| 0.0460                        | 34.925<br>1.3750           | 34.910<br>1.3744 | 47.625<br>1.8750 | 47.650<br>1.8760 | HJ-223016           | 34.900<br>1.374            | 34.884<br>1.3734 | 47.592<br>1.8737 | 47.617<br>1.8747 | 42.88<br>1.688           | 1 3/8          |
| 0.0492                        | 34.925<br>1.3750           | 34.910<br>1.3744 | 47.625<br>1.8750 | 47.650<br>1.8760 | HJ-223020           | 34.900<br>1.3740           | 34.884<br>1.3734 | 47.592<br>1.8737 | 47.617<br>1.8747 | 42.88<br>1.688           |                |
| 0.0480                        | 38.100<br>1.5000           | 38.085<br>1.4994 | 52.388<br>2.0625 | 52.418<br>2.0637 | HJ-243316           | 38.075<br>1.4990           | 38.059<br>1.4984 | 52.349<br>2.0610 | 52.380<br>2.0622 | 47.63<br>1.875           | 1 1/2          |
| 0.0514                        | 38.100<br>1.5000           | 38.085<br>1.4994 | 52.388<br>2.0625 | 52.418<br>2.0637 | HJ-243320           | 38.075<br>1.4990           | 38.059<br>1.4984 | 52.349<br>2.0610 | 52.380<br>2.0622 | 47.63<br>1.875           |                |
| 0.0503                        | 41.275<br>1.6250           | 41.260<br>1.6244 | 55.563<br>2.1875 | 55.593<br>2.1887 | HJ-263516           | 41.250<br>1.6240           | 41.234<br>1.6234 | 55.524<br>2.1860 | 55.555<br>2.1872 | 50.80<br>2.000           | 1 5/8          |
| 0.0539                        | 41.275<br>1.6250           | 41.260<br>1.6244 | 55.563<br>2.1875 | 55.593<br>2.1887 | HJ-263520           | 41.250<br>1.6240           | 41.234<br>1.6234 | 55.524<br>2.1860 | 55.555<br>2.1872 | 50.80<br>2.000           |                |
| 0.0527                        | 44.450<br>1.7500           | 44.435<br>1.7494 | 58.738<br>2.3125 | 58.768<br>2.3137 | HJ-283716           | 44.425<br>1.7490           | 44.409<br>1.7484 | 58.699<br>2.3110 | 58.730<br>2.3122 | 53.98<br>2.125           | 1 3/4          |
| 0.0564                        | 44.450<br>1.7500           | 44.435<br>1.7494 | 58.738<br>2.3125 | 58.768<br>2.3137 | HJ-283720           | 44.425<br>1.7490           | 44.409<br>1.7484 | 58.699<br>2.3110 | 58.730<br>2.3122 | 53.98<br>2.125           |                |
| 0.0595                        | 47.625<br>1.8750           | 47.610<br>1.8744 | 61.913<br>2.4375 | 61.943<br>2.4387 | HJ-303920           | 47.600<br>1.8740           | 47.584<br>1.8734 | 61.874<br>2.4360 | 61.905<br>2.4372 | 57.15<br>2.250           | 1 7/8          |

\*r<sub>as max</sub> is equal to the minimum bearing chamfer (r<sub>s min</sub>) at unmarked end.  
 (1) C<sub>g</sub> factor for bearing without inner ring

Continued on next page.



# NEEDLE ROLLER BEARINGS

## HJ TYPE – continued

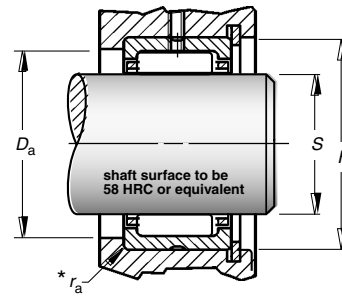
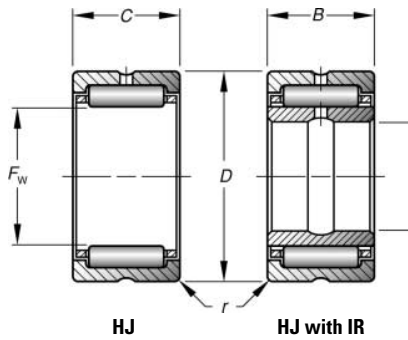
### INCH SERIES

- Check for availability.
- Nominal bearing diameters and widths shown.
- Tolerance tables found on page C139.
- Clearance fit suggested for outer ring when housing is stationary relative to load.
- Tight transition fit suggested if housing rotates relative to load.
- See page C141 for further discussion on mounting practices.
- Consult your Timken representative for oscillating applications (e.g., low radial clearance concerns).
- Unmarked end of outer ring should be assembled against housing shoulder to clear maximum allowed housing fillet ( $r_{as\ max}^*$ ).
- Meets Military Standard MS 51961.

| Shaft Diameter | Dimensions mm/in. |                |        |      | Bearing Designation | Used With Inner Ring Designation †               | Load Ratings kN/lbf. |        |                |                | Approx. Wt. kg/lbs. |     |
|----------------|-------------------|----------------|--------|------|---------------------|--------------------------------------------------|----------------------|--------|----------------|----------------|---------------------|-----|
|                | in.               | F <sub>w</sub> | D      | C/B  |                     |                                                  | r <sub>s min</sub>   | C      | C <sub>0</sub> | Limiting Speed |                     |     |
|                |                   |                |        |      |                     |                                                  |                      |        |                | Grease         |                     | Oil |
| 2              | 50.800            | 65.088         | 25.400 | 1.52 | HJ-324116           | IR-273216                                        | 53.8                 | 93.0   | 5600           | 8600           | 0.200               |     |
|                | 2.0000            | 2.5625         | 1.000  | 0.06 |                     |                                                  | 12100                | 20900  |                |                | 0.44                |     |
|                | 50.800            | 65.088         | 31.750 | 1.52 | HJ-324120           | IR-243220<br>IR-253220<br>IR-263220<br>IR-273220 | 66.7                 | 122    | 5600           | 8600           | 0.249               |     |
|                | 2.0000            | 2.5625         | 1.250  | 0.06 |                     |                                                  | 15000                | 27500  |                |                | 0.55                |     |
| 2 1/4          | 57.150            | 76.200         | 38.100 | 1.52 | HJ-364824           | IR-283624                                        | 89.9                 | 164    | 5000           | 7600           | 0.458               |     |
|                | 2.2500            | 3.0000         | 1.500  | 0.06 |                     |                                                  | 20200                | 36900  |                |                | 1.01                |     |
|                | 57.150            | 76.200         | 44.450 | 1.52 | HJ-364828           | IR-283628                                        | 104                  | 198    | 5000           | 7600           | 0.531               |     |
|                | 2.2500            | 3.0000         | 1.750  | 0.06 |                     |                                                  | 23400                | 44500  |                |                | 1.17                |     |
| 2 1/2          | 63.500            | 82.550         | 38.100 | 2.03 | HJ-405224           | IR-314024<br>IR-324024                           | 97.0                 | 187    | 4400           | 6800           | 0.499               |     |
|                | 2.5000            | 3.2500         | 1.500  | 0.08 |                     |                                                  | 21800                | 42100  |                |                | 1.10                |     |
|                | 63.500            | 82.550         | 44.450 | 2.03 | HJ-405228           | IR-314028<br>IR-324028                           | 97.0                 | 187    | 4400           | 6800           | 0.499               |     |
|                | 2.5000            | 3.2500         | 1.750  | 0.08 |                     |                                                  | 25200                | 50800  |                |                | 1.29                |     |
| 2 3/4          | 69.850            | 88.900         | 25.400 | 2.03 | HJ-445616           | —                                                | 67.2                 | 120    | 4000           | 6200           | 0.363               |     |
|                | 2.7500            | 3.5000         | 1.000  | 0.08 |                     |                                                  | 15100                | 27000  |                |                | 0.80                |     |
|                | 69.850            | 88.900         | 38.100 | 2.03 | HJ-445624           | IR-364424                                        | 101                  | 203    | 4000           | 6200           | 0.544               |     |
|                | 2.7500            | 3.5000         | 1.500  | 0.08 |                     |                                                  | 22700                | 45700  |                |                | 1.20                |     |
|                | 69.850            | 88.900         | 44.450 | 2.03 | HJ-445628           | IR-354428<br>IR-364428                           | 117                  | 245    | 4000           | 6200           | 0.635               |     |
|                | 2.7500            | 3.5000         | 1.750  | 0.08 |                     |                                                  | 26300                | 55100  |                |                | 1.40                |     |
| 3              | 76.200            | 95.250         | 38.100 | 2.03 | HJ-486024           | IR-404824                                        | 107                  | 226    | 3700           | 5600           | 0.585               |     |
|                | 3.0000            | 3.7500         | 1.500  | 0.08 |                     |                                                  | 24100                | 50900  |                |                | 1.29                |     |
|                | 76.200            | 95.250         | 44.450 | 2.03 | HJ-486028           | IR-384828<br>IR-404828                           | 124                  | 273    | 3700           | 5600           | 0.685               |     |
|                | 3.0000            | 3.7500         | 1.750  | 0.08 |                     |                                                  | 27900                | 61400  |                |                | 1.51                |     |
| 3 1/4          | 82.550            | 107.950        | 44.450 | 2.03 | HJ-526828           | IR-445228                                        | 162                  | 305    | 3400           | 5300           | 1.016               |     |
|                | 3.2500            | 4.2500         | 1.750  | 0.08 |                     |                                                  | 36400                | 68600  |                |                | 2.24                |     |
|                | 82.550            | 107.950        | 50.800 | 2.03 | HJ-526832           | IR-445232                                        | 184                  | 358    | 3400           | 5300           | 1.161               |     |
|                | 3.2500            | 4.2500         | 2.000  | 0.08 |                     |                                                  | 41300                | 80500  |                |                | 2.56                |     |
| 3 1/2          | 88.900            | 114.300        | 50.800 | 2.03 | HJ-567232           | IR-475632<br>IR-485632                           | 187                  | 375    | 3200           | 4900           | 1.238               |     |
|                | 3.5000            | 4.5000         | 2.000  | 0.08 |                     |                                                  | 42000                | 84300  |                |                | 2.73                |     |
| 3 3/4          | 95.250            | 120.650        | 50.800 | 2.54 | HJ-607632           | IR-506032<br>IR-526032                           | 197                  | 405    | 4540           | 4375           | 1.455               |     |
|                | 3.7500            | 4.7500         | 2.000  | 0.10 |                     |                                                  | 44200                | 91000  |                |                | 3.208               |     |
| 4              | 101.600           | 127.000        | 50.800 | 2.54 | HJ-648032           | IR-526432<br>IR-546432<br>IR-566432              | 205                  | 436    | 4230           | 4625           | 1.541               |     |
|                | 4.0000            | 5.0000         | 2.000  | 0.10 |                     |                                                  | 46000                | 98000  |                |                | 3.397               |     |
| 4 1/4          | 107.950           | 133.350        | 50.800 | 2.54 | HJ-688432           | IR-566832<br>IR-606832                           | 207                  | 454    | 3970           | 4875           | 1.626               |     |
|                | 4.2500            | 5.2500         | 2.000  | 0.10 |                     |                                                  | 46500                | 102000 |                |                | 3.586               |     |
| 4 1/2          | 114.300           | 152.400        | 57.150 | 2.54 | HJ-729636           | IR-607236                                        | 286                  | 516    | 3850           | 5438           | 3.035               |     |
|                | 4.5000            | 6.0000         | 2.250  | 0.10 |                     |                                                  | 64400                | 116000 |                |                | 6.691               |     |
|                | 114.3000          | 152.4000       | 63.500 | 2.54 | HJ-729640           | IR-607240                                        | 319                  | 596    | 3850           | 5438           | 3.372               |     |
|                | 4.5000            | 6.0000         | 2.500  | 0.10 |                     |                                                  | 71700                | 134000 |                |                | 7.434               |     |

† See pages C150-C153 for inch series inner rings. Order inner rings separately.  
<sup>(1)</sup> C<sub>0</sub> factor for bearing without inner ring.

# Heavy-Duty Needle Roller Bearings



| C <sub>g</sub> <sup>(1)</sup> | Mounting Dimensions mm/in. |                   |                   |                   | Bearing Designation | Mounting Dimensions mm/in. |                   |                   |                   | Shoulder Dia. ±.38 ±.015 | Shaft Diameter in. |
|-------------------------------|----------------------------|-------------------|-------------------|-------------------|---------------------|----------------------------|-------------------|-------------------|-------------------|--------------------------|--------------------|
|                               | Clearance Fit              |                   |                   |                   |                     | Tight Transition Fit       |                   |                   |                   |                          |                    |
|                               | Max.                       | Min.              | Min.              | Max.              |                     | Max.                       | Min.              | Min.              | Max.              |                          |                    |
|                               | S                          |                   | H                 |                   |                     | S                          |                   | H                 |                   | D <sub>a</sub>           |                    |
| 0.0578                        | 50.800<br>2.0000           | 50.782<br>1.9993  | 65.088<br>2.5625  | 65.118<br>2.5637  | HJ-324116           | 50.770<br>1.9988           | 50.752<br>1.9981  | 65.049<br>2.5610  | 65.080<br>2.5622  | 60.33<br>2.375           |                    |
| 0.0618                        | 50.800<br>2.0000           | 50.782<br>1.9993  | 65.088<br>2.5625  | 65.118<br>2.5637  | HJ-324120           | 50.770<br>1.9988           | 50.752<br>1.9981  | 65.049<br>2.5610  | 65.080<br>2.5622  | 60.33<br>2.375           | 2                  |
| 0.0683                        | 57.150<br>2.2500           | 57.132<br>2.2493  | 76.200<br>3.0000  | 76.230<br>3.0012  | HJ-364824           | 57.120<br>2.2488           | 57.102<br>2.2481  | 76.162<br>2.9985  | 76.192<br>2.9997  | 68.28<br>2.688           | 2 1/4              |
| 0.0715                        | 57.150<br>2.2500           | 57.132<br>2.2493  | 76.200<br>3.0000  | 76.230<br>3.0012  | HJ-364828           | 57.120<br>2.2488           | 57.102<br>2.2481  | 76.162<br>2.9985  | 76.192<br>2.9997  | 68.28<br>2.688           |                    |
| 0.0739                        | 63.500<br>2.5000           | 63.482<br>2.4993  | 82.550<br>3.2500  | 82.586<br>3.2514  | HJ-405224           | 63.470<br>2.4988           | 63.452<br>2.4981  | 82.502<br>3.2481  | 82.537<br>3.2495  | 74.63<br>2.938           | 2 1/2              |
| 0.0774                        | 63.500<br>2.5000           | 63.482<br>2.4993  | 82.550<br>3.2500  | 82.586<br>3.2514  | HJ-405228           | 63.470<br>2.4988           | 63.452<br>2.4981  | 82.502<br>3.2481  | 82.537<br>3.2495  | 74.63<br>2.938           |                    |
| 0.0690                        | 69.850<br>2.7500           | 69.832<br>2.7493  | 88.900<br>3.5000  | 88.936<br>3.5014  | HJ-445616           | 69.820<br>2.7488           | 69.802<br>2.7481  | 88.852<br>3.4981  | 88.887<br>3.4995  | 80.98<br>3.188           |                    |
| 0.0786                        | 69.850<br>2.7500           | 69.832<br>2.7493  | 88.900<br>3.5000  | 88.936<br>3.5014  | HJ-445624           | 69.820<br>2.7488           | 69.802<br>2.7481  | 88.852<br>3.4981  | 88.887<br>3.4995  | 80.98<br>3.188           | 2 3/4              |
| 0.0823                        | 69.850<br>2.7500           | 69.832<br>2.7493  | 88.900<br>3.5000  | 88.936<br>3.5014  | HJ-445628           | 69.820<br>2.7488           | 69.802<br>2.7481  | 88.852<br>3.4981  | 88.887<br>3.4995  | 80.98<br>3.188           |                    |
| 0.0839                        | 76.200<br>3.0000           | 76.182<br>2.9993  | 95.250<br>3.7500  | 95.286<br>3.7514  | HJ-486024           | 76.170<br>2.9988           | 76.152<br>2.9981  | 95.202<br>3.7481  | 95.237<br>3.7495  | 87.33<br>3.438           | 3                  |
| 0.0879                        | 76.200<br>3.0000           | 76.182<br>2.9993  | 95.250<br>3.7500  | 95.286<br>3.7514  | HJ-486028           | 76.170<br>2.9988           | 76.152<br>2.9981  | 95.202<br>3.7481  | 95.237<br>3.7495  | 87.33<br>3.438           |                    |
| 0.0888                        | 82.550<br>3.2500           | 82.527<br>3.2491  | 107.950<br>4.2500 | 107.986<br>4.2514 | HJ-526828           | 82.514<br>3.2486           | 82.492<br>3.2477  | 107.902<br>4.2481 | 107.937<br>4.2495 | 98.43<br>3.875           | 3 1/4              |
| 0.0924                        | 82.550<br>3.2500           | 82.527<br>3.2491  | 107.950<br>4.2500 | 107.986<br>4.2514 | HJ-526832           | 82.514<br>3.2486           | 82.492<br>3.2477  | 107.902<br>4.2481 | 107.937<br>4.2495 | 98.43<br>3.875           |                    |
| 0.0965                        | 88.900<br>3.5000           | 88.877<br>3.4991  | 114.300<br>4.5000 | 114.336<br>4.5014 | HJ-567232           | 88.864<br>3.4986           | 88.842<br>3.4977  | 114.252<br>4.4981 | 114.287<br>4.4995 | 104.78<br>4.125          | 3 1/2              |
| 0.1011                        | 95.250<br>3.7500           | 95.227<br>3.7491  | 120.650<br>4.7500 | 120.691<br>4.7516 | HJ-607632           | 95.217<br>3.7487           | 95.192<br>3.7477  | 120.594<br>4.7478 | 120.635<br>4.7494 | 111.13<br>4.375          | 3 3/4              |
| 0.1060                        | 101.600<br>4.0000          | 101.577<br>3.9991 | 127.000<br>5.0000 | 127.041<br>5.0016 | HJ-648032           | 101.564<br>3.9986          | 101.542<br>3.9977 | 126.944<br>4.9978 | 126.985<br>4.9994 | 117.48<br>4.625          | 4                  |
| 0.1099                        | 107.950<br>4.2500          | 107.927<br>4.2491 | 133.350<br>5.2500 | 133.391<br>5.2516 | HJ-688432           | 107.914<br>4.2486          | 107.892<br>4.2477 | 133.294<br>5.2478 | 133.335<br>5.2494 | 123.83<br>4.875          | 4 1/4              |
|                               | 114.300<br>4.5000          | 114.277<br>4.4991 | 152.400<br>6.0000 | 152.441<br>6.0016 | HJ-729636           | 114.264<br>4.4986          | 114.242<br>4.4977 | 152.344<br>5.9978 | 152.385<br>5.9994 | 138.11<br>5.438          | 4 1/2              |
| 0.1137                        | 114.300<br>4.5000          | 114.277<br>4.4991 | 152.400<br>6.0000 | 152.441<br>6.0016 | HJ-729640           | 114.264<br>4.4986          | 114.242<br>4.4977 | 152.344<br>5.9978 | 152.385<br>5.9994 | 138.11<br>5.438          |                    |

\*r<sub>as max</sub> is equal to the minimum bearing chamfer (r<sub>s min</sub>) at unmarked end.  
 (1) C<sub>g</sub> factor for bearing without inner ring.

Continued on next page.



## NEEDLE ROLLER BEARINGS

### HJ TYPE – continued

#### INCH SERIES

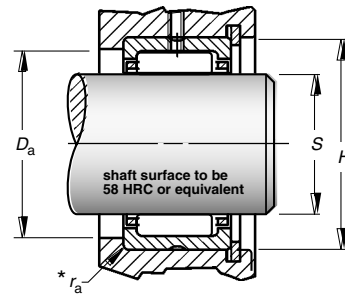
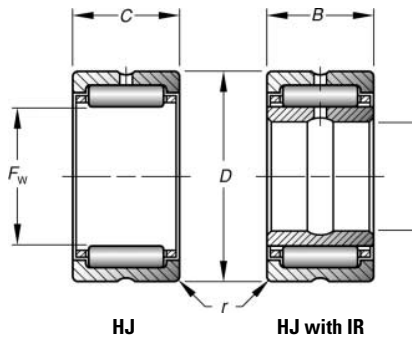
- Check for availability.
- Nominal bearing diameters and widths shown.
- Tolerance tables found on page C139.
- Clearance fit suggested for outer ring when housing is stationary relative to load.
- Tight transition fit suggested if housing rotates relative to load.
- See page C141 for further discussion on mounting practices.
- Consult your Timken representative for oscillating applications (e.g., low radial clearance concerns).
- Unmarked end of outer ring should be assembled against housing shoulder to clear maximum allowed housing fillet ( $r_{as\ max}^*$ ).
- Meets Military Standard MS 51961.

| Shaft Diameter | Dimensions mm/in. |                |        |      | Bearing Designation | Used With Inner Ring Designation † | Load Ratings kN/lbf. |               |              |                | Approx. Wt. kg/lbs. |     |
|----------------|-------------------|----------------|--------|------|---------------------|------------------------------------|----------------------|---------------|--------------|----------------|---------------------|-----|
|                | in.               | F <sub>w</sub> | D      | C/B  |                     |                                    | r <sub>s min</sub>   | Basic Dynamic | Basic Static | Limiting Speed |                     |     |
|                |                   |                |        |      |                     |                                    |                      |               |              | Grease         |                     | Oil |
|                |                   |                |        |      |                     | C                                  | C <sub>0</sub>       | RPM           |              |                |                     |     |
| 5              | 127.000           | 165.100        | 50.800 | 2.54 | HJ-8010432          | —                                  | 272                  | 503           | 3430         | 5938           | —                   |     |
|                | 5.0000            | 6.5000         | 2.000  | 0.10 |                     |                                    | 61200                | 113000        |              |                |                     |     |
|                | 127.000           | 165.100        | 57.150 | 2.54 | HJ-8010436          | IR-648036<br>IR-688036             | 309                  | 592           | 3430         | 5938           | 3.324               |     |
|                | 5.0000            | 6.5000         | 2.250  | 0.10 |                     |                                    | 69400                | 133000        |              |                | 7.327               |     |
|                | 127.000           | 165.100        | 63.500 | 2.54 | HJ-8010440          | IR-648040                          | 344                  | 676           | 3430         | 5938           | 3.693               |     |
|                | 5.0000            | 6.5000         | 2.500  | 0.10 |                     |                                    | 77300                | 152000        |              |                | 8.141               |     |
| 5 1/2          | 139.700           | 177.800        | 63.500 | 2.54 | HJ-8811240          | IR-728840                          | 350                  | 712           | 3120         | 6438           | 4.014               |     |
|                | 5.5000            | 7.0000         | 2.500  | 0.10 |                     |                                    | 78600                | 160000        |              |                | 8.849               |     |
|                | 139.700           | 177.800        | 76.200 | 2.54 | HJ-8811248          | IR-728848                          | 415                  | 885           | 3120         | 6438           | 4.817               |     |
|                | 5.5000            | 7.0000         | 3.000  | 0.10 |                     |                                    | 93300                | 199000        |              |                | 10.62               |     |
| 5 3/4          | 146.050           | 184.150        | 76.200 | 3.05 | HJ-9211648          | IR-769248                          | 422                  | 921           | 2960         | 6688           | 5.009               |     |
|                | 5.7500            | 7.2500         | 3.000  | 0.12 |                     |                                    | 94800                | 207000        |              |                | 11.04               |     |
| 6              | 152.400           | 190.500        | 63.500 | 3.05 | HJ-9612040          | IR-809640                          | 369                  | 792           | 2830         | 6938           | 4.335               |     |
|                | 6.0000            | 7.5000         | 2.500  | 0.12 |                     |                                    | 83000                | 178000        |              |                | 9.557               |     |
|                | 152.400           | 190.500        | 76.200 | 3.05 | HJ-9612048          | IR-809648                          | 442                  | 996           | 2830         | 6938           | 5.202               |     |
|                | 6.0000            | 7.5000         | 3.000  | 0.12 |                     |                                    | 99300                | 224000        |              |                | 11.47               |     |
| 6 1/2          | 165.100           | 203.200        | 63.500 | 3.05 | HJ-10412840         | IR-8810440                         | 383                  | 850           | 2600         | 7438           | 4.656               |     |
|                | 6.5000            | 8.0000         | 2.500  | 0.12 |                     |                                    | 86000                | 191000        |              |                | 10.26               |     |
|                | 165.100           | 203.200        | 76.200 | 3.05 | HJ-10412848         | IR-8810448                         | 454                  | 1054          | 2600         | 7438           | 5.582               |     |
|                | 6.5000            | 8.0000         | 3.000  | 0.12 |                     |                                    | 102000               | 237000        |              |                | 12.31               |     |
| 7 1/4          | 184.150           | 231.775        | 76.200 | 3.05 | HJ-11614648         | IR-9611648                         | 526                  | 1125          | 2340         | 8500           | 7.888               |     |
|                | 7.2500            | 9.1250         | 3.000  | 0.12 |                     |                                    | 118300               | 253000        |              |                | 17.39               |     |
| 7 3/4          | 196.850           | 244.475        | 76.200 | 3.05 | HJ-12415448         | IR-10412448                        | 547                  | 1205          | 2180         | 9000           | 8.370               |     |
|                | 7.7500            | 9.6250         | 3.000  | 0.12 |                     |                                    | 123000               | 271000        |              |                | 18.45               |     |
| 8 1/4          | 209.550           | 257.175        | 76.200 | 3.05 | HJ-13216248         | IR-11213248                        | 565                  | 1290          | 2040         | 9500           | 8.852               |     |
|                | 8.2500            | 10.1250        | 3.000  | 0.12 |                     |                                    | 127000               | 290000        |              |                | 19.51               |     |
| 8 3/4          | 222.250           | 269.875        | 76.200 | 4.06 | HJ-14017048         | IR-12014048                        | 578                  | 1370          | 1920         | 10000          | 9.333               |     |
|                | 8.7500            | 10.6250        | 3.000  | 0.16 |                     |                                    | 130000               | 308000        |              |                | 20.58               |     |
| 9 1/4          | 234.950           | 282.575        | 76.200 | 4.06 | HJ-14817848         | IR-12814848                        | 605                  | 1450          | 1810         | 10500          | 9.815               |     |
|                | 9.2500            | 11.1250        | 3.000  | 0.16 |                     |                                    | 136000               | 326000        |              |                | 21.64               |     |

† See pages C150-C153 for inch series inner rings. Order inner rings separately.

(1) C<sub>0</sub> factor for bearing without inner ring.

## Heavy-Duty Needle Roller Bearings



| C <sub>g</sub> <sup>1</sup> | Mounting Dimensions mm/in. |                   |                    |                    | Bearing Designation | Mounting Dimensions mm/in. |                   |                   |                   | Shoulder Dia. ±.38 ±.015 | Shaft Diameter |
|-----------------------------|----------------------------|-------------------|--------------------|--------------------|---------------------|----------------------------|-------------------|-------------------|-------------------|--------------------------|----------------|
|                             | Clearance Fit              |                   |                    |                    |                     | Tight Transition Fit       |                   |                   |                   |                          |                |
|                             | Max.                       | Min.              | Min.               | Max.               |                     | Max.                       | Min.              | Min.              | Max.              |                          |                |
|                             | S                          |                   | H                  |                    |                     | S                          |                   | H                 |                   | Da                       | in.            |
| –                           | 127.000<br>5.0000          | 126.975<br>4.9990 | 165.100<br>6.5000  | 165.141<br>6.5016  | HJ-8010432          | 126.959<br>4.9984          | 126.934<br>4.9974 | 165.044<br>6.4978 | 165.085<br>6.4994 | 150.81<br>5.938          | 5              |
| 0.1188                      | 127.000<br>5.0000          | 126.975<br>4.9990 | 165.100<br>6.5000  | 165.141<br>6.5016  | HJ-8010436          | 126.959<br>4.9984          | 126.934<br>4.9974 | 165.044<br>6.4978 | 165.085<br>6.4994 | 150.81<br>5.938          |                |
| 0.1213                      | 127.000<br>5.0000          | 126.975<br>4.9990 | 165.100<br>6.5000  | 165.141<br>6.5016  | HJ-8010440          | 126.959<br>4.9984          | 126.934<br>4.9974 | 165.044<br>6.4978 | 165.085<br>6.4994 | 150.81<br>5.938          |                |
| 0.1297                      | 139.700<br>5.5000          | 139.675<br>5.4990 | 177.800<br>7.0000  | 177.841<br>7.0016  | HJ-8811240          | 139.659<br>5.4984          | 139.634<br>5.4974 | 177.744<br>6.9978 | 177.785<br>6.9994 | 163.51<br>6.438          | 5 1/2          |
| 0.1369                      | 139.700<br>5.5000          | 139.675<br>5.4990 | 177.800<br>7.0000  | 177.841<br>7.0016  | HJ-8811248          | 139.659<br>5.4984          | 139.634<br>5.4974 | 177.744<br>6.9978 | 177.785<br>6.9994 | 163.51<br>6.438          |                |
| 0.1409                      | 146.050<br>5.7500          | 146.025<br>5.7490 | 184.150<br>7.2500  | 184.196<br>7.2518  | HJ-9211648          | 146.009<br>5.7484          | 145.984<br>5.7474 | 184.089<br>7.2476 | 184.135<br>7.2494 | 169.86<br>6.688          | 5 3/4          |
| 0.1384                      | 152.400<br>6.0000          | 152.375<br>5.9990 | 190.500<br>7.5000  | 190.546<br>7.5018  | HJ-9612040          | 152.359<br>5.9984          | 152.334<br>5.9974 | 190.439<br>7.4976 | 190.485<br>7.4994 | 176.21<br>6.938          | 6              |
| 0.1461                      | 152.400<br>6.0000          | 152.375<br>5.9990 | 190.500<br>7.5000  | 190.546<br>7.5018  | HJ-9612048          | 152.359<br>5.9984          | 152.334<br>5.9974 | 190.439<br>7.4976 | 190.485<br>7.4994 | 176.21<br>6.938          |                |
| 0.1459                      | 165.100<br>6.5000          | 165.075<br>6.4990 | 203.200<br>8.0000  | 203.246<br>8.0018  | HJ-10412840         | 165.059<br>6.4984          | 165.034<br>6.4974 | 203.139<br>7.9976 | 203.185<br>7.9994 | 188.91<br>7.438          | 6 1/2          |
| 0.1539                      | 165.100<br>6.5000          | 165.075<br>6.4990 | 203.200<br>8.0000  | 203.246<br>8.0018  | HJ-10412848         | 165.059<br>6.4984          | 165.034<br>6.4974 | 203.139<br>7.9976 | 203.185<br>7.9994 | 188.91<br>7.438          |                |
| 0.1586                      | 184.150<br>7.2500          | 184.120<br>7.2488 | 231.775<br>9.1250  | 231.821<br>9.1268  | HJ-11614648         | 184.099<br>7.2480          | 184.069<br>7.2468 | 231.714<br>9.1226 | 231.760<br>9.1244 | 215.90<br>8.500          | 7 1/4          |
| 0.1662                      | 196.850<br>7.7500          | 196.820<br>7.7488 | 244.475<br>9.6250  | 244.521<br>9.6268  | HJ-12415448         | 196.799<br>7.7480          | 196.769<br>7.7468 | 244.414<br>9.6226 | 244.460<br>9.6244 | 228.60<br>9.000          | 7 3/4          |
| 0.1736                      | 209.550<br>8.2500          | 209.520<br>8.2488 | 257.175<br>10.1250 | 257.226<br>10.1270 | HJ-13216248         | 209.499<br>8.2480          | 209.469<br>8.2468 | 257.109<br>10.122 | 257.160<br>10.124 | 241.30<br>9.500          | 8 1/4          |
| 0.1810                      | 222.250<br>8.7500          | 222.220<br>8.7488 | 269.875<br>10.6250 | 269.926<br>10.6270 | HJ-14017048         | 222.199<br>8.7480          | 222.169<br>8.7468 | 269.809<br>10.622 | 269.860<br>10.624 | 254.00<br>10.000         | 8 3/4          |
| 0.1885                      | 234.950<br>9.2500          | 234.920<br>9.2488 | 282.575<br>11.1250 | 282.626<br>11.1270 | HJ-14817848         | 234.899<br>9.2480          | 234.869<br>9.2468 | 282.509<br>11.122 | 282.560<br>11.124 | 266.70<br>10.500         | 9 1/4          |



## NEEDLE ROLLER BEARINGS

### SEALED HEAVY-DUTY NEEDLE ROLLER BEARINGS

#### INCH SERIES

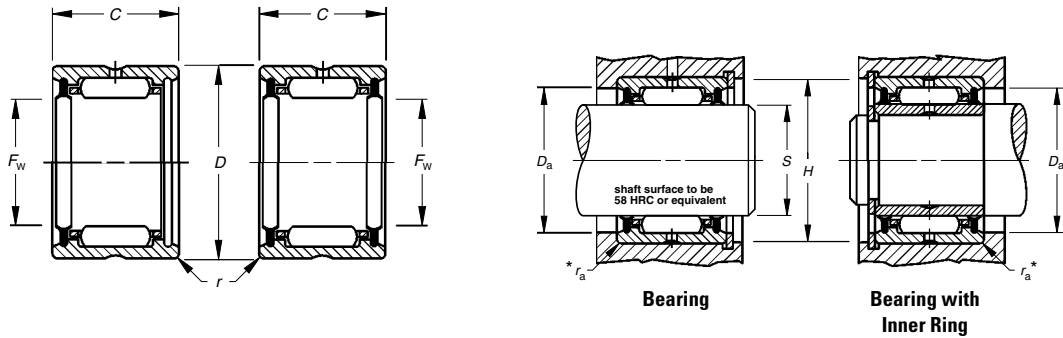
- Bearing diameters and widths listed are nominal.
- For inspection purposes, see tolerance tables on page C139.
- Available with one or two contact lip seals designed to retain lubricant and exclude foreign material.
- Single seals are normally installed in the stamped end of bearing.
- Seals limit the bearing operating temperature between -25° F and +225° F (-30° C and +110° C).
- For operating temperature outside of the above range, or if seals are exposed to unusual fluids, please consult your Timken representative.

| Shaft Diameter | Dimensions mm/in. |                  |                |              | Bearing Designation |               |                                                  | Used With Inner Ring †  | Load Ratings kN/bf.     |                       |                | C <sub>0</sub> |
|----------------|-------------------|------------------|----------------|--------------|---------------------|---------------|--------------------------------------------------|-------------------------|-------------------------|-----------------------|----------------|----------------|
|                | in.               | F <sub>w</sub>   | D              | C/B          | r <sub>s</sub> min  | One Seal      | Two Seals                                        |                         | Dynamic C               | Static C <sub>0</sub> | Limiting Speed |                |
|                |                   |                  |                |              |                     | RPM           |                                                  |                         |                         |                       |                |                |
| 5/8            | 15.875<br>0.6250  | 28.575<br>1.1250 | 25.40<br>1.000 | 0.64<br>0.03 | HJ-101816RS         | HJ-101816.2RS | —                                                | 19.3<br>4350            | 20.7<br>4650            | 12000                 | 0.025          |                |
| 3/4            | 19.050<br>0.7500  | 31.750<br>1.2500 | 25.40<br>1.000 | 1.02<br>0.04 | HJ-122016RS         | HJ-122016.2RS | IR-081216                                        | 20.7<br>4650            | 23.3<br>5240            | 10000                 | 0.028          |                |
| 7/8            | 22.225<br>0.8750  | 34.925<br>1.3750 | 25.40<br>1.000 | 1.02<br>0.04 | HJ-142216RS         | HJ-142216.2RS | IR-101416                                        | 23.0<br>5180            | 27.9<br>6270            | 8700                  | 0.031          |                |
| 1              | 25.400<br>1.0000  | 38.100<br>1.5000 | 25.40<br>1.000 | 1.02<br>0.04 | HJ-162416RS         | HJ-162416.2RS | IR-121616<br>IR-131616                           | 25.3<br>5680            | 32.5<br>7300            | 7600                  | 0.034          |                |
| 1 1/8          | 28.575<br>1.1250  | 41.275<br>1.6250 | 31.75<br>1.250 | 1.02<br>0.04 | HJ-182620RS         | HJ-182620.2RS | IR-141820                                        | 36.3<br>8170            | 53.8<br>12100           | 6800                  | 0.040          |                |
| 1 1/4          | 31.750<br>1.2500  | 44.450<br>1.7500 | 31.75<br>1.250 | 1.02<br>0.04 | HJ-202820RS         | HJ-202820.2RS | IR-162020                                        | 37.4<br>8410            | 57.4<br>12900           | 6100                  | 0.043          |                |
| 1 3/8          | 34.925<br>1.3750  | 47.625<br>1.8750 | 31.75<br>1.250 | 1.02<br>0.04 | HJ-223020RS         | HJ-223020.2RS | IR-182220                                        | 39.8<br>8950            | 64.1<br>14400           | 5600                  | 0.046          |                |
| 1 1/2          | 38.100<br>1.5000  | 52.388<br>2.0625 | 31.75<br>1.250 | 1.52<br>0.06 | HJ-243320RS         | HJ-243320.2RS | IR-192420                                        | 47.6<br>10700           | 72.5<br>16300           | 5100                  | 0.0480         |                |
| 1 5/8          | 41.275<br>1.6250  | 55.563<br>2.1875 | 31.75<br>1.250 | 1.52<br>0.06 | HJ-263520RS         | HJ-263520.2RS | IR-212620                                        | 48.5<br>10900           | 76.5<br>17200           | 2400                  | 0.050          |                |
| 1 3/4          | 44.450<br>1.7500  | 58.738<br>2.3125 | 31.75<br>1.250 | 1.52<br>0.06 | HJ-283720RS         | HJ-283720.2RS | IR-222820<br>IR-232820<br>IR-242820              | 49.8<br>11200<br>—      | 81.0<br>18200<br>—      | 4400                  | 0.053          |                |
| 2              | 50.800<br>2.0000  | 65.088<br>2.5625 | 31.75<br>1.250 | 1.52<br>0.06 | HJ-324120RS         | HJ-324120.2RS | IR-243220<br>IR-253220<br>IR-263220<br>IR-273220 | 53.8<br>12100<br>—<br>— | 93.0<br>20900<br>—<br>— | 3800                  | 0.058          |                |
| 2 1/4          | 57.150<br>2.2500  | 76.200<br>3.0000 | 44.45<br>1.750 | 1.52<br>0.06 | HJ-364828RS         | HJ-364828.2RS | IR-283628                                        | 89.9<br>20200           | 164.1<br>36900          | 1700                  | 0.068          |                |
| 2 1/2          | 63.500<br>2.5000  | 82.550<br>3.2500 | 44.45<br>1.750 | 2.03<br>0.08 | HJ-405228RS         | HJ-405228.2RS | IR-222620<br>IR-314028<br>IR-324028              | 97.0<br>21800<br>—      | 187.3<br>42100<br>—     | 3100                  | 0.074          |                |
| 2 3/4          | 69.850<br>2.7500  | 88.900<br>3.5000 | 44.45<br>1.750 | 2.03<br>0.08 | HJ-445628RS         | HJ-445628.2RS | IR-354428<br>IR-364428                           | 101.0<br>22700          | 203.3<br>45700          | 1400                  | 0.079          |                |
| 3              | 76.200<br>3.0000  | 95.250<br>3.7500 | 44.45<br>1.750 | 2.03<br>0.08 | HJ-486028RS         | HJ-486028.2RS | IR-384828<br>IR-404828                           | 107.2<br>24100          | 226.4<br>50900          | 2500                  | 0.084          |                |

† See pages C150-C153 for inch series inner rings. Order inner rings separately.

§ Based on standard seal shaft contact speed of 305 m/min., 1000 ft./min.

## Heavy-Duty Needle Roller Bearings



| Approx. Wt. kg/lbs. | Mounting Dimensions mm/in. |                         |                         |                         | Bearing Designation | Mounting Dimensions mm/in. |                         |                         |                         | Shoulder Dia. $\pm 0.38 \pm 0.15$ | Shaft Diameter in. |
|---------------------|----------------------------|-------------------------|-------------------------|-------------------------|---------------------|----------------------------|-------------------------|-------------------------|-------------------------|-----------------------------------|--------------------|
|                     | Clearance Fit              |                         |                         |                         |                     | Tight Transition Fit       |                         |                         |                         |                                   |                    |
|                     | Max.                       | Min.                    | Min.                    | Max.                    |                     | Max.                       | Min.                    | Min.                    | Max.                    |                                   |                    |
|                     | S                          |                         | H                       |                         |                     | S                          |                         | H                       |                         | Da                                | in.                |
| <b>0.07</b><br>0.15 | <b>15.875</b><br>0.6250    | <b>15.865</b><br>0.6246 | <b>28.575</b><br>1.1250 | <b>28.595</b><br>1.1258 | -101816             | <b>15.860</b><br>0.6244    | <b>15.850</b><br>0.6240 | <b>28.547</b><br>1.1239 | <b>28.567</b><br>1.1247 | <b>23.83</b><br>0.938             | <b>5/8</b>         |
| <b>0.08</b><br>0.17 | <b>19.050</b><br>0.7500    | <b>19.037</b><br>0.7495 | <b>31.750</b><br>1.2500 | <b>31.775</b><br>1.2510 | -122016             | <b>19.030</b><br>0.7492    | <b>19.017</b><br>0.7487 | <b>31.717</b><br>1.2487 | <b>31.742</b><br>1.2497 | <b>26.97</b><br>1.062             | <b>3/4</b>         |
| <b>0.09</b><br>0.19 | <b>22.225</b><br>0.8750    | <b>22.212</b><br>0.8745 | <b>34.925</b><br>1.3750 | <b>34.950</b><br>1.3760 | -142216             | <b>22.205</b><br>0.8742    | <b>22.192</b><br>0.8737 | <b>34.892</b><br>1.3737 | <b>34.917</b><br>1.3747 | <b>30.18</b><br>1.188             | <b>7/8</b>         |
| <b>0.10</b><br>0.21 | <b>25.400</b><br>1.0000    | <b>25.387</b><br>0.9995 | <b>38.100</b><br>1.5000 | <b>38.125</b><br>1.5010 | -162416             | <b>25.380</b><br>0.9992    | <b>25.367</b><br>0.9987 | <b>38.067</b><br>1.4987 | <b>38.092</b><br>1.4997 | <b>33.32</b><br>1.312             | <b>1</b>           |
| <b>0.13</b><br>0.29 | <b>28.575</b><br>1.1250    | <b>28.562</b><br>1.1245 | <b>41.275</b><br>1.6250 | <b>41.300</b><br>1.6260 | -182620             | <b>28.555</b><br>1.1242    | <b>28.542</b><br>1.1237 | <b>41.242</b><br>1.6237 | <b>41.267</b><br>1.6247 | <b>36.53</b><br>1.438             | <b>1 1/8</b>       |
| <b>0.15</b><br>0.32 | <b>31.750</b><br>1.2500    | <b>31.735</b><br>1.2494 | <b>44.450</b><br>1.7500 | <b>44.475</b><br>1.7510 | -202820             | <b>31.725</b><br>1.2490    | <b>31.709</b><br>1.2484 | <b>44.417</b><br>1.7487 | <b>44.442</b><br>1.7497 | <b>39.67</b><br>1.562             | <b>1 1/4</b>       |
| <b>0.16</b><br>0.35 | <b>34.925</b><br>1.3750    | <b>34.910</b><br>1.3744 | <b>47.625</b><br>1.8750 | <b>47.650</b><br>1.8760 | -223020             | <b>34.900</b><br>1.3740    | <b>34.884</b><br>1.3734 | <b>47.592</b><br>1.8737 | <b>47.617</b><br>1.8747 | <b>42.88</b><br>1.688             | <b>1 3/8</b>       |
| <b>0.20</b><br>0.43 | <b>38.100</b><br>1.5000    | <b>38.085</b><br>1.4994 | <b>52.388</b><br>2.0625 | <b>52.418</b><br>2.0637 | -243320             | <b>38.075</b><br>1.4990    | <b>38.059</b><br>1.4984 | <b>52.349</b><br>2.0610 | <b>52.380</b><br>2.0622 | <b>47.63</b><br>1.875             | <b>1 1/2</b>       |
| <b>0.21</b><br>0.46 | <b>41.275</b><br>1.6250    | <b>41.260</b><br>1.6244 | <b>55.563</b><br>2.1875 | <b>55.593</b><br>2.1887 | -263520             | <b>41.250</b><br>1.6240    | <b>41.234</b><br>1.6234 | <b>55.524</b><br>2.1860 | <b>55.555</b><br>2.1872 | <b>50.80</b><br>2.000             | <b>1 5/8</b>       |
| <b>0.22</b><br>0.49 | <b>44.450</b><br>1.7500    | <b>44.435</b><br>1.7494 | <b>58.738</b><br>2.3125 | <b>58.768</b><br>2.3137 | -283720             | <b>44.425</b><br>1.7490    | <b>44.409</b><br>1.7484 | <b>58.699</b><br>2.3110 | <b>58.730</b><br>2.3122 | <b>53.98</b><br>2.125             | <b>1 3/4</b>       |
| <b>0.25</b><br>0.55 | <b>50.800</b><br>2.0000    | <b>50.782</b><br>1.9993 | <b>65.088</b><br>2.5625 | <b>65.118</b><br>2.5637 | -324120             | <b>50.770</b><br>1.9988    | <b>50.752</b><br>1.9981 | <b>65.049</b><br>2.5610 | <b>65.080</b><br>2.5622 | <b>60.33</b><br>2.375             | <b>2</b>           |
| <b>0.53</b><br>1.17 | <b>57.150</b><br>2.2500    | <b>57.132</b><br>2.2493 | <b>76.200</b><br>3.0000 | <b>76.230</b><br>3.0012 | -364828             | <b>57.120</b><br>2.2488    | <b>57.102</b><br>2.2481 | <b>76.162</b><br>2.9985 | <b>76.192</b><br>2.9997 | <b>68.28</b><br>2.688             | <b>2 1/4</b>       |
| <b>0.59</b><br>1.29 | <b>63.500</b><br>2.5000    | <b>63.482</b><br>2.4993 | <b>82.550</b><br>3.2500 | <b>82.586</b><br>3.2514 | -405228             | <b>63.470</b><br>2.4988    | <b>63.452</b><br>2.4981 | <b>82.502</b><br>3.2481 | <b>82.537</b><br>3.2495 | <b>74.63</b><br>2.938             | <b>2 1/2</b>       |
| <b>0.64</b><br>1.40 | <b>69.850</b><br>2.7500    | <b>69.832</b><br>2.7493 | <b>88.900</b><br>3.5000 | <b>88.936</b><br>3.5014 | -445628             | <b>69.820</b><br>2.7488    | <b>69.802</b><br>2.7481 | <b>88.852</b><br>3.4981 | <b>88.887</b><br>3.4995 | <b>80.98</b><br>3.188             | <b>2 3/4</b>       |
| <b>0.68</b><br>1.51 | <b>76.200</b><br>3.0000    | <b>76.182</b><br>2.9993 | <b>95.250</b><br>3.7500 | <b>95.286</b><br>3.7514 | -486028             | <b>76.170</b><br>2.9988    | <b>76.152</b><br>2.9981 | <b>95.202</b><br>3.7481 | <b>95.237</b><br>3.7495 | <b>87.33</b><br>3.438             | <b>3</b>           |

\* $r_{as \max}$  is equal to the minimum bearing chamfer ( $r_{s \min}$ ) at unmarked end.





# NEEDLE ROLLER BEARINGS

## INNER RINGS

### INCH SERIES

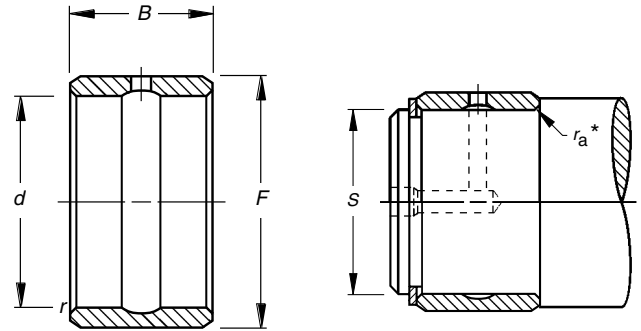
- Check for availability.
- Ideal choice where shaft not practical to use as inner raceway.
- Provided in inch nominal dimensions for use with inch series heavy-duty needle roller bearings.
- Designed to meet established inch tolerances.
- Selected size should be wider than matching drawn cup bearing.
- Maximum shaft fillet radius ( $r_{s\ max}$ ) cannot exceed inner ring bore chamfer ( $r_{s\ min}$ ) as shown.
- Optional centralized lubrication groove (bore) or through-hole available – specify when ordering.
- Designed to be axially clamped against shoulder for loose transition fit on shaft.
- After mounting, for tight transition fit (keeping inner ring from rotating relative to shaft), inner ring O.D. must not exceed raceway diameter on matching bearing.

| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Approx. Wt. kg/lbs. | Loose Transition Fit mm/in. |        | Inner Ring Designation | Interference Fit mm/in. |        | Used With Bearing Designation |
|----------------|-------------------|--------|-------|-------|------------------------|---------------------|-----------------------------|--------|------------------------|-------------------------|--------|-------------------------------|
|                | in.               | d      | F     | B     |                        |                     | $r_{s\ min}$                | Max.   |                        | Min.                    | Max.   |                               |
| 3/8            | 9.525             | 15.875 | 19.05 | 0.64  | IR-061012              | 0.018               | 9.520                       | 9.510  | IR-061012              | 9.538                   | 9.530  | HJ-101812                     |
|                | 0.3750            | 0.6250 | 0.750 | 0.025 |                        |                     |                             |        |                        |                         |        |                               |
| 1/2            | 12.700            | 19.050 | 19.05 | 1.02  | IR-081212              | 0.023               | 12.692                      | 12.682 | IR-081212              | 12.715                  | 12.708 | HJ-122012                     |
|                | 0.5000            | 0.7500 | 0.750 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 12.700            | 19.050 | 25.40 | 1.02  | IR-081216              | 0.032               | 12.692                      | 12.682 | IR-081216              | 12.715                  | 12.708 | HJ-122016                     |
|                | 0.5000            | 0.7500 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 5/8            | 15.875            | 22.225 | 19.05 | 1.02  | IR-101412              | 0.027               | 15.867                      | 15.857 | IR-101412              | 15.890                  | 15.883 | HJ-142212                     |
|                | 0.6250            | 0.8750 | 0.750 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 15.875            | 22.225 | 25.40 | 1.02  | IR-101416              | 0.036               | 15.867                      | 15.857 | IR-101416              | 15.890                  | 15.883 | HJ-142216                     |
|                | 0.6250            | 0.8750 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 11/16          | 17.463            | 22.225 | 19.05 | 1.02  | IR-111412              | 0.023               | 17.455                      | 17.445 | IR-111412              | 17.478                  | 17.470 | HJ-142212                     |
|                | 0.6875            | 0.8750 | 0.750 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 3/4            | 19.050            | 25.400 | 19.05 | 1.02  | IR-121612              | 0.032               | 19.042                      | 19.030 | IR-121612              | 19.068                  | 19.058 | HJ-162412                     |
|                | 0.7500            | 1.0000 | 0.750 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 19.050            | 25.400 | 25.40 | 1.02  | IR-121616              | 0.041               | 19.042                      | 19.030 | IR-121616              | 19.068                  | 19.058 | HJ-162416                     |
|                | 0.7500            | 1.0000 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 13/16          | 20.638            | 25.400 | 25.40 | 1.02  | IR-131616              | 0.032               | 20.630                      | 20.617 | IR-131616              | 20.655                  | 20.645 | HJ-162416                     |
|                | 0.8125            | 1.0000 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 7/8            | 22.225            | 28.575 | 25.40 | 1.02  | IR-141816              | 0.050               | 22.217                      | 22.205 | IR-141816              | 22.243                  | 22.233 | HJ-182616                     |
|                | 0.8750            | 1.1250 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 22.225            | 28.575 | 31.75 | 1.02  | IR-141820              | 0.059               | 22.217                      | 22.205 | IR-141820              | 22.243                  | 22.233 | HJ-182620                     |
|                | 0.8750            | 1.1250 | 1.250 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 15/16          | 23.813            | 28.575 | 25.40 | 1.02  | IR-151816              | 0.036               | 23.805                      | 23.792 | IR-151816              | 23.830                  | 23.820 | HJ-182616                     |
|                | 0.9375            | 1.1250 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 23.813            | 28.575 | 31.75 | 1.02  | IR-151820              | 0.045               | 23.805                      | 23.792 | IR-151820              | 23.830                  | 23.820 | HJ-182620                     |
|                | 0.9375            | 1.1250 | 1.250 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 1              | 25.400            | 31.750 | 25.40 | 1.02  | IR-162016              | 0.054               | 25.392                      | 25.380 | IR-162016              | 25.418                  | 25.408 | HJ-202816                     |
|                | 1.0000            | 1.2500 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 25.400            | 31.750 | 31.75 | 1.02  | IR-162020              | 0.068               | 25.392                      | 25.380 | IR-162020              | 25.418                  | 25.408 | HJ-202820                     |
|                | 1.0000            | 1.2500 | 1.250 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 1 1/8          | 28.575            | 34.925 | 25.40 | 1.02  | IR-182216              | 0.059               | 28.567                      | 28.555 | IR-182216              | 28.593                  | 28.583 | HJ-223016                     |
|                | 1.1250            | 1.3750 | 1.000 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
|                | 28.575            | 34.925 | 31.75 | 1.02  | IR-182220              | 0.077               | 28.567                      | 28.555 | IR-182220              | 28.593                  | 28.583 | HJ-223020                     |
|                | 1.1250            | 1.3750 | 1.250 | 0.04  |                        |                     |                             |        |                        |                         |        |                               |
| 1 1/16         | 30.163            | 38.100 | 31.75 | 1.52  | IR-192420              | 0.100               | 30.155                      | 30.142 | IR-192420              | 30.180                  | 30.170 | HJ-243320                     |
|                | 1.1875            | 1.5000 | 1.250 | 0.06  |                        |                     |                             |        |                        |                         |        |                               |
| 1 1/4          | 31.750            | 38.100 | 25.40 | 1.52  | IR-202416              | 0.068               | 31.740                      | 31.725 | IR-202416              | 31.770                  | 31.760 | HJ-243316                     |
|                | 1.2500            | 1.5000 | 1.000 | 0.06  |                        |                     |                             |        |                        |                         |        |                               |
|                | 31.750            | 38.100 | 31.75 | 1.52  | IR-202420              | 0.082               | 31.740                      | 31.725 | IR-202420              | 31.770                  | 31.760 | HJ-243320                     |
|                | 1.2500            | 1.5000 | 1.250 | 0.06  |                        |                     |                             |        |                        |                         |        |                               |
| 1 5/16         | 33.338            | 41.275 | 25.40 | 1.52  | IR-212616              | 0.086               | 33.327                      | 33.312 | IR-212616              | 33.358                  | 33.348 | HJ-263516                     |
|                | 1.3125            | 1.6250 | 1.000 | 0.06  |                        |                     |                             |        |                        |                         |        |                               |

Continued on next page.

## Heavy-Duty Needle Roller Bearings

- See tables for required bearing dimensions raceway diameter.
- After mounting, if O.D. of inner ring exceeds the required raceway diameter for matching bearing, ring should be ground to proper diameter while mounted on shaft.
- Unmarked end of inner ring to be assembled against the shaft shoulder to assure clearing the maximum allowable shaft fillet ( $r_{as\ max}$ ) as indicated in tables shown.



| Shaft Diameter | Dimensions mm/in. |               |               |              | Inner Ring Designation | Approx. Wt. kg/lbs. | Loose Transition Fit mm/in. |               | Inner Ring Designation | Interference Fit mm/in. |               | Used With Bearing Designation |
|----------------|-------------------|---------------|---------------|--------------|------------------------|---------------------|-----------------------------|---------------|------------------------|-------------------------|---------------|-------------------------------|
|                | in.               | d             | F             | B            |                        |                     | $\epsilon_{\min}$           | Max.          |                        | Min.                    | Max.          |                               |
|                |                   | <b>33.338</b> | <b>41.275</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-212620</b>    | <b>0.109</b>                | <b>33.327</b> | <b>33.312</b>          | <b>IR-212620</b>        | <b>33.358</b> | <b>33.348</b>                 |
|                |                   | 1.3125        | 1.6250        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 3/8          |                   | <b>34.925</b> | <b>41.275</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-222620</b>    | <b>0.091</b>                | <b>34.915</b> | <b>34.900</b>          | <b>IR-222620</b>        | <b>34.945</b> | <b>34.935</b>                 |
|                |                   | 1.3750        | 1.6250        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>34.925</b> | <b>44.450</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-222820</b>    | <b>0.141</b>                | <b>34.915</b> | <b>34.900</b>          | <b>IR-222820</b>        | <b>34.945</b> | <b>34.935</b>                 |
|                |                   | 1.3750        | 1.7500        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 7/16         |                   | <b>36.513</b> | <b>44.450</b> | <b>25.40</b> | <b>1.52</b>            | <b>IR-232816</b>    | <b>0.095</b>                | <b>36.502</b> | <b>36.487</b>          | <b>IR-232816</b>        | <b>36.533</b> | <b>36.523</b>                 |
|                |                   | 1.4375        | 1.7500        | 1.000        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>36.513</b> | <b>44.450</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-232820</b>    | <b>0.118</b>                | <b>36.502</b> | <b>36.487</b>          | <b>IR-232820</b>        | <b>36.533</b> | <b>36.523</b>                 |
|                |                   | 1.4375        | 1.7500        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 1/2          |                   | <b>38.100</b> | <b>44.450</b> | <b>25.40</b> | <b>1.52</b>            | <b>IR-242816</b>    | <b>0.077</b>                | <b>38.090</b> | <b>38.075</b>          | <b>IR-242816</b>        | <b>38.120</b> | <b>38.110</b>                 |
|                |                   | 1.5000        | 1.7500        | 1.000        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>38.100</b> | <b>44.450</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-242820</b>    | <b>0.095</b>                | <b>38.090</b> | <b>38.075</b>          | <b>IR-242820</b>        | <b>38.120</b> | <b>38.110</b>                 |
|                |                   | 1.5000        | 1.7500        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>38.100</b> | <b>50.800</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-243220</b>    | <b>0.209</b>                | <b>38.090</b> | <b>38.075</b>          | <b>IR-243220</b>        | <b>38.120</b> | <b>38.110</b>                 |
|                |                   | 1.5000        | 2.0000        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 9/16         |                   | <b>39.688</b> | <b>47.625</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-253020</b>    | <b>0.127</b>                | <b>39.677</b> | <b>39.662</b>          | <b>IR-253020</b>        | <b>39.708</b> | <b>39.698</b>                 |
|                |                   | 1.5625        | 1.8750        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>39.688</b> | <b>50.800</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-253220</b>    | <b>0.186</b>                | <b>39.677</b> | <b>39.662</b>          | <b>IR-253220</b>        | <b>39.708</b> | <b>39.698</b>                 |
|                |                   | 1.5625        | 2.0000        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 5/8          |                   | <b>41.275</b> | <b>50.800</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-263220</b>    | <b>0.163</b>                | <b>41.265</b> | <b>41.250</b>          | <b>IR-263220</b>        | <b>41.295</b> | <b>41.285</b>                 |
|                |                   | 1.6250        | 2.0000        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 11/16        |                   | <b>42.863</b> | <b>50.800</b> | <b>25.40</b> | <b>1.52</b>            | <b>IR-273216</b>    | <b>0.109</b>                | <b>42.852</b> | <b>42.837</b>          | <b>IR-273216</b>        | <b>42.883</b> | <b>42.873</b>                 |
|                |                   | 1.6875        | 2.0000        | 1.000        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>42.863</b> | <b>50.800</b> | <b>31.75</b> | <b>1.52</b>            | <b>IR-273220</b>    | <b>0.136</b>                | <b>42.852</b> | <b>42.837</b>          | <b>IR-273220</b>        | <b>42.883</b> | <b>42.873</b>                 |
|                |                   | 1.6875        | 2.0000        | 1.250        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 3/4          |                   | <b>44.450</b> | <b>57.150</b> | <b>38.10</b> | <b>1.52</b>            | <b>IR-283624</b>    | <b>0.286</b>                | <b>44.440</b> | <b>44.425</b>          | <b>IR-283624</b>        | <b>44.470</b> | <b>44.460</b>                 |
|                |                   | 1.7500        | 2.2500        | 1.500        | 0.06                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>44.450</b> | <b>57.150</b> | <b>44.45</b> | <b>1.52</b>            | <b>IR-283628</b>    | <b>0.336</b>                | <b>44.440</b> | <b>44.425</b>          | <b>IR-283628</b>        | <b>44.470</b> | <b>44.460</b>                 |
|                |                   | 1.7500        | 2.2500        | 1.750        | 0.06                   |                     |                             |               |                        |                         |               |                               |
| 1 15/16        |                   | <b>49.213</b> | <b>63.500</b> | <b>38.10</b> | <b>2.03</b>            | <b>IR-314024</b>    | <b>0.358</b>                | <b>49.202</b> | <b>49.187</b>          | <b>IR-314024</b>        | <b>49.233</b> | <b>49.223</b>                 |
|                |                   | 1.9375        | 2.5000        | 1.500        | 0.08                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>49.213</b> | <b>63.500</b> | <b>44.45</b> | <b>2.03</b>            | <b>IR-314028</b>    | <b>0.417</b>                | <b>49.202</b> | <b>49.187</b>          | <b>IR-314028</b>        | <b>49.233</b> | <b>49.223</b>                 |
|                |                   | 1.9375        | 2.5000        | 1.750        | 0.08                   |                     |                             |               |                        |                         |               |                               |
| 2              |                   | <b>50.800</b> | <b>63.500</b> | <b>38.10</b> | <b>2.03</b>            | <b>IR-324024</b>    | <b>0.322</b>                | <b>50.790</b> | <b>50.772</b>          | <b>IR-324024</b>        | <b>50.823</b> | <b>50.810</b>                 |
|                |                   | 2.0000        | 2.5000        | 1.500        | 0.08                   |                     |                             |               |                        |                         |               |                               |
|                |                   | <b>50.800</b> | <b>63.500</b> | <b>44.45</b> | <b>2.03</b>            | <b>IR-324028</b>    | <b>0.376</b>                | <b>50.790</b> | <b>50.772</b>          | <b>IR-324028</b>        | <b>50.823</b> | <b>50.810</b>                 |
|                |                   | 2.0000        | 2.5000        | 1.750        | 0.08                   |                     |                             |               |                        |                         |               |                               |
| 2 3/16         |                   | <b>55.563</b> | <b>69.850</b> | <b>44.45</b> | <b>2.03</b>            | <b>IR-354428</b>    | <b>0.467</b>                | <b>55.552</b> | <b>55.535</b>          | <b>IR-354428</b>        | <b>55.585</b> | <b>55.573</b>                 |
|                |                   | 2.1875        | 2.7500        | 1.750        | 0.08                   |                     |                             |               |                        |                         |               |                               |
| 2 1/4          |                   | <b>57.150</b> | <b>69.850</b> | <b>38.10</b> | <b>2.03</b>            | <b>IR-364424</b>    | <b>0.358</b>                | <b>57.140</b> | <b>57.122</b>          | <b>IR-364424</b>        | <b>57.173</b> | <b>57.160</b>                 |
|                |                   | 2.2500        | 2.7500        | 1.500        | 0.08                   |                     |                             |               |                        |                         |               |                               |

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# NEEDLE ROLLER BEARINGS

## INNER RINGS — *continued*

### INCH SERIES

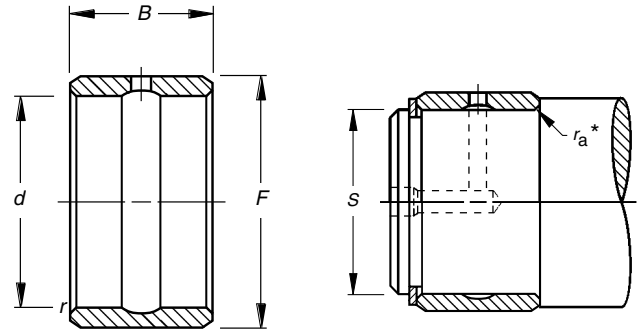
- Check for availability.
- Ideal choice where shaft not practical to use as inner raceway.
- Provided in inch nominal dimensions for use with inch series heavy-duty needle roller bearings.
- Designed to meet established inch tolerances.
- Selected size should be wider than matching drawn cup bearing.
- Maximum shaft fillet radius ( $r_{s\ max}$ ) cannot exceed inner ring bore chamfer ( $r_{s\ min}$ ) as shown.
- Optional centralized lubrication groove (bore) or through-hole available – specify when ordering.
- Designed to be axially clamped against shoulder for loose transition fit on shaft.
- After mounting, for tight transition fit (keeping inner ring from rotating relative to shaft), inner ring O.D. must not exceed raceway diameter on matching bearing.

| Shaft Diameter | Dimensions mm/in. |                |              |              | Inner Ring Designation | Approx. Wt. kg/lbs. | Loose Transition Fit mm/in. |                | Inner Ring Designation | Interference Fit mm/in. |                | Used With Bearing Designation |
|----------------|-------------------|----------------|--------------|--------------|------------------------|---------------------|-----------------------------|----------------|------------------------|-------------------------|----------------|-------------------------------|
|                | d                 | F              | B            | $r_{s\ min}$ |                        |                     | Max.                        | Min.           |                        | Max.                    | Min.           |                               |
| in.            |                   |                |              |              |                        |                     | S                           |                |                        | S                       |                |                               |
|                | <b>57.150</b>     | <b>69.850</b>  | <b>44.45</b> | <b>2.03</b>  | IR-364428              | 0.417               | <b>57.140</b>               | <b>57.122</b>  | IR-364428              | <b>57.173</b>           | <b>57.160</b>  | HJ-445628                     |
|                | 2.2500            | 2.7500         | 1.750        | 0.08         |                        |                     | 2.2496                      | 2.2489         |                        | 2.2509                  | 2.2504         |                               |
| 2 3/8          | <b>60.325</b>     | <b>76.200</b>  | <b>44.45</b> | <b>2.03</b>  | IR-384828              | 0.562               | <b>60.315</b>               | <b>60.297</b>  | IR-384828              | <b>60.348</b>           | <b>60.335</b>  | HJ-486028                     |
|                | 2.3750            | 3.0000         | 1.750        | 0.08         |                        |                     | 2.3746                      | 2.3739         |                        | 2.3759                  | 2.3754         |                               |
| 2 1/2          | <b>63.500</b>     | <b>76.200</b>  | <b>38.10</b> | <b>2.03</b>  | IR-404824              | 0.395               | <b>63.490</b>               | <b>63.472</b>  | IR-404824              | <b>63.523</b>           | <b>63.510</b>  | HJ-486024                     |
|                | 2.5000            | 3.0000         | 1.500        | 0.08         |                        |                     | 2.4996                      | 2.4989         |                        | 2.5009                  | 2.5004         |                               |
|                | <b>63.500</b>     | <b>76.200</b>  | <b>44.45</b> | <b>2.03</b>  | IR-404828              | 0.463               | <b>63.490</b>               | <b>63.472</b>  | IR-404828              | <b>63.523</b>           | <b>63.510</b>  | HJ-486028                     |
|                | 2.5000            | 3.0000         | 1.750        | 0.08         |                        |                     | 2.4996                      | 2.4989         |                        | 2.5009                  | 2.5004         |                               |
| 2 3/4          | <b>69.850</b>     | <b>82.550</b>  | <b>44.45</b> | <b>2.03</b>  | IR-445228              | 0.503               | <b>69.840</b>               | <b>69.822</b>  | IR-445228              | <b>69.873</b>           | <b>69.860</b>  | HJ-526828                     |
|                | 2.7500            | 3.2500         | 1.750        | 0.08         |                        |                     | 2.7496                      | 2.7489         |                        | 2.7509                  | 2.7504         |                               |
|                | <b>69.850</b>     | <b>82.550</b>  | <b>50.80</b> | <b>2.03</b>  | IR-445232              | 0.576               | <b>69.840</b>               | <b>69.822</b>  | IR-445232              | <b>69.873</b>           | <b>69.860</b>  | HJ-526832                     |
|                | 2.7500            | 3.2500         | 2.000        | 0.08         |                        |                     | 2.7496                      | 2.7489         |                        | 2.7509                  | 2.7504         |                               |
| 2 15/16        | <b>74.613</b>     | <b>88.900</b>  | <b>50.80</b> | <b>2.03</b>  | IR-475632              | 0.694               | <b>74.602</b>               | <b>74.585</b>  | IR-475632              | <b>74.635</b>           | <b>74.623</b>  | HJ-567232                     |
|                | 2.9375            | 3.5000         | 2.000        | 0.08         |                        |                     | 2.9371                      | 2.9364         |                        | 2.9384                  | 2.9379         |                               |
| 3              | <b>76.200</b>     | <b>88.900</b>  | <b>50.80</b> | <b>2.03</b>  | IR-485632              | 0.621               | <b>76.190</b>               | <b>76.172</b>  | IR-485632              | <b>76.223</b>           | <b>76.210</b>  | HJ-567232                     |
|                | 3.0000            | 3.5000         | 2.000        | 0.08         |                        |                     | 2.9996                      | 2.9989         |                        | 3.0009                  | 3.0004         |                               |
| 3 1/8          | <b>79.375</b>     | <b>95.250</b>  | <b>50.80</b> | <b>2.54</b>  | IR-506032              | 0.880               | <b>79.365</b>               | <b>79.347</b>  | IR-506032              | <b>79.398</b>           | <b>79.385</b>  | HJ-607632                     |
|                | 3.1250            | 3.7500         | 2.000        | 0.1          |                        |                     | 3.1246                      | 3.1239         |                        | 3.1259                  | 3.1254         |                               |
| 3 1/4          | <b>82.550</b>     | <b>95.250</b>  | <b>50.80</b> | <b>2.54</b>  | IR-526032              | 0.708               | <b>82.537</b>               | <b>82.517</b>  | IR-526032              | <b>82.578</b>           | <b>82.563</b>  | HJ-607632                     |
|                | 3.2500            | 3.7500         | 2.000        | 0.1          |                        |                     | 3.2495                      | 3.2487         |                        | 3.2511                  | 3.2505         |                               |
|                | <b>82.550</b>     | <b>101.600</b> | <b>50.80</b> | <b>2.54</b>  | IR-526432              | 1.089               | <b>82.537</b>               | <b>82.517</b>  | IR-526432              | <b>82.578</b>           | <b>82.563</b>  | HJ-648032                     |
|                | 3.2500            | 4.0000         | 2.000        | 0.1          |                        |                     | 3.2495                      | 3.2487         |                        | 3.2511                  | 3.2505         |                               |
| 3 3/8          | <b>85.725</b>     | <b>101.600</b> | <b>50.80</b> | <b>2.54</b>  | IR-546432              | 0.930               | <b>85.712</b>               | <b>85.692</b>  | IR-546432              | <b>85.753</b>           | <b>85.738</b>  | HJ-648032                     |
|                | 3.3750            | 4.0000         | 2.000        | 0.1          |                        |                     | 3.3745                      | 3.3737         |                        | 3.3761                  | 3.3755         |                               |
| 3 1/2          | <b>88.900</b>     | <b>101.600</b> | <b>50.80</b> | <b>2.54</b>  | IR-566432              | 0.757               | <b>88.887</b>               | <b>88.867</b>  | IR-566432              | <b>88.928</b>           | <b>88.913</b>  | HJ-648032                     |
|                | 3.5000            | 4.0000         | 2.000        | 0.1          |                        |                     | 3.4995                      | 3.4987         |                        | 3.5011                  | 3.5005         |                               |
|                | <b>88.900</b>     | <b>107.950</b> | <b>50.80</b> | <b>2.54</b>  | IR-566832              | 1.179               | <b>88.887</b>               | <b>88.867</b>  | IR-566832              | <b>88.928</b>           | <b>88.913</b>  | HJ-688432                     |
|                | 3.5000            | 4.2500         | 2.000        | 0.1          |                        |                     | 3.4995                      | 3.4987         |                        | 3.5011                  | 3.5005         |                               |
| 3 3/4          | <b>95.250</b>     | <b>107.950</b> | <b>50.80</b> | <b>2.54</b>  | IR-606832              | 1.012               | <b>95.237</b>               | <b>95.217</b>  | IR-606832              | <b>95.278</b>           | <b>95.263</b>  | HJ-688432                     |
|                | 3.7500            | 4.2500         | 2.000        | 0.1          |                        |                     | 3.7495                      | 3.7487         |                        | 3.7511                  | 3.7505         |                               |
|                | <b>95.250</b>     | <b>114.300</b> | <b>57.15</b> | <b>2.54</b>  | IR-607236              | 1.406               | <b>95.237</b>               | <b>95.217</b>  | IR-607236              | <b>95.278</b>           | <b>95.263</b>  | HJ-729636                     |
|                | 3.7500            | 4.5000         | 2.250        | 0.1          |                        |                     | 3.7495                      | 3.7487         |                        | 3.7511                  | 3.7505         |                               |
|                | <b>95.250</b>     | <b>114.300</b> | <b>63.50</b> | <b>2.54</b>  | IR-607240              | 1.565               | <b>95.237</b>               | <b>95.217</b>  | IR-607240              | <b>95.278</b>           | <b>95.263</b>  | HJ-729640                     |
|                | 3.7500            | 4.5000         | 2.500        | 0.1          |                        |                     | 3.7495                      | 3.7487         |                        | 3.7511                  | 3.7505         |                               |
| 4              | <b>101.600</b>    | <b>127.000</b> | <b>57.15</b> | <b>2.54</b>  | IR-648036              | 2.046               | <b>101.587</b>              | <b>101.567</b> | IR-648036              | <b>101.628</b>          | <b>101.613</b> | HJ-8010436                    |
|                | 4.0000            | 5.0000         | 2.250        | 0.1          |                        |                     | 3.9995                      | 3.9987         |                        | 4.0011                  | 4.0005         |                               |
|                | <b>101.600</b>    | <b>127.000</b> | <b>63.50</b> | <b>2.54</b>  | IR-648040              | 2.272               | <b>101.587</b>              | <b>101.567</b> | IR-648040              | <b>101.628</b>          | <b>101.613</b> | HJ-8010440                    |
|                | 4.0000            | 5.0000         | 2.500        | 0.1          |                        |                     | 3.9995                      | 3.9987         |                        | 4.0011                  | 4.0005         |                               |
| 4 1/4          | <b>107.950</b>    | <b>127.000</b> | <b>57.15</b> | <b>2.54</b>  | IR-688036              | 1.565               | <b>107.937</b>              | <b>107.917</b> | IR-688036              | <b>107.978</b>          | <b>107.963</b> | HJ-8010436                    |
|                | 4.2500            | 5.0000         | 2.250        | 0.1          |                        |                     | 4.2495                      | 4.2487         |                        | 4.2511                  | 4.2505         |                               |
| 4 1/2          | <b>114.300</b>    | <b>139.700</b> | <b>63.50</b> | <b>2.54</b>  | IR-728840              | 2.495               | <b>114.287</b>              | <b>114.267</b> | IR-728840              | <b>114.328</b>          | <b>114.313</b> | HJ-8811240                    |
|                | 4.5000            | 5.5000         | 2.500        | 0.1          |                        |                     | 4.4995                      | 4.4987         |                        | 4.5011                  | 4.5005         |                               |

Continued on next page.

## Heavy-Duty Needle Roller Bearings

- See tables for required bearing dimensions raceway diameter.
- After mounting, if O.D. of inner ring exceeds the required raceway diameter for matching bearing, ring should be ground to proper diameter while mounted on shaft.
- Unmarked end of inner ring to be assembled against the shaft shoulder to assure clearing the maximum allowable shaft fillet ( $r_{as\ max}$ ) as indicated in tables shown.



| Shaft Diameter | Dimensions mm/in.        |                          |                       |                              | Inner Ring Designation | Approx. Wt. kg/lbs.    | Loose Transition Fit mm/in. |                          | Inner Ring Designation | Interference Fit mm/in.  |                          | Used With Bearing Designation |
|----------------|--------------------------|--------------------------|-----------------------|------------------------------|------------------------|------------------------|-----------------------------|--------------------------|------------------------|--------------------------|--------------------------|-------------------------------|
|                | d                        | F                        | B                     | $r_{\min}$                   |                        |                        | Max.                        | Min.                     |                        | Max.                     | Min.                     |                               |
| <b>in.</b>     | <b>d</b>                 | <b>F</b>                 | <b>B</b>              | <b><math>r_{\min}</math></b> |                        |                        | <b>S</b>                    |                          |                        | <b>S</b>                 |                          |                               |
|                | <b>114.300</b><br>4.5000 | <b>139.700</b><br>5.5000 | <b>76.20</b><br>3.000 | <b>2.54</b><br>0.1           | <b>IR-728848</b>       | <b>2.989</b><br>6.590  | <b>114.287</b><br>4.4995    | <b>114.267</b><br>4.4987 | <b>IR-728848</b>       | <b>114.328</b><br>4.5011 | <b>114.313</b><br>4.5005 | <b>HJ-8811248</b>             |
| <b>4 3/4</b>   | <b>120.650</b><br>4.7500 | <b>146.050</b><br>5.7500 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-769248</b>       | <b>3.180</b><br>7.010  | <b>120.635</b><br>4.7494    | <b>120.612</b><br>4.7485 | <b>IR-769248</b>       | <b>120.683</b><br>4.7513 | <b>120.665</b><br>4.7506 | <b>HJ-9211648</b>             |
| <b>5</b>       | <b>127.000</b><br>5.0000 | <b>152.400</b><br>6.0000 | <b>63.50</b><br>2.500 | <b>3.05</b><br>0.12          | <b>IR-809640</b>       | <b>2.781</b><br>6.130  | <b>126.985</b><br>4.9994    | <b>126.962</b><br>4.9985 | <b>IR-809640</b>       | <b>127.033</b><br>5.0013 | <b>127.015</b><br>5.0006 | <b>HJ-9612040</b>             |
|                | <b>127.000</b><br>5.0000 | <b>152.400</b><br>6.0000 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-809648</b>       | <b>3.325</b><br>7.330  | <b>126.985</b><br>4.9994    | <b>126.962</b><br>4.9985 | <b>IR-809648</b>       | <b>127.033</b><br>5.0013 | <b>127.015</b><br>5.0006 | <b>HJ-9612048</b>             |
| <b>5 1/2</b>   | <b>139.700</b><br>5.5000 | <b>165.100</b><br>6.5000 | <b>63.50</b><br>2.500 | <b>3.05</b><br>0.12          | <b>IR-8810440</b>      | <b>3.035</b><br>6.690  | <b>139.685</b><br>5.4994    | <b>139.662</b><br>5.4985 | <b>IR-8810440</b>      | <b>139.733</b><br>5.5013 | <b>139.715</b><br>5.5006 | <b>HJ-10412840</b>            |
|                | <b>139.700</b><br>5.5000 | <b>165.100</b><br>6.5000 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-8810448</b>      | <b>3.629</b><br>8.000  | <b>139.685</b><br>5.4994    | <b>139.662</b><br>5.4985 | <b>IR-8810448</b>      | <b>139.733</b><br>5.5013 | <b>139.715</b><br>5.5006 | <b>HJ-10412848</b>            |
| <b>6</b>       | <b>152.400</b><br>6.0000 | <b>184.150</b><br>7.2500 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-9611648</b>      | <b>4.935</b><br>10.880 | <b>152.385</b><br>5.9994    | <b>152.362</b><br>5.9985 | <b>IR-9611648</b>      | <b>152.433</b><br>6.0013 | <b>152.415</b><br>6.0006 | <b>HJ-11614648</b>            |
| <b>6 1/2</b>   | <b>165.100</b><br>6.5000 | <b>196.850</b><br>7.7500 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-10412448</b>     | <b>5.343</b><br>11.780 | <b>165.085</b><br>6.4994    | <b>165.062</b><br>6.4985 | <b>IR-10412448</b>     | <b>165.133</b><br>6.5013 | <b>165.115</b><br>6.5006 | <b>HJ-12415448</b>            |
| <b>7</b>       | <b>177.800</b><br>7.0000 | <b>209.550</b><br>8.2500 | <b>76.20</b><br>3.000 | <b>3.05</b><br>0.12          | <b>IR-11213248</b>     | <b>5.389</b><br>11.880 | <b>177.785</b><br>6.9994    | <b>177.762</b><br>6.9985 | <b>IR-11213248</b>     | <b>177.833</b><br>7.0013 | <b>177.815</b><br>7.0006 | <b>HJ-13216248</b>            |
| <b>7 1/2</b>   | <b>190.500</b><br>7.5000 | <b>222.250</b><br>8.7500 | <b>76.20</b><br>3.000 | <b>4.06</b><br>0.16          | <b>IR-12014048</b>     | <b>6.110</b><br>13.470 | <b>190.485</b><br>7.4994    | <b>190.454</b><br>7.4982 | <b>IR-12014048</b>     | <b>190.536</b><br>7.5014 | <b>190.515</b><br>7.5006 | <b>HJ-14017048</b>            |
| <b>8</b>       | <b>203.200</b><br>8.0000 | <b>234.950</b><br>9.2500 | <b>76.20</b><br>3.000 | <b>4.06</b><br>0.16          | <b>IR-12814848</b>     | <b>6.518</b><br>14.370 | <b>203.185</b><br>7.9994    | <b>203.154</b><br>7.9982 | <b>IR-12814848</b>     | <b>203.236</b><br>8.0014 | <b>203.215</b><br>8.0006 | <b>HJ-14817848</b>            |

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## **NEEDLE ROLLER BEARINGS**

### **NOTES**

C



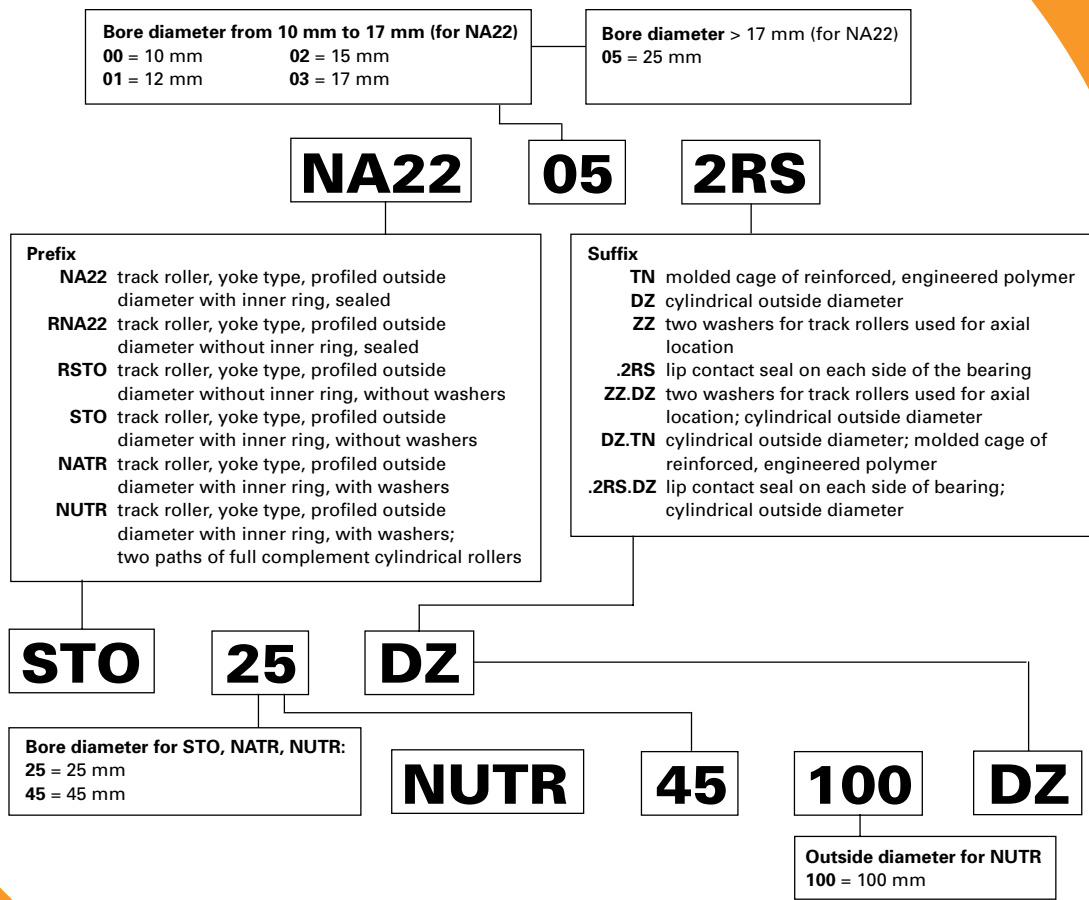
## TRACK ROLLERS

**Overview:** Track rollers (also known as cam followers) are characterized by their thick-walled outer rings that run directly on a track. The thick outer rings permit high load-carrying capability while minimizing both distortion and bending stresses. Sealed designs with internal thrust washers help extend service life under conditions of infrequent lubrication.

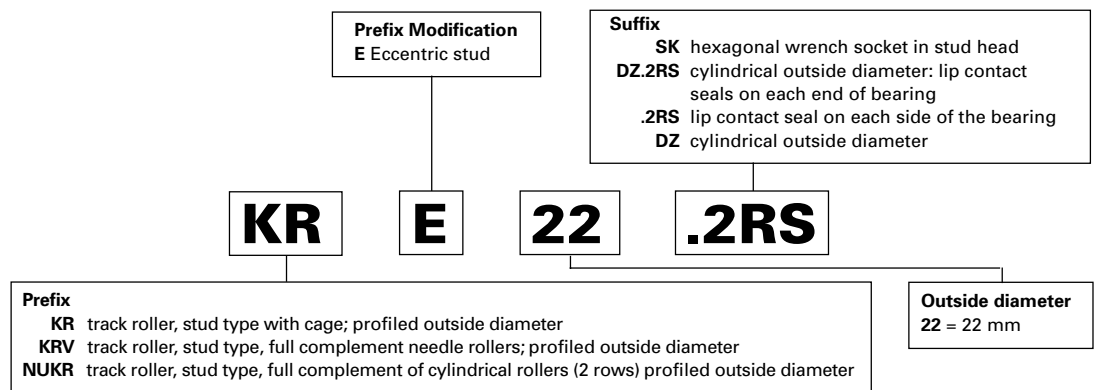
- **Sizes:** 16 mm - 110 mm (1/2 in. - 4 in.) bore.
- **Markets:** Ram support rollers, material handling and indexing equipment.
- **Features:** Available in two basic designs: with an inner ring for straddle mounting in a yoke or with an integral stud for cantilever mounting.
- **Benefits:** High load-carrying capability with minimized distortion and bending stresses. Extended service life under conditions of infrequent relubrication.



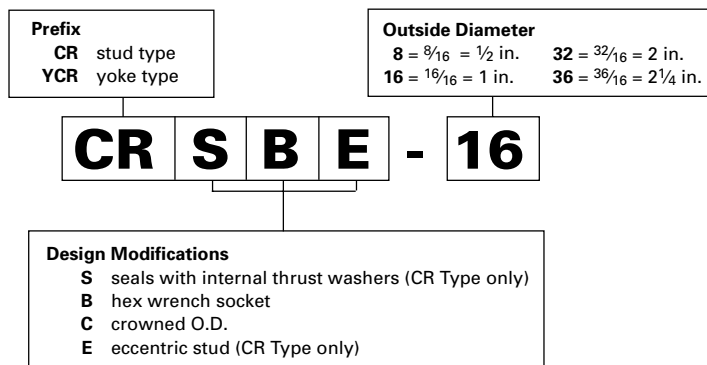
## Yoke Type Track Rollers – Metric Nominal Dimensions



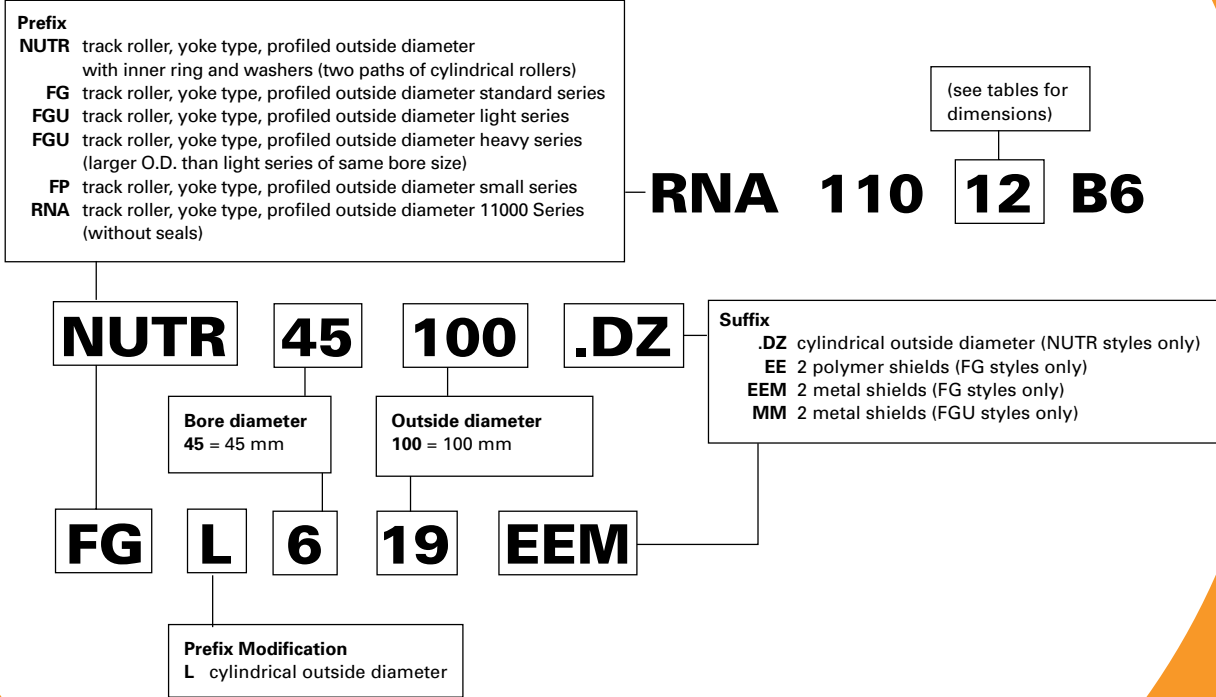
## Stud Type Track Rollers – Metric Nominal Dimensions



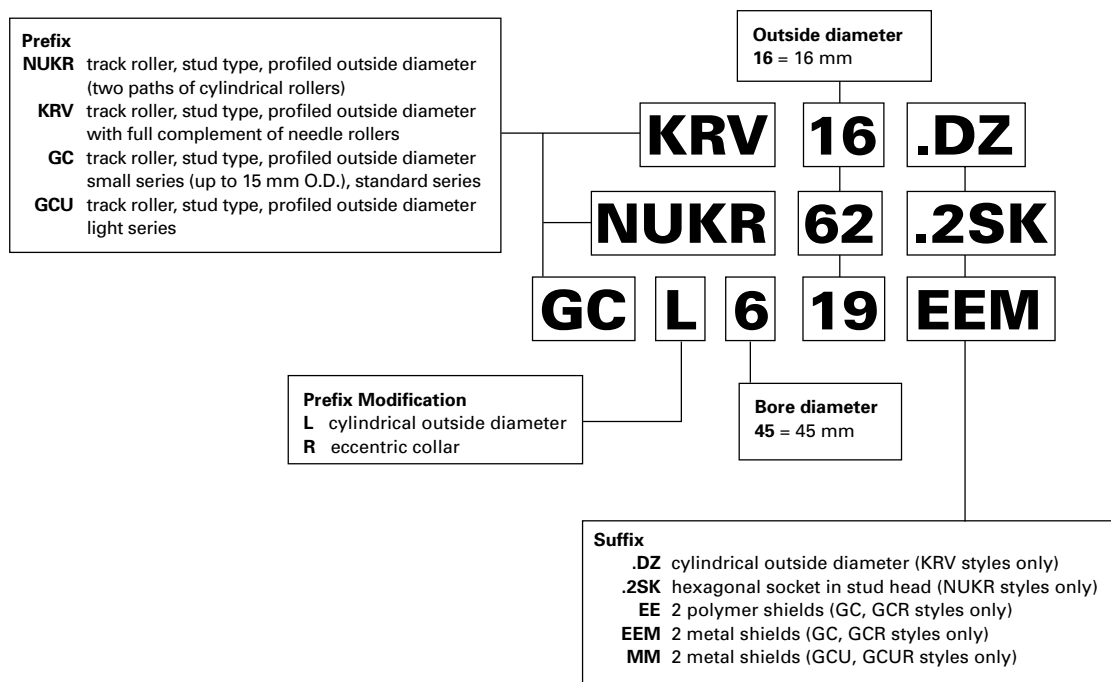
## Track Rollers / Cam Followers – Inch Nominal Dimensions



## Full Complement Yoke Type Track Rollers - Metric Nominal Dimensions

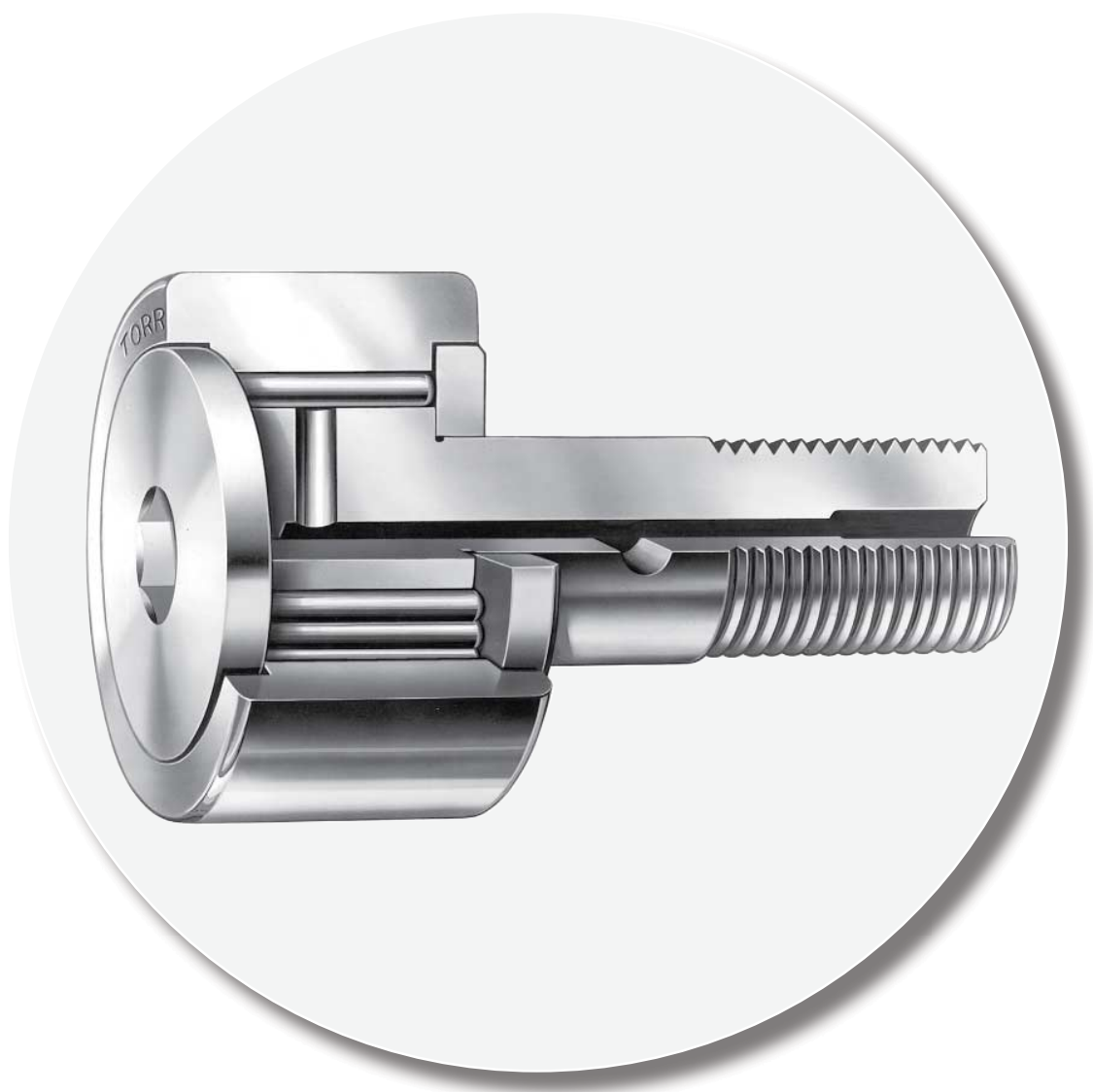


## Full Complement Stud Type Track Rollers - Metric Nominal Dimensions





C



# Stud Type and Yoke Type Track Rollers

## STUD TYPE AND YOKE TYPE TRACK ROLLERS METRIC SERIES Page

Introduction ..... C160

### STUD TYPE METRIC SERIES

Needle Roller and Cage Assemblies (KR Series) ..... C168

Needle Roller and Cage Assemblies, Sealed  
(KR....2S Series) ..... C170

Full Complement with Needle Rollers (KRV Series) or  
Cylindrical Rollers (NUKR Series)..... C172

Full Complement, Small Series, Unsealed (GC Series)..... C174

Full Complement, Standard Series, with or  
without Seals (GC Series)..... C176

Full Complement, with Metal Seals (GCU.....MM Series) ... C178

Full Complement, Eccentric (GCR Series) ..... C180

Full Complement Eccentric, with Metal Seals  
(GCUR.....MM Series) ..... C184

### YOKE TYPE METRIC SERIES

Caged, without Inner Ring, No End Washers  
(RSTO Series) ..... C186

Caged, with Inner Ring, No End Washers (STO Series)..... C188

Caged, without Inner Ring, No End Washers,  
Sealed (RNA22 Series) ..... C190

Caged, with Inner Ring, No End Washers,  
Sealed (NA22 Series) ..... C192

Caged, with Inner Ring, With End Washers  
(NATR, STO.ZZ Series) ..... C194

Full Complement, with Inner Ring, with End Washers,  
Cylindrical Rollers (NUTR Series)..... C196

Page

Full Complement, Non-Separable, Small Series,  
Unsealed (FP Series)..... C198

Full Complement, Non-Separable, Sealed or Unsealed  
(FG Series) ..... C199

Full Complement, Non-Separable, Light Series,  
with Metal Seals (FGU.....MM Series) ..... C202

Full Complement, Non-Separable, Heavy Series,  
with Metal Seals (FGU.....MM Series) ..... C203

Full Complement, without Inner Ring, Unsealed  
(RNA.....B6, RNAB, RNAL Series) ..... C205

Separate Inner Rings for RNA.....B6, RNAB,  
RNAL Series (BIC Series)..... C205

## STUD TYPE AND YOKE TYPE TRACK ROLLERS INCH SERIES

Introduction ..... C206

Stud Type Track Rollers CR, CRS Series ..... C212

Stud Type Track Rollers CRSB Series ..... C216

Yoke Type Track Rollers YCR, YCRS Series ..... C220

C





## NEEDLE ROLLER BEARINGS

### STUD TYPE AND YOKE TYPE TRACK ROLLERS – METRIC SERIES

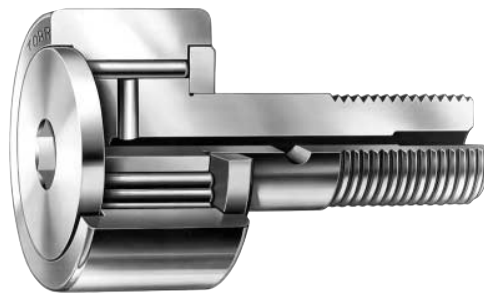
Timken track rollers listed in this catalog have been designed with outer rings of a large radial cross section to withstand heavy rolling and shock loads on track type or cam-controlled equipment. The outside diameters of the outer rings are either profiled or cylindrical. Profiled track rollers are designed to alleviate uneven bearing loading resulting from deflection, bending or misalignment in mounting.

Stud type track rollers are available in various open designs, as well as with lip contact seals or metal shields.

Yoke type track rollers are designed for straddle mounting. The various metric series designs are grouped and organized as illustrated below.

#### REFERENCE STANDARDS ARE:

- **ISO 6278** – Needle roller bearings – Track rollers – Boundary dimensions
- **ISO 492** – Radial bearings – Tolerances
- **DIN 620** – Tolerances of Ball and Roller Bearings
- **ISO 281** – Rolling bearings – Dynamic load ratings and rating life



#### Suffixes – Stud Type, Metric Series (except GC types)

|               |                                               |
|---------------|-----------------------------------------------|
| <b>.2RS</b>   | two seals                                     |
| <b>DZ</b>     | cylindrical outside diameter                  |
| <b>DZ.2RS</b> | cylindrical outside diameter • two seals      |
| <b>SK</b>     | hexagonal socket in flange end                |
| <b>2SK</b>    | hexagonal socket in both flange and stud ends |

#### Suffixes – Yoke Type, Metric Series (except FP or FG types)

|                |                                                                             |
|----------------|-----------------------------------------------------------------------------|
| <b>DZ.TN</b>   | cylindrical outside diameter • molded cage of reinforced engineered polymer |
| <b>TN</b>      | molded cage of reinforced engineered polymer                                |
| <b>DZ</b>      | cylindrical outside diameter                                                |
| <b>ZZ</b>      | two end washers for the outer ring                                          |
| <b>ZZ.DZ</b>   | two end washers for the outer ring • cylindrical outside diameter           |
| <b>.2RS</b>    | two seals                                                                   |
| <b>.2RS.DZ</b> | two seals • cylindrical outside diameter                                    |

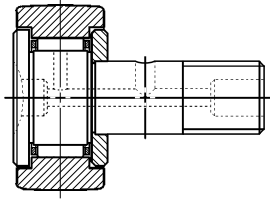
#### Suffixes – Yoke Type (FP, FG) and Stud Type (GC)

|            |               |
|------------|---------------|
| <b>EE</b>  | polymer seals |
| <b>EEM</b> | metal shields |
| <b>MM</b>  | metal shields |

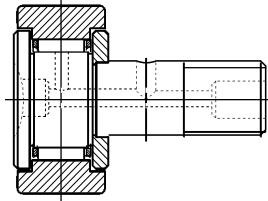
C

STUD TYPE METRIC SERIES TRACK ROLLER TYPES

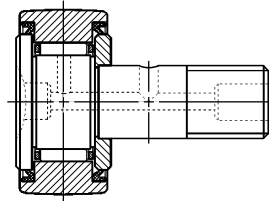
STUD TYPE TRACK ROLLERS, CAGED NEEDLE ROLLERS



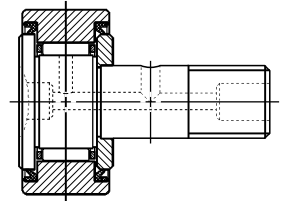
KR



KR.DZ

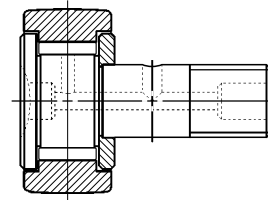


KR.2RS

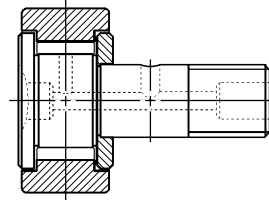


KR.DZ.2RS

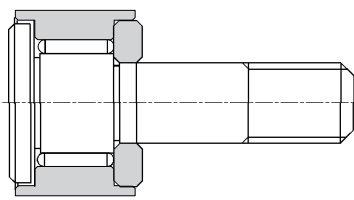
STUD TYPE TRACK ROLLERS, FULL COMPLEMENT NEEDLE ROLLERS



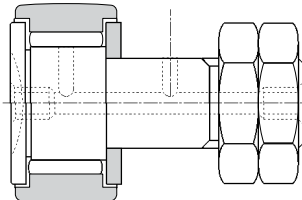
KRV



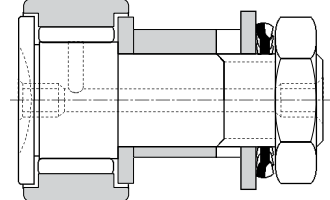
KRV.DZ



GC/GCL

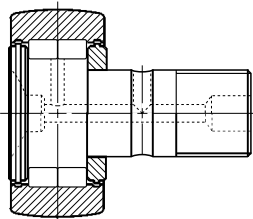


GC/GCL

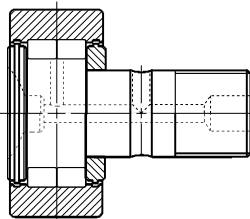


GCR/GCRL

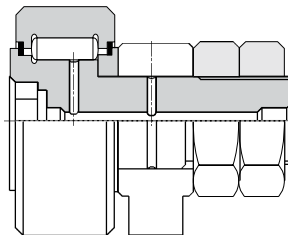
STUD TYPE TRACK ROLLERS, FULL COMPLEMENT CYLINDRICAL ROLLERS



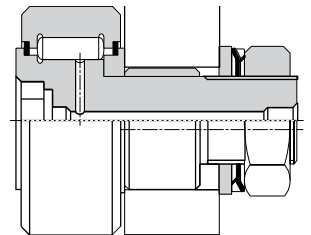
NUKR



NUKR.DZ



GCU/GCUL



GCUR/GCURL

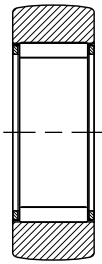




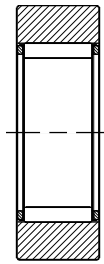
# NEEDLE ROLLER BEARINGS

## TYPES OF METRIC SERIES YOKE TYPE TRACK ROLLERS

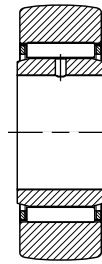
### YOKE TYPE TRACK ROLLERS WITHOUT END WASHERS



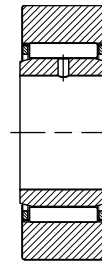
RSTO



RSTO.DZ



STO



STO.DZ

### SEALED YOKE TYPE TRACK ROLLERS WITHOUT END WASHERS.



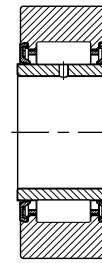
RNA22.2RS



RNA22.2RS.DZ

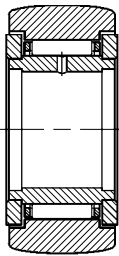


NA22.2RS

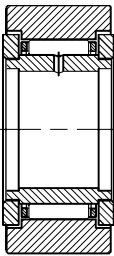


NA22.2RS.DZ

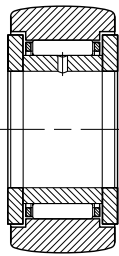
### YOKE TYPE TRACK ROLLERS WITH END WASHERS



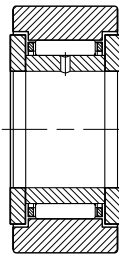
NATR



NATR.DZ

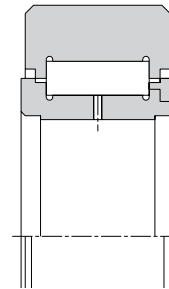


STO.ZZ

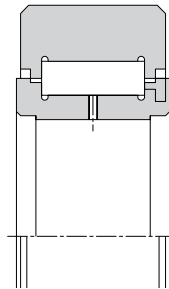


STO.ZZ.DZ

### YOKE TYPE TRACK ROLLERS WITH FULL COMPLEMENT OF CYLINDRICAL ROLLERS

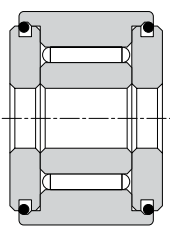


FGU/FGUL Light

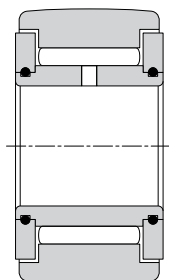


FGU/FGUL Heavy

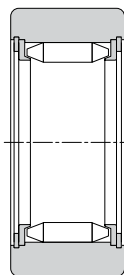
### YOKE TYPE TRACK ROLLERS WITH END WASHERS, FULL COMPLEMENT OF NEEDLE ROLLERS



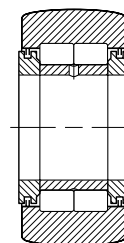
FP/FPL



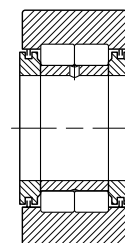
FG/FGL



RNA1100



NUTR



NUTR.DZ

C

## CONSTRUCTION

### STUD TYPE TRACK ROLLERS

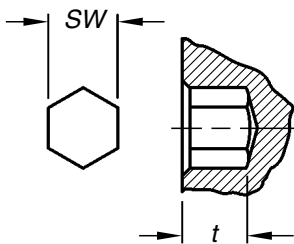
The metric series stud type track roller is a non-separable unit, consisting of a large radial cross-section outer ring, needle roller and cage radial assembly or a full complement of needle or cylindrical rollers, a stud and a retaining washer securely fastened to the stud.

The seals on the sealed stud type track rollers are located in the counterbores of the outer ring and seal against the stud flange and the retaining washer, providing good retention of lubricant and exclusion of foreign material. The seals are thermally stable in a temperature range between -30° C and 110° C.

A screwdriver slot (standard) or a hexagonal wrench socket (customer requested) in the head of the stud facilitates mounting. Wrench sizes are listed on the dimensional tables where found among certain GC Series sizes on pages later in this section. Other metric series hexagonal socket sizes are listed in Table 1.

TABLE 1 –  
HEXAGONAL SOCKET – METRIC SERIES

| Stud Type Track Roller<br>Outside Diameter |    | Dimensions |     |
|--------------------------------------------|----|------------|-----|
| ><br>mm                                    | ≤  | SW         | t   |
| 19                                         | 16 | 3          | 2.5 |
| 30                                         | 26 | 4          | 2.5 |
| 40                                         | 35 | 6          | 4   |
| 62                                         | 52 | 8          | 5   |
| 80                                         | 72 | 12         | 7   |
|                                            | 90 | 17         | 10  |



### ECCENTRIC STUDS FOR STUD TYPE TRACK ROLLERS

To provide radial adjustment of the outer ring toward the track or cam surface at the time of installation, some metric series stud type track rollers are available with eccentric studs which are specified by adding the letter "E" to the designation letters: KRE and NUKRE. The GCR and GCUR Series include an eccentric bushing added to the track roller stud. Appropriate dimensions of the eccentric stud bushing are listed in Table 2 and 2A.

Since a track roller with an eccentric stud is usually adjusted upon installation by turning the stud in the mounting hole, a close clearance fit between the outside diameter of the bushing and the mounting hole is necessary. For turning the stud, a hexagonal wrench is generally more convenient than a screwdriver, thus, the option of a hexagonal wrench socket in the head of the stud should be considered.

Some applications may require more secure positioning than provided by the tightened stud nut. If so, it is recommended that the mounting hole and the eccentric bushing be drilled at the time of installation to accept a locating dowel pin.

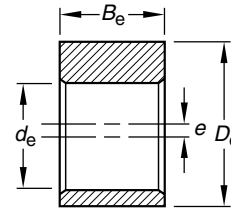


TABLE 2 –  
ECCENTRIC BUSHING DIMENSIONS –  
METRIC SERIES (EXCEPT GCR, GCUR SERIES)

| Stud Type<br>Outside<br>> | Track Roller<br>Diameter mm<br>≤ | Dimensions |    |    |     |
|---------------------------|----------------------------------|------------|----|----|-----|
|                           |                                  | de         | De | Be | e   |
| 19                        | 16                               | 6          | 9  | 7  | 0.5 |
| 22                        | 19                               | 8          | 11 | 9  | 0.5 |
| 30                        | 26                               | 10         | 13 | 10 | 0.5 |
| 30                        | 32                               | 12         | 15 | 11 | 0.5 |
| 35                        | 35                               | 16         | 20 | 14 | 1.0 |
| 40                        | 40                               | 18         | 22 | 16 | 1.0 |
| 47                        | 52                               | 20         | 24 | 18 | 1.0 |
| 62                        | 72                               | 24         | 28 | 22 | 1.0 |
| 80                        | 90                               | 30         | 35 | 29 | 1.5 |

TABLE 2A –  
ECCENTRIC BUSHING DIMENSIONS  
METRIC SERIES GCR, GCUR

| over<br>mm | incl. | de | De | Bw   | e   |
|------------|-------|----|----|------|-----|
| -          | 19    | 6  | 9  | 7.5  | 0.5 |
| 19         | 28    | 10 | 14 | 10.5 | 1.0 |
| 28         | 32    | 12 | 16 | 11.5 | 1.0 |
| 32         | 35    | 16 | 21 | 15.1 | 1.5 |
| 35         | 40    | 18 | 24 | 17.1 | 1.5 |
| 40         | 52    | 20 | 27 | 19.1 | 2.0 |
| 52         | 72    | 24 | 36 | 24.1 | 3.0 |
| 72         | 90    | 30 | 42 | 30.7 | 3.0 |
| 90         | 110   | 36 | 48 | 36.5 | 3.0 |
| 110        | -     | 42 | 54 | 43.5 | 3.0 |



## NEEDLE ROLLER BEARINGS

### YOKE TYPE TRACK ROLLERS

#### METRIC SERIES YOKE TYPE TRACK ROLLERS WITHOUT END WASHERS

These yoke type track rollers are available with a profiled or a cylindrical outside diameter of the outer ring, and with or without a separable inner ring. Since they are supplied without end washers, their outer rings must be guided by the adjacent end locating surfaces. Tolerance class F6 is the normal specification for the bore of the metric series needle roller and cage radial assemblies used with these yoke type track rollers.

#### YOKE TYPE TRACK ROLLERS – SERIES RSTO & STO

Series STO have a separable inner ring and when the inner ring is removed they become series RSTO. They run directly on a hardened and ground inner raceway. Quality requirements for inner raceways are given in the engineering section of this catalog.

#### SEALED YOKE TYPE TRACK ROLLERS WITHOUT END WASHERS – SERIES RNA 22.2RS & NA22.2RS

These yoke type track rollers have the same bore diameter and outside diameter as most of the other metric series yoke type track rollers listed in this catalog. The thick section outer ring is made of one-piece channel-shaped bearing quality steel, heat treated to yield maximum load carrying capability. The integral end flanges provide axial guidance for the large diameter needle rollers, and a cage supplies their inward retention. These track rollers have two integral lip contact seals designated by .2RS. The seals are thermally stable in a temperature range between -30° C and 110° C. Care should be exercised when mounting track rollers without inner rings onto inner raceways to avoid damage to the seals. Inner raceway quality requirements are given in the engineering section of this catalog.

#### METRIC SERIES YOKE TYPE TRACK ROLLERS WITH END WASHERS

These yoke type track rollers are available with a crowned or a cylindrical outside diameter of the outer ring. Metric series yoke type track rollers with end washers, depending on the internal construction, may be end guided, either through the end washers or between the end faces of the rollers and the inside faces of the outer ring flanges.

#### YOKE TYPE TRACK ROLLERS – SERIES NATR & STO.ZZ

The series NATR yoke type track rollers are of non-separable design consisting of a crowned or a cylindrical outer ring, caged needle rollers, an inner ring and two retaining end washers securely fastened to the inner ring. The series STO.ZZ yoke type track rollers are of separable design with two loose end washers. These end washers placed in the counter bores of the outer ring form very effective labyrinth type shields, providing good retention of lubricant and exclusion of foreign material. A lubrication hole in the inner ring enables relubrication when a cross-drilled bolt or shaft, which can be serviced from the end, is used.

#### YOKE TYPE TRACK ROLLERS – SERIES NUTR

The series NUTR yoke type track rollers are of non-separable design consisting of a profiled or cylindrical outer ring, two rows of full complements of cylindrical rollers, an inner ring, two retaining end washers and two shields. The outer ring is located axially through the cylindrical rollers.

A lubricating hole in the inner ring enables relubrication when a cross-drilled bolt or shaft, which can be serviced from the end, is used.

The smallest track roller of this series has an outside diameter of 35 mm. NUTR yoke type track rollers are well suited to carry high loads and designs with a thicker outer ring are particularly suitable for high shock loads. Designs with thicker outer ring have a larger outside diameter which can be identified by the bearing designation (e.g., NUTR 1542).

#### YOKE TYPE TRACK ROLLERS – SERIES FP AND FG

The FP and FG non-separable inner ring designs are available in profiled or cylindrical outer rings. Both employ a full complement of needle rollers and require relubrication via a pathway through the shaft. The FP Series is the smallest series available and is not offered with seals.

#### YOKE TYPE TRACK ROLLERS – SERIES FGU (LIGHT AND HEAVY TYPES)

The FGU non-separable inner ring designs are available in profiled or cylindrical outer rings. All FGU Series use a full complement of cylindrical rollers between the inner and outer rings and require relubrication via a pathway through the shaft. The FGU Heavy series uses a thicker outer ring section and are capable of higher loads.

Both FGU Series are only available with a metal shield for a roller sealing option.

#### YOKE TYPE TRACK ROLLERS – SERIES RNA, RNAB, RNAL

The RNA and RNAB Series design use a full complement of needle rollers retained with a pair of end washers. A separate, matching inner ring is listed in the tables of part numbers. The RNAL Series use a cylindrical outer ring and is only offered in limited sizes.

C

### DIMENSIONAL ACCURACY

The tolerances of the basic metric series caged roller and NUKR stud type and yoke type track rollers whose outer rings have a cylindrical outside diameter, correspond to tolerances specified in ISO-492 Radial bearings - Tolerances. The outer ring tolerances given in Table 4 apply to the outer rings used in the caged roller and NUKR stud type and caged roller and NUTR yoke type, metric series, track rollers. Metric series track rollers with a crowned outside diameter are the exception: their outside diameter tolerances is 0-0.05 for all caged roller sizes and NUTR, NUKR types. The remaining types have h9 tolerance on profiled outer diameters and h7 for straight diameters. Stud diameter and stud length tolerances are

TABLE 3 – TOLERANCES FOR STUD DIAMETER AND STUD LENGTH – METRIC SERIES

| Stud Diameter mm |     |                  |     | Stud Length mm |                 |
|------------------|-----|------------------|-----|----------------|-----------------|
| >                | ≤   | μm               |     | high           | low             |
|                  |     | high             | low | high           | low             |
| d <sub>1</sub>   |     | Δd <sub>1s</sub> |     | B <sub>2</sub> | ΔB <sub>2</sub> |
| 3                | 6   | 0                | -12 | all<br>lengths | 0   -1          |
| 6                | 10  | 0                | -15 |                |                 |
| 10               | 18  | 0                | -18 |                |                 |
| 18               | 30  | 0                | -21 |                |                 |
| 30               | 50  | 0                | -25 |                |                 |
| 50               | 80  | 0                | -30 |                |                 |
| 80               | 100 | 0                | -35 |                |                 |

given in Table 3. The inner ring tolerances given in Table 5 apply to inner rings used in metric series caged roller, NUKR Series yoke type track rollers.

### MOUNTING STUD TYPE TRACK ROLLERS

When the stud shank of a metric series stud type track roller is mounted in a hole of tolerance H7, the installation force should be applied only to the center portion of the flanged end of the stud, preferably with an arbor press. The surface of the hole in the machine element which supports the stud must not deform under the expected load, and the support should be sufficiently rigid to resist bending loads. Deformation and bending will cause uneven loading of the outer ring.

In mounting the stud type track roller, the retaining washer must be firmly backed up by a flat shoulder which is square with the stud center line. The shoulder diameter must be no smaller than the minimum clamping diameter, d<sub>a</sub> listed in the tabular data.

The maximum inherent strength of the stud is obtained when the track roller is supported as close as possible to the retaining washer, which minimizes the bending moment. For this reason the edge of the housing which supports the stud shank should be kept as sharp as practical, but free from burrs.

The clamping nut should not be tightened with a torque value higher than the maximum listed. A screwdriver slot or hexagonal wrench socket in the flanged end of the stud is provided for a tool to prevent the stud from turning when the nut is being tightened. Hexagonal nuts are supplied with all metric series stud type track rollers.

TABLE 4 – OUTER RING – METRIC SERIES (CAGED ROLLER AND NUKR, NUTR TYPES)

Tolerances in mm (0.001 mm)

| mm  |     | cylindrical      |     |      |     | crowned         |      |      |      |                 |
|-----|-----|------------------|-----|------|-----|-----------------|------|------|------|-----------------|
| >   | ≤   | high             | low | high | low | high            | low  | high | low  | max.            |
| D   |     | ΔD <sub>mp</sub> |     |      |     | ΔC <sub>s</sub> |      |      |      | K <sub>ea</sub> |
| 10  | 18  | 0                | -8  | 0    | -50 | 0               | -120 | 0    | -120 | 15              |
| 18  | 30  | 0                | -9  | 0    | -50 | 0               | -120 | 0    | -120 | 15              |
| 30  | 50  | 0                | -11 | 0    | -50 | 0               | -120 | 0    | -120 | 20              |
| 50  | 80  | 0                | -13 | 0    | -50 | 0               | -120 | 0    | -120 | 25              |
| 80  | 120 | 0                | -15 | 0    | -50 | 0               | -120 | 0    | -120 | 35              |
| 120 | 150 | 0                | -18 | 0    | -50 | 0               | -120 | 0    | -120 | 40              |
| 150 | 180 | 0                | -25 | 0    | -50 | 0               | -150 | 0    | -150 | 45              |
| 180 | 240 | 0                | -30 | 0    | -50 | 0               | -200 | 0    | -200 | 50              |

TABLE 5 – INNER RING – METRIC SERIES (CAGED ROLLER AND NUTR TYPES)

Tolerances in mm (0.001 mm)

| mm  |     | high             | low | high            | low  |
|-----|-----|------------------|-----|-----------------|------|
| >   | ≤   | Δd <sub>mp</sub> |     | ΔB <sub>s</sub> |      |
| d   |     |                  |     |                 |      |
| 2.5 | 18  | 0                | -8  | 0               | -180 |
| 18  | 30  | 0                | -10 | 0               | -210 |
| 30  | 50  | 0                | -12 | 0               | -250 |
| 50  | 80  | 0                | -15 | 0               | -300 |
| 80  | 120 | 0                | -20 | 0               | -350 |





## NEEDLE ROLLER BEARINGS

### YOKE TYPE TRACK ROLLERS

The machine element with the holes in which the mounting bolt or shaft is supported must be sufficiently rigid to resist local crushing under the applied load, and to resist bending which can cause uneven loading of the needle rollers.

When applied loads are high, the h6 or j6 tolerance should be used in conjunction with a high strength shaft or bolt for mounting metric series yoke type track rollers. When loads are moderate, a g6 tolerance may be used with a high strength shaft or bolt. For light loads, the loose transition fit with the f6 tolerance may be used with an unhardened shaft or bolt.

The yoke type track rollers with inner rings, also those with end washers as well as inner rings, should be clamped endwise between parallel faces perpendicular to the axis to prevent the

retaining washers from coming off under load. The dimensions of machine parts adjoining the metric series yoke type track rollers should be based on the minimum clamping diameter  $d_a$  to ensure that the washers are adequately supported. If the track roller cannot be end clamped, a close axial fit in the yoke is required. Care should be taken that the lubricating hole is located in the unloaded zone of the raceway.

The metric series yoke type track rollers without inner rings require a hardened and ground shaft or bolt with a k5 tolerance. Inner raceway quality requirements are given in the engineering section of this catalog.

C

## LOAD RATINGS

### DYNAMIC LOADING AS A TRACK ROLLER

When the outer ring of a stud type or yoke type track roller runs on a track, the contact, under a radial load, causes elastic (oval) deformation of the outer ring. As a result, a smaller zone of the raceway is loaded and the load is distributed on fewer needle rollers. This in turn affects the dynamic and static load ratings of the track rollers. Also, this deformation generates bending stress in the outer ring which must not exceed the maximum permitted for the material of the outer ring. The maximum permissible dynamic ( $F_{r\text{ perm}}$ ) radial load condition is determined by this requirement.

The rating life of stud type or yoke type track rollers should be calculated using the dynamic load ratings  $C_w$  shown in the tables. The tables also show the maximum permissible radial load,  $F_{r\text{ perm}}$  that can be dynamically applied on stud type or yoke type track rollers. However, to calculate the  $L_{10}$  life of a track roller, the applied radial load must not be greater than  $C_w/2$  based on ideal operating conditions of alignment, lubrication, temperature, speed, and accelerations.

### STATIC RATING AS A TRACK ROLLER

In addition to the basic static load rating  $C_0$ , the tables also list the maximum permissible static radial load  $F_{0r\text{ perm}}$  that may be applied to a stud type or yoke type metric series track roller. The values of  $F_{0r\text{ perm}}$  result in a calculated minimum static factor  $f_s$  of 0.7 for the worst condition of internal load distribution in metric series track roller operation. **The  $F_{0r\text{ perm}}$  values must not be exceeded.** The static factor  $f_s$  can be calculated using the following formula:

$$f_s \geq 0.7 \cdot \frac{F_{0r\text{ perm}}}{P_{0r}}$$

where

$F_{0r\text{ perm}}$  = Maximum permissible static radial load (kN)

$P_{0r}$  = Equivalent static load (kN)

$P_{0r} = F_{0r}$  for metric series track rollers

$F_{0r}$  = Static radial load (kN)

$f_s$  = Static factor whose values should not be smaller than those suggested in Table 6.

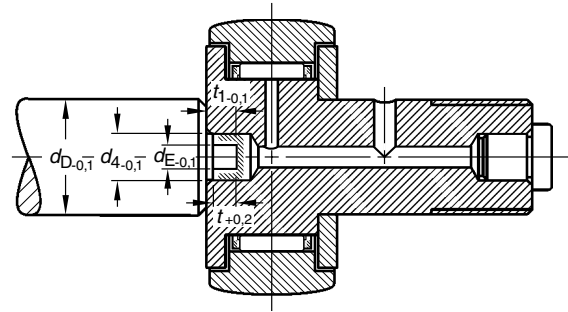
TABLE 6 – SUGGESTED VALUES FOR STATIC FACTORS  $f_s$  FOR METRIC SERIES TRACK ROLLERS

| Requirements For Yoke Type Track Rollers And Stud Type Track Rollers         | Suggested $f_s$ Values |
|------------------------------------------------------------------------------|------------------------|
| High shock-type loads                                                        |                        |
| Quiet running                                                                | 1.5...2.5              |
| Normal loading                                                               |                        |
| Normal quietness of running                                                  | 1...1.5                |
| Minor impact loads and rotary motion particularly quiet running not required | 0.7...1                |

## LUBRICATION OF STUD TYPE TRACK ROLLERS

Timken metric series stud type track rollers are supplied with a lithium soap based, general purpose grease. When the caged KR Series track rollers are operated at low speeds, with light loads and in clean environments, there often is no need to relubricate the track roller. In other applications, periodic relubrication may be necessary to obtain optimum performance. The full complement series of track rollers have less internal volume available for grease storage, therefore, they may require more frequent lubrication than caged type track rollers. Stud type track rollers, with a screwdriver slot in the flanged end of the stud, have provisions for relubrication through the flanged end of the stud. Metric series stud type track rollers with hexagonal sockets can not be relubricated from the flanged end of the stud. Both types of metric series stud type track rollers, with outside diameters larger than 22 mm (28 mm for all GC variations), allow for relubrication through the threaded end of the stud. In addition, caged roller and NUKR Series stud type track rollers with 30 mm and larger outside diameters allow for relubrication through a cross-drilled hole in the stud shank. The ends of the axial holes are counterbored to accept press-fit grease fittings of series VENN. The grease fittings are supplied with metric series stud type track rollers. Hole diameters ( $d_4$ ) for these grease fittings are listed in the tables of dimensions on pages later in this chapter as it applies. Note that the GC small series has no axial hole.

One or more plugs are supplied with every metric series stud type track roller to close off unused holes. At the flanged end, the plug must not be pushed in too deeply as it may cover the cross-drilled lubricating hole. The plug should be pressed in using an installation tool whose dimensions are given in Table 8. If the cross-drilled hole in the stud shank is not used, it will be covered when the track roller is properly installed.



During installation of the track roller it will be desirable to ensure that the cross drilled hole is positioned in the unloaded zone of the track roller raceway. The location of the cross-drilled hole can be best recognized by its alignment with the manufacturer's stamp or parallel to the screwdriver slot, in certain cases.

## LUBRICATION OF YOKE TYPE TRACK ROLLERS

Yoke type track rollers are produced with a lubricating hole in the inner ring so they can be relubricated through a cross-drilled hole in the supporting shaft or bolt. When mounting yoke type track rollers, care should be taken that the lubrication hole is located in the unloaded raceway zone.

Oil is the preferred lubricant for yoke type track rollers. Continuous oil lubrication or frequent grease lubrication should be used for steady rotating conditions. Applications involving slow, intermittent oscillations are not as critical, and longer intervals between relubrication are permitted. Sealed yoke type track rollers are normally supplied with an initial charge of a medium temperature grease. Caged yoke type track rollers have maximum grease storage capacity and, consequently, longer pregreased life than full complement types.

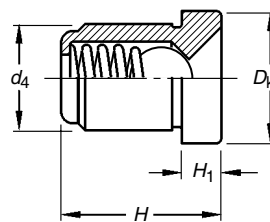


TABLE 7 – METRIC SERIES GREASE FITTINGS, SERIES VENN

| Designation | Dimensions mm |       |    |       | Wt. g approx. |
|-------------|---------------|-------|----|-------|---------------|
|             | $d_4$         | $D_K$ | H  | $H_1$ |               |
| VENN 4      | 4             | 6     | 6  | 1.5   | 0.4           |
| VENN 6      | 6             | 8     | 7  | 2     | 1.6           |
| VENN 8      | 8             | 10    | 12 | 3     | 4.7           |

TABLE 8 – INSTALLATION TOOL FOR METRIC SERIES PLUG

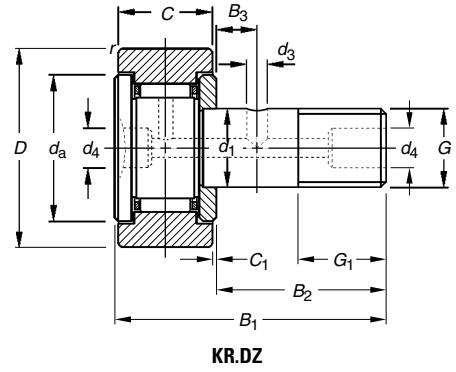
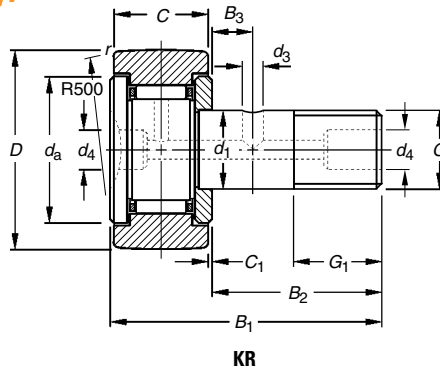
| Stud Type Track Roller Outside Diameter mm | Dimensions |     |       |       |       |     |
|--------------------------------------------|------------|-----|-------|-------|-------|-----|
|                                            | >          | ≤   | $d_4$ | $d_D$ | $d_E$ | t   |
| 16                                         | 26         | 3.9 | 10    | 2.7   | 3.7   | 4.5 |
| 30                                         | 40         | 5.9 | 12    | 4.7   | 4.7   | 7   |
| 47                                         | 90         | 7.9 | 15    | 6.7   | 6.7   | 10  |



# NEEDLE ROLLER BEARINGS

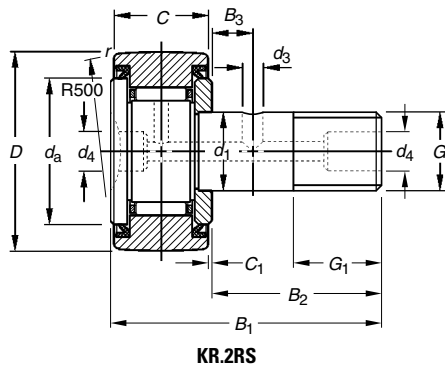
## NEEDLE ROLLER AND CAGE ASSEMBLIES, STUD TYPE (KR SERIES)

### METRIC SERIES



| Outer Dia. | Dimensions mm/in. |        |        |       |                     |       |       |       |       |       | Thread |         |       |
|------------|-------------------|--------|--------|-------|---------------------|-------|-------|-------|-------|-------|--------|---------|-------|
|            | mm                | $d_1$  | $h_7$  | C     | $r_{s \text{ min}}$ | $B_1$ | $B_2$ | $B_3$ | $G_1$ | $d_4$ | $d_3$  | G       | $C_1$ |
| 16         | 6                 | 6      | 16     | 11    | 0.3                 | 28.2  | 16    |       | 8     | 4     |        | M6x1    | 0.6   |
|            | 0.2362            | 0.2362 | 0.6299 | 0.433 | 0.012               | 1.110 | 0.630 |       | 0.315 | 0.157 |        | M6x1    | 0.024 |
| 19         | 8                 | 6      | 16     | 11    | 0.3                 | 28.2  | 16    |       | 8     | 4     |        | M6x1    | 0.6   |
|            | 0.3150            | 0.2362 | 0.6299 | 0.433 | 0.012               | 1.110 | 0.630 |       | 0.315 | 0.157 |        | M6x1    | 0.024 |
| 22         | 8                 | 8      | 19     | 11    | 0.3                 | 32.2  | 20    |       | 10    | 4     |        | M8x1.25 | 0.6   |
|            | 0.3150            | 0.3150 | 0.7480 | 0.433 | 0.012               | 1.268 | 0.787 |       | 0.394 | 0.157 |        | M8x1.25 | 0.024 |
| 26         | 10                | 8      | 19     | 11    | 0.3                 | 32.2  | 20    |       | 10    | 4     |        | M8x1.25 | 0.6   |
|            | 0.3937            | 0.3150 | 0.7480 | 0.433 | 0.012               | 1.268 | 0.787 |       | 0.394 | 0.157 |        | M8x1.25 | 0.024 |
| 30         | 12                | 10     | 22     | 12    | 0.3                 | 36.0  | 23    |       | 12    | 4     |        | M10x1   | 0.6   |
|            | 0.4724            | 0.3937 | 0.8661 | 0.472 | 0.012               | 1.417 | 0.906 |       | 0.472 | 0.157 |        | M10x1   | 0.024 |
| 32         | 12                | 10     | 22     | 12    | 0.3                 | 36.2  | 23    |       | 12    | 4     |        | M10x1   | 0.6   |
|            | 0.4724            | 0.3937 | 0.8661 | 0.472 | 0.012               | 1.425 | 0.906 |       | 0.472 | 0.157 |        | M10x1   | 0.024 |
| 36         | 12                | 10     | 26     | 12    | 0.3                 | 36.0  | 23    |       | 12    | 4     |        | M10x1   | 0.6   |
|            | 0.4724            | 0.3937 | 1.0236 | 0.472 | 0.012               | 1.417 | 0.906 |       | 0.472 | 0.157 |        | M10x1   | 0.024 |
| 40         | 12                | 10     | 26     | 12    | 0.3                 | 36.2  | 23    |       | 12    | 4     |        | M10x1   | 0.6   |
|            | 0.4724            | 0.3937 | 1.0236 | 0.472 | 0.012               | 1.425 | 0.906 |       | 0.472 | 0.157 |        | M10x1   | 0.024 |
| 44         | 12                | 12     | 30     | 14    | 0.6                 | 40.0  | 25    | 6     | 13    | 6     | 3      | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724 | 1.1811 | 0.551 | 0.024               | 1.575 | 0.984 | 0.236 | 0.512 | 0.236 | 0.118  | M12x1.5 | 0.024 |
| 48         | 12                | 12     | 30     | 14    | 0.6                 | 40.2  | 25    | 6     | 13    | 6     | 3      | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724 | 1.1811 | 0.551 | 0.024               | 1.583 | 0.984 | 0.236 | 0.512 | 0.236 | 0.118  | M12x1.5 | 0.024 |
| 52         | 12                | 12     | 32     | 14    | 0.6                 | 40.0  | 25    | 6     | 13    | 6     | 3      | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724 | 1.2598 | 0.551 | 0.024               | 1.575 | 0.984 | 0.236 | 0.512 | 0.236 | 0.118  | M12x1.5 | 0.024 |
| 56         | 12                | 12     | 32     | 14    | 0.6                 | 40.2  | 25    | 6     | 13    | 6     | 3      | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724 | 1.2598 | 0.551 | 0.024               | 1.583 | 0.984 | 0.236 | 0.512 | 0.236 | 0.118  | M12x1.5 | 0.024 |

## Stud Type and Yoke Type Track Rollers



KR.2RS

| d <sub>a</sub>     | Bearing Designation | Load Ratings kN/lbf. |                     |                      |                     |                     | Tightening Torque<br>Nm/in.-lbs. | Limiting Speed<br>Grease<br>RPM | Wt.<br>kg/lbs.        |
|--------------------|---------------------|----------------------|---------------------|----------------------|---------------------|---------------------|----------------------------------|---------------------------------|-----------------------|
|                    |                     | Dynamic              | Static              | As a Track Roller    |                     |                     |                                  |                                 |                       |
|                    |                     |                      |                     | Dynamic              | Static              | Static              |                                  |                                 |                       |
| C                  | C <sub>0</sub>      | C <sub>w</sub>       | F <sub>r perm</sub> | F <sub>0r perm</sub> |                     |                     |                                  |                                 |                       |
| <b>11</b><br>0.433 | <b>KR16</b>         | <b>3.60</b><br>810   | <b>3.58</b><br>800  | <b>2.97</b><br>670   | <b>2.85</b><br>640  | <b>3.58</b><br>800  | <b>7</b><br>62.0                 | <b>17000</b>                    | <b>0.019</b><br>0.042 |
| <b>11</b><br>0.433 | <b>KR16.DZ</b>      | <b>3.60</b><br>810   | <b>3.58</b><br>800  | <b>2.97</b><br>670   | <b>2.85</b><br>640  | <b>3.58</b><br>800  | <b>7</b><br>62.0                 | <b>17000</b>                    | <b>0.019</b><br>0.042 |
| <b>13</b><br>0.512 | <b>KR19</b>         | <b>4.18</b><br>940   | <b>4.65</b><br>1050 | <b>3.28</b><br>740   | <b>3.29</b><br>740  | <b>4.22</b><br>950  | <b>16</b><br>142                 | <b>13000</b>                    | <b>0.031</b><br>0.068 |
| <b>13</b><br>0.512 | <b>KR19.DZ</b>      | <b>4.18</b><br>940   | <b>4.65</b><br>1050 | <b>3.28</b><br>740   | <b>3.29</b><br>740  | <b>4.22</b><br>950  | <b>16</b><br>142                 | <b>13000</b>                    | <b>0.031</b><br>0.068 |
| <b>15</b><br>0.591 | <b>KR22</b>         | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>3.94</b><br>890   | <b>4.04</b><br>910  | <b>5.45</b><br>1230 | <b>28</b><br>248                 | <b>10000</b>                    | <b>0.046</b><br>0.101 |
| <b>15</b><br>0.591 | <b>KR22.DZ</b>      | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>3.94</b><br>890   | <b>4.04</b><br>910  | <b>5.45</b><br>1230 | <b>28</b><br>248                 | <b>10000</b>                    | <b>0.046</b><br>0.101 |
| <b>15</b><br>0.591 | <b>KR26</b>         | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>4.55</b><br>1020  | <b>6.78</b><br>1520 | <b>7.24</b><br>1630 | <b>28</b><br>248                 | <b>10000</b>                    | <b>0.059</b><br>0.130 |
| <b>15</b><br>0.591 | <b>KR26.DZ</b>      | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>4.55</b><br>1020  | <b>6.78</b><br>1520 | <b>7.24</b><br>1630 | <b>28</b><br>248                 | <b>10000</b>                    | <b>0.059</b><br>0.130 |
| <b>21</b><br>0.827 | <b>KR30</b>         | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.32</b><br>1420  | <b>7.74</b><br>1740 | <b>9.31</b><br>2090 | <b>45</b><br>398                 | <b>8200</b>                     | <b>0.087</b><br>0.192 |
| <b>21</b><br>0.827 | <b>KR30.DZ</b>      | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.32</b><br>1420  | <b>7.74</b><br>1740 | <b>9.31</b><br>2090 | <b>45</b><br>398                 | <b>8200</b>                     | <b>0.087</b><br>0.192 |
| <b>21</b><br>0.827 | <b>KR32</b>         | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.65</b><br>1490  | <b>9.62</b><br>2160 | <b>10.3</b><br>2320 | <b>45</b><br>398                 | <b>8200</b>                     | <b>0.095</b><br>0.209 |
| <b>21</b><br>0.827 | <b>KR32.DZ</b>      | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.65</b><br>1490  | <b>9.62</b><br>2160 | <b>10.3</b><br>2320 | <b>45</b><br>398                 | <b>8200</b>                     | <b>0.098</b><br>0.216 |

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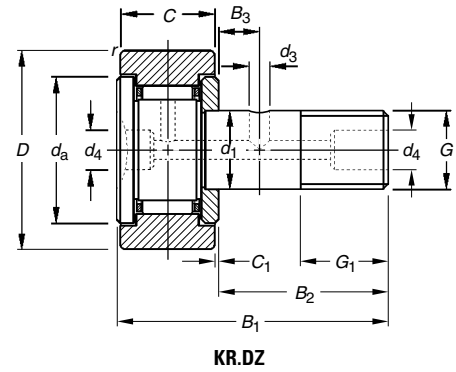
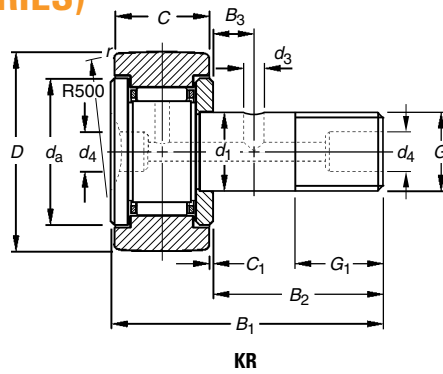




# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE ASSEMBLIES, SEALED, STUD TYPE (KR...2S SERIES)

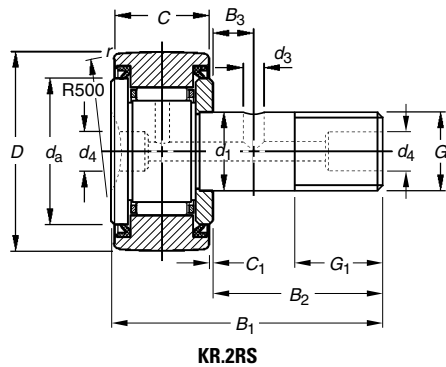
### METRIC SERIES



C

| Outer Dia. | Dimensions mm/in. |                |                |       |                    |                |                |                |                |                |                | Thread  |       |
|------------|-------------------|----------------|----------------|-------|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------|-------|
|            | mm                | d <sub>1</sub> | h <sub>7</sub> | C     | r <sub>s min</sub> | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> | d <sub>3</sub> |         | G     |
| 16         | 6                 | 6              | 16             | 11    | 0.3                | 28.2           | 16             |                | 8              | 4              |                | M6x1    | 0.6   |
|            | 0.2362            | 0.2362         | 0.6299         | 0.433 | 0.012              | 1.110          | 0.630          |                | 0.315          | 0.157          |                | M6x1    | 0.024 |
| 19         | 8                 | 8              | 19             | 11    | 0.3                | 32.2           | 20             |                | 10             | 4              |                | M8x1.25 | 0.6   |
|            | 0.3150            | 0.3150         | 0.7480         | 0.433 | 0.012              | 1.268          | 0.787          |                | 0.394          | 0.157          |                | M8x1.25 | 0.024 |
| 22         | 10                | 10             | 22             | 12    | 0.3                | 36.2           | 23             |                | 12             | 4              |                | M10x1   | 0.6   |
|            | 0.3937            | 0.3937         | 0.8661         | 0.472 | 0.012              | 1.425          | 0.906          |                | 0.472          | 0.157          |                | M10x1   | 0.024 |
| 26         | 10                | 10             | 26             | 12    | 0.3                | 36.2           | 23             |                | 12             | 4              |                | M10x1   | 0.6   |
|            | 0.3937            | 0.3937         | 1.0236         | 0.472 | 0.012              | 1.425          | 0.906          |                | 0.472          | 0.157          |                | M10x1   | 0.024 |
| 30         | 12                | 12             | 30             | 14    | 0.6                | 40.2           | 25             | 6              | 13             | 6              | 3              | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724         | 1.1811         | 0.551 | 0.024              | 1.583          | 0.984          | 0.236          | 0.512          | 0.236          | 0.118          | M12x1.5 | 0.024 |
| 32         | 12                | 12             | 32             | 14    | 0.6                | 40.2           | 25             | 6              | 13             | 6              | 3              | M12x1.5 | 0.6   |
|            | 0.4724            | 0.4724         | 1.2598         | 0.551 | 0.024              | 1.583          | 0.984          | 0.236          | 0.512          | 0.236          | 0.118          | M12x1.5 | 0.024 |

## Stud Type and Yoke Type Track Rollers



| d <sub>a</sub>     | Bearing Designation | Load Ratings kN/lbf. |                     |                     |                     |                      | Tightening Torque<br>Nm/in.-lbs. | Limiting Speed<br>Grease<br>RPM | Wt.<br>kg/lbs.        |
|--------------------|---------------------|----------------------|---------------------|---------------------|---------------------|----------------------|----------------------------------|---------------------------------|-----------------------|
|                    |                     | Dynamic              | Static              | As a Track Roller   |                     |                      |                                  |                                 |                       |
|                    |                     |                      |                     | C <sub>w</sub>      | F <sub>r perm</sub> | F <sub>0r perm</sub> |                                  |                                 |                       |
| <b>11</b><br>0.433 | <b>KR16.2RS</b>     | <b>3.60</b><br>810   | <b>3.58</b><br>800  | <b>2.97</b><br>670  | <b>2.85</b><br>640  | <b>3.58</b><br>800   | <b>7.0</b><br>61.96              | <b>17000</b>                    | <b>0.019</b><br>0.042 |
| <b>11</b><br>0.433 | <b>KR16.DZ.2RS</b>  | <b>3.60</b><br>810   | <b>3.58</b><br>800  | <b>2.97</b><br>670  | <b>2.85</b><br>640  | <b>3.58</b><br>800   | <b>7.0</b><br>61.96              | <b>17000</b>                    | <b>0.01</b><br>0.042  |
| <b>13</b><br>0.512 | <b>KR19.2RS</b>     | <b>4.18</b><br>940   | <b>4.65</b><br>1050 | <b>3.28</b><br>740  | <b>3.29</b><br>740  | <b>4.22</b><br>950   | <b>16</b><br>141.61              | <b>13000</b>                    | <b>0.031</b><br>0.068 |
| <b>13</b><br>0.512 | <b>KR19.DZ.2RS</b>  | <b>4.18</b><br>940   | <b>4.65</b><br>1050 | <b>3.28</b><br>740  | <b>3.29</b><br>740  | <b>4.22</b><br>950   | <b>16</b><br>141.61              | <b>13000</b>                    | <b>0.031</b><br>0.068 |
| <b>15</b><br>0.591 | <b>KR22.2RS</b>     | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>3.94</b><br>890  | <b>4.04</b><br>910  | <b>5.45</b><br>1230  | <b>28</b><br>247.82              | <b>10000</b>                    | <b>0.046</b><br>0.101 |
| <b>15</b><br>0.591 | <b>KR22.DZ.2RS</b>  | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>3.94</b><br>890  | <b>4.04</b><br>910  | <b>5.45</b><br>1230  | <b>28</b><br>247.82              | <b>10000</b>                    | <b>0.046</b><br>0.101 |
| <b>15</b><br>0.591 | <b>KR26.2RS</b>     | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>4.55</b><br>1020 | <b>6.78</b><br>1520 | <b>7.24</b><br>1630  | <b>28</b><br>247.82              | <b>10000</b>                    | <b>0.059</b><br>0.130 |
| <b>15</b><br>0.591 | <b>KR26.DZ.2RS</b>  | <b>5.35</b><br>1200  | <b>6.79</b><br>1530 | <b>4.55</b><br>1020 | <b>6.78</b><br>1520 | <b>7.24</b><br>1630  | <b>28</b><br>247.82              | <b>10000</b>                    | <b>0.059</b><br>0.130 |
| <b>21</b><br>0.827 | <b>KR30.2RS</b>     | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.32</b><br>1420 | <b>7.74</b><br>1740 | <b>9.31</b><br>2090  | <b>45</b><br>398.28              | <b>8200</b>                     | <b>0.087</b><br>0.192 |
| <b>21</b><br>0.827 | <b>KR30.DZ.2RS</b>  | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.32</b><br>1420 | <b>7.74</b><br>1740 | <b>9.31</b><br>2090  | <b>45</b><br>398.28              | <b>8200</b>                     | <b>0.087</b><br>0.192 |
| <b>21</b><br>0.827 | <b>KR32.2RS</b>     | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.65</b><br>1490 | <b>9.62</b><br>2160 | <b>10.3</b><br>2320  | <b>45</b><br>398.28              | <b>8200</b>                     | <b>0.098</b><br>0.216 |
| <b>21</b><br>0.827 | <b>KR32.DZ.2RS</b>  | <b>7.89</b><br>1770  | <b>9.79</b><br>2200 | <b>6.65</b><br>1490 | <b>9.62</b><br>2160 | <b>10.3</b><br>2320  | <b>45</b><br>398.28              | <b>8200</b>                     | <b>0.098</b><br>0.216 |

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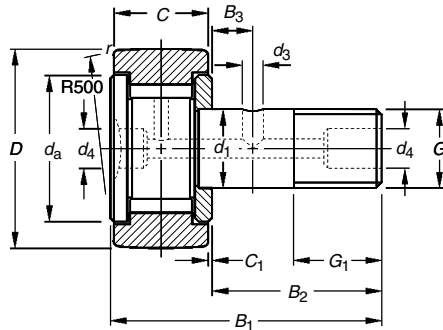




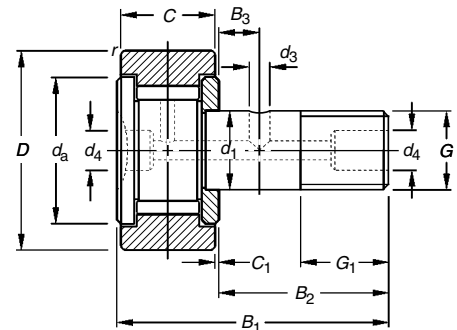
# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT WITH NEEDLE ROLLER (KRV SERIES) OR CYLINDRICAL ROLLERS, STUD TYPE (NUKR SERIES)

METRIC SERIES



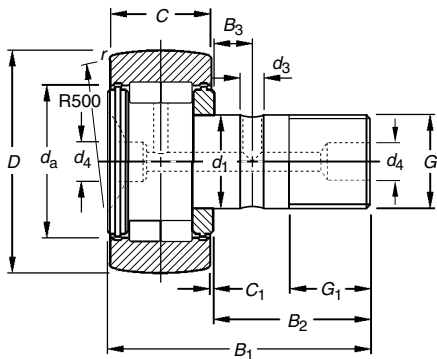
KRV



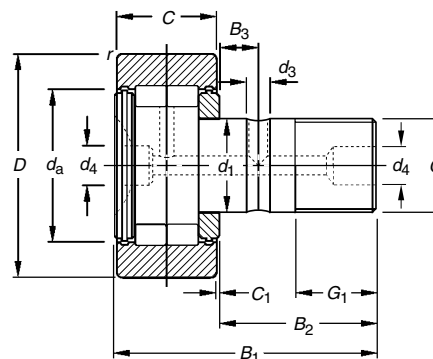
KRV.DZ

| Outer Dia. | Dimensions mm/in. |                |                   |       |                    |                |                |                |                |                | Thread         |         |                |
|------------|-------------------|----------------|-------------------|-------|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------|----------------|
|            | mm                | d <sub>1</sub> | D, h <sub>7</sub> | C     | r <sub>s</sub> min | B <sub>1</sub> | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> | d <sub>3</sub> | G       | C <sub>1</sub> |
| 16         | 6                 | 6              | 16                | 11    | 0.3                | 28.2           | 16             |                | 8              | 4              |                | M6x1    | 0.6            |
|            | 0.2362            | 0.2362         | 0.6299            | 0.433 | 0.012              | 1.110          | 0.630          |                | 0.315          | 0.157          |                | M6x1    | 0.024          |
| 19         | 8                 | 8              | 19                | 11    | 0.3                | 32.2           | 20             |                | 10             | 4              |                | M8x1.25 | 0.6            |
|            | 0.3150            | 0.3150         | 0.7480            | 0.433 | 0.012              | 1.268          | 0.787          |                | 0.394          | 0.157          |                | M8x1.25 | 0.024          |
| 22         | 10                | 10             | 22                | 12    | 0.3                | 36.2           | 23             |                | 12             | 4              |                | M10x1   | 0.6            |
|            | 0.3937            | 0.3937         | 0.8661            | 0.472 | 0.012              | 1.425          | 0.906          |                | 0.472          | 0.157          |                | M10x1   | 0.024          |
| 26         | 10                | 10             | 26                | 12    | 0.3                | 36.2           | 23             |                | 12             | 4              |                | M10x1   | 0.6            |
|            | 0.3937            | 0.3937         | 1.0236            | 0.472 | 0.012              | 1.425          | 0.906          |                | 0.472          | 0.157          |                | M10x1   | 0.024          |
| 30         | 12                | 12             | 30                | 14    | 0.6                | 40.2           | 25             | 6              | 13             | 6              | 3              | M12x1.5 | 0.6            |
|            | 0.4724            | 0.4724         | 1.1811            | 0.551 | 0.024              | 1.583          | 0.984          | 0.236          | 0.512          | 0.236          | 0.118          | M12x1.5 | 0.024          |
| 32         | 12                | 12             | 32                | 14    | 0.6                | 40.2           | 25             | 6              | 13             | 6              | 3              | M12x1.5 | 0.6            |
|            | 0.4724            | 0.4724         | 1.2598            | 0.551 | 0.024              | 1.583          | 0.984          | 0.236          | 0.512          | 0.236          | 0.118          | M12x1.5 | 0.024          |
| 35         | 16                | 16             | 35                | 18    | 0.6                | 52             | 32.5           | 8              | 17             | 6              | 3              | M16x1.5 | 0.8            |
|            | 0.6299            | 0.6299         | 1.3780            | 0.709 | 0.024              | 2.047          | 1.280          | 0.315          | 0.669          | 0.236          | 0.118          | M16x1.5 | 0.031          |
| 40         | 18                | 18             | 40                | 20    | 1                  | 58             | 36.5           | 8              | 19             | 6              | 3              | M18x1.5 | 0.8            |
|            | 0.7087            | 0.7087         | 1.5748            | 0.787 | 0.039              | 2.283          | 1.437          | 0.315          | 0.748          | 0.236          | 0.118          | M18x1.5 | 0.031          |
| 47         | 20                | 20             | 47                | 24    | 1                  | 66             | 40.5           | 9              | 21             | 6              | 4              | M20x1.5 | 0.8            |
|            | 0.7874            | 0.7874         | 1.8504            | 0.945 | 0.039              | 2.598          | 1.594          | 0.354          | 0.827          | 0.236          | 0.157          | M20x1.5 | 0.031          |
| 52         | 20                | 20             | 52                | 24    | 1                  | 66             | 40.5           | 9              | 21             | 6              | 4              | M20x1.5 | 0.8            |
|            | 0.7874            | 0.7874         | 2.0472            | 0.945 | 0.039              | 2.598          | 1.594          | 0.354          | 0.827          | 0.236          | 0.157          | M20x1.5 | 0.031          |
| 62         | 24                | 24             | 62                | 29    | 1                  | 80             | 49.5           | 11             | 25             | 8              | 4              | M24x1.5 | 0.8            |
|            | 0.9449            | 0.9449         | 2.4409            | 1.142 | 0.039              | 3.150          | 1.949          | 0.433          | 0.984          | 0.315          | 0.157          | M24x1.5 | 0.031          |
| 72         | 24                | 24             | 72                | 29    | 1.1                | 80             | 49.5           | 11             | 25             | 8              | 4              | M24x1.5 | 0.8            |
|            | 0.9449            | 0.9449         | 2.8346            | 1.142 | 0.043              | 3.150          | 1.949          | 0.433          | 0.984          | 0.315          | 0.157          | M24x1.5 | 0.031          |
| 80         | 30                | 30             | 80                | 35    | 1.1                | 100            | 63             | 15             | 32             | 8              | 4              | M30x1.5 | 1.0            |
|            | 1.1811            | 1.1811         | 3.1496            | 1.378 | 0.043              | 3.937          | 2.480          | 0.591          | 1.260          | 0.315          | 0.157          | M30x1.5 | 0.039          |
| 90         | 30                | 30             | 90                | 35    | 1.1                | 100            | 63             | 15             | 32             | 8              | 4              | M30x1.5 | 1.0            |
|            | 1.1811            | 1.1811         | 3.5433            | 1.378 | 0.043              | 3.937          | 2.480          | 0.591          | 1.260          | 0.315          | 0.157          | M30x1.5 | 0.039          |

## Stud Type and Yoke Type Track Rollers



NUKR



NUKR.DZ

| d <sub>a</sub> | Bearing Designation | Load Ratings kN/lbf. |               |                   |                     |                      | Tightening Torque<br>Nm/in.-lbs. | Limiting Speed<br>Grease<br>RPM | Wt.<br>kg/lbs. |
|----------------|---------------------|----------------------|---------------|-------------------|---------------------|----------------------|----------------------------------|---------------------------------|----------------|
|                |                     | Dynamic              | Static        | As a Track Roller |                     |                      |                                  |                                 |                |
|                |                     |                      |               | C                 | C <sub>0</sub>      | Dynamic              |                                  |                                 |                |
|                |                     |                      |               | C <sub>w</sub>    | F <sub>T perm</sub> | F <sub>0r perm</sub> |                                  |                                 |                |
| 11<br>0.433    | KRV16               | 6.90<br>1550         | 8.40<br>1890  | 5.11<br>1150      | 3.49<br>780         | 6.28<br>1410         | 7<br>62.0                        | 5700                            | 0.019<br>0.042 |
| 11<br>0.433    | KRV16.DZ            | 6.90<br>1550         | 8.40<br>1890  | 5.11<br>1150      | 3.49<br>780         | 6.28<br>1410         | 7<br>62.0                        | 5700                            | 0.019<br>0.042 |
| 13<br>0.512    | KRV19               | 8.08<br>1820         | 11.0<br>2470  | 5.66<br>1270      | 4.13<br>930         | 7.43<br>1670         | 16<br>142                        | 4300                            | 0.031<br>0.068 |
| 13<br>0.512    | KRV19.DZ            | 8.08<br>1820         | 11.0<br>2470  | 5.66<br>1270      | 4.13<br>930         | 7.43<br>1670         | 16<br>142                        | 4300                            | 0.031<br>0.068 |
| 15<br>0.591    | KRV22               | 9.45<br>2120         | 14.3<br>3210  | 6.32<br>1420      | 5.04<br>1130        | 9.07<br>2040         | 28<br>248                        | 3400                            | 0.046<br>0.101 |
| 15<br>0.591    | KRV22.DZ            | 9.45<br>2120         | 14.3<br>3210  | 6.32<br>1420      | 5.04<br>1130        | 9.07<br>2040         | 28<br>248                        | 3400                            | 0.046<br>0.101 |
| 15<br>0.591    | KRV26               | 9.45<br>2120         | 14.3<br>3210  | 7.30<br>1640      | 8.60<br>1930        | 12.7<br>2860         | 28<br>248                        | 3400                            | 0.059<br>0.130 |
| 15<br>0.591    | KRV26.DZ            | 9.45<br>2120         | 14.3<br>3210  | 7.30<br>1640      | 8.60<br>1930        | 12.7<br>2860         | 28<br>248                        | 3400                            | 0.059<br>0.130 |
| 21<br>0.827    | KRV30               | 13.4<br>3010         | 19.8<br>4450  | 9.85<br>2210      | 9.20<br>2070        | 15.7<br>3530         | 45<br>398                        | 2800                            | 0.087<br>0.192 |
| 21<br>0.827    | KRV30.DZ            | 13.4<br>3010         | 19.8<br>4450  | 9.85<br>2210      | 9.20<br>2070        | 15.7<br>3530         | 45<br>398                        | 2800                            | 0.087<br>0.192 |
| 21<br>0.827    | KRV32               | 13.4<br>3010         | 19.8<br>4450  | 10.4<br>2340      | 11.3<br>2540        | 17.4<br>3910         | 45<br>398                        | 2800                            | 0.098<br>0.216 |
| 21<br>0.827    | KRV32.DZ            | 13.4<br>3010         | 19.8<br>4450  | 10.4<br>2340      | 11.3<br>2540        | 17.4<br>3910         | 45<br>398                        | 2800                            | 0.098<br>0.216 |
| 25<br>0.984    | NUKR35.2SK          | 24.7<br>5550         | 29.4<br>6610  | 16.2<br>3640      | 10.1<br>2270        | 16.1<br>3620         | 53.2<br>471                      | 6100                            | 0.170<br>0.375 |
| 27<br>1.063    | NUKR40.2SK          | 26.6<br>5980         | 33.3<br>7490  | 18.7<br>4200      | 15.0<br>3370        | 23.9<br>5370         | 77.5<br>686                      | 5300                            | 0.250<br>0.551 |
| 33<br>1.299    | NUKR47.2SK          | 41.4<br>9310         | 53.2<br>12000 | 28.1<br>6320      | 20.5<br>4610        | 32.7<br>7350         | 109<br>965                       | 4500                            | 0.380<br>0.838 |
| 37<br>1.457    | NUKR52.2SK          | 45.8<br>10300        | 63.1<br>14200 | 29.6<br>6650      | 22.2<br>4990        | 35.4<br>7960         | 109<br>965                       | 3700                            | 0.461<br>1.016 |
| 45<br>1.772    | NUKR62.2SK          | 62.7<br>14100        | 83.1<br>18700 | 40.9<br>9190      | 29.6<br>6650        | 47.2<br>10600        | 193<br>1708                      | 3200                            | 0.790<br>1.742 |
| 51<br>2.008    | NUKR72.2SK          | 68.9<br>15500        | 97.8<br>22000 | 46.1<br>10400     | 39.6<br>8900        | 63.1<br>14200        | 193<br>1708                      | 2600                            | 1.040<br>2.293 |
| 52<br>2.047    | NUKR80.2SK          | 95.4<br>21400        | 130<br>29200  | 69.7<br>15700     | 63.2<br>14200       | 101<br>22700         | 390<br>3452                      | 2900                            | 1.550<br>3.417 |
| 52<br>2.047    | NUKR90.2SK          | 95.4<br>21400        | 130<br>29200  | 77.8<br>17500     | 97.8<br>22000       | 128<br>28800         | 390<br>3452                      | 2900                            | 2.020<br>4.453 |



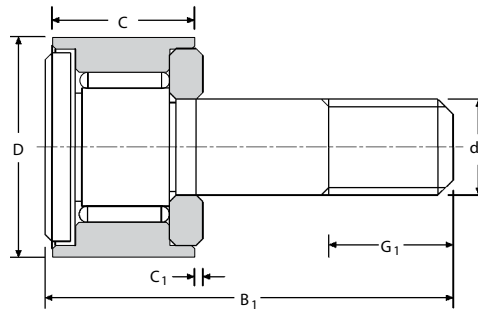


## NEEDLE ROLLER BEARINGS

### FULL COMPLEMENT, SMALL SERIES, UNSEALED, STUD TYPE (GC SERIES)

#### METRIC SERIES

GC: convex outer ring  
GCL: cylindrical outer ring



GC Series

C

| Outer Dia. | Dimensions mm/in. |        |                |       |                |                    |                |                | Profiled Designation |
|------------|-------------------|--------|----------------|-------|----------------|--------------------|----------------|----------------|----------------------|
|            | mm                | D      | d <sub>1</sub> | C     | C <sub>1</sub> | r <sub>s min</sub> | B <sub>1</sub> | G <sub>1</sub> |                      |
| 10         | 10                | 4      | 8              | 0.25  | 0.2            | 19.5               | 6              | GC 10          |                      |
|            | 0.3937            | 0.1575 | 0.315          | 0.010 | 0.008          | 0.768              | 0.236          |                |                      |
| 11         | 11                | 4      | 8              | 0.25  | 0.2            | 19.5               | 6              | GC 11          |                      |
|            | 0.4331            | 0.1575 | 0.315          | 0.010 | 0.008          | 0.768              | 0.236          |                |                      |
| 12         | 12                | 5      | 9              | 0.25  | 0.2            | 22.5               | 7              | GC 12          |                      |
|            | 0.4724            | 0.1969 | 0.354          | 0.010 | 0.008          | 0.886              | 0.276          |                |                      |
| 13         | 13                | 5      | 9              | 0.25  | 0.2            | 22.5               | 7              | GC 13          |                      |
|            | 0.5118            | 0.1969 | 0.354          | 0.010 | 0.008          | 0.886              | 0.276          |                |                      |
| 14         | 14                | 6      | 9.5            | 0.25  | 0.3            | 26                 | 8              | GC 14          |                      |
|            | 0.5512            | 0.2362 | 0.374          | 0.010 | 0.012          | 1.024              | 0.315          |                |                      |
| 15         | 15                | 6      | 9.5            | 0.25  | 0.3            | 26                 | 8              | GC 15          |                      |
|            | 0.5906            | 0.2362 | 0.374          | 0.010 | 0.012          | 1.024              | 0.315          |                |                      |

Stud Type and Yoke Type Track Rollers

C

| Cylindrical Designation | Tightening Torque Nm/in.-lbs. | Load Ratings kN/lbf.   |                     |                       | Limiting Speed Grease RPM | Wt. kg/lbs. |
|-------------------------|-------------------------------|------------------------|---------------------|-----------------------|---------------------------|-------------|
|                         |                               | Dynamic C <sub>1</sub> | F <sub>r perm</sub> | Static F <sub>0</sub> |                           |             |
| GCL 10                  | 0.9                           | 2.13                   | 0.52                | 0.96                  | 14000                     | 0.006       |
|                         | 7.97                          | 479                    | 117                 | 216                   |                           | 0.014       |
| GCL 11                  | 0.9                           | 2.48                   | 0.52                | 0.96                  | 14000                     | 0.007       |
|                         | 7.97                          | 558                    | 117                 | 216                   |                           | 0.016       |
| GCL 12                  | 1.8                           | 2.98                   | 0.90                | 1.68                  | 11000                     | 0.011       |
|                         | 15.93                         | 670                    | 202                 | 378                   |                           | 0.024       |
| GCL 13                  | 1.8                           | 3.35                   | 0.90                | 1.68                  | 11000                     | 0.011       |
|                         | 15.93                         | 753                    | 202                 | 378                   |                           | 0.024       |
| GCL 14                  | 3.0                           | 3.5                    | 1.48                | 2.75                  | 10000                     | 0.016       |
|                         | 26.55                         | 787                    | 333                 | 618                   |                           | 0.035       |
| GCL 15                  | 3.0                           | 3.75                   | 1.48                | 2.75                  | 10000                     | 0.018       |
|                         | 26.55                         | 843                    | 333                 | 618                   |                           | 0.039       |



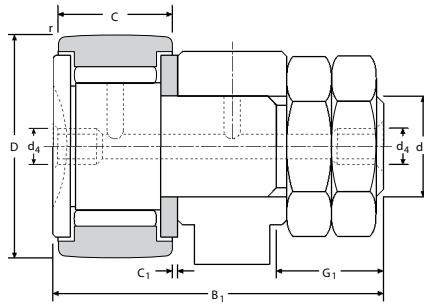


# NEEDLE ROLLER BEARINGS

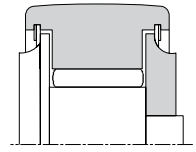
**FULL COMPLEMENT,  
STANDARD SERIES,  
WITH OR WITHOUT SEALS,  
STUD TYPE (GC SERIES)**

## METRIC SERIES

GC: convex outer ring  
GCL: cylindrical outer ring



GC/GCL



GC...EE, GC...EM

C

| Outer Dia. | Dimensions mm/in. |        |                |       |                |                    |                |                      | Profiled Designation |
|------------|-------------------|--------|----------------|-------|----------------|--------------------|----------------|----------------------|----------------------|
|            | mm                | D      | d <sub>1</sub> | C     | C <sub>1</sub> | r <sub>s min</sub> | B <sub>1</sub> | G <sub>1</sub>       |                      |
| 16         | 16                | 6      | 11             | 0.60  | 0.3            | 28.3               | 8              | GC 16                |                      |
|            | 0.6299            | 0.2362 | 0.433          | 0.024 | 0.012          | 1.114              | 0.315          |                      |                      |
| 19         | 19                | 8      | 11             | 0.60  | 0.3            | 32.3               | 10             | GC 19                |                      |
|            | 0.748             | 0.315  | 0.433          | 0.024 | 0.012          | 1.272              | 0.394          |                      |                      |
| 22         | 22                | 10     | 12             | 0.60  | 0.3            | 36.3               | 12             | GC 22                |                      |
|            | 0.8661            | 0.3937 | 0.472          | 0.024 | 0.012          | 1.429              | 0.472          |                      |                      |
| 24         | 24                | 10     | 12             | 0.60  | 0.3            | 36.3               | 12             | GC 24                |                      |
|            | 0.9449            | 0.3937 | 0.472          | 0.024 | 0.012          | 1.429              | 0.472          |                      |                      |
| 26         | 26                | 10     | 12             | 0.60  | 0.3            | 36.3               | 12             | GC 26 <sup>(4)</sup> |                      |
|            | 1.0236            | 0.3937 | 0.472          | 0.024 | 0.012          | 1.429              | 0.472          |                      |                      |
| 28         | 28                | 10     | 12             | 0.60  | 0.3            | 36.3               | 12             | GC 28                |                      |
|            | 1.1024            | 0.3937 | 0.472          | 0.024 | 0.012          | 1.429              | 0.472          |                      |                      |
| 30         | 30                | 12     | 14             | 0.60  | 0.6            | 40.3               | 13             | GC 30                |                      |
|            | 1.1811            | 0.4724 | 0.51           | 0.024 | 0.024          | 1.587              | 0.512          |                      |                      |
| 32         | 32                | 12     | 14             | 0.60  | 0.6            | 40.3               | 13             | GC 32                |                      |
|            | 1.2598            | 0.4724 | 0.51           | 0.024 | 0.024          | 1.587              | 0.512          |                      |                      |
| 35         | 35                | 16     | 18             | 0.80  | 0.6            | 52.3               | 17             | GC 35                |                      |
|            | 1.378             | 0.6299 | 0.709          | 0.031 | 0.024          | 2.059              | 0.669          |                      |                      |
| 47         | 47                | 20     | 24             | 0.80  | 1              | 66.3               | 21             | GC 47                |                      |
|            | 1.8504            | 0.7874 | 0.45           | 0.031 | 0.039          | 2.61               | 0.827          |                      |                      |
| 52         | 52                | 20     | 24             | 0.80  | 1              | 66.3               | 21             | GC 52                |                      |
|            | 2.0472            | 0.7874 | 0.45           | 0.031 | 0.039          | 2.61               | 0.827          |                      |                      |
| 62         | 62                | 24     | 29             | 0.80  | 1              | 80.3               | 25             | GC 62                |                      |
|            | 2.4409            | 0.9449 | 1.142          | 0.031 | 0.039          | 3.161              | 0.984          |                      |                      |
| 72         | 72                | 24     | 29             | 0.80  | 1              | 80.3               | 25             | GC 72                |                      |
|            | 2.8346            | 0.9449 | 1.142          | 0.031 | 0.039          | 3.161              | 0.984          |                      |                      |
| 80         | 80                | 30     | 35             | 1.00  | 1              | 100.3              | 32             | GC 80                |                      |
|            | 3.1496            | 1.1811 | 1.378          | 0.039 | 0.039          | 3.949              | 1.26           |                      |                      |
| 85         | 85                | 30     | 35             | 1.00  | 1              | 100.3              | 32             | GCL 85 EE            |                      |
|            | 3.3465            | 1.1811 | 1.378          | 0.039 | 0.039          | 3.949              | 1.26           |                      |                      |
|            | 85                | 30     | 35             | 1.00  | 1              | 100.3              | 32             | GCL 85 EEM           |                      |
|            | 3.3465            | 1.1811 | 1.378          | 0.039 | 0.039          | 3.949              | 1.26           |                      |                      |
| 90         | 90                | 30     | 35             | 1.00  | 1              | 100.3              | 32             | GC 90                |                      |
|            | 3.5433            | 1.1811 | 1.378          | 0.039 | 0.039          | 3.949              | 1.26           |                      |                      |

## Stud Type and Yoke Type Track Rollers

C

| Tightening Torque<br>Nm/in.-lbs. | Load Ratings kN/lbf. |                |                 | Limiting Speed<br>Grease<br>RPM | mm<br>wrench | mm/in.     | Wt.<br>kg/lbs. |
|----------------------------------|----------------------|----------------|-----------------|---------------------------------|--------------|------------|----------------|
|                                  | Dynamic<br>C         | $F_{r\ per m}$ | Static<br>$F_0$ |                                 |              |            |                |
| 3<br>26.6                        | 5.05<br>1140         | 1.18<br>265    | 2.2<br>495      | 9300                            | N/A          | 4<br>0.157 | 0.021<br>0.046 |
| 8<br>70.8                        | 5.75<br>1290         | 2.83<br>636    | 5.2<br>1170     | 7600                            | N/A          | 4<br>0.157 | 0.034<br>0.075 |
| 20<br>177                        | 6.3<br>1420          | 4.9<br>1100    | 8.1<br>1820     | 6300                            | N/A          | 4<br>0.157 | 0.058<br>0.128 |
| 20<br>177                        | 6.9<br>1550          | 5.2<br>1170    | 9.2<br>2070     | 6300                            | N/A          | 4<br>0.157 | 0.067<br>0.148 |
| 20<br>177                        | 8.9<br>2000          | 5.2<br>1170    | 9.6<br>2160     | 5500                            | N/A          | 4<br>0.157 | 0.072<br>0.159 |
| 20<br>177                        | 9.6<br>2160          | 5.2<br>1170    | 9.6<br>2160     | 5500                            | N/A          | 4<br>0.157 | 0.08<br>0.176  |
| 26<br>230                        | 12.9<br>2900         | 7.7<br>1730    | 14.3<br>3210    | 4800                            | 8            | 4<br>0.157 | 0.115<br>0.254 |
| 26<br>230                        | 13.8<br>3100         | 7.7<br>1730    | 14.3<br>3210    | 4800                            | 8            | 4<br>0.157 | 0.12<br>0.265  |
| 64<br>566                        | 19.2<br>4320         | 11.4<br>2560   | 24<br>5400      | 3850                            | 10           | 6<br>0.236 | 0.208<br>0.459 |
| 120<br>1060                      | 28.3<br>6360         | 21.4<br>4810   | 40<br>8990      | 2700                            | 14           | 6<br>0.236 | 0.477<br>1.052 |
| 120<br>1060                      | 34<br>7640           | 21.4<br>4810   | 40<br>8990      | 2700                            | 14           | 6<br>0.236 | 0.542<br>1.195 |
| 220<br>1950                      | 42<br>9440           | 31<br>6970     | 57.5<br>12900   | 2330                            | 12           | 6<br>0.236 | 0.944<br>2.081 |
| 220<br>1950                      | 44<br>9890           | 31<br>6970     | 57.5<br>12900   | 2330                            | 12           | 6<br>0.236 | 1.165<br>2.568 |
| 450<br>3980                      | 60<br>13500          | 50<br>11200    | 93<br>20900     | 1700                            | 14           | 8<br>0.315 | 1.915<br>4.222 |
| 450<br>3980                      | 64<br>14400          | 50<br>11200    | 93<br>20900     | 1700                            | 14           | 8<br>0.315 | 2.096<br>4.621 |
| 450<br>3980                      | 64<br>14400          | 50<br>11200    | 93<br>20900     | 1700                            | 14           | 8<br>0.315 | 2.096<br>4.621 |
| 450<br>3980                      | 65<br>14600          | 50<br>11200    | 93<br>20900     | 1700                            | 14           | 8<br>0.315 | 2.287<br>5.042 |



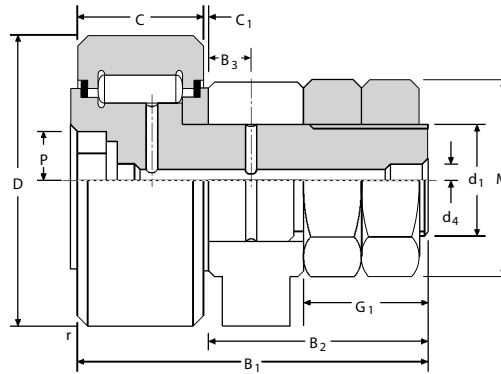


# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT, WITH METAL SEALS, STUD TYPE (GCU...MM SERIES)

### METRIC SERIES

GCU: convex outer ring  
GCUL: cylindrical outer ring



GCU, GCUL

| Outside Dia. | Dimensions mm/in.    |                     |                    |                      |                       |                    |                     | Profiled Designation | Cylindrical Designation |
|--------------|----------------------|---------------------|--------------------|----------------------|-----------------------|--------------------|---------------------|----------------------|-------------------------|
| mm           | D                    | d <sub>1</sub>      | C                  | C <sub>1</sub>       | B <sub>1</sub>        | G <sub>1</sub>     | r <sub>smin</sub>   |                      |                         |
| <b>35</b>    | <b>35</b><br>1.3780  | <b>16</b><br>0.6299 | <b>18</b><br>0.709 | <b>0.85</b><br>0.033 | <b>52.3</b><br>2.059  | <b>17</b><br>0.669 | <b>0.6</b><br>0.024 | <b>GCU 35 MM</b>     | <b>GCUL 35 MM</b>       |
| <b>40</b>    | <b>40</b><br>1.5748  | <b>18</b><br>0.7087 | <b>20</b><br>0.787 | <b>0.85</b><br>0.033 | <b>58.3</b><br>2.295  | <b>19</b><br>0.748 | <b>1.0</b><br>0.039 | <b>GCU 40</b>        |                         |
|              | <b>40</b><br>1.5748  | <b>18</b><br>0.7087 | <b>20</b><br>0.787 | <b>0.85</b><br>0.033 | <b>58.3</b><br>2.295  | <b>19</b><br>0.748 | <b>1.0</b><br>0.039 | <b>GCU 40 MM</b>     | <b>GCUL 40 MM</b>       |
| <b>47</b>    | <b>47</b><br>1.8504  | <b>20</b><br>0.7874 | <b>24</b><br>0.945 | <b>0.85</b><br>0.033 | <b>66.3</b><br>2.610  | <b>21</b><br>0.827 | <b>1.0</b><br>0.039 | <b>GCU 47 MM</b>     | <b>GCUL 47 MM</b>       |
| <b>52</b>    | <b>52</b><br>2.0472  | <b>20</b><br>0.7874 | <b>24</b><br>0.945 | <b>0.85</b><br>0.033 | <b>66.3</b><br>2.610  | <b>21</b><br>0.827 | <b>1.0</b><br>0.039 |                      | <b>GCUL 52</b>          |
|              | <b>52</b><br>2.0472  | <b>20</b><br>0.7874 | <b>24</b><br>0.945 | <b>0.85</b><br>0.033 | <b>66.3</b><br>2.610  | <b>21</b><br>0.827 | <b>1.0</b><br>0.039 | <b>GCU 52 MM</b>     | <b>GCUL 52 MM</b>       |
| <b>62</b>    | <b>62</b><br>2.4409  | <b>24</b><br>0.9449 | <b>29</b><br>1.142 | <b>0.85</b><br>0.033 | <b>80.3</b><br>3.161  | <b>25</b><br>0.984 | <b>1.0</b><br>0.039 | <b>GCU 62 MM</b>     |                         |
| <b>72</b>    | <b>72</b><br>2.8346  | <b>24</b><br>0.9449 | <b>29</b><br>1.142 | <b>0.85</b><br>0.033 | <b>80.3</b><br>3.161  | <b>25</b><br>0.984 | <b>1.1</b><br>0.043 |                      | <b>GCUL 72 MM</b>       |
| <b>80</b>    | <b>80</b><br>3.1496  | <b>30</b><br>1.1811 | <b>35</b><br>1.378 | <b>1.10</b><br>0.043 | <b>100.3</b><br>3.949 | <b>32</b><br>1.260 | <b>1.1</b><br>0.043 | <b>GCU 80 MM</b>     |                         |
| <b>90</b>    | <b>90</b><br>3.5433  | <b>30</b><br>1.1811 | <b>35</b><br>1.378 | <b>1.10</b><br>0.043 | <b>100.3</b><br>3.949 | <b>32</b><br>1.260 | <b>1.1</b><br>0.043 |                      | <b>GCUL 90</b>          |
|              | <b>90</b><br>3.5433  | <b>30</b><br>1.1811 | <b>35</b><br>1.378 | <b>1.10</b><br>0.043 | <b>100.3</b><br>3.949 | <b>32</b><br>1.260 | <b>1.1</b><br>0.043 | <b>GCU 90 MM</b>     |                         |
| <b>100</b>   | <b>100</b><br>3.9370 | <b>36</b><br>1.4173 | <b>40</b><br>1.575 | <b>1.10</b><br>0.043 | <b>117.3</b><br>4.618 | <b>38</b><br>1.496 | <b>2.0</b><br>0.079 | <b>GCU 100</b>       |                         |
|              | <b>100</b><br>3.9370 | <b>36</b><br>1.4173 | <b>40</b><br>1.575 | <b>1.10</b><br>0.043 | <b>117.3</b><br>4.618 | <b>38</b><br>1.496 | <b>2.0</b><br>0.079 | <b>GCU 100 MM</b>    |                         |
| <b>110</b>   | <b>110</b><br>4.3307 | <b>36</b><br>1.4173 | <b>40</b><br>1.575 | <b>1.10</b><br>0.043 | <b>117.3</b><br>4.618 | <b>38</b><br>1.496 | <b>2.0</b><br>0.079 | <b>GCU 110 MM</b>    | <b>GCUL 110 MM</b>      |
| <b>120</b>   | <b>120</b><br>4.7244 | <b>42</b><br>1.6535 | <b>46</b><br>1.811 | <b>1.10</b><br>0.043 | <b>136.3</b><br>5.366 | <b>44</b><br>1.732 | <b>2.0</b><br>0.079 | <b>GCU 120 MM</b>    |                         |
| <b>130</b>   | <b>130</b><br>5.1181 | <b>42</b><br>1.6535 | <b>46</b><br>1.811 | <b>1.10</b><br>0.043 | <b>136.3</b><br>5.366 | <b>44</b><br>1.732 | <b>2.0</b><br>0.079 |                      | <b>GCUL 130</b>         |
|              | <b>130</b><br>5.1181 | <b>42</b><br>1.6535 | <b>46</b><br>1.811 | <b>1.10</b><br>0.043 | <b>136.3</b><br>5.366 | <b>44</b><br>1.732 | <b>2.0</b><br>0.079 | <b>GCU 130 MM</b>    |                         |

## Stud Type and Yoke Type Track Rollers

C

| Tightening<br>Torque<br>Nm/in.-lbs. | Load Ratings kN/lbf. |                      |                      | Limiting Speed<br>Grease<br>RPM | mm<br>wrench | mm/in.             |                   | Wt.<br>kg/lbs.         |
|-------------------------------------|----------------------|----------------------|----------------------|---------------------------------|--------------|--------------------|-------------------|------------------------|
|                                     | Dynamic              |                      | Static               |                                 |              | B <sub>3</sub>     | d <sub>4</sub>    |                        |
|                                     | C                    | F <sub>r perm</sub>  | F <sub>01</sub>      |                                 |              |                    |                   |                        |
| <b>64</b><br>566                    | <b>17.0</b><br>3820  | <b>7.80</b><br>1750  | <b>17.2</b><br>3870  | <b>5700</b>                     | <b>10</b>    | <b>8</b><br>0.315  | <b>6</b><br>0.236 | <b>0.200</b><br>0.441  |
| <b>90</b><br>797                    | <b>20.0</b><br>4500  | <b>11.5</b><br>2590  | <b>22.0</b><br>4950  | <b>5200</b>                     | <b>12</b>    | <b>8</b><br>0.315  | <b>6</b><br>0.236 | <b>0.289</b><br>0.637  |
| <b>90</b><br>797                    | <b>20.0</b><br>4500  | <b>11.5</b><br>2590  | <b>22.0</b><br>4950  | <b>5200</b>                     | <b>12</b>    | <b>8</b><br>0.315  | <b>6</b><br>0.236 | <b>0.289</b><br>0.637  |
| <b>120</b><br>1060                  | <b>29.5</b><br>6630  | <b>15.5</b><br>3480  | <b>33.0</b><br>7420  | <b>4400</b>                     | <b>14</b>    | <b>9</b><br>0.354  | <b>6</b><br>0.236 | <b>0.450</b><br>0.992  |
| <b>120</b><br>1060                  | <b>36.5</b><br>8210  | <b>21.5</b><br>4830  | <b>40.0</b><br>8990  | <b>4400</b>                     | <b>14</b>    | <b>9</b><br>0.354  | <b>6</b><br>0.236 | <b>0.520</b><br>1.146  |
| <b>120</b><br>1060                  | <b>36.5</b><br>8210  | <b>21.5</b><br>4830  | <b>40.0</b><br>8990  | <b>4400</b>                     | <b>14</b>    | <b>9</b><br>0.354  | <b>6</b><br>0.236 | <b>0.520</b><br>1.146  |
| <b>220</b><br>1950                  | <b>52.0</b><br>11700 | <b>31.0</b><br>6970  | <b>58.0</b><br>13000 | <b>3700</b>                     | <b>12</b>    | <b>11</b><br>0.433 | <b>6</b><br>0.236 | <b>0.910</b><br>2.006  |
| <b>220</b><br>1950                  | <b>63.0</b><br>14200 | <b>31.0</b><br>6970  | <b>58.0</b><br>13000 | <b>3700</b>                     | <b>12</b>    | <b>11</b><br>0.433 | <b>6</b><br>0.236 | <b>1.140</b><br>2.513  |
| <b>450</b><br>3980                  | <b>76.0</b><br>17100 | <b>48.0</b><br>10800 | <b>93.0</b><br>20900 | <b>2700</b>                     | <b>14</b>    | <b>15</b><br>0.591 | <b>8</b><br>0.315 | <b>1.870</b><br>4.123  |
| <b>450</b><br>3980                  | <b>94.0</b><br>21100 | <b>50.0</b><br>11200 | <b>93.0</b><br>20900 | <b>2700</b>                     | <b>14</b>    | <b>15</b><br>0.591 | <b>8</b><br>0.315 | <b>2.230</b><br>4.916  |
| <b>450</b><br>3980                  | <b>94.0</b><br>21100 | <b>50.0</b><br>11200 | <b>93.0</b><br>20900 | <b>2700</b>                     | <b>14</b>    | <b>15</b><br>0.591 | <b>8</b><br>0.315 | <b>2.230</b><br>4.914  |
| <b>740</b><br>6550                  | <b>115</b><br>25900  | <b>76.0</b><br>17100 | <b>142</b><br>31900  | <b>2300</b>                     | <b>17</b>    | <b>20</b><br>0.787 | <b>8</b><br>0.315 | <b>3.290</b><br>7.253  |
| <b>740</b><br>6550                  | <b>115</b><br>25900  | <b>76.0</b><br>17100 | <b>142</b><br>31900  | <b>2300</b>                     | <b>17</b>    | <b>20</b><br>0.787 | <b>8</b><br>0.315 | <b>3.290</b><br>7.253  |
| <b>740</b><br>6550                  | <b>129</b><br>29000  | <b>76.0</b><br>17100 | <b>142</b><br>31900  | <b>2300</b>                     | <b>17</b>    | <b>20</b><br>0.787 | <b>8</b><br>0.315 | <b>3.800</b><br>8.378  |
| <b>1 200</b><br>10620               | <b>150</b><br>33700  | <b>120</b><br>27000  | <b>200</b><br>45000  | <b>2000</b>                     | <b>19</b>    | <b>24</b><br>0.945 | <b>8</b><br>0.315 | <b>5.422</b><br>1.953  |
| <b>1 200</b><br>10620               | <b>163</b><br>36600  | <b>121</b><br>27200  | <b>223</b><br>50100  | <b>2000</b>                     | <b>19</b>    | <b>24</b><br>0.945 | <b>8</b><br>0.315 | <b>5.780</b><br>12.743 |
| <b>1 200</b><br>10620               | <b>163</b><br>36600  | <b>121</b><br>27200  | <b>223</b><br>50100  | <b>2000</b>                     | <b>19</b>    | <b>24</b><br>0.945 | <b>8</b><br>0.315 | <b>5.780</b><br>12.743 |



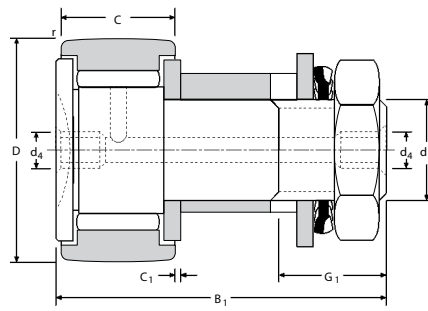


# NEEDLE ROLLER BEARINGS

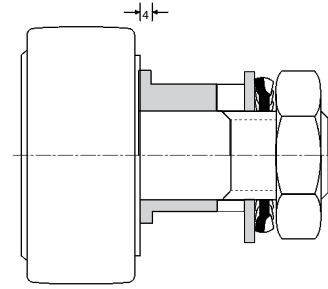
## FULL COMPLEMENT, ECCENTRIC, STUD TYPE (GCR SERIES)

### METRIC SERIES

GCR: convex outer ring  
GCRL: cylindrical outer ring



GCR 16-52



GCR 62-90

| Outer Dia. | Dimensions mm/in. |        |                |       |                |                |                | Profiled Designation | Cylindrical Designation |                    |
|------------|-------------------|--------|----------------|-------|----------------|----------------|----------------|----------------------|-------------------------|--------------------|
|            | mm                | D      | d <sub>1</sub> | C     | C <sub>1</sub> | B <sub>1</sub> | G <sub>1</sub> |                      |                         | r <sub>a</sub> min |
| 16         | 16                | 16     | 6              | 11    | 0.60           | 28.3           | 8              | 0.3                  | GCR 16                  |                    |
|            | 0.6299            | 0.6299 | 0.2362         | 0.433 | 0.024          | 1.114          | 0.315          | 0.012                | GCR 16 EE               | GCRL 16 EE         |
|            | 0.6299            | 0.6299 | 0.2362         | 0.433 | 0.024          | 1.114          | 0.315          | 0.012                | GCR 16 EEM              | GCRL 16 EEM        |
| 19         | 19                | 19     | 8              | 11    | 0.60           | 32.3           | 10             | 0.3                  | GCR 19                  |                    |
|            | 0.748             | 0.748  | 0.315          | 0.433 | 0.024          | 1.272          | 0.394          | 0.012                | GCR 19 EE               | GCRL 19 EE         |
|            | 0.748             | 0.748  | 0.315          | 0.433 | 0.024          | 1.272          | 0.394          | 0.012                | GCR 19 EEM              |                    |
| 22         | 22                | 22     | 10             | 12    | 0.60           | 36.3           | 12             | 0.3                  | GCR 22 EE               | GCRL 22 EE         |
|            | 0.8661            | 0.8661 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 22 EEM              | GCRL 22 EEM        |
|            | 0.8661            | 0.8661 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 24                  |                    |
| 24         | 24                | 24     | 10             | 12    | 0.60           | 36.3           | 12             | 0.3                  | GCR 24                  |                    |
|            | 0.9449            | 0.9449 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 24 EE               | GCRL 24 EE         |
|            | 0.9449            | 0.9449 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 24 EEM              | GCRL 24 EEM        |
| 26         | 26                | 26     | 10             | 12    | 0.60           | 36.3           | 12             | 0.3                  | GCR 26                  |                    |
|            | 1.0236            | 1.0236 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 26 EE               | GCRL 26 EE         |
|            | 1.0236            | 1.0236 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 28 EE               |                    |
| 28         | 28                | 28     | 10             | 12    | 0.60           | 36.3           | 12             | 0.3                  | GCR 28 EE               |                    |
|            | 1.1024            | 1.1024 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 28 EEM              | GCRL 28 EEM        |
|            | 1.1024            | 1.1024 | 0.3937         | 0.472 | 0.024          | 1.429          | 0.472          | 0.012                | GCR 30 EE               | GCRL 30 EE         |
| 30         | 30                | 30     | 12             | 14    | 0.60           | 40.3           | 13             | 0.6                  | GCR 30 EE               | GCRL 30 EE         |
|            | 1.1811            | 1.1811 | 0.4724         | 0.551 | 0.024          | 1.587          | 0.512          | 0.024                | GCR 30 EEM              | GCRL 30 EEM        |
|            | 1.1811            | 1.1811 | 0.4724         | 0.551 | 0.024          | 1.587          | 0.512          | 0.024                | GCR 32                  |                    |
| 32         | 32                | 32     | 12             | 14    | 0.60           | 40.3           | 13             | 0.6                  | GCR 32                  |                    |
|            | 1.2598            | 1.2598 | 0.4724         | 0.551 | 0.024          | 1.587          | 0.512          | 0.024                | GCR 32 EE               | GCRL 32 EE         |
|            | 1.2598            | 1.2598 | 0.4724         | 0.551 | 0.024          | 1.587          | 0.512          | 0.024                | GCR 32 EEM              |                    |
| 35         | 35                | 35     | 16             | 18    | 0.80           | 52.3           | 17             | 0.6                  | GCR 35                  |                    |
|            | 1.378             | 1.378  | 0.6299         | 0.709 | 0.031          | 2.059          | 0.669          | 0.024                | GCR 35 EE               | GCRL 35 EE         |
|            | 1.378             | 1.378  | 0.6299         | 0.709 | 0.031          | 2.059          | 0.669          | 0.024                | GCR 35 EEM              | GCRL 35 EEM        |

## Stud Type and Yoke Type Track Rollers

| Tightening<br>Torque<br>Nm/in.-lbs. | Load Ratings kN/lbf. |                     |                     | Limiting Speed<br><br>Grease<br>RPM | mm/in.            | Wt.<br>kg/lbs.        |
|-------------------------------------|----------------------|---------------------|---------------------|-------------------------------------|-------------------|-----------------------|
|                                     | Dynamic              |                     | Static              |                                     |                   |                       |
|                                     | C <sub>0</sub>       | F <sub>r perm</sub> | F <sub>0</sub>      |                                     |                   |                       |
| <b>2</b><br>17.7                    | <b>5.05</b><br>1140  | <b>1.18</b><br>265  | <b>2.20</b><br>495  | <b>9300</b>                         | <b>4</b><br>0.157 | <b>0.024</b><br>0.053 |
| <b>2</b><br>17.7                    | <b>5.05</b><br>1140  | <b>1.18</b><br>265  | <b>2.20</b><br>495  | <b>9300</b>                         | <b>4</b><br>0.157 | <b>0.024</b><br>0.053 |
| <b>2</b><br>17.7                    | <b>5.05</b><br>1140  | <b>1.18</b><br>265  | <b>2.20</b><br>495  | <b>9300</b>                         | <b>4</b><br>0.157 | <b>0.024</b><br>0.053 |
| <b>5</b><br>44.3                    | <b>5.75</b><br>1290  | <b>2.83</b><br>636  | <b>4.50</b><br>1010 | <b>7600</b>                         | <b>4</b><br>0.157 | <b>0.039</b><br>0.086 |
| <b>5</b><br>44.3                    | <b>5.75</b><br>1290  | <b>2.83</b><br>636  | <b>4.50</b><br>1010 | <b>7600</b>                         | <b>4</b><br>0.157 | <b>0.039</b><br>0.086 |
| <b>5</b><br>44.3                    | <b>5.75</b><br>1290  | <b>2.83</b><br>636  | <b>4.50</b><br>1010 | <b>7600</b>                         | <b>4</b><br>0.157 | <b>0.039</b><br>0.086 |
| <b>16</b><br>142                    | <b>6.30</b><br>1420  | <b>4.90</b><br>1100 | <b>5.60</b><br>1260 | <b>6300</b>                         | <b>4</b><br>0.157 | <b>0.057</b><br>0.126 |
| <b>16</b><br>142                    | <b>6.30</b><br>1420  | <b>4.90</b><br>1100 | <b>5.60</b><br>1260 | <b>6300</b>                         | <b>4</b><br>0.157 | <b>0.057</b><br>0.126 |
| <b>16</b><br>142                    | <b>6.90</b><br>1550  | <b>5.20</b><br>1170 | <b>5.60</b><br>1260 | <b>6300</b>                         | <b>4</b><br>0.157 | <b>0.072</b><br>0.159 |
| <b>16</b><br>142                    | <b>6.90</b><br>1550  | <b>5.20</b><br>1170 | <b>5.60</b><br>1260 | <b>6300</b>                         | <b>4</b><br>0.157 | <b>0.072</b><br>0.159 |
| <b>16</b><br>142                    | <b>6.90</b><br>1550  | <b>5.20</b><br>1170 | <b>5.60</b><br>1260 | <b>6300</b>                         | <b>4</b><br>0.157 | <b>0.072</b><br>0.159 |
| <b>16</b><br>142                    | <b>8.90</b><br>2000  | <b>5.20</b><br>1170 | <b>6.10</b><br>1370 | <b>5500</b>                         | <b>4</b><br>0.157 | <b>0.080</b><br>0.176 |
| <b>16</b><br>142                    | <b>8.90</b><br>2000  | <b>5.20</b><br>1170 | <b>6.10</b><br>1370 | <b>5500</b>                         | <b>4</b><br>0.157 | <b>0.080</b><br>0.176 |
| <b>16</b><br>142                    | <b>9.60</b><br>2160  | <b>5.20</b><br>1170 | <b>6.10</b><br>1370 | <b>5500</b>                         | <b>4</b><br>0.157 | <b>0.088</b><br>0.194 |
| <b>16</b><br>142                    | <b>9.60</b><br>2160  | <b>5.20</b><br>1170 | <b>6.10</b><br>1370 | <b>5500</b>                         | <b>4</b><br>0.157 | <b>0.088</b><br>0.194 |
| <b>22</b><br>195                    | <b>12.9</b><br>2900  | <b>7.70</b><br>1730 | <b>10.4</b><br>2340 | <b>4800</b>                         | <b>4</b><br>0.157 | <b>0.118</b><br>0.260 |
| <b>22</b><br>195                    | <b>12.9</b><br>2900  | <b>7.70</b><br>1730 | <b>10.4</b><br>2340 | <b>4800</b>                         | <b>4</b><br>0.157 | <b>0.118</b><br>0.260 |
| <b>22</b><br>195                    | <b>13.8</b><br>3100  | <b>7.70</b><br>1730 | <b>10.4</b><br>2340 | <b>4800</b>                         | <b>4</b><br>0.157 | <b>0.126</b><br>0.278 |
| <b>22</b><br>195                    | <b>13.8</b><br>3100  | <b>7.70</b><br>1730 | <b>10.4</b><br>2340 | <b>4800</b>                         | <b>4</b><br>0.157 | <b>0.126</b><br>0.278 |
| <b>22</b><br>195                    | <b>13.8</b><br>3100  | <b>7.70</b><br>1730 | <b>10.4</b><br>2340 | <b>4800</b>                         | <b>4</b><br>0.157 | <b>0.126</b><br>0.278 |
| <b>55</b><br>487                    | <b>19.2</b><br>4320  | <b>11.4</b><br>2560 | <b>11.0</b><br>2470 | <b>3850</b>                         | <b>6</b><br>0.236 | <b>0.220</b><br>0.485 |
| <b>55</b><br>487                    | <b>19.2</b><br>4320  | <b>11.4</b><br>2560 | <b>11.0</b><br>2470 | <b>3850</b>                         | <b>6</b><br>0.236 | <b>0.220</b><br>0.485 |
| <b>55</b><br>487                    | <b>19.2</b><br>4320  | <b>11.4</b><br>2560 | <b>11.0</b><br>2470 | <b>3850</b>                         | <b>6</b><br>0.236 | <b>0.220</b><br>0.485 |

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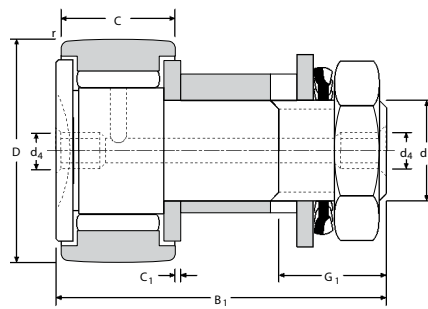


# NEEDLE ROLLER BEARINGS

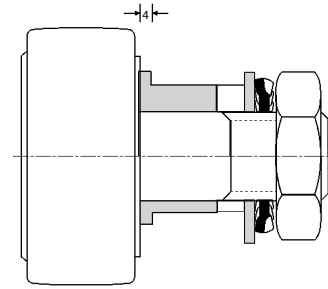
## FULL COMPLEMENT, ECCENTRIC, STUD TYPE (GCR SERIES) – continued

### METRIC SERIES

GCR: convex outer ring  
GCRL: cylindrical outer ring



GCR 16-52



GCR 62-90

| Outer Dia. | Dimensions mm/in. |        |                |       |                |                |                | Profiled Designation | Cylindrical Designation |                    |
|------------|-------------------|--------|----------------|-------|----------------|----------------|----------------|----------------------|-------------------------|--------------------|
|            | mm                | D      | d <sub>1</sub> | C     | C <sub>1</sub> | B <sub>1</sub> | G <sub>1</sub> |                      |                         | r <sub>a</sub> min |
| 40         | 40                | 40     | 18             | 20    | 0.80           | 58.3           | 19             | 1                    | GCR 40                  | GCRL 40            |
|            | 1.5748            | 1.5748 | 0.7087         | 0.787 | 0.709          | 2.295          | 0.748          | 0.039                | GCR 40 EE               | GCRL 40 EE         |
|            | 1.5748            | 1.5748 | 0.7087         | 0.787 | 0.709          | 2.295          | 0.748          | 0.039                | GCR 40 EEM              | GCRL 40 EEM        |
| 47         | 47                | 47     | 20             | 24    | 0.80           | 66.3           | 21             | 1                    | GCR 47 EE               |                    |
|            | 1.8504            | 1.8504 | 0.7874         | 0.945 | 0.709          | 2.61           | 0.827          | 0.039                | GCR 47 EEM              | GCRL 47 EEM        |
|            | 1.8504            | 1.8504 | 0.7874         | 0.945 | 0.709          | 2.61           | 0.827          | 0.039                | GCR 47 EEM              | GCRL 47 EEM        |
| 52         | 52                | 52     | 20             | 24    | 0.80           | 66.3           | 21             | 1                    | GCR 52                  |                    |
|            | 2.0472            | 2.0472 | 0.7874         | 0.945 | 0.709          | 2.61           | 0.827          | 0.039                | GCR 52 EE               | GCRL 52 EE         |
|            | 2.0472            | 2.0472 | 0.7874         | 0.945 | 0.709          | 2.61           | 0.827          | 0.039                | GCR 52 EEM              | GCRL 52 EEM        |
| 62         | 62                | 62     | 24             | 29    | 0.80           | 80.3           | 25             | 1                    | GCR 62                  |                    |
|            | 2.4409            | 2.4409 | 0.9449         | 1.142 | 0.709          | 3.161          | 0.984          | 0.039                | GCR 62 EE               |                    |
|            | 2.4409            | 2.4409 | 0.9449         | 1.142 | 0.709          | 3.161          | 0.984          | 0.039                | GCR 62 EEM              | GCRL 62 EEM        |
| 72         | 72                | 72     | 24             | 29    | 0.80           | 80.3           | 25             | 1                    | GCR 72 EE               | GCRL 72 EE         |
|            | 2.8346            | 2.8346 | 0.9449         | 1.142 | 0.709          | 3.161          | 0.984          | 0.039                |                         | GCRL 72 EEM        |
|            | 2.8346            | 2.8346 | 0.9449         | 1.142 | 0.709          | 3.161          | 0.984          | 0.039                |                         | GCRL 72 EEM        |
| 80         | 80                | 80     | 30             | 35    | 1.00           | 100.3          | 32             | 1                    | GCR 80                  |                    |
|            | 3.1496            | 3.1496 | 1.1811         | 1.378 | 0.039          | 3.949          | 1.26           | 0.039                | GCR 80 EE               | GCRL 80 EE         |
|            | 3.1496            | 3.1496 | 1.1811         | 1.378 | 0.039          | 3.949          | 1.26           | 0.039                | GCR 80 EEM              | GCRL 80 EEM        |
| 90         | 90                | 90     | 30             | 35    | 1.00           | 100.3          | 32             | 1                    | GCR 90                  | GCRL 90            |
|            | 3.5433            | 3.5433 | 1.1811         | 1.378 | 0.039          | 3.949          | 1.26           | 0.039                | GCR 90 EE               |                    |
|            | 3.5433            | 3.5433 | 1.1811         | 1.378 | 0.039          | 3.949          | 1.26           | 0.039                | GCR 90 EEM              |                    |

## Stud Type and Yoke Type Track Rollers

| Tightening<br>Torque<br>Nm/in.-lbs. | Load Ratings kN/lbf. |                      |                      | Limiting Speed<br>Grease<br>RPM | mm/in.            | Wt.<br>kg/lbs.        |
|-------------------------------------|----------------------|----------------------|----------------------|---------------------------------|-------------------|-----------------------|
|                                     | Dynamic              |                      | Static               |                                 |                   |                       |
|                                     | C <sub>0</sub>       | F <sub>r perm</sub>  | F <sub>0</sub>       |                                 |                   |                       |
| <b>75</b><br>664                    | <b>20.0</b><br>4500  | <b>14.2</b><br>3190  | <b>12.3</b><br>2770  | <b>3150</b>                     | <b>6</b><br>0.236 | <b>0.321</b><br>0.708 |
| <b>75</b><br>664                    | <b>20.0</b><br>4500  | <b>14.2</b><br>3190  | <b>12.3</b><br>2770  | <b>3150</b>                     | <b>6</b><br>0.236 | <b>0.321</b><br>0.708 |
| <b>75</b><br>664                    | <b>20.0</b><br>4500  | <b>14.2</b><br>3190  | <b>12.3</b><br>2770  | <b>3150</b>                     | <b>6</b><br>0.236 | <b>0.321</b><br>0.708 |
| <b>100</b><br>885                   | <b>28.3</b><br>6360  | <b>21.4</b><br>4810  | <b>23.7</b><br>5330  | <b>2700</b>                     | <b>6</b><br>0.236 | <b>0.500</b><br>1.102 |
| <b>100</b><br>885                   | <b>28.3</b><br>6360  | <b>21.4</b><br>4810  | <b>23.7</b><br>5330  | <b>2700</b>                     | <b>6</b><br>0.236 | <b>0.500</b><br>1.102 |
| <b>100</b><br>885                   | <b>34.0</b><br>7640  | <b>21.4</b><br>4810  | <b>23.7</b><br>5330  | <b>2700</b>                     | <b>6</b><br>0.236 | <b>0.568</b><br>1.252 |
| <b>100</b><br>885                   | <b>34.0</b><br>7640  | <b>21.4</b><br>4810  | <b>23.7</b><br>5330  | <b>2700</b>                     | <b>6</b><br>0.236 | <b>0.568</b><br>1.252 |
| <b>100</b><br>885                   | <b>34.0</b><br>7640  | <b>21.4</b><br>4810  | <b>23.7</b><br>5330  | <b>2700</b>                     | <b>6</b><br>0.236 | <b>0.568</b><br>1.252 |
| <b>180</b><br>1590                  | <b>42.0</b><br>9440  | <b>31.0</b><br>6970  | <b>28.8</b><br>6470  | <b>2330</b>                     | <b>8</b><br>0.315 | <b>1.035</b><br>2.282 |
| <b>180</b><br>1590                  | <b>42.0</b><br>9440  | <b>31.0</b><br>6970  | <b>28.8</b><br>6470  | <b>2330</b>                     | <b>8</b><br>0.315 | <b>1.035</b><br>2.282 |
| <b>180</b><br>1590                  | <b>42.0</b><br>9440  | <b>31.0</b><br>6970  | <b>28.8</b><br>6470  | <b>2330</b>                     | <b>8</b><br>0.315 | <b>1.035</b><br>2.282 |
| <b>180</b><br>1590                  | <b>44.0</b><br>9890  | <b>31.0</b><br>6970  | <b>28.8</b><br>6470  | <b>2330</b>                     | <b>8</b><br>0.315 | <b>1.278</b><br>2.818 |
| <b>180</b><br>1590                  | <b>44.0</b><br>9890  | <b>31.0</b><br>6970  | <b>28.8</b><br>6470  | <b>2330</b>                     | <b>8</b><br>0.315 | <b>1.278</b><br>2.818 |
| <b>370</b><br>3270                  | <b>60.0</b><br>13500 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.074</b><br>4.572 |
| <b>370</b><br>3270                  | <b>60.0</b><br>13500 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.074</b><br>4.572 |
| <b>370</b><br>3270                  | <b>60.0</b><br>13500 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.074</b><br>4.572 |
| <b>370</b><br>3270                  | <b>65.0</b><br>14600 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.435</b><br>5.368 |
| <b>370</b><br>3270                  | <b>65.0</b><br>14600 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.435</b><br>5.368 |
| <b>370</b><br>3270                  | <b>65.0</b><br>14600 | <b>50.0</b><br>11200 | <b>54.0</b><br>12100 | <b>1700</b>                     | <b>8</b><br>0.315 | <b>2.435</b><br>5.368 |

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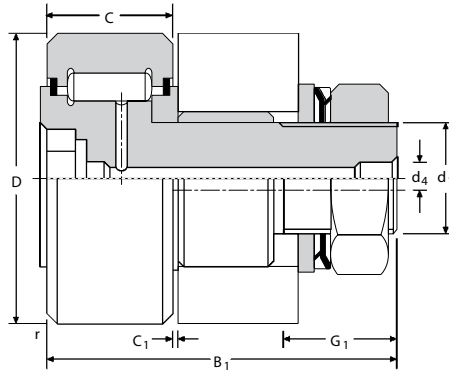


# NEEDLE ROLLER BEARINGS

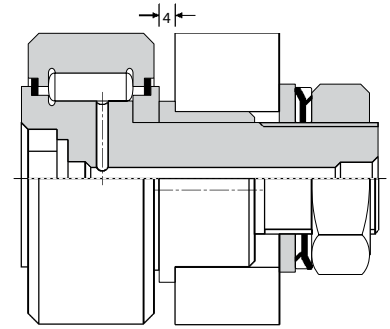
## FULL COMPLEMENT ECCENTRIC, WITH METAL SEALS, STUD TYPE (GCUR...MM SERIES)

### METRIC SERIES

GCUR: convex outer ring  
GCURL: cylindrical outer ring



GCUR 35-52



GCUR 62-130

| Outside Dia. | Dimensions mm/in. |        |                |       |                |                |                | Profiled Designation | Cylindrical Designation |
|--------------|-------------------|--------|----------------|-------|----------------|----------------|----------------|----------------------|-------------------------|
|              | mm                | D      | d <sub>1</sub> | C     | C <sub>1</sub> | B <sub>1</sub> | G <sub>1</sub> |                      |                         |
| 35           | 35                | 16     | 18             | 0.85  | 52.3           | 17             | 0.6            | GCUR 35              |                         |
|              | 1.3780            | 0.6299 | 0.709          | 0.033 | 2.059          | 0.669          | 0.024          |                      |                         |
| 40           | 40                | 18     | 20             | 0.85  | 58.3           | 19             | 1.0            | GCUR 40              |                         |
|              | 1.5748            | 0.7087 | 0.787          | 0.033 | 2.295          | 0.748          | 0.039          |                      |                         |
| 52           | 40                | 18     | 20             | 0.85  | 58.3           | 19             | 1.0            | GCURL 40 MM          |                         |
|              | 1.5748            | 0.7087 | 0.787          | 0.033 | 2.295          | 0.748          | 0.039          |                      |                         |
| 52           | 52                | 20     | 24             | 0.85  | 66.3           | 21             | 1.0            | GCUR 52 MM           |                         |
|              | 2.0472            | 0.7874 | 0.945          | 0.033 | 2.610          | 0.827          | 0.039          |                      |                         |
| 62           | 62                | 24     | 29             | 0.85  | 80.3           | 25             | 1.0            | GCUR 62              |                         |
|              | 2.4409            | 0.9449 | 1.142          | 0.033 | 3.161          | 0.984          | 0.039          |                      |                         |
| 72           | 62                | 24     | 29             | 0.85  | 80.3           | 25             | 1.0            | GCUR 62 MM           |                         |
|              | 2.4409            | 0.9449 | 1.142          | 0.033 | 3.161          | 0.984          | 0.039          |                      |                         |
| 72           | 72                | 24     | 29             | 0.85  | 80.3           | 25             | 1.1            | GCUR 72              |                         |
|              | 2.8346            | 0.9449 | 1.142          | 0.033 | 3.161          | 0.984          | 0.043          |                      |                         |
| 80           | 72                | 24     | 29             | 0.85  | 80.3           | 25             | 1.1            | GCUR 72 MM           |                         |
|              | 2.8346            | 0.9449 | 1.142          | 0.033 | 3.161          | 0.984          | 0.043          |                      |                         |
| 80           | 80                | 30     | 35             | 1.10  | 100.3          | 32             | 1.1            | GCUR 80              |                         |
|              | 3.1496            | 1.1811 | 1.378          | 0.014 | 3.949          | 1.260          | 0.043          |                      |                         |
| 90           | 80                | 30     | 35             | 1.10  | 100.3          | 32             | 1.1            | GCUR 80 MM           |                         |
|              | 3.1496            | 1.1811 | 1.378          | 0.043 | 3.949          | 1.260          | 0.043          |                      |                         |
| 90           | 90                | 30     | 35             | 1.10  | 100.3          | 32             | 1.1            | GCUR 90              |                         |
|              | 3.5433            | 1.1811 | 1.378          | 0.043 | 3.949          | 1.260          | 0.043          |                      |                         |
| 100          | 100               | 36     | 40             | 1.10  | 117.3          | 38             | 2.0            | GCUR 100             |                         |
|              | 3.9370            | 1.4173 | 1.575          | 0.043 | 4.618          | 1.496          | 0.079          |                      |                         |
| 110          | 100               | 36     | 40             | 1.10  | 117.3          | 38             | 2.0            | GCUR 100 MM          |                         |
|              | 3.9370            | 1.4173 | 1.575          | 0.043 | 4.618          | 1.496          | 0.079          |                      |                         |
| 110          | 110               | 36     | 40             | 1.10  | 117.3          | 38             | 2.0            | GCUR 110 MM          |                         |
|              | 4.3307            | 1.4173 | 1.575          | 0.043 | 4.618          | 1.496          | 0.079          |                      |                         |
| 120          | 120               | 42     | 46             | 1.10  | 136.3          | 44             | 2.0            | GCUR 120 MM          |                         |
|              | 4.7244            | 1.6535 | 1.811          | 0.043 | 5.366          | 1.732          | 0.079          |                      |                         |
| 130          | 130               | 42     | 46             | 1.10  | 136.3          | 44             | 2.0            | GCUR 130             |                         |
|              | 5.1181            | 1.6535 | 1.811          | 0.043 | 5.366          | 1.732          | 0.079          |                      |                         |
| 130          | 130               | 42     | 46             | 1.10  | 136.3          | 44             | 2.0            | GCUR 130 MM          |                         |
|              | 5.1181            | 1.6535 | 1.811          | 0.043 | 5.366          | 1.732          | 0.079          |                      |                         |

## Stud Type and Yoke Type Track Rollers

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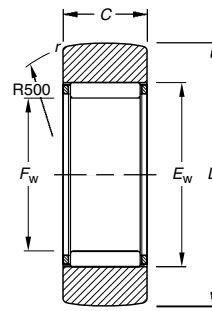
| Tightening<br>Torque<br>Nm/in.-lbs. | Load Ratings kN/bf.  |                      |                      | Limiting Speed<br>Grease<br>RPM | mm<br>wrench | mm/in.<br>d <sub>4</sub> | Wt.<br>kg/lbs.        |
|-------------------------------------|----------------------|----------------------|----------------------|---------------------------------|--------------|--------------------------|-----------------------|
|                                     | Dynamic              |                      | Static               |                                 |              |                          |                       |
|                                     | C                    | F <sub>r perm</sub>  | F <sub>01</sub>      |                                 |              |                          |                       |
| <b>55</b><br>487                    | <b>17.0</b><br>3820  | <b>7.8</b><br>1750   | <b>10.0</b><br>2250  | <b>5700</b>                     | <b>10</b>    | <b>6</b><br>0.236        | <b>0.215</b><br>0.474 |
| <b>75</b><br>664                    | <b>20.0</b><br>4500  | <b>10.9</b><br>2450  | <b>10.9</b><br>2450  | <b>5200</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>0.313</b><br>0.690 |
| <b>75</b><br>664                    | <b>20.0</b><br>4500  | <b>10.9</b><br>2450  | <b>10.9</b><br>2450  | <b>5200</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>0.313</b><br>0.690 |
| <b>100</b><br>885                   | <b>36.5</b><br>8210  | <b>21.3</b><br>4790  | <b>21.3</b><br>4790  | <b>4400</b>                     | <b>14</b>    | <b>6</b><br>0.236        | <b>0.555</b><br>1.224 |
| <b>180</b><br>1593                  | <b>52.0</b><br>11690 | <b>28.8</b><br>6470  | <b>28.8</b><br>6470  | <b>3700</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>1.022</b><br>2.253 |
| <b>180</b><br>1593                  | <b>52.0</b><br>11690 | <b>28.8</b><br>6470  | <b>28.8</b><br>6470  | <b>3700</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>1.022</b><br>2.253 |
| <b>180</b><br>1593                  | <b>63.0</b><br>14160 | <b>28.8</b><br>6470  | <b>28.8</b><br>6470  | <b>3700</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>0.113</b><br>0.249 |
| <b>180</b><br>1593                  | <b>63.0</b><br>14160 | <b>28.8</b><br>6470  | <b>28.8</b><br>6470  | <b>3700</b>                     | <b>12</b>    | <b>6</b><br>0.236        | <b>0.113</b><br>0.249 |
| <b>370</b><br>3275                  | <b>76.0</b><br>17090 | <b>48.0</b><br>10790 | <b>54.0</b><br>12140 | <b>2700</b>                     | <b>14</b>    | <b>8</b><br>0.315        | <b>0.182</b><br>0.401 |
| <b>370</b><br>3275                  | <b>76.0</b><br>17090 | <b>48.0</b><br>10790 | <b>54.0</b><br>12140 | <b>2700</b>                     | <b>14</b>    | <b>8</b><br>0.315        | <b>0.182</b><br>0.401 |
| <b>370</b><br>3275                  | <b>94.0</b><br>21130 | <b>50.0</b><br>11240 | <b>54.0</b><br>12140 | <b>2700</b>                     | <b>14</b>    | <b>8</b><br>0.315        | <b>0.182</b><br>0.402 |
| <b>610</b><br>5399                  | <b>115</b><br>25850  | <b>76.0</b><br>17090 | <b>83.0</b><br>18660 | <b>2300</b>                     | <b>17</b>    | <b>8</b><br>0.315        | <b>0.244</b><br>0.539 |
| <b>610</b><br>5399                  | <b>115</b><br>25850  | <b>76.0</b><br>17090 | <b>83.0</b><br>18660 | <b>2300</b>                     | <b>17</b>    | <b>8</b><br>0.315        | <b>0.244</b><br>0.539 |
| <b>610</b><br>5399                  | <b>129</b><br>29000  | <b>76.0</b><br>17090 | <b>83.0</b><br>18660 | <b>2300</b>                     | <b>17</b>    | <b>8</b><br>0.315        | <b>0.245</b><br>0.540 |
| <b>1000</b><br>8851                 | <b>150</b><br>33720  | <b>120</b><br>26980  | <b>130</b><br>29230  | <b>2000</b>                     | <b>19</b>    | <b>8</b><br>0.315        | <b>0.328</b><br>0.724 |
| <b>1000</b><br>8851                 | <b>150</b><br>33720  | <b>121</b><br>27200  | <b>130</b><br>29230  | <b>2000</b>                     | <b>19</b>    | <b>8</b><br>0.315        | <b>0.329</b><br>0.725 |
| <b>1000</b><br>8851                 | <b>150</b><br>33720  | <b>121</b><br>27200  | <b>130</b><br>29230  | <b>2000</b>                     | <b>19</b>    | <b>8</b><br>0.315        | <b>0.329</b><br>0.725 |



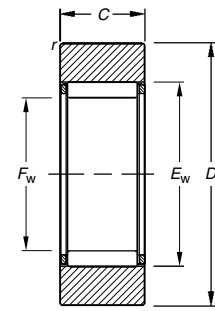
# NEEDLE ROLLER BEARINGS

**CAGED, WITHOUT INNER RING,  
NO END WASHERS,  
YOKE TYPE (RSTO SERIES)**

**METRIC SERIES**



**RSTO**



**RSTO.DZ**

| Outer Dia. | Dimensions |       |       |                |                |       | Bearing Designation | Load Ratings kN/bf. |                |                   |                     |                      | Limiting Speed Grease RPM | Wt. kg/lbs. |
|------------|------------|-------|-------|----------------|----------------|-------|---------------------|---------------------|----------------|-------------------|---------------------|----------------------|---------------------------|-------------|
|            | D          | B     | C     | F <sub>w</sub> | E <sub>w</sub> | rs    |                     | As a Bearing        |                | As a Track Roller |                     |                      |                           |             |
| mm         | D          | B     | C     | F <sub>w</sub> | E <sub>w</sub> | rs    |                     | C                   | C <sub>0</sub> | C <sub>w</sub>    | F <sub>r perm</sub> | F <sub>0r perm</sub> |                           |             |
| 16         | 16         | 8     | 7.8   | 7              | 10             | 0.3   | RST05A.TN           | 2.74                | 2.44           | 2.49              | 2.97                | 2.44                 | 19000                     | 0.009       |
|            | 0.6299     | 0.315 | 0.307 | 0.2756         | 0.394          | 0.012 |                     | 616                 | 549            | 560               | 668                 | 549                  |                           | 0.020       |
| 16         | 16         | 8     | 7.8   | 7              | 10             | 0.3   | RST05ADZ.TN         | 2.74                | 2.44           | 2.49              | 2.97                | 2.44                 | 19000                     | 0.009       |
|            | 0.6299     | 0.315 | 0.307 | 0.2756         | 0.394          | 0.012 |                     | 616                 | 549            | 560               | 668                 | 549                  |                           | 0.020       |
| 19         | 19         | 10    | 9.8   | 10             | 13             | 0.3   | RST06               | 5.40                | 6.43           | 4.15              | 4.04                | 5.63                 | 13000                     | 0.014       |
|            | 0.7480     | 0.394 | 0.386 | 0.3937         | 0.512          | 0.012 |                     | 1210                | 1450           | 933               | 908                 | 1270                 |                           | 0.031       |
| 19         | 19         | 10    | 9.8   | 10             | 13             | 0.3   | RST06DZ             | 5.40                | 6.43           | 4.15              | 4.04                | 5.63                 | 13000                     | 0.014       |
|            | 0.7480     | 0.394 | 0.386 | 0.3937         | 0.512          | 0.012 |                     | 1210                | 1450           | 933               | 908                 | 1270                 |                           | 0.031       |
| 19         | 19         | 10    | 9.8   | 10             | 13             | 0.3   | RST06TN             | 5.40                | 6.43           | 4.15              | 4.04                | 5.63                 | 13000                     | 0.014       |
|            | 0.7480     | 0.394 | 0.386 | 0.3937         | 0.512          | 0.012 |                     | 1210                | 1450           | 933               | 908                 | 1270                 |                           | 0.031       |
| 24         | 24         | 10    | 9.8   | 12             | 15             | 0.3   | RST08               | 5.85                | 7.51           | 4.79              | 6.67                | 7.44                 | 10000                     | 0.023       |
|            | 0.9449     | 0.394 | 0.386 | 0.4724         | 0.591          | 0.012 |                     | 1320                | 1690           | 1080              | 1500                | 1670                 |                           | 0.051       |
| 24         | 24         | 10    | 9.8   | 12             | 15             | 0.3   | RST08DZ             | 5.85                | 7.51           | 4.79              | 6.67                | 7.44                 | 10000                     | 0.023       |
|            | 0.9449     | 0.394 | 0.386 | 0.4724         | 0.591          | 0.012 |                     | 1320                | 1690           | 1080              | 1500                | 1670                 |                           | 0.051       |
| 30         | 30         | 12    | 11.8  | 14             | 20             | 0.3   | RST010              | 10.40               | 10.6           | 8.62              | 7.69                | 10.6                 | 9400                      | 0.044       |
|            | 1.1811     | 0.472 | 0.465 | 0.5512         | 0.787          | 0.012 |                     | 2340                | 2380           | 1940              | 1730                | 2380                 |                           | 0.097       |
| 30         | 30         | 12    | 11.8  | 14             | 20             | 0.3   | RST010DZ            | 10.40               | 10.6           | 8.62              | 7.69                | 10.6                 | 9400                      | 0.044       |
|            | 1.1811     | 0.472 | 0.465 | 0.5512         | 0.787          | 0.012 |                     | 2340                | 2380           | 1940              | 1730                | 2380                 |                           | 0.097       |
| 32         | 32         | 12    | 11.8  | 16             | 22             | 0.3   | RST012              | 11.20               | 11.9           | 8.80              | 7.65                | 10.9                 | 8100                      | 0.049       |
|            | 1.2598     | 0.472 | 0.465 | 0.6299         | 0.866          | 0.012 |                     | 2520                | 2680           | 1980              | 1720                | 2450                 |                           | 0.108       |
| 32         | 32         | 12    | 11.8  | 16             | 22             | 0.3   | RST012DZ            | 11.20               | 11.9           | 8.80              | 7.65                | 10.9                 | 8100                      | 0.049       |
|            | 1.2598     | 0.472 | 0.465 | 0.6299         | 0.866          | 0.012 |                     | 2520                | 2680           | 1980              | 1720                | 2450                 |                           | 0.108       |
| 35         | 35         | 12    | 11.8  | 20             | 26             | 0.3   | RST015              | 12.90               | 15.3           | 9.13              | 6.95                | 11.2                 | 6300                      | 0.052       |
|            | 1.3780     | 0.472 | 0.465 | 0.7874         | 1.024          | 0.012 |                     | 2900                | 3440           | 2050              | 1560                | 2520                 |                           | 0.115       |
| 35         | 35         | 12    | 11.8  | 20             | 26             | 0.3   | RST015DZ            | 12.90               | 15.3           | 9.13              | 6.95                | 11.2                 | 6300                      | 0.052       |
|            | 1.3780     | 0.472 | 0.465 | 0.7874         | 1.024          | 0.012 |                     | 2900                | 3440           | 2050              | 1560                | 2520                 |                           | 0.115       |

Continued on next page.

## Stud Type and Yoke Type Track Rollers

| Outer Dia. | Dimensions |       |       |                |                |                | Bearing Designation | Load Ratings kN/bf. |                |                   |                     |                      | Limiting Speed Grease | Wt. kg/lbs. |
|------------|------------|-------|-------|----------------|----------------|----------------|---------------------|---------------------|----------------|-------------------|---------------------|----------------------|-----------------------|-------------|
|            | D          | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> |                     | As a Bearing        |                | As a Track Roller |                     |                      |                       |             |
| mm         |            |       |       |                |                |                |                     | C                   | C <sub>0</sub> | C <sub>w</sub>    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM                   |             |
| 40         | 40         | 16    | 15.8  | 22             | 29             | 0.3            | RST017              | 19.00               | 23.3           | 13.8              | 11.4                | 18.2                 | 5800                  | 0.095       |
|            | 1.5748     | 0.630 | 0.622 | 0.8661         | 1.142          | 0.012          |                     | 4270                | 5240           | 3100              | 2560                | 4090                 |                       |             |
| 40         | 40         | 16    | 15.8  | 22             | 29             | 0.3            | RST017DZ            | 19.00               | 23.3           | 13.8              | 11.4                | 18.2                 | 5800                  | 0.095       |
|            | 1.5748     | 0.630 | 0.622 | 0.8661         | 1.142          | 0.012          |                     | 4270                | 5240           | 3100              | 2560                | 4090                 |                       |             |
| 47         | 47         | 16    | 15.8  | 25             | 32             | 0.3            | RST020              | 20.00               | 25.3           | 15.3              | 16.5                | 22.2                 | 5000                  | 0.134       |
|            | 1.8504     | 0.630 | 0.622 | 0.9843         | 1.260          | 0.012          |                     | 4500                | 5690           | 3440              | 3710                | 4990                 |                       |             |
| 47         | 47         | 16    | 15.8  | 25             | 32             | 0.3            | RST020DZ            | 20.00               | 25.3           | 15.3              | 16.5                | 22.2                 | 5000                  | 0.134       |
|            | 1.8504     | 0.630 | 0.622 | 0.9843         | 1.260          | 0.012          |                     | 4500                | 5690           | 3440              | 3710                | 4990                 |                       |             |
| 52         | 52         | 16    | 15.8  | 30             | 37             | 0.3            | RST025              | 22.40               | 31.0           | 16.0              | 16.9                | 23.7                 | 4100                  | 0.155       |
|            | 2.0472     | 0.630 | 0.622 | 1.1811         | 1.457          | 0.012          |                     | 5040                | 6970           | 3600              | 3800                | 5330                 |                       |             |
| 52         | 52         | 16    | 15.8  | 30             | 37             | 0.3            | RST025DZ            | 22.30               | 31.0           | 16.0              | 16.9                | 23.7                 | 4100                  | 0.155       |
|            | 2.0472     | 0.630 | 0.622 | 1.1811         | 1.457          | 0.012          |                     | 5010                | 6970           | 3600              | 3800                | 5330                 |                       |             |
| 62         | 62         | 20    | 19.8  | 38             | 46             | 0.6            | RST030              | 33.30               | 51.0           | 22.3              | 23.2                | 34.2                 | 3200                  | 0.258       |
|            | 2.4409     | 0.787 | 0.780 | 1.4961         | 1.811          | 0.024          |                     | 7490                | 11470          | 5010              | 5220                | 7690                 |                       |             |
| 62         | 62         | 20    | 19.8  | 38             | 46             | 0.6            | RST030DZ            | 33.30               | 51.0           | 22.3              | 23.2                | 34.2                 | 3200                  | 0.258       |
|            | 2.4409     | 0.787 | 0.780 | 1.4961         | 1.811          | 0.024          |                     | 7490                | 11470          | 5010              | 5220                | 7690                 |                       |             |
| 72         | 72         | 20    | 19.8  | 42             | 50             | 0.6            | RST035              | 35.20               | 56.6           | 25.2              | 33.3                | 43.0                 | 2900                  | 0.37        |
|            | 2.8346     | 0.787 | 0.780 | 1.6535         | 1.969          | 0.024          |                     | 7910                | 12720          | 5670              | 7490                | 9670                 |                       |             |
| 72         | 72         | 20    | 19.8  | 42             | 50             | 0.6            | RST035DZ            | 35.20               | 56.6           | 25.2              | 33.3                | 43.0                 | 2900                  | 0.370       |
|            | 2.8346     | 0.787 | 0.780 | 1.6535         | 1.969          | 0.024          |                     | 7910                | 12720          | 5670              | 7490                | 9670                 |                       |             |
| 80         | 80         | 20    | 19.8  | 50             | 58             | 0.6            | RST040              | 38.80               | 67.8           | 25.9              | 34.7                | 45.0                 | 2400                  | 0.430       |
|            | 3.1496     | 0.787 | 0.780 | 1.9685         | 2.283          | 0.024          |                     | 8720                | 15240          | 5820              | 7800                | 10120                |                       |             |
| 80         | 80         | 20    | 19.8  | 50             | 58             | 0.6            | RST040DZ            | 38.80               | 67.8           | 25.9              | 34.7                | 45.0                 | 2400                  | 0.430       |
|            | 3.1496     | 0.787 | 0.780 | 1.9685         | 2.283          | 0.024          |                     | 8720                | 15240          | 5820              | 7800                | 10120                |                       |             |
| 85         | 85         | 20    | 19.8  | 55             | 63             | 0.6            | RST045              | 40.30               | 73.5           | 26.0              | 35.8                | 45.5                 | 2200                  | 0.447       |
|            | 3.3465     | 0.787 | 0.780 | 2.1654         | 2.480          | 0.024          |                     | 9060                | 16520          | 5850              | 8050                | 10230                |                       |             |
| 90         | 90         | 20    | 19.8  | 60             | 68             | 0.6            | RST050              | 41.80               | 79.2           | 26.0              | 37.1                | 45.8                 | 2000                  | 0.495       |
|            | 3.5433     | 0.787 | 0.780 | 2.3622         | 2.677          | 0.024          |                     | 9400                | 17800          | 5850              | 8340                | 10300                |                       |             |

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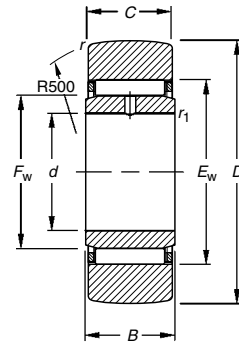




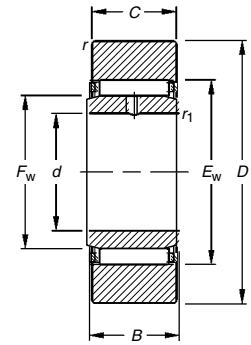
# NEEDLE ROLLER BEARINGS

## CAGED, WITH INNER RING, NO END WASHERS YOKE TYPE (STO SERIES)

### METRIC SERIES



STO



STO.DZ

| Outer Dia.<br>mm | Dimensions |        |       |       |                |                |                |                 | Bearing Designation | Load Ratings kN/lbf. |                |                   |                     |                      |      | Limiting Speed Grease<br>RPM | Wt.<br>kg/lbs. |
|------------------|------------|--------|-------|-------|----------------|----------------|----------------|-----------------|---------------------|----------------------|----------------|-------------------|---------------------|----------------------|------|------------------------------|----------------|
|                  | D          | d      | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> | r <sub>1s</sub> |                     | As a Bearing         |                | As a Track Roller |                     |                      |      |                              |                |
|                  |            |        |       |       |                |                |                |                 |                     | C                    | C <sub>0</sub> | C <sub>w</sub>    | F <sub>r perm</sub> | F <sub>0r perm</sub> |      |                              |                |
| 19               | 19         | 6      | 10    | 9.8   | 10             | 13             | 0.3            | 0.3             | STO6                | 5.40                 | 6.43           | 4.15              | 4.04                | 5.63                 | 9400 | 0.018                        |                |
|                  | 0.7480     | 0.2362 | 0.394 | 0.386 | 0.3937         | 0.5118         | 0.012          | 0.012           |                     | 1210                 | 1450           | 933               | 908                 | 1270                 |      |                              | 0.040          |
| 24               | 19         | 6      | 10    | 9.8   | 10             | 13             | 0.3            | 0.3             | STO6DZ              | 5.40                 | 6.43           | 4.15              | 4.04                | 5.63                 | 9400 | 0.018                        |                |
|                  | 0.7480     | 0.2362 | 0.394 | 0.386 | 0.3937         | 0.5118         | 0.012          | 0.012           |                     | 1210                 | 1450           | 933               | 908                 | 1270                 |      |                              | 0.040          |
| 24               | 24         | 8      | 10    | 9.8   | 12             | 15             | 0.3            | 0.3             | STO8                | 5.85                 | 7.51           | 4.79              | 6.67                | 7.44                 | 8100 | 0.028                        |                |
|                  | 0.9449     | 0.3150 | 0.394 | 0.386 | 0.4724         | 0.5906         | 0.012          | 0.012           |                     | 1320                 | 1690           | 1080              | 1500                | 1670                 |      |                              | 0.062          |
| 30               | 24         | 8      | 10    | 9.8   | 12             | 15             | 0.3            | 0.3             | STO8DZ              | 5.85                 | 7.51           | 4.79              | 6.67                | 7.44                 | 8100 | 0.028                        |                |
|                  | 0.9449     | 0.3150 | 0.394 | 0.386 | 0.4724         | 0.5906         | 0.012          | 0.012           |                     | 1320                 | 1690           | 1080              | 1500                | 1670                 |      |                              | 0.062          |
| 30               | 30         | 10     | 12    | 11.8  | 14             | 20             | 0.3            | 0.3             | STO10               | 10.4                 | 10.6           | 8.62              | 7.69                | 10.6                 | 6300 | 0.065                        |                |
|                  | 1.1811     | 0.3937 | 0.472 | 0.465 | 0.5512         | 0.7874         | 0.012          | 0.012           |                     | 2340                 | 2380           | 1940              | 1730                | 2380                 |      |                              | 0.143          |
| 32               | 30         | 10     | 12    | 11.8  | 14             | 20             | 0.3            | 0.3             | STO10DZ             | 10.4                 | 10.6           | 8.62              | 7.69                | 10.6                 | 6300 | 0.065                        |                |
|                  | 1.1811     | 0.3937 | 0.472 | 0.465 | 0.5512         | 0.7874         | 0.012          | 0.012           |                     | 2340                 | 2380           | 1940              | 1730                | 2380                 |      |                              | 0.143          |
| 32               | 32         | 12     | 12    | 11.8  | 16             | 22             | 0.3            | 0.3             | STO12               | 11.2                 | 11.9           | 8.80              | 7.65                | 10.9                 | 5800 | 0.114                        |                |
|                  | 1.2598     | 0.4724 | 0.472 | 0.465 | 0.6299         | 0.8661         | 0.012          | 0.012           |                     | 2520                 | 2680           | 1980              | 1720                | 2450                 |      |                              | 0.251          |
| 35               | 32         | 12     | 12    | 11.8  | 16             | 22             | 0.3            | 0.3             | STO12DZ             | 11.2                 | 11.9           | 8.80              | 7.65                | 10.9                 | 5800 | 0.114                        |                |
|                  | 1.2598     | 0.4724 | 0.472 | 0.465 | 0.6299         | 0.8661         | 0.012          | 0.012           |                     | 2520                 | 2680           | 1980              | 1720                | 2450                 |      |                              | 0.251          |
| 35               | 35         | 15     | 12    | 11.8  | 20             | 26             | 0.3            | 0.3             | STO15               | 12.9                 | 15.3           | 9.13              | 6.95                | 11.2                 | 5000 | 0.160                        |                |
|                  | 1.3780     | 0.5906 | 0.472 | 0.465 | 0.7874         | 1.0236         | 0.012          | 0.012           |                     | 2900                 | 3440           | 2050              | 1560                | 2520                 |      |                              | 0.353          |
| 40               | 35         | 15     | 12    | 11.8  | 20             | 26             | 0.3            | 0.3             | STO15DZ             | 12.9                 | 15.3           | 9.13              | 6.95                | 11.2                 | 5000 | 0.156                        |                |
|                  | 1.3780     | 0.5906 | 0.472 | 0.465 | 0.7874         | 1.0236         | 0.012          | 0.012           |                     | 2900                 | 3440           | 2050              | 1560                | 2520                 |      |                              | 0.344          |
| 40               | 40         | 17     | 16    | 15.8  | 22             | 29             | 0.3            | 0.3             | STO17               | 19.1                 | 23.3           | 13.8              | 11.4                | 18.2                 | 4100 | 0.114                        |                |
|                  | 1.5748     | 0.6693 | 0.630 | 0.622 | 0.8661         | 1.1417         | 0.012          | 0.012           |                     | 4290                 | 5240           | 3100              | 2560                | 4090                 |      |                              | 0.251          |
| 47               | 40         | 17     | 16    | 15.8  | 22             | 29             | 0.3            | 0.3             | STO17DZ             | 19.1                 | 23.3           | 13.8              | 11.4                | 18.2                 | 4100 | 0.114                        |                |
|                  | 1.5748     | 0.6693 | 0.630 | 0.622 | 0.8661         | 1.1417         | 0.012          | 0.012           |                     | 4290                 | 5240           | 3100              | 2560                | 4090                 |      |                              | 0.251          |
| 47               | 47         | 20     | 16    | 15.8  | 25             | 32             | 0.3            | 0.3             | STO20               | 19.8                 | 25.3           | 15.3              | 16.5                | 22.2                 | 3200 | 0.325                        |                |
|                  | 1.8504     | 0.7874 | 0.630 | 0.622 | 0.9843         | 1.2598         | 0.012          | 0.012           |                     | 4450                 | 5690           | 3440              | 3710                | 4990                 |      |                              | 0.717          |
| 47               | 47         | 20     | 16    | 15.8  | 25             | 32             | 0.3            | 0.3             | STO20DZ             | 20.0                 | 25.3           | 15.3              | 16.5                | 22.2                 | 3200 | 0.156                        |                |
|                  | 1.8504     | 0.7874 | 0.630 | 0.622 | 0.9843         | 1.2598         | 0.012          | 0.012           |                     | 4500                 | 5690           | 3440              | 3710                | 4990                 |      |                              | 0.344          |

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## Stud Type and Yoke Type Track Rollers

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| Outer Dia. | Dimensions |        |       |       |                |                |                |                 | Bearing Designation | Load Ratings kN/lbf. |                     |                     |                      |       | Limiting Speed Grease RPM | Wt. kg/lbs.    |
|------------|------------|--------|-------|-------|----------------|----------------|----------------|-----------------|---------------------|----------------------|---------------------|---------------------|----------------------|-------|---------------------------|----------------|
|            | D          | d      | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> | r <sub>is</sub> |                     | As a Bearing Dynamic | As a Bearing Static | As a Track Roller   |                      |       |                           |                |
| mm         |            |        |       |       |                |                |                |                 | C                   | C <sub>0</sub>       | C <sub>w</sub>      | F <sub>r perm</sub> | F <sub>0r perm</sub> |       |                           |                |
| 52         | 52         | 25     | 16    | 15.8  | 30             | 37             | 0.3            | 0.3             | ST025               | 22.4                 | 31.0                | 16.0                | 16.9                 | 23.7  | 2900                      | 0.435<br>0.959 |
|            | 2.0472     | 0.9843 | 0.630 | 0.622 | 1.1811         | 1.4567         | 0.012          | 0.012           |                     | 5040                 | 6970                | 3600                | 3800                 | 5330  |                           |                |
| 52         | 52         | 25     | 16    | 15.8  | 30             | 37             | 0.3            | 0.3             | ST025DZ             | 22.4                 | 31.0                | 16.0                | 16.9                 | 23.7  | 2900                      | 0.435<br>0.959 |
|            | 2.0472     | 0.9843 | 0.630 | 0.622 | 1.1811         | 1.4567         | 0.012          | 0.012           |                     | 5040                 | 6970                | 3600                | 3800                 | 5330  |                           |                |
| 62         | 62         | 30     | 20    | 19.8  | 38             | 46             | 0.6            | 0.6             | ST030               | 33.3                 | 51.0                | 22.3                | 23.2                 | 34.2  | 2400                      | 0.325<br>0.717 |
|            | 2.4409     | 1.1811 | 0.787 | 0.780 | 1.4961         | 1.8110         | 0.024          | 0.024           |                     | 7490                 | 11470               | 5010                | 5220                 | 7690  |                           |                |
| 62         | 62         | 30     | 20    | 19.8  | 38             | 46             | 0.6            | 0.6             | ST030DZ             | 33.3                 | 51.0                | 22.3                | 23.2                 | 34.2  | 2400                      | 0.325<br>0.717 |
|            | 2.4409     | 1.1811 | 0.787 | 0.780 | 1.4961         | 1.8110         | 0.024          | 0.024           |                     | 7490                 | 11470               | 5010                | 5220                 | 7690  |                           |                |
| 72         | 72         | 35     | 20    | 19.8  | 42             | 50             | 0.6            | 0.6             | ST035               | 35.2                 | 56.6                | 25.2                | 33.3                 | 43.0  | 2200                      | 0.435<br>0.959 |
|            | 2.8346     | 1.3780 | 0.787 | 0.780 | 1.6535         | 1.9685         | 0.024          | 0.024           |                     | 7910                 | 12720               | 5670                | 7490                 | 9670  |                           |                |
| 72         | 72         | 35     | 20    | 19.8  | 42             | 50             | 0.6            | 0.6             | ST035DZ             | 35.2                 | 56.6                | 25.2                | 33.3                 | 43.0  | 2200                      | 0.435<br>0.959 |
|            | 2.8346     | 1.3780 | 0.787 | 0.780 | 1.6535         | 1.9685         | 0.024          | 0.024           |                     | 7910                 | 12720               | 5670                | 7490                 | 9670  |                           |                |
| 80         | 80         | 40     | 20    | 19.8  | 50             | 58             | 0.6            | 1.0             | ST040               | 38.8                 | 67.8                | 25.9                | 34.7                 | 45.0  | 2000                      | 0.540<br>1.190 |
|            | 3.1496     | 1.5748 | 0.787 | 0.780 | 1.9685         | 2.2835         | 0.024          | 0.039           |                     | 8720                 | 15240               | 5820                | 7800                 | 10120 |                           |                |
| 80         | 80         | 40     | 20    | 19.8  | 50             | 58             | 0.6            | 1.0             | ST040DZ             | 38.8                 | 67.8                | 25.9                | 34.7                 | 45.0  | 2000                      | 0.540<br>1.190 |
|            | 3.1496     | 1.5748 | 0.787 | 0.780 | 1.9685         | 2.2835         | 0.024          | 0.039           |                     | 8720                 | 15240               | 5820                | 7800                 | 10120 |                           |                |
| 85         | 85         | 45     | 20    | 19.8  | 55             | 63             | 0.6            | 1.0             | ST045               | 40.3                 | 73.5                | 26.0                | 35.8                 | 45.5  | 13000                     | 0.580<br>1.279 |
|            | 3.3465     | 1.7717 | 0.787 | 0.780 | 2.1654         | 2.4803         | 0.024          | 0.039           |                     | 9060                 | 16520               | 5850                | 8050                 | 10230 |                           |                |
| 85         | 85         | 45     | 20    | 19.8  | 55             | 63             | 0.6            | 1.0             | ST045DZ             | 40.3                 | 73.5                | 26.0                | 35.8                 | 45.5  | 13000                     | 0.580<br>1.279 |
|            | 3.3465     | 1.7717 | 0.787 | 0.780 | 2.1654         | 2.4803         | 0.024          | 0.039           |                     | 9060                 | 16520               | 5850                | 8050                 | 10230 |                           |                |
| 90         | 90         | 50     | 20    | 19.8  | 60             | 68             | 0.6            | 1.0             | ST050               | 41.8                 | 79.2                | 26.0                | 37.1                 | 45.8  | 10000                     | 0.650<br>1.433 |
|            | 3.5433     | 1.9685 | 0.787 | 0.780 | 2.3622         | 2.6772         | 0.024          | 0.039           |                     | 9400                 | 17800               | 5850                | 8340                 | 10300 |                           |                |
| 90         | 90         | 50     | 20    | 19.8  | 60             | 68             | 0.6            | 1.0             | ST050DZ             | 41.8                 | 79.2                | 26.0                | 37.1                 | 45.8  | 10000                     | 0.650<br>1.433 |
|            | 3.5433     | 1.9685 | 0.787 | 0.780 | 2.3622         | 2.6772         | 0.024          | 0.039           |                     | 9400                 | 17800               | 5850                | 8340                 | 10300 |                           |                |



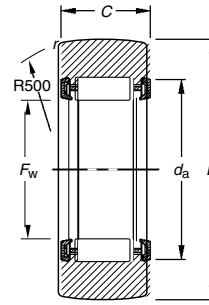




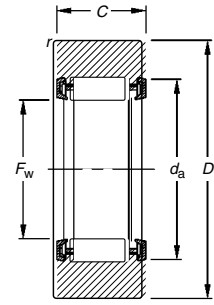
# NEEDLE ROLLER BEARINGS

**CAGED, WITHOUT INNER RING,  
NO END WASHERS, SEALED,  
YOKE TYPE (RNA22 SERIES)**

**METRIC SERIES**



RNA22.2RS



RNA22.2RS.DZ

| Outer Dia.<br>mm | Dimensions |       |                |                |                | Bearing Designation | Load Ratings kN/bf. |        |                   |                     |                      | Limiting Speed Grease<br>RPM | Wt<br>kg/lbs. |
|------------------|------------|-------|----------------|----------------|----------------|---------------------|---------------------|--------|-------------------|---------------------|----------------------|------------------------------|---------------|
|                  | D          | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> |                     | As a Bearing        |        | As a Track Roller |                     |                      |                              |               |
|                  |            |       |                |                |                |                     | Dynamic             | Static | Dynamic           | F <sub>r perm</sub> | F <sub>0r perm</sub> |                              |               |
| 19               | 19         | 11.8  | 10             | 14             | 0.3            | RNA22/6.2RS         | 4.70                | 5.43   | 4.13              | 3.06                | 4.59                 | 13000                        | 0.014         |
|                  | 0.7480     | 0.465 | 0.3937         | 0.551          | 0.012          |                     | 1060                | 1220   | 928               | 688                 | 1030                 |                              |               |
| 19               | 19         | 11.8  | 10             | 14             | 0.3            | RNA22/6.2RS.DZ      | 4.70                | 5.43   | 4.13              | 3.06                | 4.59                 | 13000                        | 0.014         |
|                  | 0.7480     | 0.465 | 0.3937         | 0.551          | 0.012          |                     | 1060                | 1220   | 928               | 688                 | 1030                 |                              |               |
| 24               | 24         | 11.8  | 12             | 18             | 0.3            | RNA22/8.2RS         | 6.70                | 6.08   | 5.31              | 3.37                | 5.22                 | 11000                        | 0.025         |
|                  | 0.9449     | 0.465 | 0.4724         | 0.709          | 0.012          |                     | 1510                | 1370   | 1190              | 758                 | 1170                 |                              |               |
| 24               | 24         | 11.8  | 12             | 18             | 0.3            | RNA22/8.2RS.DZ      | 6.70                | 6.08   | 5.31              | 3.37                | 5.22                 | 11000                        | 0.025         |
|                  | 0.9449     | 0.465 | 0.4724         | 0.709          | 0.012          |                     | 1510                | 1370   | 1190              | 758                 | 1170                 |                              |               |
| 30               | 30         | 13.8  | 14             | 20             | 0.6            | RNA2200.2RS         | 8.50                | 9.45   | 8.03              | 7.85                | 9.45                 | 9400                         | 0.049         |
|                  | 1.1811     | 0.543 | 0.5512         | 0.787          | 0.024          |                     | 1910                | 2120   | 1810              | 1760                | 2120                 |                              |               |
| 30               | 30         | 13.8  | 14             | 20             | 0.6            | RNA2200.2RS.DZ      | 8.50                | 9.45   | 8.03              | 7.85                | 9.45                 | 9400                         | 0.049         |
|                  | 1.1811     | 0.543 | 0.5512         | 0.787          | 0.024          |                     | 1910                | 2120   | 1810              | 1760                | 2120                 |                              |               |
| 32               | 32         | 13.8  | 16             | 22             | 0.6            | RNA2201.2RS         | 9.00                | 10.5   | 8.2               | 7.78                | 10.1                 | 8100                         | 0.053         |
|                  | 1.2598     | 0.543 | 0.6299         | 0.866          | 0.024          |                     | 2020                | 2360   | 1840              | 1750                | 2270                 |                              |               |
| 32               | 32         | 13.8  | 16             | 22             | 0.6            | RNA2201.2RS.DZ      | 9.00                | 10.5   | 8.2               | 7.78                | 10.1                 | 8100                         | 0.053         |
|                  | 1.2598     | 0.543 | 0.6299         | 0.866          | 0.024          |                     | 2020                | 2360   | 1840              | 1750                | 2270                 |                              |               |
| 35               | 35         | 13.8  | 20             | 27             | 0.6            | RNA2202.2RS         | 12.2                | 14.5   | 9.24              | 6.00                | 10.2                 | 6300                         | 0.055         |
|                  | 1.3780     | 0.543 | 0.7874         | 1.063          | 0.024          |                     | 2740                | 3260   | 2080              | 1350                | 2290                 |                              |               |
| 35               | 35         | 13.8  | 20             | 27             | 0.6            | RNA2202.2RS.DZ      | 12.2                | 14.5   | 9.24              | 6.00                | 10.2                 | 6300                         | 0.055         |
|                  | 1.3780     | 0.543 | 0.7874         | 1.063          | 0.024          |                     | 2740                | 3260   | 2080              | 1350                | 2290                 |                              |               |
| 40               | 40         | 15.8  | 22             | 30             | 1.0            | RNA2203.2RS         | 16.3                | 17.8   | 11.9              | 8.50                | 13.7                 | 5900                         | 0.090         |
|                  | 1.5748     | 0.622 | 0.8661         | 1.181          | 0.039          |                     | 3660                | 4000   | 2680              | 1910                | 3080                 |                              |               |
| 40               | 40         | 15.8  | 22             | 30             | 1.0            | RNA2203.2RS.DZ      | 16.3                | 17.8   | 11.9              | 8.50                | 13.7                 | 5900                         | 0.090         |
|                  | 1.5748     | 0.622 | 0.8661         | 1.181          | 0.039          |                     | 3660                | 4000   | 2680              | 1910                | 3080                 |                              |               |
| 47               | 47         | 17.8  | 25             | 35             | 1.0            | RNA2204.2RS         | 19.6                | 20.2   | 14.8              | 11.0                | 16.7                 | 5200                         | 0.150         |
|                  | 1.8504     | 0.701 | 0.9843         | 1.378          | 0.039          |                     | 4410                | 4540   | 3330              | 2470                | 3750                 |                              |               |
| 47               | 47         | 17.8  | 25             | 35             | 1.0            | RNA2204.2RS.DZ      | 19.6                | 20.2   | 14.8              | 11.0                | 16.7                 | 5200                         | 0.150         |
|                  | 1.8504     | 0.701 | 0.9843         | 1.378          | 0.039          |                     | 4410                | 4540   | 3330              | 2470                | 3750                 |                              |               |

Continued on next page.

## Stud Type and Yoke Type Track Rollers

C

| Outer Dia. | Dimensions |       |                |                |                | Bearing Designation | Load Ratings kN/lbf. |                |                   |                     |                      | Limiting Speed Grease | Wt. kg/lbs. |
|------------|------------|-------|----------------|----------------|----------------|---------------------|----------------------|----------------|-------------------|---------------------|----------------------|-----------------------|-------------|
|            | D          | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> |                     | As a Bearing         |                | As a Track Roller |                     |                      |                       |             |
| mm         |            |       |                |                |                |                     | C                    | C <sub>0</sub> | C <sub>w</sub>    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM                   |             |
| 52         | 52         | 17.8  | 30             | 40             | 1.0            | RNA2205.2RS         | 21.6                 | 24.3           | 15.5              | 11.3                | 17.7                 | 4300                  | 0.171       |
|            | 2.0472     | 0.701 | 1.1811         | 1.575          | 0.039          |                     | 4860                 | 5460           | 3480              | 2540                | 3980                 |                       |             |
|            | 52         | 17.8  | 30             | 40             | 1.0            | RNA2205.2RS.DZ      | 21.6                 | 24.3           | 15.5              | 11.3                | 17.7                 | 4300                  | 0.171       |
|            | 2.0472     | 0.701 | 1.1811         | 1.575          | 0.039          |                     | 4860                 | 5460           | 3480              | 2540                | 3980                 |                       |             |
| 62         | 62         | 19.8  | 35             | 47             | 1.0            | RNA2206.2RS         | 29.0                 | 32.8           | 21.2              | 15.8                | 24.8                 | 3700                  | 0.285       |
|            | 2.4409     | 0.780 | 1.3780         | 1.850          | 0.039          |                     | 6520                 | 7370           | 4770              | 3550                | 5580                 |                       |             |
|            | 62         | 19.8  | 35             | 47             | 1.0            | RNA2206.2RS.DZ      | 29.7                 | 32.8           | 21.2              | 15.8                | 24.8                 | 3700                  | 0.285       |
|            | 2.4409     | 0.780 | 1.3780         | 1.850          | 0.039          |                     | 6680                 | 7370           | 4770              | 3550                | 5580                 |                       |             |
| 72         | 72         | 22.8  | 42             | 54             | 1.1            | RNA2207.2RS         | 40.5                 | 52.5           | 28.6              | 24.2                | 37.9                 | 3000                  | 0.490       |
|            | 2.8346     | 0.898 | 1.6535         | 2.126          | 0.043          |                     | 9100                 | 11800          | 6430              | 5440                | 8520                 |                       |             |
|            | 72         | 22.8  | 42             | 54             | 1.1            | RNA2207.2RS.DZ      | 40.5                 | 52.5           | 28.6              | 24.2                | 37.9                 | 3000                  | 0.420       |
|            | 2.8346     | 0.898 | 1.6535         | 2.126          | 0.043          |                     | 9100                 | 11800          | 6430              | 5440                | 8520                 |                       |             |
| 80         | 80         | 22.8  | 48             | 60             | 1.1            | RNA2208.2RS         | 44.0                 | 60.0           | 30.4              | 27.8                | 42.0                 | 2600                  | 0.515       |
|            | 3.1496     | 0.898 | 1.8898         | 2.362          | 0.043          |                     | 9890                 | 13490          | 6830              | 6250                | 9440                 |                       |             |
|            | 80         | 22.8  | 48             | 60             | 1.1            | RNA2208.2RS.DZ      | 44.3                 | 60.0           | 30.4              | 27.8                | 42.0                 | 2600                  | 0.515       |
|            | 3.1496     | 0.898 | 1.8898         | 2.362          | 0.043          |                     | 9960                 | 13490          | 6830              | 6250                | 9440                 |                       |             |
| 85         | 85         | 22.8  | 52             | 64             | 1.1            | RNA2209.2RS         | 45.6                 | 63.9           | 30.9              | 29.7                | 43.7                 | 2400                  | 0.565       |
|            | 3.3465     | 0.898 | 2.0472         | 2.520          | 0.043          |                     | 10250                | 14370          | 6950              | 6680                | 9820                 |                       |             |
|            | 85         | 22.8  | 52             | 64             | 1.1            | RNA2209.2RS.DZ      | 45.6                 | 63.9           | 30.9              | 29.7                | 43.7                 | 2400                  | 0.565       |
|            | 3.3465     | 0.898 | 2.0472         | 2.520          | 0.043          |                     | 10250                | 14370          | 6950              | 6680                | 9820                 |                       |             |
| 90         | 90         | 22.8  | 58             | 70             | 1.1            | RNA2210.2RS         | 48.5                 | 71.3           | 31.0              | 29.4                | 43.4                 | 2100                  | 0.590       |
|            | 3.5433     | 0.898 | 2.2835         | 2.756          | 0.043          |                     | 10900                | 16030          | 6970              | 6610                | 9760                 |                       |             |
|            | 90         | 22.8  | 58             | 70             | 1.1            | RNA2210.2RS.DZ      | 48.5                 | 71.3           | 31.0              | 29.4                | 43.4                 | 2100                  | 0.590       |
|            | 3.5433     | 0.898 | 2.2835         | 2.756          | 0.043          |                     | 10900                | 16030          | 6970              | 6610                | 9760                 |                       |             |

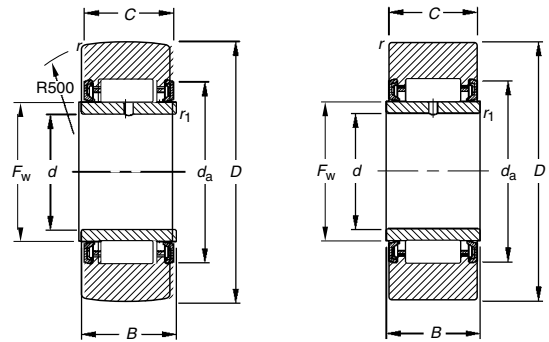




# NEEDLE ROLLER BEARINGS

**CAGED, WITH INNER RING,  
NO END WASHERS, SEALED,  
YOKE TYPE (NA SERIES)**

## METRIC SERIES



NA22.2RS

NA22.2RS.DZ

| Outer Dia. | Dimensions |        |       |       |                |                |                |                 | Bearing Designation | Load Ratings kN/bf.  |                     |                           |                          | Speed Grease RPM | Wt. kg/lbs. |                |
|------------|------------|--------|-------|-------|----------------|----------------|----------------|-----------------|---------------------|----------------------|---------------------|---------------------------|--------------------------|------------------|-------------|----------------|
|            | D          | d      | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> | r <sub>ts</sub> |                     | As a Bearing Dynamic | As a Bearing Static | As a Track Roller Dynamic | As a Track Roller Static |                  |             |                |
| mm         | D          | d      | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> | r <sub>ts</sub> | C                   | C <sub>0</sub>       | C <sub>w</sub>      | F <sub>r perm</sub>       | F <sub>0r perm</sub>     | RPM              |             |                |
| 19         | 19         | 6      | 12    | 11.8  | 10             | 14             | 0.3            | 0.3             | NA22/6.2RS          | 4.70                 | 5.43                | 4.13                      | 3.06                     | 4.59             | 13000       | 0.018<br>0.040 |
|            | 0.7480     | 0.2362 | 0.472 | 0.465 | 0.3937         | 0.5512         | 0.012          | 0.012           |                     | 1060                 | 1220                | 928                       | 688                      | 1030             |             |                |
| 19         | 19         | 6      | 12    | 11.8  | 10             | 14             | 0.3            | 0.3             | NA22/6.2RS.DZ       | 4.70                 | 4.55                | 4.13                      | 3.06                     | 4.59             | 13000       | 0.018<br>0.040 |
|            | 0.7480     | 0.2362 | 0.472 | 0.465 | 0.3937         | 0.5512         | 0.012          | 0.012           |                     | 1060                 | 1020                | 928                       | 688                      | 1030             |             |                |
| 24         | 24         | 8      | 12    | 11.8  | 12             | 18             | 0.3            | 0.3             | NA22/8.2RS          | 6.70                 | 6.08                | 5.31                      | 3.37                     | 5.22             | 11000       | 0.031<br>0.068 |
|            | 0.9449     | 0.3150 | 0.472 | 0.465 | 0.4724         | 0.7087         | 0.012          | 0.012           |                     | 1510                 | 1370                | 1190                      | 758                      | 1170             |             |                |
| 24         | 24         | 8      | 12    | 11.8  | 12             | 18             | 0.3            | 0.3             | NA22/8.2RS.DZ       | 6.70                 | 6.08                | 5.31                      | 3.37                     | 5.22             | 11000       | 0.031<br>0.068 |
|            | 0.9449     | 0.3150 | 0.472 | 0.465 | 0.4724         | 0.7087         | 0.012          | 0.012           |                     | 1510                 | 1370                | 1190                      | 758                      | 1170             |             |                |
| 30         | 30         | 10     | 14    | 13.8  | 14             | 20             | 0.6            | 0.3             | NA2200.2RS          | 8.50                 | 9.45                | 8.03                      | 7.85                     | 9.45             | 9400        | 0.057<br>0.126 |
|            | 1.1811     | 0.3937 | 0.551 | 0.543 | 0.5512         | 0.7874         | 0.024          | 0.012           |                     | 1910                 | 2120                | 1810                      | 1760                     | 2120             |             |                |
| 30         | 30         | 10     | 14    | 13.8  | 14             | 20             | 0.6            | 0.3             | NA2200.2RS.DZ       | 8.50                 | 9.45                | 8.03                      | 7.85                     | 9.45             | 9400        | 0.057<br>0.126 |
|            | 1.1811     | 0.3937 | 0.551 | 0.543 | 0.5512         | 0.7874         | 0.024          | 0.012           |                     | 1910                 | 2120                | 1810                      | 1760                     | 2120             |             |                |
| 32         | 32         | 12     | 14    | 13.8  | 16             | 22             | 0.6            | 0.3             | NA2201.2RS          | 9.00                 | 10.5                | 8.20                      | 7.78                     | 10.1             | 8100        | 0.063<br>0.139 |
|            | 1.2598     | 0.4724 | 0.551 | 0.543 | 0.6299         | 0.8661         | 0.024          | 0.012           |                     | 2020                 | 2360                | 1840                      | 1750                     | 2270             |             |                |
| 32         | 32         | 12     | 14    | 13.8  | 16             | 22             | 0.6            | 0.3             | NA2201.2RS.DZ       | 9.00                 | 10.5                | 8.20                      | 7.78                     | 10.1             | 8100        | 0.063<br>0.139 |
|            | 1.2598     | 0.4724 | 0.551 | 0.543 | 0.6299         | 0.8661         | 0.024          | 0.012           |                     | 2020                 | 2360                | 1840                      | 1750                     | 2270             |             |                |
| 35         | 35         | 15     | 14    | 13.8  | 20             | 27             | 0.6            | 0.3             | NA2202.2RS          | 12.2                 | 14.5                | 9.24                      | 6.00                     | 10.2             | 6300        | 0.070<br>0.154 |
|            | 1.3780     | 0.5906 | 0.551 | 0.543 | 0.7874         | 1.0630         | 0.024          | 0.012           |                     | 2740                 | 3260                | 2080                      | 1350                     | 2290             |             |                |
| 35         | 35         | 15     | 14    | 13.8  | 20             | 27             | 0.6            | 0.3             | NA2202.2RS.DZ       | 12.2                 | 14.5                | 9.24                      | 6.00                     | 10.2             | 6300        | 0.070<br>0.154 |
|            | 1.3780     | 0.5906 | 0.551 | 0.543 | 0.7874         | 1.0630         | 0.024          | 0.012           |                     | 2740                 | 3260                | 2080                      | 1350                     | 2290             |             |                |
| 40         | 40         | 17     | 16    | 15.8  | 22             | 30             | 1.0            | 0.3             | NA2203.2RS          | 16.3                 | 17.8                | 11.9                      | 8.50                     | 13.7             | 5900        | 0.107<br>0.236 |
|            | 1.5748     | 0.6693 | 0.630 | 0.622 | 0.8661         | 1.1811         | 0.039          | 0.012           |                     | 3660                 | 4000                | 2680                      | 1910                     | 3080             |             |                |
| 40         | 40         | 17     | 16    | 15.8  | 22             | 30             | 1.0            | 0.3             | NA2203.2RS.DZ       | 16.3                 | 17.8                | 11.9                      | 8.50                     | 13.7             | 5900        | 0.107<br>0.236 |
|            | 1.5748     | 0.6693 | 0.630 | 0.622 | 0.8661         | 1.1811         | 0.039          | 0.012           |                     | 3660                 | 4000                | 2680                      | 1910                     | 3080             |             |                |
| 47         | 47         | 20     | 18    | 17.8  | 25             | 35             | 1.0            | 0.3             | NA2204.2RS          | 19.6                 | 20.2                | 14.8                      | 11.0                     | 16.7             | 5200        | 0.175<br>0.386 |
|            | 1.8504     | 0.7874 | 0.709 | 0.701 | 0.9843         | 1.3780         | 0.039          | 0.012           |                     | 4410                 | 4540                | 3330                      | 2470                     | 3750             |             |                |
| 47         | 47         | 20     | 18    | 17.8  | 25             | 35             | 1.0            | 0.3             | NA2204.2RS.DZ       | 19.6                 | 20.2                | 14.8                      | 11.0                     | 16.7             | 5200        | 0.175<br>0.386 |
|            | 1.8504     | 0.7874 | 0.709 | 0.701 | 0.9843         | 1.3780         | 0.039          | 0.012           |                     | 4410                 | 4540                | 3330                      | 2470                     | 3750             |             |                |

Continued on next page.

## Stud Type and Yoke Type Track Rollers

C

| Outer Dia. | Dimensions |        |       |       |                |                |                |                 | Bearing Designation | Load Ratings kN/lbf. |                     |                     |                      |      | Speed Grease RPM | Wt. kg/lbs. |
|------------|------------|--------|-------|-------|----------------|----------------|----------------|-----------------|---------------------|----------------------|---------------------|---------------------|----------------------|------|------------------|-------------|
|            | D          | d      | B     | C     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s</sub> | r <sub>is</sub> |                     | As a Bearing Dynamic | As a Bearing Static | As a Track Roller   |                      |      |                  |             |
| mm         |            |        |       |       |                |                |                |                 | C                   | C <sub>0</sub>       | C <sub>w</sub>      | F <sub>r perm</sub> | F <sub>0r perm</sub> |      |                  |             |
| 52         | 52         | 25     | 18    | 17.8  | 30             | 40             | 1.0            | 0.3             | NA2205.2RS          | 21.6                 | 24.3                | 15.5                | 11.3                 | 17.7 | 4300             | 0.202       |
|            | 2.0472     | 0.9843 | 0.709 | 0.701 | 1.1811         | 1.5748         | 0.039          | 0.012           |                     | 4860                 | 5460                | 3480                | 2540                 | 3980 |                  |             |
| 52         | 52         | 25     | 18    | 17.8  | 30             | 40             | 1.0            | 0.3             | NA2205.2RS.DZ       | 21.6                 | 24.3                | 15.5                | 11.3                 | 17.7 | 4300             | 0.202       |
|            | 2.0472     | 0.9843 | 0.709 | 0.701 | 1.1811         | 1.5748         | 0.039          | 0.012           |                     | 4860                 | 5460                | 3480                | 2540                 | 3980 |                  |             |
| 62         | 62         | 30     | 20    | 19.8  | 35             | 47             | 1.0            | 0.3             | NA2206.2RS          | 29.0                 | 32.8                | 21.2                | 15.8                 | 24.8 | 3700             | 0.324       |
|            | 2.4409     | 1.1811 | 0.787 | 0.780 | 1.3780         | 1.8504         | 0.039          | 0.012           |                     | 6520                 | 7370                | 4770                | 3550                 | 5580 |                  |             |
| 62         | 62         | 30     | 20    | 19.8  | 35             | 47             | 1.0            | 0.3             | NA2206.2RS.DZ       | 29.0                 | 32.8                | 21.2                | 15.8                 | 24.8 | 3700             | 0.324       |
|            | 2.4409     | 1.1811 | 0.787 | 0.780 | 1.3780         | 1.8504         | 0.039          | 0.012           |                     | 6520                 | 7370                | 4770                | 3550                 | 5580 |                  |             |
| 72         | 72         | 35     | 23    | 22.8  | 42             | 54             | 1.1            | 0.6             | NA2207.2RS          | 40.5                 | 52.5                | 28.6                | 24.2                 | 37.9 | 3000             | 0.490       |
|            | 2.8346     | 1.3780 | 0.906 | 0.898 | 1.6535         | 2.1260         | 0.043          | 0.024           |                     | 9100                 | 11800               | 6430                | 5440                 | 8520 |                  |             |
| 72         | 72         | 35     | 23    | 22.8  | 42             | 54             | 1.1            | 0.6             | NA2207.2RS.DZ       | 40.5                 | 52.5                | 28.6                | 24.2                 | 37.9 | 3000             | 0.490       |
|            | 2.8346     | 1.3780 | 0.906 | 0.898 | 1.6535         | 2.1260         | 0.043          | 0.024           |                     | 9100                 | 11800               | 6430                | 5440                 | 8520 |                  |             |
| 80         | 80         | 40     | 23    | 22.8  | 48             | 60             | 1.1            | 0.6             | NA2208.2RS          | 44.0                 | 60.0                | 30.4                | 27.8                 | 42.0 | 2600             | 0.615       |
|            | 3.1496     | 1.5748 | 0.906 | 0.898 | 1.8898         | 2.3622         | 0.043          | 0.024           |                     | 9890                 | 13500               | 6830                | 6250                 | 9440 |                  |             |
| 80         | 80         | 40     | 23    | 22.8  | 48             | 60             | 1.1            | 0.6             | NA2208.2RS.DZ       | 44.0                 | 60.0                | 30.4                | 27.8                 | 42.0 | 2600             | 0.615       |
|            | 3.1496     | 1.5748 | 0.906 | 0.898 | 1.8898         | 2.3622         | 0.043          | 0.024           |                     | 9890                 | 13500               | 6830                | 6250                 | 9440 |                  |             |
| 85         | 85         | 45     | 23    | 22.8  | 52             | 64             | 1.1            | 0.6             | NA2209.2RS          | 45.0                 | 63.9                | 30.9                | 29.7                 | 43.7 | 2400             | 0.661       |
|            | 3.3465     | 1.7717 | 0.906 | 0.898 | 2.0472         | 2.5197         | 0.043          | 0.024           |                     | 10100                | 14400               | 6950                | 6680                 | 9820 |                  |             |
| 85         | 85         | 45     | 23    | 22.8  | 52             | 64             | 1.1            | 0.6             | NA2209.2RS.DZ       | 45.0                 | 63.9                | 30.9                | 29.7                 | 43.7 | 2400             | 0.661       |
|            | 3.3465     | 1.7717 | 0.906 | 0.898 | 2.0472         | 2.5197         | 0.043          | 0.024           |                     | 10100                | 14400               | 6950                | 6680                 | 9820 |                  |             |
| 90         | 90         | 50     | 23    | 22.8  | 58             | 70             | 1.1            | 0.6             | NA2210.2RS          | 48.0                 | 71.3                | 31.0                | 29.4                 | 43.4 | 2100             | 0.712       |
|            | 3.5433     | 1.9685 | 0.906 | 0.898 | 2.2835         | 2.7559         | 0.043          | 0.024           |                     | 10800                | 16000               | 6970                | 6610                 | 9760 |                  |             |
| 90         | 90         | 50     | 23    | 22.8  | 58             | 70             | 1.1            | 0.6             | NA2210.2RS.DZ       | 48.0                 | 71.3                | 31.0                | 29.4                 | 43.4 | 2100             | 0.712       |
|            | 3.5433     | 1.9685 | 0.906 | 0.898 | 2.2835         | 2.7559         | 0.043          | 0.024           |                     | 10800                | 16000               | 6970                | 6610                 | 9760 |                  |             |

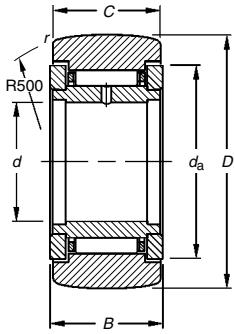




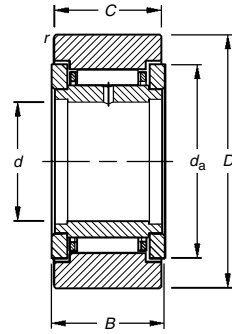
# NEEDLE ROLLER BEARINGS

## CAGED, WITH INNER RING, WITH END WASHERS, YOKE TYPE (NATR, STO...ZZ SERIES)

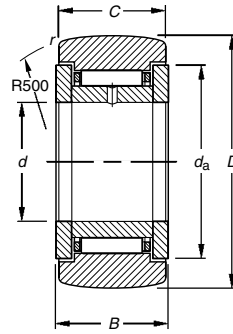
### METRIC SERIES



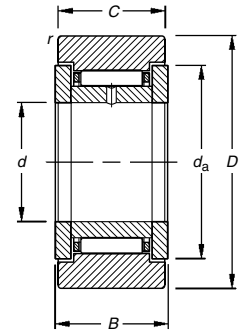
NATR



NATR.DZ



STO.ZZ



STO.ZZ.DZ

| Outer Dia.<br>mm | Dimensions |        |       |       |                |                | Bearing Designation | Load Ratings kN/bf.  |                     |                     |                      |                          | Limiting Speed Grease<br>RPM | Wt.<br>kg/lbs. |
|------------------|------------|--------|-------|-------|----------------|----------------|---------------------|----------------------|---------------------|---------------------|----------------------|--------------------------|------------------------------|----------------|
|                  | D          | d      | B     | C     | d <sub>a</sub> | r <sub>s</sub> |                     | As a Bearing Dynamic | As a Bearing Static | As a Track Roller   |                      | As a Track Roller Static |                              |                |
|                  |            |        |       |       |                |                | C                   | C <sub>0</sub>       | C <sub>w</sub>      | F <sub>r perm</sub> | F <sub>0r perm</sub> |                          |                              |                |
| 16               | 16         | 5      | 12    | 11.0  | 13             | 0.3            | NATR5               | 4.62                 | 5.19                | 3.34                | 2.62                 | 4.01                     | 13000                        | 0.017          |
|                  | 0.6299     | 0.1969 | 0.472 | 0.433 | 0.512          | 0.012          |                     | 1040                 | 1170                | 751                 | 589                  | 901                      |                              | 0.037          |
| 16               | 16         | 5      | 12    | 11.0  | 13             | 0.3            | NATR5DZ             | 4.62                 | 5.19                | 3.34                | 2.62                 | 4.01                     | 13000                        | 0.017          |
|                  | 0.6299     | 0.1969 | 0.472 | 0.433 | 0.512          | 0.012          |                     | 1040                 | 1170                | 751                 | 589                  | 901                      |                              | 0.037          |
| 19               | 19         | 6      | 12    | 11.0  | 16             | 0.3            | NATR6               | 4.84                 | 5.66                | 3.84                | 4.28                 | 5.28                     | 12000                        | 0.022          |
|                  | 0.7480     | 0.2362 | 0.472 | 0.433 | 0.630          | 0.012          |                     | 1090                 | 1270                | 863                 | 962                  | 1190                     |                              | 0.049          |
| 19               | 19         | 6      | 12    | 11.0  | 16             | 0.3            | NATR6DZ             | 5.84                 | 6.66                | 3.84                | 4.28                 | 5.28                     | 12000                        | 0.022          |
|                  | 0.7480     | 0.2362 | 0.472 | 0.433 | 0.630          | 0.012          |                     | 1310                 | 1500                | 863                 | 962                  | 1190                     |                              | 0.049          |
| 19               | 19         | 6      | 14    | 13.8  | 15             | 0.3            | STO6ZZ              | 5.37                 | 6.47                | 4.31                | 5.23                 | 6.17                     | 12000                        | 0.024          |
|                  | 0.7480     | 0.2362 | 0.551 | 0.543 | 0.591          | 0.012          |                     | 1210                 | 1450                | 969                 | 1180                 | 1390                     |                              | 0.053          |
| 19               | 19         | 6      | 14    | 13.8  | 15             | 0.3            | STO6ZZ.DZ           | 5.37                 | 6.47                | 4.31                | 5.23                 | 6.17                     | 12000                        | 0.024          |
|                  | 0.7480     | 0.2362 | 0.551 | 0.543 | 0.591          | 0.012          |                     | 1210                 | 1450                | 969                 | 1180                 | 1390                     |                              | 0.053          |
| 24               | 24         | 8      | 14    | 13.8  | 18             | 0.3            | STO8ZZ              | 5.82                 | 7.54                | 4.97                | 7.54                 | 8.14                     | 9900                         | 0.040          |
|                  | 0.9449     | 0.3150 | 0.551 | 0.543 | 0.709          | 0.012          |                     | 1310                 | 1700                | 1120                | 1700                 | 1830                     |                              | 0.088          |
| 24               | 24         | 8      | 14    | 13.8  | 18             | 0.3            | STO8ZZ.DZ           | 5.82                 | 7.54                | 4.97                | 7.54                 | 8.14                     | 9900                         | 0.040          |
|                  | 0.9449     | 0.3150 | 0.551 | 0.543 | 0.709          | 0.012          |                     | 1310                 | 1700                | 1120                | 1700                 | 1830                     |                              | 0.088          |
| 24               | 24         | 8      | 15    | 14.0  | 20             | 0.3            | NATR8               | 8.39                 | 8.67                | 6.66                | 5.79                 | 8.08                     | 10000                        | 0.043          |
|                  | 0.9449     | 0.3150 | 0.591 | 0.551 | 0.787          | 0.012          |                     | 1890                 | 1950                | 1500                | 1300                 | 1820                     |                              | 0.095          |
| 24               | 24         | 8      | 15    | 14.0  | 20             | 0.3            | NATR8DZ             | 9.39                 | 9.67                | 6.66                | 5.79                 | 8.08                     | 10000                        | 0.043          |
|                  | 0.9449     | 0.3150 | 0.591 | 0.551 | 0.787          | 0.012          |                     | 2110                 | 2170                | 1500                | 1300                 | 1820                     |                              | 0.095          |
| 30               | 30         | 10     | 15    | 14.0  | 24             | 0.6            | NATR10              | 9.57                 | 9.45                | 8.15                | 8.58                 | 10.1                     | 9400                         | 0.068          |
|                  | 1.1811     | 0.3937 | 0.591 | 0.551 | 0.945          | 0.024          |                     | 2150                 | 2120                | 1830                | 1930                 | 2270                     |                              | 0.150          |
| 30               | 30         | 10     | 15    | 14.0  | 24             | 0.6            | NATR10DZ            | 9.57                 | 9.45                | 8.15                | 8.58                 | 10.1                     | 9400                         | 0.068          |
|                  | 1.1811     | 0.3937 | 0.591 | 0.551 | 0.945          | 0.024          |                     | 2150                 | 2120                | 1830                | 1930                 | 2270                     |                              | 0.150          |
| 30               | 30         | 10     | 16    | 15.8  | 23             | 0.3            | STO10ZZ             | 10.4                 | 10.6                | 8.94                | 9.64                 | 11.4                     | 9400                         | 0.071          |
|                  | 1.1811     | 0.3937 | 0.630 | 0.622 | 0.906          | 0.012          |                     | 2340                 | 2380                | 2010                | 2170                 | 2560                     |                              | 0.157          |
| 30               | 30         | 10     | 16    | 15.8  | 23             | 0.3            | STO10ZZ.DZ          | 10.4                 | 10.6                | 8.94                | 9.64                 | 11.4                     | 9400                         | 0.071          |
|                  | 1.1811     | 0.3937 | 0.630 | 0.622 | 0.906          | 0.012          |                     | 2340                 | 2380                | 2010                | 2170                 | 2560                     |                              | 0.157          |
| 32               | 32         | 12     | 15    | 14.0  | 26             | 0.6            | NATR12              | 10.2                 | 10.5                | 8.32                | 8.50                 | 10.4                     | 8100                         | 0.075          |
|                  | 1.2598     | 0.4724 | 0.591 | 0.551 | 1.024          | 0.024          |                     | 2290                 | 2360                | 1870                | 1910                 | 2340                     |                              | 0.165          |
| 32               | 32         | 12     | 15    | 14.0  | 26             | 0.6            | NATR12DZ            | 10.2                 | 10.5                | 8.32                | 8.50                 | 10.4                     | 8100                         | 0.075          |
|                  | 1.2598     | 0.4724 | 0.591 | 0.551 | 1.024          | 0.024          |                     | 2290                 | 2360                | 1870                | 1910                 | 2340                     |                              | 0.165          |
| 32               | 32         | 12     | 16    | 15.8  | 25             | 0.3            | STO12ZZ             | 11.2                 | 11.9                | 9.13                | 9.54                 | 11.7                     | 8100                         | 0.078          |
|                  | 1.2598     | 0.4724 | 0.630 | 0.622 | 0.984          | 0.012          |                     | 2520                 | 2680                | 2050                | 2140                 | 2630                     |                              | 0.172          |
| 32               | 32         | 12     | 16    | 15.8  | 25             | 0.3            | STO12ZZ.DZ          | 11.2                 | 11.9                | 9.13                | 9.54                 | 11.7                     | 8100                         | 0.078          |
|                  | 1.2598     | 0.4724 | 0.630 | 0.622 | 0.984          | 0.012          |                     | 2520                 | 2680                | 2050                | 2140                 | 2630                     |                              | 0.172          |

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## Stud Type and Yoke Type Track Rollers

C

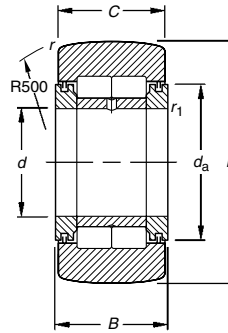
| Outer Dia. | Dimensions |        |                |                |                     |                      | Bearing Designation | Load Ratings kN/bf. |              |      |                   |       | Limiting Speed Grease | Wt. kg/lbs. |  |
|------------|------------|--------|----------------|----------------|---------------------|----------------------|---------------------|---------------------|--------------|------|-------------------|-------|-----------------------|-------------|--|
|            | mm         | D      | d              | B              | C                   | d <sub>a</sub>       |                     | r <sub>s</sub>      | As a Bearing |      | As a Track Roller |       |                       |             |  |
|            |            | C      | C <sub>0</sub> | C <sub>w</sub> | F <sub>r perm</sub> | F <sub>0r perm</sub> |                     | RPM                 |              |      |                   |       |                       |             |  |
| 35         | 35         | 15     | 16             | 15.8           | 30                  | 0.3                  | ST015ZZ             | 12.9                | 15.3         | 9.47 | 8.52              | 12.1  | 6300                  | 0.089       |  |
|            | 1.3780     | 0.5906 | 0.630          | 0.622          | 1.181               | 0.012                |                     | 2900                | 3440         | 2130 | 1920              | 2720  |                       |             |  |
| 35         | 35         | 15     | 16             | 15.8           | 30                  | 0.3                  | ST015ZZ.DZ          | 12.9                | 15.3         | 9.47 | 8.52              | 12.1  | 6300                  | 0.089       |  |
|            | 1.3780     | 0.5906 | 0.630          | 0.622          | 1.181               | 0.012                |                     | 2900                | 3440         | 2130 | 1920              | 2720  |                       |             |  |
| 40         | 40         | 17     | 20             | 19.8           | 33                  | 0.3                  | ST017ZZ             | 19.0                | 23.3         | 14.2 | 13.4              | 19.3  | 5600                  | 0.145       |  |
|            | 1.5748     | 0.6693 | 0.787          | 0.780          | 1.299               | 0.012                |                     | 4270                | 5240         | 3190 | 3010              | 4340  |                       |             |  |
| 40         | 40         | 17     | 20             | 19.8           | 33                  | 0.3                  | ST017ZZ.DZ          | 19.0                | 23.3         | 14.2 | 13.4              | 19.3  | 5600                  | 0.145       |  |
|            | 1.5748     | 0.6693 | 0.787          | 0.780          | 1.299               | 0.012                |                     | 4270                | 5240         | 3190 | 3010              | 4340  |                       |             |  |
| 47         | 47         | 20     | 20             | 19.8           | 37                  | 0.3                  | ST020ZZ             | 20.0                | 25.4         | 15.7 | 19.5              | 23.5  | 4900                  | 0.200       |  |
|            | 1.8504     | 0.7874 | 0.787          | 0.780          | 1.457               | 0.012                |                     | 4500                | 5710         | 3530 | 4380              | 5280  |                       |             |  |
| 47         | 47         | 20     | 20             | 19.8           | 37                  | 0.3                  | ST020ZZ.DZ          | 20.0                | 25.4         | 15.7 | 19.5              | 23.5  | 4900                  | 0.200       |  |
|            | 1.8504     | 0.7874 | 0.787          | 0.780          | 1.457               | 0.012                |                     | 4500                | 5710         | 3530 | 4380              | 5280  |                       |             |  |
| 52         | 52         | 25     | 20             | 19.8           | 42                  | 0.3                  | ST025ZZ             | 22.4                | 31.1         | 16.4 | 19.8              | 25.1  | 4100                  | 0.240       |  |
|            | 2.0472     | 0.9843 | 0.787          | 0.780          | 1.654               | 0.012                |                     | 5040                | 6990         | 3690 | 4450              | 5640  |                       |             |  |
| 52         | 52         | 25     | 20             | 19.8           | 42                  | 0.3                  | ST025ZZ.DZ          | 22.4                | 31.1         | 16.4 | 19.8              | 25.1  | 4100                  | 0.240       |  |
|            | 2.0472     | 0.9843 | 0.787          | 0.780          | 1.654               | 0.012                |                     | 5040                | 6990         | 3690 | 4450              | 5640  |                       |             |  |
| 62         | 62         | 30     | 25             | 24.8           | 52                  | 0.6                  | ST030ZZ             | 33.3                | 51.0         | 23.0 | 26.9              | 36.2  | 3200                  | 0.412       |  |
|            | 2.4409     | 1.1811 | 0.984          | 0.976          | 2.047               | 0.024                |                     | 7490                | 11500        | 5170 | 6050              | 8140  |                       |             |  |
| 62         | 62         | 30     | 25             | 24.8           | 52                  | 0.6                  | ST030ZZ.DZ          | 33.3                | 51.0         | 23.0 | 26.9              | 36.2  | 3200                  | 0.412       |  |
|            | 2.4409     | 1.1811 | 0.984          | 0.976          | 2.047               | 0.024                |                     | 7490                | 11500        | 5170 | 6050              | 8140  |                       |             |  |
| 72         | 72         | 35     | 25             | 24.8           | 56                  | 0.6                  | ST035ZZ             | 35.2                | 56.6         | 25.9 | 39.2              | 45.5  | 2900                  | 0.555       |  |
|            | 2.8346     | 1.3780 | 0.984          | 0.976          | 2.205               | 0.024                |                     | 7910                | 12700        | 5820 | 8810              | 10200 |                       |             |  |
| 72         | 72         | 35     | 25             | 24.8           | 56                  | 0.6                  | ST035ZZ.DZ          | 35.2                | 56.6         | 25.9 | 39.2              | 45.5  | 2900                  | 0.555       |  |
|            | 2.8346     | 1.3780 | 0.984          | 0.976          | 2.205               | 0.024                |                     | 7910                | 12700        | 5820 | 8810              | 10200 |                       |             |  |
| 80         | 80         | 40     | 26             | 25.8           | 64                  | 0.6                  | ST040ZZ             | 38.8                | 67.8         | 26.8 | 41.5              | 48.1  | 2400                  | 0.700       |  |
|            | 3.1496     | 1.5748 | 1.024          | 1.016          | 2.520               | 0.024                |                     | 8720                | 15200        | 6020 | 9330              | 10800 |                       |             |  |
| 80         | 80         | 40     | 26             | 25.8           | 64                  | 0.6                  | ST040ZZ.DZ          | 38.8                | 67.8         | 26.8 | 41.5              | 48.1  | 2400                  | 0.700       |  |
|            | 3.1496     | 1.5748 | 1.024          | 1.016          | 2.520               | 0.024                |                     | 8720                | 15200        | 6020 | 9330              | 10800 |                       |             |  |
| 85         | 85         | 45     | 26             | 25.8           | 69                  | 0.6                  | ST045ZZ             | 40.3                | 73.5         | 26.9 | 42.4              | 48.6  | 2200                  | 0.770       |  |
|            | 3.3465     | 1.7717 | 1.024          | 1.016          | 2.717               | 0.024                |                     | 9060                | 16500        | 6050 | 9530              | 10900 |                       |             |  |
| 85         | 85         | 45     | 26             | 25.8           | 69                  | 0.6                  | ST045ZZ.DZ          | 40.3                | 73.5         | 26.9 | 42.4              | 48.6  | 2200                  | 0.770       |  |
|            | 3.3465     | 1.7717 | 1.024          | 1.016          | 2.717               | 0.024                |                     | 9060                | 16500        | 6050 | 9530              | 10900 |                       |             |  |



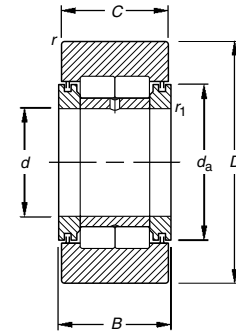
# NEEDLE ROLLER BEARINGS

**FULL COMPLEMENT,  
WITH INNER RING,  
WITH END WASHERS,  
CYLINDRICAL ROLLERS,  
YOKE TYPE (NUTR SERIES)**

**METRIC SERIES**



**NUTR**



**NUTR.DZ**

| Outer Dia. | Dimensions |        |       |       |       |       |       | Bearing Designation | Load Ratings kN/lbf. |       |                     |                      |       | Limiting Speed Grease RPM | Wt. kg/lbs. |
|------------|------------|--------|-------|-------|-------|-------|-------|---------------------|----------------------|-------|---------------------|----------------------|-------|---------------------------|-------------|
|            | D          | d      | B     | C     | da    | rs    | rs    |                     | As a Bearing         |       | As a Track Roller   |                      |       |                           |             |
| mm         | D          | d      | B     | C     | da    | rs    | rs    | C                   | Co                   | Cw    | F <sub>r perm</sub> | F <sub>Or perm</sub> |       |                           |             |
| 35         | 35         | 15     | 19    | 18    | 24    | 0.6   | 0.3   | NUTR15              | 24.7                 | 29.3  | 16.2                | 10.1                 | 16.1  | 6100                      | 0.105       |
|            | 1.3780     | 0.5906 | 0.748 | 0.709 | 0.945 | 0.024 | 0.012 |                     | 5550                 | 6590  | 3640                | 2270                 | 3620  |                           |             |
| 35         | 35         | 15     | 19    | 18    | 24    | 0.6   | 0.3   | NUTR15DZ            | 22.8                 | 29.4  | 16.2                | 10.1                 | 16.1  | 6100                      | 0.105       |
|            | 1.3780     | 0.5906 | 0.748 | 0.709 | 0.945 | 0.024 | 0.012 |                     | 5130                 | 6610  | 3640                | 2270                 | 3620  |                           |             |
| 40         | 40         | 17     | 21    | 20    | 27    | 1.0   | 0.3   | NUTR17              | 26.6                 | 33.4  | 18.7                | 15.0                 | 23.9  | 5300                      | 0.154       |
|            | 1.5748     | 0.6693 | 0.827 | 0.787 | 1.063 | 0.039 | 0.012 |                     | 5980                 | 7510  | 4200                | 3370                 | 5370  |                           |             |
| 40         | 40         | 17     | 21    | 20    | 27    | 1.0   | 0.3   | NUTR17DZ            | 24.5                 | 33.3  | 18.7                | 15.0                 | 23.9  | 5300                      | 0.154       |
|            | 1.5748     | 0.6693 | 0.827 | 0.787 | 1.063 | 0.039 | 0.012 |                     | 5510                 | 7490  | 4200                | 3370                 | 5370  |                           |             |
| 42         | 42         | 15     | 19    | 18    | 24    | 0.6   | 0.3   | NUTR1542            | 22.8                 | 29.4  | 20.0                | 21.2                 | 28.4  | 6100                      | 0.166       |
|            | 1.6535     | 0.5906 | 0.748 | 0.709 | 0.945 | 0.024 | 0.012 |                     | 5130                 | 6610  | 4500                | 4770                 | 6380  |                           |             |
| 42         | 42         | 15     | 19    | 18    | 24    | 0.6   | 0.3   | NUTR1542DZ          | 22.8                 | 29.4  | 20.0                | 21.2                 | 28.4  | 6100                      | 0.166       |
|            | 1.6535     | 0.5906 | 0.748 | 0.709 | 0.945 | 0.024 | 0.012 |                     | 5130                 | 6610  | 4500                | 4770                 | 6380  |                           |             |
| 47         | 47         | 17     | 21    | 20    | 27    | 1.0   | 0.3   | NUTR1747            | 24.5                 | 33.3  | 22.0                | 28.1                 | 33.6  | 5300                      | 0.230       |
|            | 1.8504     | 0.6693 | 0.827 | 0.787 | 1.063 | 0.039 | 0.012 |                     | 5510                 | 7490  | 4950                | 6320                 | 7550  |                           |             |
| 47         | 47         | 17     | 21    | 20    | 27    | 1.0   | 0.3   | NUTR1747DZ          | 24.5                 | 33.3  | 22.0                | 28.1                 | 33.6  | 5300                      | 0.230       |
|            | 1.8504     | 0.6693 | 0.827 | 0.787 | 1.063 | 0.039 | 0.012 |                     | 5510                 | 7490  | 4950                | 6320                 | 7550  |                           |             |
| 47         | 47         | 20     | 25    | 24    | 32    | 1.0   | 0.3   | NUTR20              | 39.0                 | 53.2  | 28.1                | 20.5                 | 32.7  | 4500                      | 0.254       |
|            | 1.8504     | 0.7874 | 0.984 | 0.945 | 1.260 | 0.039 | 0.012 |                     | 8770                 | 12000 | 6320                | 4610                 | 7350  |                           |             |
| 47         | 47         | 20     | 25    | 24    | 32    | 1.0   | 0.3   | NUTR20DZ            | 39.0                 | 53.2  | 28.1                | 20.5                 | 32.7  | 4500                      | 0.254       |
|            | 1.8504     | 0.7874 | 0.984 | 0.945 | 1.260 | 0.039 | 0.012 |                     | 8770                 | 12000 | 6320                | 4610                 | 7350  |                           |             |
| 52         | 52         | 20     | 25    | 24    | 32    | 1.0   | 0.3   | NUTR2052            | 39.0                 | 53.2  | 31.6                | 31.0                 | 45.9  | 4500                      | 0.326       |
|            | 2.0472     | 0.7874 | 0.984 | 0.945 | 1.260 | 0.039 | 0.012 |                     | 8770                 | 12000 | 7100                | 6970                 | 10300 |                           |             |
| 52         | 52         | 20     | 25    | 24    | 32    | 1.0   | 0.3   | NUTR2052DZ          | 39.0                 | 53.2  | 31.6                | 31.0                 | 45.9  | 4500                      | 0.326       |
|            | 2.0472     | 0.7874 | 0.984 | 0.945 | 1.260 | 0.039 | 0.012 |                     | 8770                 | 12000 | 7100                | 6970                 | 10300 |                           |             |
| 52         | 52         | 25     | 25    | 24    | 37    | 1.0   | 0.3   | NUTR25              | 43.0                 | 63.1  | 29.6                | 22.2                 | 35.4  | 3700                      | 0.291       |
|            | 2.0472     | 0.9843 | 0.984 | 0.945 | 1.457 | 0.039 | 0.012 |                     | 9670                 | 14200 | 6650                | 4990                 | 7960  |                           |             |
| 52         | 52         | 25     | 25    | 24    | 37    | 1.0   | 0.3   | NUTR25DZ            | 43.0                 | 63.1  | 29.6                | 22.2                 | 35.4  | 3700                      | 0.291       |
|            | 2.0472     | 0.9843 | 0.984 | 0.945 | 1.457 | 0.039 | 0.012 |                     | 9670                 | 14200 | 6650                | 4990                 | 7960  |                           |             |
| 62         | 62         | 25     | 25    | 24    | 37    | 1.0   | 0.3   | NUTR2562            | 43.0                 | 63.1  | 36.0                | 43.9                 | 57.8  | 3700                      | 0.460       |
|            | 2.4409     | 0.9843 | 0.984 | 0.945 | 1.457 | 0.039 | 0.012 |                     | 9670                 | 14200 | 8090                | 9870                 | 13000 |                           |             |
| 62         | 62         | 25     | 25    | 24    | 37    | 1.0   | 0.3   | NUTR2562DZ          | 43.0                 | 63.1  | 36.0                | 43.9                 | 57.8  | 3700                      | 0.460       |
|            | 2.4409     | 0.9843 | 0.984 | 0.945 | 1.457 | 0.039 | 0.012 |                     | 9670                 | 14200 | 8090                | 9870                 | 13000 |                           |             |
| 62         | 62         | 30     | 29    | 28    | 44    | 1.0   | 0.3   | NUTR30              | 60.0                 | 83.1  | 40.8                | 29.0                 | 46.2  | 3200                      | 0.480       |
|            | 2.4409     | 1.1811 | 1.142 | 1.102 | 1.732 | 0.039 | 0.012 |                     | 13500                | 18700 | 9170                | 6520                 | 10400 |                           |             |
| 62         | 62         | 30     | 29    | 28    | 44    | 1.0   | 0.3   | NUTR30DZ            | 60.0                 | 83.1  | 40.8                | 29.0                 | 46.2  | 3200                      | 0.480       |
|            | 2.4409     | 1.1811 | 1.142 | 1.102 | 1.732 | 0.039 | 0.012 |                     | 13500                | 18700 | 9170                | 6520                 | 10400 |                           |             |

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## Stud Type and Yoke Type Track Rollers

| Outer Dia. | Dimensions |        |       |       |       |                |                | Bearing Designation | Load Ratings kN/lbf. |                |                |                     |                      | Limiting Speed Grease RPM | Wt. kg/lbs. |
|------------|------------|--------|-------|-------|-------|----------------|----------------|---------------------|----------------------|----------------|----------------|---------------------|----------------------|---------------------------|-------------|
|            | mm         | D      | d     | B     | C     | d <sub>a</sub> | r <sub>s</sub> |                     | r <sub>1s</sub>      | As a Bearing   |                | As a Track Roller   |                      |                           |             |
|            |            |        |       |       |       |                |                |                     | C                    | C <sub>0</sub> | C <sub>w</sub> | F <sub>r perm</sub> | F <sub>0r perm</sub> |                           |             |
| 72         | 72         | 30     | 29    | 28    | 44    | 1.0            | 0.3            | NUTR3072            | 60.0                 | 83.1           | 48.6           | 53.2                | 74.2                 | 3200                      | 0.711       |
|            | 2.8346     | 1.1811 | 1.142 | 1.102 | 1.732 | 0.039          | 0.012          |                     | 13500                | 18700          | 10900          | 12000               | 16700                |                           |             |
|            | 72         | 30     | 29    | 28    | 44    | 1.0            | 0.3            | NUTR3072DZ          | 60.0                 | 83.1           | 48.6           | 53.2                | 74.2                 | 3200                      | 0.711       |
|            | 2.8346     | 1.1811 | 1.142 | 1.102 | 1.732 | 0.039          | 0.012          |                     | 13500                | 18700          | 10900          | 12000               | 16700                |                           |             |
|            | 72         | 35     | 29    | 28    | 50    | 1.1            | 0.6            | NUTR35              | 65.5                 | 97.8           | 45.9           | 38.7                | 61.7                 | 2600                      | 0.655       |
|            | 2.8346     | 1.3780 | 1.142 | 1.102 | 1.969 | 0.043          | 0.024          |                     | 14700                | 22000          | 10300          | 8700                | 13900                |                           |             |
|            | 72         | 35     | 29    | 28    | 50    | 1.1            | 0.6            | NUTR35DZ            | 65.5                 | 97.8           | 45.9           | 38.7                | 61.7                 | 2600                      | 0.655       |
|            | 2.8346     | 1.3780 | 1.142 | 1.102 | 1.969 | 0.043          | 0.024          |                     | 14700                | 22000          | 10300          | 8700                | 13900                |                           |             |
| 80         | 80         | 35     | 29    | 28    | 50    | 1.1            | 0.6            | NUTR3580            | 65.5                 | 97.8           | 51.7           | 58.7                | 81.9                 | 2600                      | 0.865       |
|            | 3.1496     | 1.3780 | 1.142 | 1.102 | 1.969 | 0.043          | 0.024          |                     | 14700                | 22000          | 11600          | 13200               | 18400                |                           |             |
|            | 80         | 35     | 29    | 28    | 50    | 1.1            | 0.6            | NUTR3580DZ          | 65.5                 | 97.8           | 51.7           | 58.7                | 81.9                 | 2600                      | 0.865       |
|            | 3.1496     | 1.3780 | 1.142 | 1.102 | 1.969 | 0.043          | 0.024          |                     | 14700                | 22000          | 11600          | 13200               | 18400                |                           |             |
|            | 80         | 40     | 32    | 30    | 55    | 1.1            | 0.6            | NUTR40              | 88.0                 | 132            | 60.6           | 48.0                | 76.5                 | 2500                      | 0.848       |
|            | 3.1496     | 1.5748 | 1.260 | 1.181 | 2.165 | 0.043          | 0.024          |                     | 19800                | 29700          | 13600          | 10800               | 17200                |                           |             |
|            | 80         | 40     | 32    | 30    | 55    | 1.1            | 0.6            | NUTR40DZ            | 88.0                 | 132            | 60.6           | 48.0                | 76.5                 | 2500                      | 0.848       |
|            | 3.1496     | 1.5748 | 1.260 | 1.181 | 2.165 | 0.043          | 0.024          |                     | 19800                | 29700          | 13600          | 10800               | 17200                |                           |             |
| 85         | 85         | 45     | 32    | 30    | 60    | 1.1            | 0.6            | NUTR45              | 93.0                 | 146            | 62.0           | 50.2                | 80.0                 | 2200                      | 0.917       |
|            | 3.3465     | 1.7717 | 1.260 | 1.181 | 2.362 | 0.043          | 0.024          |                     | 20900                | 32800          | 13900          | 11300               | 18000                |                           |             |
|            | 85         | 45     | 32    | 30    | 60    | 1.1            | 0.6            | NUTR45DZ            | 93.0                 | 146            | 62.0           | 50.2                | 80.0                 | 2200                      | 0.917       |
|            | 3.3465     | 1.7717 | 1.260 | 1.181 | 2.362 | 0.043          | 0.024          |                     | 20900                | 32800          | 13900          | 11300               | 18000                |                           |             |
| 90         | 90         | 40     | 32    | 30    | 55    | 1.1            | 0.6            | NUTR4090            | 88.0                 | 132            | 69.1           | 75.4                | 111                  | 2500                      | 1.162       |
|            | 3.5433     | 1.5748 | 1.260 | 1.181 | 2.165 | 0.043          | 0.024          |                     | 19800                | 29700          | 15500          | 17000               | 25000                |                           |             |
|            | 90         | 40     | 32    | 30    | 55    | 1.1            | 0.6            | NUTR4090DZ          | 88.0                 | 132            | 69.1           | 75.4                | 111                  | 2500                      | 1.162       |
|            | 3.5433     | 1.5748 | 1.260 | 1.181 | 2.165 | 0.043          | 0.024          |                     | 19800                | 29700          | 15500          | 17000               | 25000                |                           |             |
|            | 90         | 50     | 32    | 30    | 65    | 1.1            | 0.6            | NUTR50              | 98.0                 | 160            | 63.3           | 52.9                | 84.3                 | 2000                      | 0.988       |
|            | 3.5433     | 1.9685 | 1.260 | 1.181 | 2.559 | 0.043          | 0.024          |                     | 22000                | 36000          | 14200          | 11900               | 19000                |                           |             |
|            | 90         | 50     | 32    | 30    | 65    | 1.1            | 0.6            | NUTR50DZ            | 98.0                 | 160            | 63.3           | 52.9                | 84.3                 | 2000                      | 0.988       |
|            | 3.5433     | 1.9685 | 1.260 | 1.181 | 2.559 | 0.043          | 0.024          |                     | 22000                | 36000          | 14200          | 11900               | 19000                |                           |             |
| 100        | 100        | 45     | 32    | 30    | 60    | 1.1            | 0.6            | NUTR45100           | 93.0                 | 146            | 74.3           | 92.2                | 127                  | 2200                      | 1.412       |
|            | 3.9370     | 1.7717 | 1.260 | 1.181 | 2.362 | 0.043          | 0.024          |                     | 20900                | 32800          | 16700          | 20700               | 28600                |                           |             |
|            | 100        | 45     | 32    | 30    | 60    | 1.1            | 0.6            | NUTR45100DZ         | 93.0                 | 146            | 74.3           | 92.2                | 127                  | 2200                      | 1.412       |
|            | 3.9370     | 1.7717 | 1.260 | 1.181 | 2.362 | 0.043          | 0.024          |                     | 20900                | 32800          | 16700          | 20700               | 28600                |                           |             |
| 110        | 110        | 50     | 32    | 30    | 65    | 1.1            | 0.6            | NUTR50110           | 98.0                 | 160            | 79.0           | 110                 | 141                  | 2000                      | 1.727       |
|            | 4.3307     | 1.9685 | 1.260 | 1.181 | 2.559 | 0.043          | 0.024          |                     | 22000                | 36000          | 17800          | 24700               | 31700                |                           |             |
|            | 110        | 50     | 32    | 30    | 65    | 1.1            | 0.6            | NUTR50110DZ         | 98.0                 | 160            | 79.0           | 110                 | 141                  | 2000                      | 1.727       |
|            | 4.3307     | 1.9685 | 1.260 | 1.181 | 2.559 | 0.043          | 0.024          |                     | 22000                | 36000          | 17800          | 24700               | 31700                |                           |             |



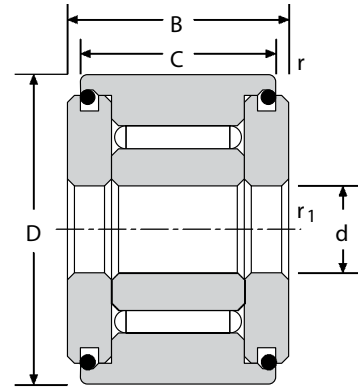


## NEEDLE ROLLER BEARINGS

### FULL COMPLEMENT, NON-SEPARABLE, SMALL SERIES, UNSEALED, YOKE TYPE (FP SERIES)

#### METRIC SERIES

FP: convex outer ring  
FPL: cylindrical outer ring



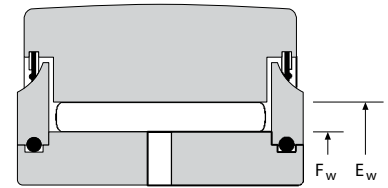
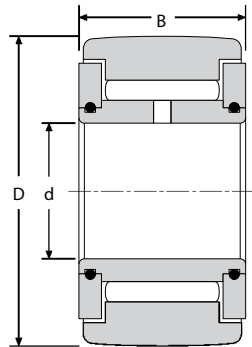
FP, FPL

| Outside Dia. | Dimensions mm/in. |        |       |       |                  |                   | Designation           |                          | Load Ratings kN/lbf. |                     |                      | Limiting Speed | Wt. kg/lbs. |
|--------------|-------------------|--------|-------|-------|------------------|-------------------|-----------------------|--------------------------|----------------------|---------------------|----------------------|----------------|-------------|
|              | D                 | d      | C     | B     | r <sub>min</sub> | r <sub>1min</sub> | Profiled Track Roller | Cylindrical Track Roller | Dynamic              | Static              |                      | Grease         |             |
| mm           | D                 | d      | C     | B     | r <sub>min</sub> | r <sub>1min</sub> |                       |                          | C                    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM            |             |
| 10           | 10                | 3      | 8     | 8.7   | 0.2              | 0.15              | FP 3 10               | FPL 3 10                 | 2.13                 | 1.16                | 2.05                 | 13800          | 0.004       |
|              | 0.3937            | 0.1181 | 0.315 | 0.343 | 0.008            | 0.006             |                       |                          | 480                  | 260                 | 460                  |                | 0.009       |
| 12           | 12                | 4      | 9     | 9.7   | 0.2              | 0.15              | FP 4 12               | FPL 4 12                 | 2.98                 | 1.82                | 3.35                 | 11400          | 0.006       |
|              | 0.4724            | 0.1575 | 0.354 | 0.382 | 0.008            | 0.006             |                       |                          | 670                  | 410                 | 750                  |                | 0.013       |
| 13           | 13                | 4      | 9     | 9.7   | 0.2              | 0.15              | FP 4 13               | FPL 4 13                 | 3.35                 | 2.45                | 3.95                 | 11400          | 0.008       |
|              | 0.5118            | 0.1575 | 0.354 | 0.382 | 0.008            | 0.006             |                       |                          | 750                  | 550                 | 890                  |                | 0.018       |
| 14           | 14                | 4      | 9     | 10.2  | 0.3              | 0.15              | FP 4 14               |                          | 3.50                 | 2.55                | 4.35                 | 10100          | 0.010       |
|              | 0.5512            | 0.1575 | 0.354 | 0.402 | 0.012            | 0.006             |                       | 790                      | 570                  | 980                 | 0.022                |                |             |
| 15           | 15                | 4      | 9     | 10.2  | 0.3              | 0.15              | FP 4 15               |                          | 3.50                 | 3.20                | 4.75                 | 10100          | 0.011       |
|              | 0.5906            | 0.1575 | 0.354 | 0.402 | 0.012            | 0.006             |                       | 790                      | 720                  | 1070                | 0.024                |                |             |

C

**FULL COMPLEMENT,  
NON-SEPARABLE,  
SEALED OR UNSEALED,  
YOKE TYPE (FG SERIES)  
METRIC SERIES**

FG: convex outer ring  
FGL: cylindrical outer ring



FG, FGL

| Outside Dia. | Dimensions mm/in. |        |        |       |                |                |                  |                   | Designation           |                          | Load Ratings kN/lbf. |                     |                      | Limiting Speed | Wt. kg/lbs. |
|--------------|-------------------|--------|--------|-------|----------------|----------------|------------------|-------------------|-----------------------|--------------------------|----------------------|---------------------|----------------------|----------------|-------------|
|              | mm                | D      | d      | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>min</sub> | r <sub>fmin</sub> | Profiled Track Roller | Cylindrical Track Roller | Dynamic              |                     | Static               | Grease         |             |
|              |                   |        |        |       |                |                |                  |                   |                       |                          | C                    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM            |             |
| 16           | 16                | 16     | 5      | 12    | 7.7            | 10.7           | 0.3              | 0.3               | FG 5 16               | FGL 5 16                 | 5.05                 | 3.25                | 5.40                 | 9300           | 0.016       |
|              |                   | 0.6299 | 0.1969 | 0.472 | 0.3031         | 0.4213         | 0.012            | 0.012             |                       |                          | 1140                 | 730                 | 1210                 |                | 0.035       |
|              |                   |        |        |       |                |                |                  |                   | FG 5 16 EE            | FGL 5 16 EE              | 5.05                 | 3.25                | 5.40                 | 9300           | 0.016       |
| 16           | 16                | 16     | 5      | 12    | 7.7            | 10.7           | 0.3              | 0.3               | FG 5 16 EEM           |                          | 5.05                 | 3.25                | 5.40                 | 9300           | 0.016       |
|              |                   | 0.6299 | 0.1969 | 0.472 | 0.3031         | 0.4213         | 0.012            | 0.012             |                       |                          | 1140                 | 730                 | 1210                 |                | 0.035       |
|              |                   |        |        |       |                |                |                  |                   | FG 6 19               | FGL 6 19                 | 5.80                 | 4.05                | 6.70                 | 7600           | 0.019       |
| 19           | 19                | 19     | 6      | 12    | 9.7            | 12.7           | 0.3              | 0.3               | FG 6 19 EE            | FGL 6 19 EE              | 5.80                 | 4.05                | 6.70                 | 7600           | 0.019       |
|              |                   | 0.7480 | 0.2362 | 0.472 | 0.3819         | 0.5000         | 0.012            | 0.012             |                       |                          | 1300                 | 910                 | 1510                 |                | 0.042       |
|              |                   |        |        |       |                |                |                  |                   | FG 6 19 EEM           | FGL 6 19 EEM             | 5.80                 | 4.05                | 6.70                 | 7600           | 0.019       |
| 19           | 19                | 19     | 6      | 12    | 9.7            | 12.7           | 0.3              | 0.3               | FG 6 19 EE            | FGL 6 19 EE              | 5.80                 | 4.05                | 6.70                 | 7600           | 0.019       |
|              |                   | 0.7480 | 0.2362 | 0.472 | 0.3819         | 0.5000         | 0.012            | 0.012             |                       |                          | 1300                 | 910                 | 1510                 |                | 0.042       |
|              |                   |        |        |       |                |                |                  |                   | FG 8 24               | FGL 8 24                 | 6.90                 | 6.60                | 9.20                 | 6300           | 0.037       |
| 24           | 24                | 24     | 8      | 13    | 12.0           | 15.0           | 0.3              | 0.3               | FG 8 24 EE            | FGL 8 24 EE              | 6.90                 | 6.60                | 9.20                 | 6300           | 0.037       |
|              |                   | 0.9449 | 0.3150 | 0.512 | 0.4724         | 0.5906         | 0.012            | 0.012             |                       |                          | 1550                 | 1480                | 2070                 |                | 0.082       |
|              |                   |        |        |       |                |                |                  |                   | FG 8 24 EEM           | FGL 8 24 EEM             | 6.90                 | 6.60                | 9.20                 | 6300           | 0.037       |
| 24           | 24                | 24     | 8      | 13    | 12.0           | 15.0           | 0.3              | 0.3               | FG 8 24 EEM           | FGL 8 24 EEM             | 6.90                 | 6.60                | 9.20                 | 6300           | 0.037       |
|              |                   | 0.9449 | 0.3150 | 0.512 | 0.4724         | 0.5906         | 0.012            | 0.012             |                       |                          | 1550                 | 1480                | 2070                 |                | 0.082       |
|              |                   |        |        |       |                |                |                  |                   | FG 8 24 15            | FGL 8 24 15              | 8.70                 | 8.50                | 12.3                 | 6300           | 0.044       |
| 24           | 24                | 24     | 8      | 15    | 12.0           | 15.0           | 0.3              | 0.3               | FG 8 24 15 EE         | FGL 8 24 15 EE           | 8.70                 | 8.50                | 12.3                 | 6300           | 0.044       |
|              |                   | 0.9449 | 0.3150 | 0.591 | 0.4724         | 0.5906         | 0.012            | 0.012             |                       |                          | 1960                 | 1910                | 2770                 |                | 0.097       |
|              |                   |        |        |       |                |                |                  |                   | FG 8 24 15 EEM        | FGL 8 24 15 EEM          | 8.70                 | 8.50                | 12.3                 | 6300           | 0.044       |
| 24           | 24                | 24     | 8      | 15    | 12.0           | 15.0           | 0.3              | 0.3               | FG 8 24 15 EEM        | FGL 8 24 15 EEM          | 8.70                 | 8.50                | 12.3                 | 6300           | 0.044       |
|              |                   | 0.9449 | 0.3150 | 0.591 | 0.4724         | 0.5906         | 0.012            | 0.012             |                       |                          | 1960                 | 1910                | 2770                 |                | 0.097       |
|              |                   |        |        |       |                |                |                  |                   | FG 10 30              | FGL 10 30                | 12.9                 | 8.50                | 15.5                 | 4800           | 0.066       |
| 30           | 30                | 30     | 10     | 15    | 15.2           | 20.2           | 0.6              | 0.3               | FG 10 30 EE           | FGL 10 30 EE             | 12.9                 | 8.50                | 15.5                 | 4800           | 0.066       |
|              |                   | 1.1811 | 0.3937 | 0.591 | 0.5984         | 0.7953         | 0.024            | 0.012             |                       |                          | 2900                 | 1910                | 3480                 |                | 0.146       |
|              |                   |        |        |       |                |                |                  |                   | FG 10 30 EEM          | FGL 10 30 EEM            | 12.9                 | 8.50                | 15.5                 | 4800           | 0.066       |
| 30           | 30                | 30     | 10     | 15    | 15.2           | 20.2           | 0.6              | 0.3               | FG 10 30 EEM          | FGL 10 30 EEM            | 12.9                 | 8.50                | 15.5                 | 4800           | 0.066       |
|              |                   | 1.1811 | 0.3937 | 0.591 | 0.5984         | 0.7953         | 0.024            | 0.012             |                       |                          | 2900                 | 1910                | 3480                 |                | 0.146       |
|              |                   |        |        |       |                |                |                  |                   | FG 12 32              | FGL 12 32                | 12.9                 | 8.30                | 16.2                 | 4200           | 0.077       |
| 32           | 32                | 32     | 12     | 15    | 17.6           | 22.6           | 0.6              | 0.3               | FG 12 32 EE           | FGL 12 32 EE             | 12.9                 | 8.30                | 16.2                 | 4200           | 0.077       |
|              |                   | 1.2598 | 0.4724 | 0.591 | 0.6929         | 0.8898         | 0.024            | 0.012             |                       |                          | 2900                 | 1870                | 3640                 |                | 0.170       |
|              |                   |        |        |       |                |                |                  |                   | FG 12 32 EEM          | FGL 12 32 EEM            | 12.9                 | 8.30                | 16.2                 | 4200           | 0.077       |
| 32           | 32                | 32     | 12     | 15    | 17.6           | 22.6           | 0.6              | 0.3               | FG 12 32 EEM          | FGL 12 32 EEM            | 12.9                 | 8.30                | 16.2                 | 4200           | 0.077       |
|              |                   | 1.2598 | 0.4724 | 0.591 | 0.6929         | 0.8898         | 0.024            | 0.012             |                       |                          | 2900                 | 1870                | 3640                 |                | 0.170       |
|              |                   |        |        |       |                |                |                  |                   | FG 15 35              | FGL 15 35                | 18.0                 | 12.2                | 25.6                 | 3750           | 0.103       |
| 35           | 35                | 35     | 15     | 19    | 20.1           | 25.2           | 0.6              | 0.3               | FG 15 35 EE           | FGL 15 35 EE             | 18.0                 | 12.2                | 25.6                 | 3750           | 0.103       |
|              |                   | 1.3780 | 0.5906 | 0.748 | 0.7929         | 0.9921         | 0.024            | 0.012             |                       |                          | 4050                 | 2740                | 5760                 |                | 0.227       |
|              |                   |        |        |       |                |                |                  |                   | FG 15 35 EEM          | FGL 15 35 EEM            | 18.0                 | 12.2                | 25.6                 | 3750           | 0.103       |
| 35           | 35                | 35     | 15     | 19    | 20.1           | 25.2           | 0.6              | 0.3               | FG 15 35 EEM          | FGL 15 35 EEM            | 18.0                 | 12.2                | 25.6                 | 3750           | 0.103       |
|              |                   | 1.3780 | 0.5906 | 0.748 | 0.7929         | 0.9921         | 0.024            | 0.012             |                       |                          | 4050                 | 2740                | 5760                 |                | 0.227       |
|              |                   |        |        |       |                |                |                  |                   | FG 15 35 EEM          | FGL 15 35 EEM            | 18.0                 | 12.2                | 25.6                 | 3750           | 0.103       |

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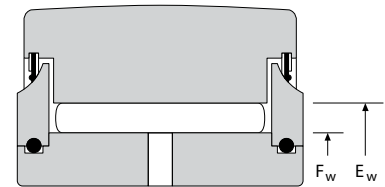
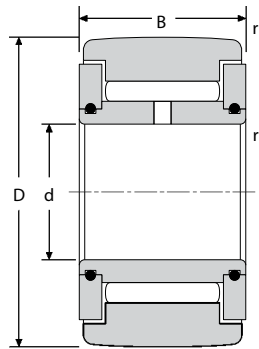


# NEEDLE ROLLER BEARINGS

**FULL COMPLEMENT,  
NON-SEPARABLE,  
SEALED OR UNSEALED,  
YOKE TYPE (FG SERIES) — *continued***

## METRIC SERIES

FG: convex outer ring  
FGL: cylindrical outer ring



FG, FGL

| Outside Dia. | Dimensions mm/in. |        |       |        |                |                |                   | Designation        |                       | Load Ratings kN/bf.      |                      |        | Limiting Speed | Wt. kg/lbs. |        |
|--------------|-------------------|--------|-------|--------|----------------|----------------|-------------------|--------------------|-----------------------|--------------------------|----------------------|--------|----------------|-------------|--------|
|              | mm                | D      | d     | B      | F <sub>w</sub> | E <sub>w</sub> | r <sub>smin</sub> | r <sub>1smin</sub> | Profiled Track Roller | Cylindrical Track Roller | Dynamic              | Static |                |             | Grease |
|              |                   |        |       |        |                |                |                   |                    | C                     | F <sub>r perm</sub>      | F <sub>0r perm</sub> | RPM    |                |             |        |
| 40           | 40                | 17     | 21    | 24.0   | 30.0           | 0.6            | 0.3               | FG 17 40           | FGL 17 40             | 22.3                     | 14.2                 | 31.0   | 3150           | 0.155       |        |
|              | 1.5748            | 0.6693 | 0.827 | 0.9449 | 1.1811         | 0.024          | 0.012             |                    |                       | 5010                     | 3190                 | 6970   |                |             |        |
|              | 40                | 17     | 21    | 24.0   | 30.0           | 0.6            | 0.3               | FG 17 40 EE        | FGL 17 40 EE          | 22.3                     | 14.2                 | 31.0   |                |             |        |
| 47           | 47                | 20     | 25    | 28.7   | 34.7           | 1.0            | 0.3               | FG 20 47           | FGL 20 47             | 28.3                     | 21.4                 | 44.5   | 2700           | 0.295       |        |
|              | 1.8504            | 0.7874 | 0.984 | 1.1299 | 1.3661         | 0.039          | 0.012             |                    |                       | 6360                     | 4810                 | 10000  |                |             |        |
|              | 47                | 20     | 25    | 28.7   | 34.7           | 1.0            | 0.3               | FG 20 47 EE        | FGL 20 47 EE          | 28.3                     | 21.4                 | 44.5   |                |             |        |
| 52           | 52                | 25     | 25    | 33.5   | 39.5           | 1.0            | 0.3               | FG 25 52           | FGL 25 52             | 29.0                     | 23.6                 | 48.0   | 2330           | 0.310       |        |
|              | 2.0472            | 0.9843 | 0.984 | 1.3189 | 1.5551         | 0.039          | 0.012             |                    |                       | 6520                     | 5310                 | 10800  |                |             |        |
|              | 52                | 25     | 25    | 33.5   | 39.5           | 1.0            | 0.3               | FG 25 52 EE        | FGL 25 52 EE          | 29.0                     | 23.6                 | 48.0   |                |             |        |
| 62           | 62                | 30     | 29    | 38.2   | 44.2           | 1.0            | 0.3               | FG 30 62           | FGL 30 62             | 38.5                     | 38.0                 | 73.0   | 2050           | 0.490       |        |
|              | 2.4409            | 1.1811 | 1.142 | 1.5039 | 1.7402         | 0.039          | 0.012             |                    |                       | 8660                     | 8540                 | 16400  |                |             |        |
|              | 62                | 30     | 29    | 38.2   | 44.2           | 1.0            | 0.3               | FG 30 62 EE        | FGL 30 62 EE          | 38.5                     | 38.0                 | 73.0   |                |             |        |
| 72           | 72                | 35     | 29    | 44.0   | 50.0           | 1.0            | 0.6               | FG 35 72           | FGL 35 72             | 43.5                     | 49.0                 | 90.0   | 1800           | 0.670       |        |
|              | 2.8346            | 1.3780 | 1.142 | 1.7323 | 1.9685         | 0.039          | 0.024             |                    |                       | 9780                     | 11000                | 20200  |                |             |        |
|              | 72                | 35     | 29    | 44.0   | 50.0           | 1.0            | 0.6               | FG 35 72 EE        | FGL 35 72 EE          | 43.5                     | 49.0                 | 90.0   |                |             |        |
| 80           | 80                | 40     | 32    | 49.7   | 55.7           | 1.0            | 0.6               | FG 40 80           |                       | 54.0                     | 66.0                 | 123    | 1620           | 0.890       |        |
|              | 3.1496            | 1.5748 | 1.260 | 1.9567 | 2.1929         | 0.039          | 0.024             |                    |                       | 12100                    | 14800                | 27700  |                |             |        |
|              | 80                | 40     | 32    | 49.7   | 55.7           | 1.0            | 0.6               | FG 40 80 EE        | FGL 40 80 EE          | 54.0                     | 66.0                 | 123    |                |             |        |
| 85           | 85                | 45     | 32    | 55.4   | 61.4           | 1.0            | 0.6               | FG 45 85 EE        |                       | 53.0                     | 69.0                 | 125    | 1450           | 0.970       |        |
|              | 3.3465            | 1.7717 | 1.260 | 2.1811 | 2.4173         | 0.039          | 0.024             |                    |                       | 11900                    | 15500                | 28100  |                |             |        |
|              | 85                | 45     | 32    | 55.4   | 61.4           | 1.0            | 0.6               | FG 45 85 EEM       | FGL 45 85 EEM         | 53.0                     | 69.0                 | 125    |                |             |        |
| 90           | 90                | 50     | 32    | 62.1   | 68.1           | 1.0            | 0.6               | FG 50 90           |                       | 51.0                     | 74.0                 | 123    | 1300           | 1.04        |        |
|              | 3.5433            | 1.9685 | 1.260 | 2.4449 | 2.6811         | 0.039          | 0.024             |                    |                       | 11500                    | 16600                | 27700  |                |             |        |

Continued on next page.

## Stud Type and Yoke Type Track Rollers

| Outside Dia. | Dimensions mm/in. |        |       |        |                |                |                 | Designation      |                       | Load Ratings kN/lbf.     |         |                     | Limiting Speed       | Wt. kg/lbs. |  |
|--------------|-------------------|--------|-------|--------|----------------|----------------|-----------------|------------------|-----------------------|--------------------------|---------|---------------------|----------------------|-------------|--|
|              | mm                | D      | B     | C      | F <sub>w</sub> | E <sub>w</sub> | r <sub>sm</sub> | r <sub>1sm</sub> | Profiled Track Roller | Cylindrical Track Roller | Dynamic | Static              | Grease               |             |  |
|              |                   |        |       |        |                |                |                 |                  |                       |                          | C       | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM         |  |
|              | 90                | 50     | 32    | 62.1   | 68.1           | 1.0            | 0.6             | FG 50 90 EE      | FGL 50 90 EE          | 51.0                     | 74.0    | 123                 | 1300                 | 1.04        |  |
|              | 3.5433            | 1.9685 | 1.260 | 2.4449 | 2.6811         | 0.039          | 0.024           |                  |                       | 11500                    | 16600   | 27700               |                      | 2.293       |  |
|              | 90                | 50     | 32    | 62.1   | 68.1           | 1.0            | 0.6             | FG 50 90 EEM     | FGL 50 90 EEM         | 51.0                     | 74.0    | 123                 | 1300                 | 1.04        |  |
|              | 3.5433            | 1.9685 | 1.260 | 2.4449 | 2.6811         | 0.039          | 0.024           |                  |                       | 11500                    | 16600   | 27700               |                      | 2.29        |  |
| 100          | 100               | 55     | 36    | 70.0   | 77.0           | 1.5            | 0.6             | FG 55 100        | FGL 55 100            | 60.0                     | 88.0    | 142                 | 1150                 | 1.35        |  |
|              | 3.9370            | 2.1654 | 1.417 | 2.7559 | 3.0315         | 0.059          | 0.024           |                  |                       | 13500                    | 19800   | 31900               |                      | 2.976       |  |
|              | 100               | 55     | 36    | 70.0   | 77.0           | 1.5            | 0.6             | FG 55 100 EEM    | FGL 55 100 EEM        | 60.0                     | 88.0    | 142                 | 1150                 | 1.35        |  |
|              | 3.9370            | 2.1654 | 1.417 | 2.7559 | 3.0315         | 0.059          | 0.024           |                  |                       | 13500                    | 19800   | 31900               |                      | 2.976       |  |
| 110          | 110               | 60     | 36    | 75.0   | 82.0           | 1.5            | 0.6             | FG 60 110        |                       | 67.0                     | 102     | 168                 | 1090                 | 1.65        |  |
|              | 4.3307            | 2.3622 | 1.417 | 2.9528 | 3.2283         | 0.059          | 0.024           |                  |                       | 15100                    | 22900   | 37800               |                      | 3.638       |  |
|              | 110               | 60     | 36    | 75.0   | 82.0           | 1.5            | 0.6             | FG 60 110 EEM    | FGL 60 110 EEM        | 67.0                     | 102     | 168                 | 1090                 | 1.65        |  |
|              | 4.3307            | 2.3622 | 1.417 | 2.9528 | 3.2283         | 0.059          | 0.024           |                  |                       | 15100                    | 22900   | 37800               |                      | 3.638       |  |
| 120          | 120               | 65     | 42    | 80.0   | 87.0           | 1.5            | 0.6             | FG 65 120        |                       | 83.0                     | 135     | 223                 | 1020                 | 2.35        |  |
|              | 4.7244            | 2.5591 | 1.654 | 3.1496 | 3.4252         | 0.059          | 0.024           |                  |                       | 18700                    | 30300   | 50100               |                      | 5.181       |  |
|              | 120               | 65     | 42    | 80.0   | 87.0           | 1.5            | 0.6             | FG 65 120 EEM    | FGL 65 120 EEM        | 83.0                     | 135     | 223                 | 1020                 | 2.35        |  |
|              | 4.7244            | 2.5591 | 1.654 | 3.1496 | 3.4252         | 0.059          | 0.024           |                  |                       | 18700                    | 30300   | 50100               |                      | 5.181       |  |
| 125          | 125               | 70     | 42    | 85.0   | 92.0           | 1.5            | 0.6             | FG 70 125 EEM    | FGL 70 125 EEM        | 83.0                     | 144     | 228                 | 960                  | 2.50        |  |
|              | 4.9213            | 2.7559 | 1.654 | 3.3465 | 3.6220         | 0.059          | 0.024           |                  |                       | 18700                    | 32400   | 51300               |                      | 5.512       |  |
| 130          | 130               | 75     | 42    | 90.0   | 97.0           | 1.5            | 0.6             | FG 75 130 EEM    |                       | 84.0                     | 155     | 234                 | 910                  | 2.65        |  |
|              | 5.1181            | 2.9528 | 1.654 | 3.5433 | 3.8189         | 0.059          | 0.024           |                  |                       | 18900                    | 34800   | 52600               |                      | 5.842       |  |
| 140          | 140               | 80     | 48    | 100.0  | 108.0          | 2.0            | 1.0             | FG 80 140        |                       | 99.0                     | 197     | 275                 | 820                  | 3.40        |  |
|              | 5.5118            | 3.1496 | 1.890 | 3.9370 | 4.2520         | 0.079          | 0.039           |                  |                       | 22300                    | 44300   | 61800               |                      | 7.496       |  |
|              | 140               | 80     | 48    | 100.0  | 108.0          | 2.0            | 1.0             | FG 80 140 EEM    | FGL 80 140 EEM        | 99.0                     | 197     | 275                 | 820                  | 3.40        |  |
|              | 5.5118            | 3.1496 | 1.890 | 3.9370 | 4.2520         | 0.079          | 0.039           |                  |                       | 22300                    | 44300   | 61800               |                      | 7.496       |  |
| 150          | 150               | 85     | 48    | 107.0  | 115.0          | 2.0            | 1.0             | FG 85 150        |                       | 105                      | 220     | 300                 | 770                  | 4.00        |  |
|              | 5.9055            | 3.3465 | 1.890 | 4.2126 | 4.5276         | 0.079          | 0.039           |                  |                       | 23600                    | 49500   | 67400               |                      | 8.818       |  |
|              | 150               | 85     | 48    | 107.0  | 115.0          | 2.0            | 1.0             | FG 85 150 EEM    |                       | 105                      | 220     | 300                 | 770                  | 4.00        |  |
|              | 5.9055            | 3.3465 | 1.890 | 4.2126 | 4.5276         | 0.079          | 0.039           |                  |                       | 23600                    | 49500   | 67400               |                      | 8.818       |  |
| 160          | 160               | 90     | 54    | 115.0  | 123.0          | 2.0            | 1.0             | FG 90 160 EEM    |                       | 120                      | 288     | 370                 | 710                  | 5.30        |  |
|              | 6.2992            | 3.5433 | 2.126 | 4.5276 | 4.8425         | 0.079          | 0.039           |                  |                       | 27000                    | 64700   | 83200               |                      | 11.7        |  |
| 170          | 170               | 95     | 54    | 120.0  | 128.0          | 2.0            | 1.0             | FG 95 170 EEM    |                       | 129                      | 302     | 410                 | 690                  | 6.00        |  |
|              | 6.6929            | 3.7402 | 2.126 | 4.7244 | 5.0394         | 0.079          | 0.039           |                  |                       | 29000                    | 67900   | 92200               |                      | 13.2        |  |
| 180          | 180               | 100    | 65    | 126.0  | 136.0          | 2.0            | 1.5             | FG 100 180       |                       | 175                      | 353     | 530                 | 650                  | 8.05        |  |
|              | 7.0866            | 3.9370 | 2.559 | 4.9606 | 5.3543         | 0.079          | 0.059           |                  |                       | 39300                    | 79400   | 119100              |                      | 17.8        |  |
|              | 180               | 100    | 65    | 126.0  | 136.0          | 2.0            | 1.5             | FG 100 180 EEM   | FGL 100 180 EEM       | 175                      | 353     | 530                 | 650                  | 8.05        |  |
|              | 7.0866            | 3.9370 | 2.559 | 4.9606 | 5.3543         | 0.079          | 0.059           |                  |                       | 39300                    | 79400   | 119100              |                      | 17.7        |  |
| 200          | 200               | 110    | 65    | 140.0  | 150.0          | 2.0            | 1.5             | FG 110 200 EEM   |                       | 189                      | 420     | 600                 | 590                  | 10.00       |  |
|              | 7.8740            | 4.3307 | 2.559 | 5.5118 | 5.9055         | 0.079          | 0.059           |                  |                       | 42500                    | 94400   | 134900              |                      | 22.0        |  |
| 215          | 215               | 120    | 65    | 150.0  | 160.0          | 2.0            | 1.5             | FG 120 215 EEM   |                       | 199                      | 486     | 660                 | 550                  | 11.50       |  |
|              | 8.4646            | 4.7244 | 2.559 | 5.9055 | 6.2992         | 0.079          | 0.059           |                  |                       | 44700                    | 103300  | 148400              |                      | 25.3        |  |
| 270          | 270               | 150    | 78    | 186.0  | 198.0          | 3.0            | 1.5             | FG 150 270 EEM   |                       | 290                      | 710     | 1020                | 440                  | 22.00       |  |
|              | 10.6299           | 5.9055 | 3.071 | 7.3228 | 7.7953         | 0.118          | 0.059           |                  |                       | 65200                    | 159600  | 229300              |                      | 48.5        |  |

C



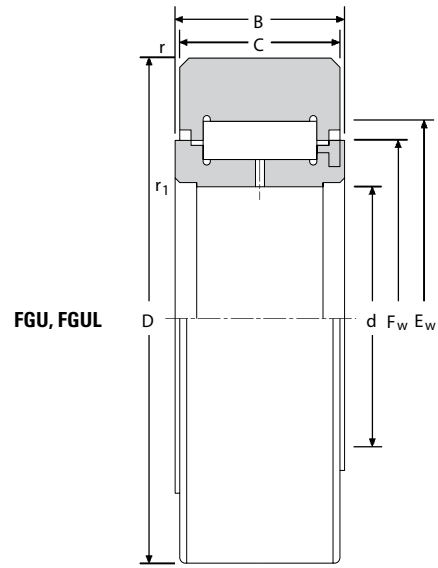


# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT, NON-SEPARABLE, LIGHT SERIES, WITH METAL SEALS YOKE TYPE (FGU...MM SERIES)

### METRIC SERIES

FGU: convex outer ring  
 FGUL: cylindrical outer ring

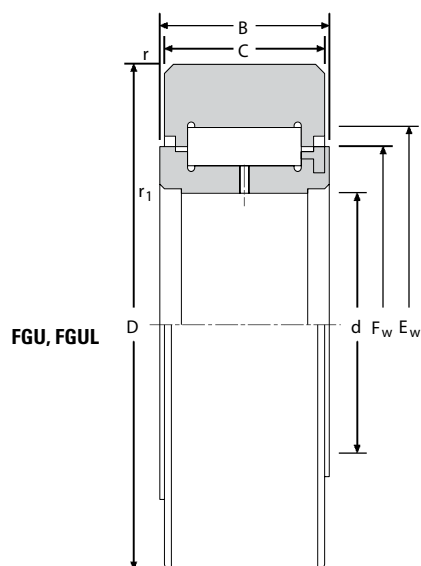


| Outside Dia. | Dimensions mm/in. |        |       |       |                |                |                    |                     | Designation           |                          | Load Ratings kN/lbf. |                     |                      | Limiting Speed<br>Grease<br>RPM | Wt.<br>kg/lbs.   |
|--------------|-------------------|--------|-------|-------|----------------|----------------|--------------------|---------------------|-----------------------|--------------------------|----------------------|---------------------|----------------------|---------------------------------|------------------|
|              | D                 | d      | C     | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s min</sub> | r <sub>1s min</sub> | Profiled Track Roller | Cylindrical Track Roller | Dynamic              | Static              | Static               |                                 |                  |
| mm           | D                 | d      | C     | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>s min</sub> | r <sub>1s min</sub> |                       |                          | C                    | F <sub>r perm</sub> | F <sub>0r perm</sub> |                                 |                  |
| 35           | 35                | 15     | 18    | 19    | 20.4           | 28.4           | 0.6                | 0.3                 | FGU 15 35             |                          | 7.80                 | 17.0                | 17.0                 | 5700                            | 0.096<br>0.212   |
|              | 1.3780            | 0.5906 | 0.709 | 0.748 | 0.8031         | 1.1181         | 0.024              | 0.012               |                       |                          | 1750                 | 3820                | 3820                 |                                 |                  |
|              | 35                | 15     | 18    | 19    | 20.4           | 28.4           | 0.6                | 0.3                 | FGU 15 35 MM          | FGUL 15 35 MM            | 7.80                 | 17.0                | 17.0                 | 5700                            | 0.096<br>0.212   |
|              | 1.3780            | 0.5906 | 0.709 | 0.748 | 0.8031         | 1.1181         | 0.024              | 0.012               |                       |                          | 1750                 | 3820                | 3820                 |                                 |                  |
| 40           | 40                | 17     | 20    | 21    | 23.0           | 31.0           | 0.6                | 0.3                 | FGU 17 40 MM          |                          | 11.5                 | 20.0                | 21.5                 | 5200                            | 0.142<br>0.313   |
|              | 1.5748            | 0.6693 | 0.787 | 0.827 | 0.9055         | 1.2205         | 0.024              | 0.012               |                       |                          | 2590                 | 4500                | 4830                 |                                 |                  |
| 47           | 47                | 20     | 24    | 25    | 27.1           | 37.1           | 1.0                | 0.3                 | FGU 20 47 MM          | FGUL 20 47 MM            | 15.5                 | 29.5                | 32.3                 | 4400                            | 0.235<br>0.518   |
|              | 1.8504            | 0.7874 | 0.945 | 0.984 | 1.0669         | 1.4606         | 0.039              | 0.012               |                       |                          | 3480                 | 6630                | 7260                 |                                 |                  |
| 52           | 52                | 25     | 24    | 25    | 31.8           | 41.8           | 1.0                | 0.3                 | FGU 25 52             |                          | 17.3                 | 31.5                | 36.0                 | 3800                            | 0.268<br>0.591   |
|              | 2.0472            | 0.9843 | 0.945 | 0.984 | 1.2520         | 1.6457         | 0.039              | 0.012               |                       |                          | 3890                 | 7080                | 8090                 |                                 |                  |
|              | 52                | 25     | 24    | 25    | 31.8           | 41.8           | 1.0                | 0.3                 | FGU 25 52 MM          | FGUL 25 52 MM            | 17.3                 | 31.5                | 36.0                 | 3800                            | 0.268<br>0.591   |
|              | 2.0472            | 0.9843 | 0.945 | 0.984 | 1.2520         | 1.6457         | 0.039              | 0.012               |                       |                          | 3890                 | 7080                | 8090                 |                                 |                  |
| 62           | 62                | 30     | 28    | 29    | 38.2           | 50.2           | 1.0                | 0.3                 | FGU 30 62 MM          |                          | 24.5                 | 44.5                | 54.00                | 3200                            | 0.454<br>1.001   |
|              | 2.4409            | 1.1811 | 1.102 | 1.142 | 1.5039         | 1.9764         | 0.039              | 0.012               |                       |                          | 5510                 | 10000               | 12100                |                                 |                  |
| 72           | 72                | 35     | 28    | 29    | 45.9           | 57.9           | 1.0                | 0.6                 | FGU 35 72 MM          | FGUL 35 72 MM            | 31.3                 | 50.0                | 66.0                 | 2700                            | 0.611<br>1.347   |
|              | 2.8346            | 1.3780 | 1.102 | 1.142 | 1.8071         | 2.2795         | 0.039              | 0.024               |                       |                          | 7040                 | 11200               | 14800                |                                 |                  |
| 80           | 80                | 40     | 30    | 32    | 51.6           | 63.6           | 1.0                | 0.6                 | FGU 40 80             |                          | 40.6                 | 59.0                | 84.0                 | 2400                            | 0.822<br>1.812   |
|              | 3.1496            | 1.5748 | 1.181 | 1.260 | 2.0315         | 2.5039         | 0.039              | 0.024               |                       |                          | 9130                 | 13300               | 18900                |                                 |                  |
|              | 80                | 40     | 30    | 32    | 51.6           | 63.6           | 1.0                | 0.6                 | FGU 40 80 MM          | FGUL 40 80 MM            | 40.6                 | 59.0                | 84.0                 | 2400                            | 0.822<br>1.812   |
|              | 3.1496            | 1.5748 | 1.181 | 1.260 | 2.0315         | 2.5039         | 0.039              | 0.024               |                       |                          | 9130                 | 13300               | 18900                |                                 |                  |
| 110          | 110               | 60     | 34    | 36    | 71.2           | 87.2           | 1.5                | 0.6                 | FGU 60 110 MM         |                          | 64.0                 | 88.0                | 129                  | 1800                            | 1.625<br>3.583   |
|              | 4.3307            | 2.3622 | 1.339 | 1.417 | 2.8031         | 3.4331         | 0.059              | 0.024               |                       |                          | 14400                | 19800               | 29000                |                                 |                  |
| 120          | 120               | 65     | 40    | 42    | 76.4           | 92.4           | 1.5                | 0.6                 | FGU 65 120            |                          | 89.0                 | 110                 | 174                  | 1700                            | 2.300<br>5.071   |
|              | 4.7244            | 2.5591 | 1.575 | 1.654 | 3.0079         | 3.6378         | 0.059              | 0.024               |                       |                          | 20000                | 24700               | 39100                |                                 |                  |
|              | 120               | 65     | 40    | 42    | 76.4           | 92.4           | 1.5                | 0.6                 | FGU 65 120 MM         |                          | 89.0                 | 110                 | 174                  | 1700                            | 2.300<br>5.071   |
|              | 4.7244            | 2.5591 | 1.575 | 1.654 | 3.0079         | 3.6378         | 0.059              | 0.024               |                       |                          | 20000                | 24700               | 39100                |                                 |                  |
| 125          | 125               | 70     | 40    | 42    | 81.5           | 97.5           | 1.5                | 0.6                 | FGU 70 125 MM         |                          | 93.0                 | 110                 | 180                  | 1600                            | 2.070<br>4.564   |
|              | 4.9213            | 2.7559 | 1.575 | 1.654 | 3.2087         | 3.8386         | 0.059              | 0.024               |                       |                          | 20900                | 24700               | 40500                |                                 |                  |
| 140          | 140               | 80     | 46    | 48    | 91.7           | 107.7          | 2.0                | 1.0                 | FGU 80 140 MM         |                          | 130                  | 138                 | 250                  | 1400                            | 3.450<br>7.606   |
|              | 5.5118            | 3.1496 | 1.811 | 1.890 | 3.6102         | 4.2402         | 0.079              | 0.039               |                       |                          | 29200                | 31000               | 56200                |                                 |                  |
| 160          | 160               | 90     | 52    | 54    | 101.8          | 121.8          | 2.0                | 1.0                 | FGU 90 160 MM         |                          | 166                  | 188                 | 327                  | 1300                            | 5.185<br>11.431  |
|              | 6.2992            | 3.5433 | 2.047 | 2.126 | 4.0079         | 4.7953         | 0.079              | 0.039               |                       |                          | 37300                | 42300               | 73500                |                                 |                  |
| 170          | 170               | 95     | 52    | 54    | 108.2          | 128.2          | 2.0                | 1.0                 | FGU 95 170 MM         |                          | 184                  | 198                 | 356                  | 1200                            | 5.925<br>13.062  |
|              | 6.6929            | 3.7402 | 2.047 | 2.126 | 4.2598         | 5.0472         | 0.079              | 0.039               |                       |                          | 41400                | 44500               | 80000                |                                 |                  |
| 200          | 200               | 110    | 63    | 65    | 124.1          | 144.1          | 2.0                | 1.5                 | FGU 110 200 MM        |                          | 310                  | 280                 | 590                  | 1100                            | 10.200<br>22.487 |
|              | 7.8740            | 4.3307 | 2.480 | 2.559 | 4.8858         | 5.6732         | 0.079              | 0.059               |                       |                          | 69700                | 62900               | 132600               |                                 |                  |
| 215          | 215               | 120    | 63    | 65    | 133.6          | 157.6          | 2.0                | 1.5                 | FGU 120 215           |                          | 310                  | 310                 | 600                  | 960                             | 11.560<br>25.485 |
|              | 8.4646            | 4.7244 | 2.480 | 2.559 | 5.2598         | 6.2047         | 0.079              | 0.059               |                       |                          | 69700                | 69700               | 134900               |                                 |                  |

**FULL COMPLEMENT, NON-SEPARABLE,  
HEAVY SERIES WITH METAL SEALS  
YOKE TYPE (FGU...MM SERIES)**

**METRIC SERIES**

FGU: convex outer ring  
FGUL: cylindrical outer ring



| Outside Dia. | Dimensions mm/in. |        |       |       |        |                |                |                 | Designation           |                          | Load Ratings kN/lbf. |        |                     | Limiting Speed       | Wt. kg/lbs. |
|--------------|-------------------|--------|-------|-------|--------|----------------|----------------|-----------------|-----------------------|--------------------------|----------------------|--------|---------------------|----------------------|-------------|
|              |                   |        |       |       |        |                |                |                 | Profiled Track Roller | Cylindrical Track Roller | Dynamic              | Static |                     | Grease               |             |
|              | mm                | D      | d     | C     | B      | F <sub>w</sub> | E <sub>w</sub> | r <sub>sm</sub> | r <sub>1sm</sub>      |                          |                      | C      | F <sub>r perm</sub> | F <sub>0r perm</sub> |             |
| 42           | 42                | 15     | 18    | 19    | 20.4   | 28.4           | 1.0            | 0.3             | FGU 15 42             | FGUL 15 42 MM            | 16.5                 | 24.0   | 27.0                | 5700                 | 0.153       |
|              | 1.6535            | 0.5906 | 0.709 | 0.748 | 0.8031 | 1.1181         | 0.039          | 0.012           |                       |                          | 3710                 | 5400   | 6070                |                      |             |
| 47           | 47                | 17     | 20    | 21    | 20.0   | 28.0           | 1.0            | 0.3             | FGU 17 47             | FGUL 17 47 MM            | 22.0                 | 26.7   | 32.0                | 5200                 | 0.214       |
|              | 1.8504            | 0.6693 | 0.787 | 0.827 | 0.7874 | 1.1024         | 0.039          | 0.012           |                       |                          | 4950                 | 6000   | 7190                |                      |             |
| 52           | 52                | 20     | 24    | 25    | 27.1   | 37.1           | 1.0            | 0.3             | FGU 20 52             | FGUL 20 52 MM            | 23.7                 | 36.5   | 42.5                | 4350                 | 0.268       |
|              | 2.0472            | 0.7874 | 0.945 | 0.984 | 1.0669 | 1.4606         | 0.039          | 0.012           |                       |                          | 5330                 | 8210   | 9550                |                      |             |
| 62           | 62                | 25     | 24    | 25    | 31.8   | 41.8           | 1.0            | 0.3             | FGU 25 62             | FGUL 25 62 MM            | 34.4                 | 44.0   | 57.0                | 3800                 | 0.435       |
|              | 2.4409            | 0.9843 | 0.945 | 0.984 | 1.2520 | 1.6457         | 0.039          | 0.012           |                       |                          | 7730                 | 9890   | 12800               |                      |             |
| 72           | 72                | 30     | 28    | 29    | 38.2   | 50.2           | 1.0            | 0.3             | FGU 30 72             | FGUL 30 72 MM            | 43.4                 | 60.0   | 80.0                | 3150                 | 0.681       |
|              | 2.8346            | 1.1811 | 1.102 | 1.142 | 1.5039 | 1.9764         | 0.039          | 0.012           |                       |                          | 9760                 | 13500  | 18000               |                      |             |
| 80           | 80                | 35     | 28    | 29    | 45.9   | 57.9           | 1.0            | 0.6             | FGU 35 80             | FGUL 35 80               | 45.6                 | 62.0   | 88.0                | 2700                 | 0.82        |
|              | 3.1496            | 1.3780 | 1.102 | 1.142 | 1.8071 | 2.2795         | 0.039          | 0.024           |                       |                          | 10300                | 13900  | 19800               |                      |             |
| 90           | 80                | 35     | 28    | 29    | 45.9   | 57.9           | 1.0            | 0.6             | FGU 35 80             | FGUL 35 80               | 45.6                 | 62.0   | 88.0                | 2700                 | 0.82        |
|              | 3.1496            | 1.3780 | 1.102 | 1.142 | 1.8071 | 2.2795         | 0.039          | 0.024           |                       |                          | 10300                | 13900  | 19800               |                      |             |
| 90           | 90                | 40     | 30    | 32    | 51.6   | 63.6           | 1.0            | 0.6             | FGU 40 90             | FGUL 40 90 MM            | 61.0                 | 75.0   | 116                 | 2440                 | 1.125       |
|              | 3.5433            | 1.5748 | 1.181 | 1.260 | 2.0315 | 2.5039         | 0.039          | 0.024           |                       |                          | 13700                | 16900  | 26100               |                      |             |
| 100          | 100               | 45     | 30    | 32    | 55.4   | 67.4           | 1.5            | 0.6             | FGU 45 100            | FGUL 45 100 MM           | 78.0                 | 85.0   | 138                 | 2290                 | 1.395       |
|              | 3.9370            | 1.7717 | 1.181 | 1.260 | 2.1811 | 2.6535         | 0.059          | 0.024           |                       |                          | 17500                | 19100  | 31000               |                      |             |
| 110          | 110               | 50     | 30    | 32    | 61.1   | 73.1           | 1.5            | 0.6             | FGU 50 110            | FGUL 50 110 MM           | 91.0                 | 91.0   | 157                 | 2100                 | 1.683       |
|              | 4.3307            | 1.9685 | 1.181 | 1.260 | 2.4055 | 2.8780         | 0.059          | 0.024           |                       |                          | 20500                | 20500  | 35300               |                      |             |
| 120          | 110               | 50     | 30    | 32    | 61.1   | 73.1           | 1.5            | 0.6             | FGU 50 110            | FGUL 50 110 MM           | 91.0                 | 91.0   | 157                 | 2100                 | 1.683       |
|              | 4.3307            | 1.9685 | 1.181 | 1.260 | 2.4055 | 2.8780         | 0.059          | 0.024           |                       |                          | 20500                | 20500  | 35300               |                      |             |
| 120          | 120               | 55     | 34    | 36    | 66.1   | 82.1           | 1.5            | 0.6             | FGU 55 120            | FGUL 55 120 MM           | 98.0                 | 113    | 176                 | 1900                 | 2.235       |
|              | 4.7244            | 2.1654 | 1.339 | 1.417 | 2.6024 | 3.2323         | 0.059          | 0.024           |                       |                          | 22000                | 25400  | 39600               |                      |             |
| 130          | 120               | 55     | 34    | 36    | 66.1   | 82.1           | 1.5            | 0.6             | FGU 55 120            | FGUL 55 120 MM           | 98.0                 | 113    | 176                 | 1900                 | 2.235       |
|              | 4.7244            | 2.1654 | 1.339 | 1.417 | 2.6024 | 3.2323         | 0.059          | 0.024           |                       |                          | 22000                | 25400  | 39600               |                      |             |
| 130          | 130               | 60     | 34    | 36    | 71.2   | 87.2           | 1.5            | 0.6             | FGU 60 130            | FGUL 60 130 MM           | 114                  | 121    | 197                 | 1770                 | 2.62        |
|              | 5.1181            | 2.3622 | 1.339 | 1.417 | 2.8031 | 3.4331         | 0.059          | 0.024           |                       |                          | 25600                | 27200  | 44300               |                      |             |
| 140          | 140               | 65     | 40    | 42    | 76.4   | 92.4           | 2.0            | 0.6             | FGU 65 140            | FGUL 65 140 MM           | 153                  | 145    | 254                 | 1650                 | 3.56        |
|              | 5.5118            | 2.5591 | 1.575 | 1.654 | 3.0079 | 3.6378         | 0.079          | 0.024           |                       |                          | 34400                | 32600  | 57100               |                      |             |
| 150          | 150               | 70     | 40    | 42    | 81.5   | 97.5           | 2.0            | 0.6             | FGU 70 150            | FGUL 70 150 MM           | 172                  | 153    | 277                 | 1570                 | 4.09        |
|              | 5.9055            | 2.7559 | 1.575 | 1.654 | 3.2087 | 3.8386         | 0.079          | 0.024           |                       |                          | 38700                | 34400  | 62300               |                      |             |
| 160          | 160               | 75     | 40    | 42    | 86.6   | 102.6          | 2.0            | 0.6             | FGU 75 160            | FGUL 75 160 MM           | 193                  | 160    | 300                 | 1480                 | 4.65        |
|              | 6.2992            | 2.9528 | 1.575 | 1.654 | 3.4094 | 4.0394         | 0.079          | 0.024           |                       |                          | 43400                | 36000  | 67400               |                      |             |
| 160          | 160               | 75     | 40    | 42    | 86.6   | 102.6          | 2.0            | 0.6             | FGU 75 160            | FGUL 75 160 MM           | 193                  | 160    | 300                 | 1480                 | 4.65        |
|              | 6.2992            | 2.9528 | 1.575 | 1.654 | 3.4094 | 4.0394         | 0.079          | 0.024           |                       |                          | 43400                | 36000  | 67400               |                      |             |

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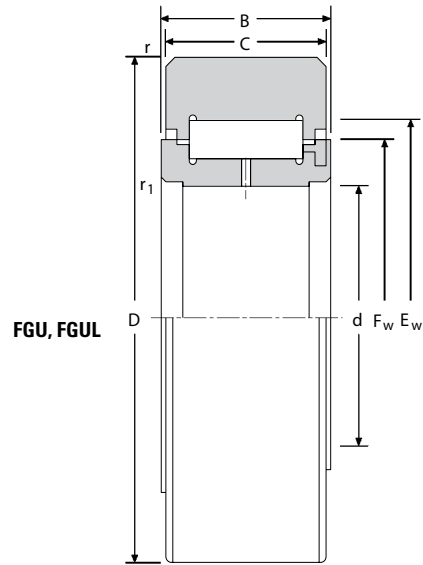


# NEEDLE ROLLER BEARINGS

## FULL COMPLEMENT, NON-SEPARABLE, HEAVY SERIES WITH METAL SEALS YOKE TYPE (FGU...MM SERIES) – *continued*

### METRIC SERIES

FGU: convex outer ring  
 FGUL: cylindrical outer ring



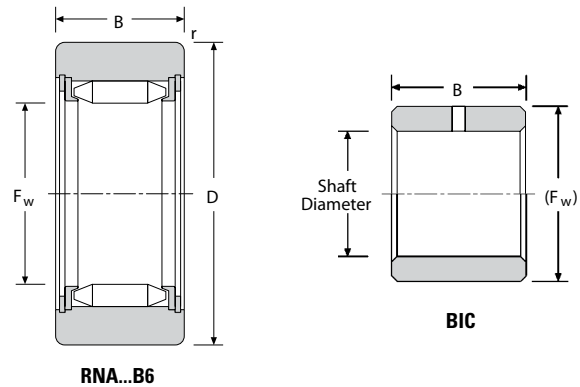
| Outside Dia. | Dimensions mm/in. |        |       |       |                |                |                   |                    | Designation                  |                          | Load Ratings kN/lbf. |                     |                      | Limiting Speed | Wt. kg/lbs. |
|--------------|-------------------|--------|-------|-------|----------------|----------------|-------------------|--------------------|------------------------------|--------------------------|----------------------|---------------------|----------------------|----------------|-------------|
|              | D                 | d      | C     | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>smin</sub> | r <sub>1smin</sub> | Profiled Track Roller        | Cylindrical Track Roller | Dynamic              | Static              | Grease               |                |             |
| mm           | D                 | d      | C     | B     | F <sub>w</sub> | E <sub>w</sub> | r <sub>smin</sub> | r <sub>1smin</sub> |                              |                          | C                    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM            |             |
| 170          | 170               | 80     | 46    | 48    | 91.7           | 107.7          | 2.0               | 1.0                | FGU 80 170                   |                          | 247                  | 190                 | 380                  | 1400           | 6.07        |
|              | 6.6929            | 3.1496 | 1.811 | 1.890 | 3.6102         | 4.2402         | 0.079             | 0.039              |                              |                          | 55500                | 42700               | 85400                |                |             |
|              | 170               | 80     | 46    | 48    | 91.7           | 107.7          | 2.0               | 1.0                | FGU 80 170 MM                |                          | 247                  | 190                 | 380                  | 1400           | 6.07        |
|              | 6.6929            | 3.1496 | 1.811 | 1.890 | 3.6102         | 4.2402         | 0.079             | 0.039              |                              |                          | 55500                | 42700               | 85400                |                |             |
| 180          | 180               | 85     | 46    | 48    | 95.5           | 115.5          | 2.0               | 1.0                | FGU 85 180                   |                          | 243                  | 215                 | 390                  | 1330           | 6.724       |
|              | 7.0866            | 3.3465 | 1.811 | 1.890 | 3.7598         | 4.5472         | 0.079             | 0.039              |                              |                          | 54600                | 48300               | 87700                |                |             |
|              | 180               | 85     | 46    | 48    | 95.5           | 115.5          | 2.0               | 1.0                | FGU 85 180 MM FGUL 85 180 MM |                          | 243                  | 215                 | 390                  | 1330           | 6.724       |
|              | 7.0866            | 3.3465 | 1.811 | 1.890 | 3.7598         | 4.5472         | 0.079             | 0.039              |                              |                          | 54600                | 48300               | 87700                |                |             |
| 190          | 190               | 90     | 52    | 54    | 101.8          | 121.8          | 2.0               | 1.0                | FGU 90 190 MM                |                          | 297                  | 250                 | 480                  | 1250           | 8.515       |
|              | 7.4803            | 3.5433 | 2.047 | 2.126 | 4.0079         | 4.7953         | 0.079             | 0.039              |                              |                          | 66800                | 56200               | 108000               |                |             |
| 260          | 260               | 120    | 63    | 65    | 133.6          | 157.6          | 3.0               | 1.5                | FGU 120 260 MM               |                          | 570                  | 395                 | 830                  | 960            | 19.750      |
|              | 10.2362           | 4.7244 | 2.480 | 2.559 | 5.2598         | 6.2047         | 0.118             | 0.059              |                              |                          | 128000               | 88800               | 187000               |                |             |
| 300          | 300               | 140    | 75    | 78    | 152.6          | 176.6          | 3.0               | 1.5                | FGU 140 300 MM               |                          | 860                  | 500                 | 1 160                | 850            | 31.265      |
|              | 11.8110           | 5.5118 | 2.953 | 3.071 | 6.0079         | 6.9528         | 0.118             | 0.059              |                              |                          | 193000               | 112000              | 261000               |                |             |

C

**FULL COMPLEMENT,  
WITHOUT INNER RING,  
UNSEALED, YOKE TYPE  
(RNA...B6, RNAB, RNAL SERIES)**

**SEPARATE INNER RINGS  
(BIC SERIES)**

**METRIC SERIES**



RNA...B6: Convex outer ring to maximum slope of 0.15%. Tolerance h9 on dim. D.  
 RNAB: Convex outer ring to maximum slope of 1.5%. Tolerance h9 on dim. D.  
 RNAL: Cylindrical outer ring. Tolerance h7 on dim. D.

| Outside Dia. | Dimensions mm/in. |                |             |                |                |                   | Bearing Designation Series |            |            | Load Ratings kN/lbf. |                     |                      | Limiting Speed | Wt. kg/lbs.    | Inner Ring Designation | Shaft Dia. |
|--------------|-------------------|----------------|-------------|----------------|----------------|-------------------|----------------------------|------------|------------|----------------------|---------------------|----------------------|----------------|----------------|------------------------|------------|
|              | D                 | d              | B           | F <sub>w</sub> | E <sub>w</sub> | r <sub>smin</sub> | RNA..B6                    | RNAB       | RNAL       | Dynamic              | Static              | Grease               | RPM            |                |                        |            |
| mm           | D                 | d              | B           | F <sub>w</sub> | E <sub>w</sub> | r <sub>smin</sub> | RNA..B6                    | RNAB       | RNAL       | C                    | F <sub>r perm</sub> | F <sub>0r perm</sub> | RPM            |                |                        |            |
| 19           | 19<br>0.7480      | 7.3<br>0.2874  | 12<br>0.472 | 7.3<br>0.287   | 12.3<br>0.484  | 0.35<br>0.014     | RNA 11005 B6               | RNAB 11005 |            | 5.10<br>1150         | 4.05<br>910         | 4.05<br>910          | 8700           | 0.019<br>0.042 |                        |            |
| 22           | 22<br>0.8661      | 9.7<br>0.3819  | 12<br>0.472 | 9.7<br>0.382   | 14.7<br>0.579  | 0.35<br>0.014     | RNA 11007 B6               | RNAB 11007 | RNAL 11007 | 6.00<br>1350         | 5.10<br>1150        | 5.20<br>1170         | 7000           | 0.022<br>0.049 |                        |            |
| 28           | 28<br>1.1024      | 12.1<br>0.4764 | 12<br>0.472 | 12.1<br>0.476  | 17.1<br>0.673  | 0.35<br>0.014     | RNA 11009 B6               | RNAB 11009 | RNAL 11009 | 7.40<br>1660         | 7.10<br>1600        | 7.10<br>1600         | 5800           | 0.028<br>0.062 |                        |            |
| 32           | 32<br>1.2598      | 17.6<br>0.6929 | 15<br>0.591 | 17.6<br>0.693  | 22.6<br>0.890  | 0.35<br>0.014     | RNA 11012 B6               | RNAB 11012 | RNAL 11012 | 10.8<br>2430         | 9.10<br>2050        | 12.7<br>2860         | 4200           | 0.032<br>0.071 | BIC 1012               | 12         |
| 35           | 35<br>1.3780      | 20.8<br>0.8189 | 15<br>0.591 | 20.8<br>0.819  | 25.8<br>1.016  | 0.65<br>0.026     | RNA 11015 B6               | RNAB 11015 |            | 10.8<br>2430         | 9.10<br>2050        | 13.4<br>3010         | 3650           | 0.035<br>0.077 | BIC 1015               | 15         |
| 42           | 42<br>1.6535      | 23.9<br>0.9409 | 15<br>0.591 | 23.9<br>0.941  | 28.9<br>1.138  | 0.65<br>0.026     | RNA 11017 B6               | RNAB 11017 | RNAL 11017 | 13.4<br>3010         | 13.9<br>3120        | 18.5<br>4160         | 3200           | 0.042<br>0.093 | BIC 1017               | 17         |
| 47           | 47<br>1.8504      | 28.7<br>1.1299 | 18<br>0.709 | 28.7<br>1.130  | 34.7<br>1.366  | 0.65<br>0.026     | RNA 11020 B6               | RNAB 11020 | RNAL 11020 | 16.8<br>3780         | 15.4<br>3460        | 23.0<br>5170         | 2700           | 0.047<br>0.104 | BIC 2020               | 20         |
| 52           | 52<br>2.0472      | 33.5<br>1.3189 | 18<br>0.709 | 33.5<br>1.319  | 39.5<br>1.555  | 0.65<br>0.026     | RNA 11025 B6               | RNAB 11025 |            | 17.2<br>3870         | 16.5<br>3710        | 24.7<br>5550         | 2330           | 0.052<br>0.115 | BIC 1025               | 25         |
| 62           | 62<br>2.4409      | 38.2<br>1.5039 | 22<br>0.866 | 38.2<br>1.504  | 44.2<br>1.740  | 0.65<br>0.026     | RNA 11030 B6               | RNAB 11030 |            | 28.5<br>6410         | 31.5<br>7080        | 49.5<br>11100        | 2050           | 0.062<br>0.137 | BIC 2030               | 30         |
| 72           | 72<br>2.8346      | 44.0<br>1.7323 | 22<br>0.866 | 44.0<br>1.732  | 50.0<br>1.969  | 0.65<br>0.026     | RNA 11035 B6               |            |            | 32.0<br>7190         | 41.0<br>9220        | 61.0<br>13700        | 1800           | 0.072<br>0.159 | BIC 2035               | 35         |
| 80           | 80<br>3.1496      | 49.7<br>1.9567 | 22<br>0.866 | 49.7<br>1.957  | 55.7<br>2.193  | 0.85<br>0.033     |                            | RNAB 11040 |            | 34.0<br>7640         | 47.0<br>10600       | 68.0<br>15300        | 1620           | 0.080<br>0.176 | BIC 2040               | 40         |
| 90           | 90<br>3.5433      | 62.1<br>2.4449 | 24<br>0.945 | 62.1<br>2.445  | 68.1<br>2.681  | 0.85<br>0.033     | RNA 11050 B6               |            |            | 32.5<br>7310         | 51.0<br>11500       | 68.0<br>15300        | 1300           | 0.090<br>0.198 | BIC 11050              | 50         |





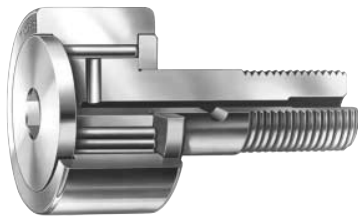


# NEEDLE ROLLER BEARINGS

## STUD TYPE AND YOKE TYPE TRACK ROLLERS

### INCH SERIES

Inch series track rollers listed in this catalog have been designed with the outer rings of large radial cross section to withstand heavy rolling or shock loads on track type or cam-controlled equipment.



CR with Stud



YCR for Yoke Mounting

### REFERENCE STANDARD:

- **ANSI/ABMA Std. 18.2** – Needle roller bearings – radial, inch design.

Before selecting specific inch series track rollers, the engineering section of this catalog should be reviewed.

C

### IDENTIFICATION

The type, special construction features, and size are designated by an identification code consisting of prefix letters followed by a dash and suffix numbers.

The initial prefix letters denote the type of track roller/cam follower. Additional prefix letters are used when it is necessary to denote special construction features. The suffix numbers following the prefix letters denote the size of the track roller. See Table 1.

The basic types are listed below:

- CR - regular stud type, full complement needle rollers, inch series
- YCR - yoke type, full complement needle rollers, inch series

Construction feature code letters for inch series track rollers are used as required, in the following order:

- S - seals with internal thrust washers
- B - hexagonal wrench socket in stud head (stud type only)
- C - profiled outer ring
- E - eccentric stud (stud type only)

Descriptions of typical examples, with complete letter codes combining basic type of bearing and construction features follow. See Table 2.

Since the entire identification code might not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for field or service replacement, to make certain that the correct unit with the correct lubricant is specified.

TABLE 1 – IDENTIFICATION CODE – INCH SERIES

| Prefix Letters |      |                       | Suffix Numbers |           |        | Complete    |
|----------------|------|-----------------------|----------------|-----------|--------|-------------|
| type           | plus | construction features | plus           | O.D. size | equals | Designation |
| CR             | plus | SBE                   | plus           | -16       | equals | CRSBE-16    |
| CR             | plus |                       |                | -16       | equals | CR-16       |

TABLE 2 – CODE DESCRIPTION – INCH SERIES

| Stud Types                                                                              |             |
|-----------------------------------------------------------------------------------------|-------------|
| Description                                                                             | Prefix Code |
| with seals and internal thrust washers                                                  | CRS         |
| with seals, internal thrust washers and profiled outer ring                             | CRSC        |
| with seals, internal thrust washers, hex socket and profiled outer ring                 | CRSBC       |
| with seals, internal thrust washers, hex socket, profiled outer ring and eccentric stud | CRSBCE      |
| Yoke Types                                                                              |             |
| with seals and internal thrust washers                                                  | YCRS        |
| with seals, internal thrust washers and profiled outer ring                             | YCRSC       |

### CONSTRUCTION

Timken products listed on the following pages have been designed with the outer ring of large radial cross section to withstand heavy rolling and shock loads on track type or cam-controlled equipment.

Regular stud type (CR) are designed with integral studs for cantilever mounting. When a regular stud type track roller is used within the permissible dynamic load ( $F_{r \text{ perm}}$ ) given in the tabular data, the ductile core of the stud provides the necessary toughness for and resistance to shock loads. A screwdriver slot or a hexagonal wrench socket in the head of the stud facilitates mounting.

Yoke type (YCR) are designed for straddle mounting. Each type is available with a full complement of needle rollers.

All inch series track roller have a black-oxide finish on all external surfaces.

### SEALED TRACK ROLLERS – INCH SERIES

Inch series sealed track rollers contain a lip type seal and an internal thrust washer. On some sizes of track rollers, the thrust washer and seal have been incorporated into a single component. Regardless of configuration, the thrust washer fits between the shoulders of the outer ring and inside faces of the steel retaining washer and flange of the stud. These washers reduce sliding friction and serve to increase the life of the bearing, particularly when it is infrequently relubricated or where misalignment occurs. In all cases, the external dimensions of the sealed bearings are the same as the unsealed bearings. The seals are thermally stable in a temperature range between  $-25^{\circ}\text{F}$  and  $+225^{\circ}\text{F}$ .

### PROFILED TRACK ROLLERS

These units are available with cylindrical or profiled outer rings.

Track rollers are designed with a profiled outer ring to alleviate the uneven bearing loading resulting from deflection, bending or misalignment in mounting.

To specify a profiled ring for any inch series track roller having a cylindrical outer ring, add the letter "C" at the end of the prefix code. For example:

- prefix CR – regular stud type, full complement of needle rollers and cylindrical outer ring
- prefix CRC – same as above, but with profiled outer ring.

The O.D. tolerance of profiled track rollers is  $+0.000 - 0.002$  inch. The profile radii are listed in Table 3.

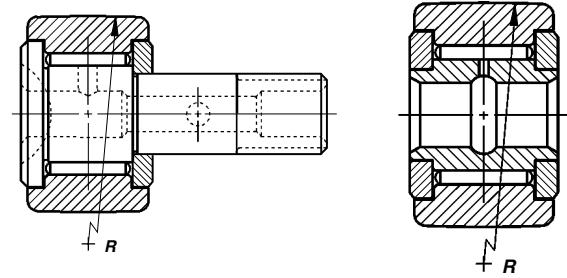
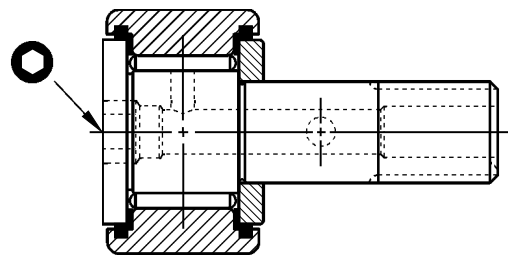


TABLE 3 – PROFILE RADIUS FOR TYPES CRC, CRSC, CRSBC, YCRC, YCRSC

| Size Designation<br>(suffix) | R Profile Radius (approx.)<br>inch | Size Designation<br>(suffix) | R Profile Radius (approx.)<br>inch |
|------------------------------|------------------------------------|------------------------------|------------------------------------|
| -8                           | 6                                  | -28                          | 20                                 |
| -8-1                         | 7                                  | -30                          | 20                                 |
| -10                          | 7                                  | -32                          | 24                                 |
| -10-1                        | 8                                  | -36                          | 24                                 |
| -12                          | 10                                 | -40                          | 30                                 |
| -14                          | 10                                 | -44                          | 30                                 |
| -16                          | 12                                 | -48                          | 30                                 |
| -18                          | 12                                 | -52                          | 30                                 |
| -20                          | 14                                 | -56                          | 30                                 |
| -22                          | 14                                 | -64                          | 30                                 |
| -24                          | 20                                 |                              |                                    |
| -26                          | 20                                 |                              |                                    |

### HEXAGONAL SOCKETS

Smaller sizes of regular inch series stud type units have a screwdriver slot or a hexagonal socket in the flanged end of the stud to facilitate mounting. Larger sizes have a socket to accommodate a hexagonal wrench. Wrench sizes are listed in Table 4.





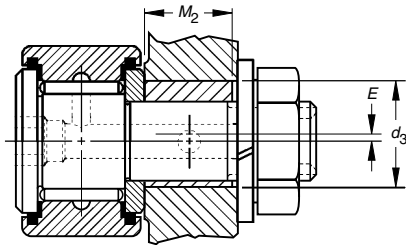
## NEEDLE ROLLER BEARINGS

### ECCENTRIC STUDS

To provide radial adjustment of the outer ring toward the track or cam surface at the time of installation, the regular inch series stud types are available with eccentric studs which are specified by adding the letter "E" to the construction feature code:

prefix CRSBE – regular stud type track roller with full complement of needle rollers, two seals, with internal thrust washers, hexagonal wrench socket in stud head, and eccentric stud.

Pertinent dimensions of the eccentric stud are listed in Table 5.



Since a track roller with an eccentric stud is usually adjusted upon installation by turning the stud in the mounting hole, a close clearance fit between the outside diameter of the bushing and the mounting hole is necessary. For turning the stud, a hexagonal wrench is generally more convenient than a screwdriver, and an option for a hexagonal wrench socket in the head of the stud should be exercised.

Some applications may require more secure positioning than provided by the tightened stud nut. If so, it is suggested that the housing and eccentric bushing be drilled at the time of installation to accept a locating dowel pin.

TABLE 4 – HEXAGONAL WRENCH SIZES – INCH SERIES

| Size Designation (suffix) | Wrench Size Inch | Size Designation (suffix) | Wrench Size Inch |
|---------------------------|------------------|---------------------------|------------------|
| -8                        | 1/8              | -28                       | 5/16             |
| -8-1                      | 1/8              | -30                       | 5/16             |
| -10                       | 1/8              | -32                       | 7/16             |
| -10-1                     | 1/8              | -36                       | 7/16             |
| -12                       | 3/16             | -40                       | 1/2              |
| -14                       | 3/16             | -44                       | 1/2              |
| -16                       | 1/4              | -48                       | 3/4              |
| -18                       | 1/4              | -52                       | 3/4              |
| -20                       | 1/4              | -56                       | 3/4              |
| -22                       | 1/4              | -64                       | 3/4              |
| -24                       | 5/16             |                           |                  |
| -26                       | 5/16             |                           |                  |

TABLE 5 – ECCENTRIC BUSHING DIMENSIONS  
REGULAR STUD TYPE (TYPE CR)

| Size Designation (suffix) | Bushing Outside Diameter +0.001 -0.001 | Inch Bushing Width +0.000 -0.010 | Eccentricity |
|---------------------------|----------------------------------------|----------------------------------|--------------|
|                           | $D_e$                                  | $B_e$                            | $e$          |
| -8-1                      | 0.250                                  | 0.375                            | 0.010        |
| -10-1                     | 0.375                                  | 0.437                            | 0.015        |
| -12                       | 0.500                                  | 0.500                            | 0.015        |
| -14                       | 0.500                                  | 0.500                            | 0.015        |
| -16                       | 0.625                                  | 0.500                            | 0.030        |
| -18                       | 0.625                                  | 0.500                            | 0.030        |
| -20                       | 0.687                                  | 0.625                            | 0.030        |
| -22                       | 0.687                                  | 0.625                            | 0.030        |
| -24                       | 0.875                                  | 0.750                            | 0.030        |
| -26                       | 0.875                                  | 0.750                            | 0.030        |
| -28                       | 1.000                                  | 0.875                            | 0.030        |
| -30                       | 1.000                                  | 0.875                            | 0.030        |
| -32                       | 1.187                                  | 1.000                            | 0.030        |
| -36                       | 1.187                                  | 1.000                            | 0.030        |
| -40                       | 1.375                                  | 1.125                            | 0.030        |
| -44                       | 1.375                                  | 1.125                            | 0.030        |
| -48                       | 1.750                                  | 1.250                            | 0.060        |
| -52                       | 1.750                                  | 1.250                            | 0.060        |
| -56                       | 1.812                                  | 1.375                            | 0.060        |
| -64                       | 2.000                                  | 2.000                            | 0.060        |

\* To ensure proper clamping of the stud, the housing should be slightly wider than the maximum width of the eccentric bushing.

### LOAD RATINGS

#### DYNAMIC LOADING AS A TRACK ROLLER

When the outer ring of a stud type or yoke type track roller runs on a track, the contact under a radial load causes elastic (oval) deformation of the outer ring. As a result, a smaller zone of the raceway is loaded and the load is distributed on fewer needle rollers. This in turn affects the track roller's dynamic and static load ratings. Also, this deformation generates bending stress in the outer ring which must not exceed the maximum permitted for the material of the outer ring. The maximum permissible dynamic ( $F_{rperm}$ ) radial load condition is determined by this requirement.

The rating life of a stud type or yoke type track roller should be calculated using the dynamic load ratings  $C_w$  shown in the tables. The tables also show the maximum permissible radial load,  $F_{rperm}$  that can be dynamically applied on the stud type or yoke type track rollers. However, to calculate the  $L_{10}$  life of a track roller, the applied radial load must not be greater than  $C_w/4$  based on ideal operating conditions of alignment, lubrication, temperature, speed and accelerations.

**STATIC LOADING**

In addition to the basic static load rating  $C_0$ , the tables also list the maximum permissible static radial load  $F_{0r\ perm}$  that may be applied to a stud type or yoke type track roller. The values of  $F_{0r\ perm}$  result in a minimum static factor  $f_s$  of 0.7 for the worst condition of internal load distribution in inch series track roller operation. The  $F_{0r\ perm}$  values must not be exceeded. The static factor  $f_s$  can be calculated using the following formula:

$$f_s \geq 0.7 \cdot \frac{F_{0r\ perm}}{P_{0r}}$$

where

$F_{0r\ perm}$  = Maximum permissible static radial load

$P_{0r}$  = Equivalent static load

$P_{0r} = F_{0r}$  for yoke type track rollers

$F_{0r}$  = Static radial load

$f_s$  = Static factor whose values should not be smaller than those suggested in table 6

**TABLE 6 – SUGGESTED VALUES FOR STATIC FACTORS  $f_s$  FOR INCH SERIES TRACK ROLLERS**

| Requirements For Yoke Type Track Rollers And Stud Type Track Rollers         | Suggested $f_s$ Values |
|------------------------------------------------------------------------------|------------------------|
| High shock-type loads                                                        |                        |
| Quiet running                                                                | 1.5...2.5              |
| Normal loading                                                               |                        |
| Normal quietness of running                                                  | 1...1.5                |
| Minor impact loads and rotary motion particularly quiet running not required | 0.7...1                |

**MOUNTING**

The surface of the hole in the machine element, which supports the stud or the mounting shaft, must not deform under the expected load, and the support should be sufficiently rigid to resist bending loads.

Deformation and bending will cause uneven loading of the outer ring.

In mounting the stud type track roller, the retaining washer must be firmly backed up by a flat shoulder which is square with the stud center line. The shoulder diameter must be no smaller than the minimum clamping diameter ( $d_a$ ) listed in the tabular data.

The maximum inherent strength of the stud is obtained when the unit is supported as close as possible to the retaining washer, which minimizes the bending moment. For this reason, the edge of the housing which supports the stud shank should be kept as sharp as possible, but free from burrs.

To minimize deflection in mounted stud type track rollers, the stud shank should be housed with the fit ( $d_b$ ) shown in the tabular data. The clamping nut should not be tightened with a torque value higher than the maximum listed. A screwdriver slot or hexagonal socket in the end of the stud is provided for a tool to prevent the stud from turning when the nut is being tightened. Since the bottom of the screwdriver slot is not flat, it is helpful to put a radius on the tip of the screwdriver being used to hold the stud more securely.

When the stud shank is housed with an interference fit, installation force should be applied only to the center portion of the flanged end of the stud, preferably with an arbor press.

When the loads are high, the yoke type track rollers should be mounted on a high strength bolt or shaft with the tight transition fit listed in the tabular data. The bearing should be clamped between flat and parallel faces at right angles to the axis to prevent the retaining washers from coming off under load. If the bearing cannot be clamped, a close axial fit in the yoke is required.

When the applied loads are light to moderate, the inner ring of a yoke type track roller may be mounted on an unhardened shaft or bolt with the loose transition fit listed in the tabular data. Again, the retaining washers should be backed up axially to prevent their coming off under load.





## NEEDLE ROLLER BEARINGS

### LUBRICATION

All inch series stud type track rollers with a screwdriver slot in the flanged end of the stud have provisions for lubrication through the flanged end of the stud. The 12 and larger sizes of inch series stud type track rollers with screwdriver slots have provisions for relubrication through either end of the stud and through a cross-drilled hole in the shank. The ends of the axial holes are counterbored to accept drive type grease lubrication fittings. Hole diameters for these grease fittings are listed in the tables of dimensions.

Sizes 8 through 10-1 of the inch series stud type track rollers with a hexagonal socket in the flanged end of the stud cannot be relubricated. Size 12 and up have relubrication provisions in the threaded end of the stud and a cross-drilled hole in the shank. At the threaded end of the stud, the axial hole is counterbored to receive a drive type grease fitting. Sizes 12 through 22 and 48 through 64 of inch series stud type track rollers with hexagonal sockets also have provisions for relubrication through the hex socket in the flanged end of the stud. Sizes 48 through 64 are supplied with lubrication fittings which may be installed in the axial hole in the bottom of the hexagonal slot in the head end of the stud, at a depth which allows the hexagonal wrench to be inserted in the wrench socket without damaging the grease fitting.

Plugs are furnished with stud type track rollers to close off unused holes. If the cross-drilled hole in the stud shank is not used, it will be covered when the track roller is installed properly.

Most inch series yoke type track rollers are produced with lubrication holes and grooves in the inner ring bores so they can be relubricated through axially and radially drilled holes in the supporting shaft or bolt.

Oil is the preferred lubricant for all types. Use continuous oil lubrication or frequent grease lubrication for steady rotating conditions. Applications involving slow, intermittent oscillation are not as critical, and longer intervals between relubrication are permissible. Both stud and yoke type track rollers are normally supplied with medium temperature grease lubrication.

### SPECIAL TRACK ROLLERS/ CAM FOLLOWERS

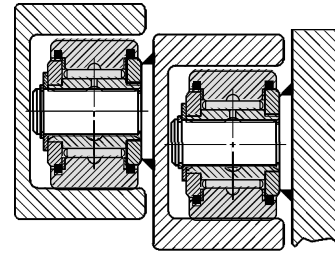
Track rollers can be obtained with dimensions different from those in the tabular data, if the quantities permit economical production. For these and other modifications please consult your Timken representative.

C



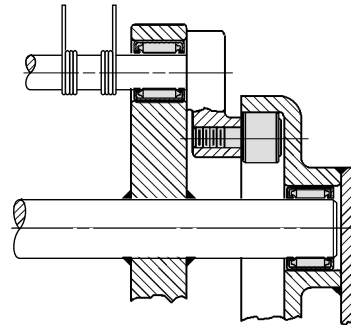
### FORKLIFT TRUCK

Yoke type sealed units serve as high capacity and rugged guide rollers for lift trucks. Their design permits them to be mounted on studs welded to the structure. The seals exclude foreign matter and extend the time between relubrication periods.



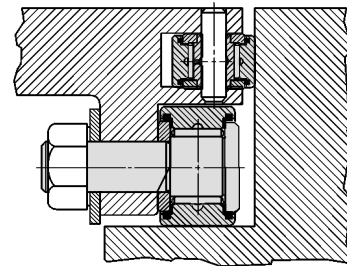
### HAY BALER

Stud types are important components on many different types of farm equipment because of their required long service life under punishing loads and severe operating conditions. Needle bearings provide dependable and economical operation in the windrow pickup of hay balers.



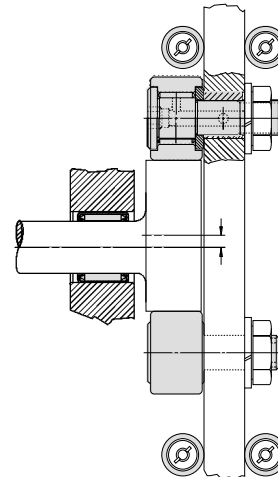
### MACHINE WAY

Heavily loaded machine tool tables must travel freely and accurately. Stud and yoke type sealed units, in combination, support and guide such tables under the most severe conditions. The high capacity and the very low wear rate permit heavy loads to be carried without impairing the accuracy of the table's travel. The seals exclude dirt and chips and make the need for relubrication infrequent.



### RECIPROCATING SLIDE

Stud types find wide application in feeding and advancing mechanisms on metalworking presses. The rotary motion of an eccentric cam rotating between two cam followers mounted on a slide imparts reciprocating linear motion to the slide. Dwell periods as well as accuracy in both rapid and slow linear actuation of the slide are made possible.





# NEEDLE ROLLER BEARINGS

## STUD TYPE TRACK ROLLERS CR, CRS SERIES

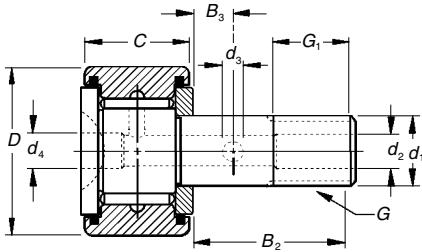
### INCH SERIES

- Screwdriver slot in head facilitates mounting.
- Nonseparable, sealed unit with outer ring, full complement of needle rollers, stud seals, self-lubricating resin internal thrust washers, and stud-fastened retaining washer.
- Seals help retain lubricant and exclude foreign matter (CRS Series).
- Relubrication via axially drilled hole through stud with cross-drilled holes in stud raceway and shank.
- Recessed axial hole accepts standard nominal inch drive-type grease lubrication fitting.
- Lubrication fitting plugs furnished to close off unused holes.
- Tolerance limits for outside diameters of stud and outer ring refer to "single mean diameter" (see engineering section).
- A close fit between stud and hole required for mounting.
- Bore dimensions given below result in varying fit (0.0010 in. tight to 0.0005 in. loose).
- Retaining washer should be firmly backed up by flat housing shoulder (perpendicular to the stud axis).
- Shoulder diameter should be at least same size as minimum clamping diameter listed.
- May be mounted with two thin lock nuts or nut and lock washer.

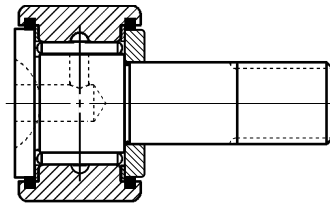
| Outside Diameter | Dimensions mm/in.  |                   |                   |                |                |                |                                 |                |         |     | Track Roller Designation |                                        |
|------------------|--------------------|-------------------|-------------------|----------------|----------------|----------------|---------------------------------|----------------|---------|-----|--------------------------|----------------------------------------|
|                  | +0.25<br>-0        | +0<br>-.025       | +0<br>-.13        |                |                |                |                                 |                |         |     | Without Seals            | With Seals And Internal Thrust Washers |
|                  | +0.0010<br>-0.0000 | +0.0000<br>-0.001 | +0.0000<br>-0.005 | (nom.)         | Min.           |                |                                 |                |         | UNF |                          |                                        |
| in.              | d <sub>1</sub>     | D                 | C                 | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> , d <sub>2</sub> | d <sub>3</sub> | G       |     |                          |                                        |
| 1/2              | 4.826              | 12.70             | 8.74              | 12.70          |                | 6.35           | 3.18                            |                |         |     | CR-8                     | CRS-8                                  |
|                  | 0.1900             | 0.500             | 0.344             | 0.500          | —              | 0.250          | .125*                           | —              | 10-32   |     |                          |                                        |
| 5/8              | 4.826              | 12.70             | 9.53              | 15.88          |                | 6.35           | 3.18                            |                |         |     | CR-8-1                   | CRS-8-1                                |
|                  | 0.1900             | 0.500             | 0.375             | 0.625          | —              | 0.250          | .125*                           | —              | 10-32   |     |                          |                                        |
| 5/8              | 6.350              | 15.88             | 10.31             | 15.88          |                | 7.92           | 3.18                            |                |         |     | CR-10                    | CRS-10                                 |
|                  | 0.2500             | 0.625             | 0.406             | 0.625          | —              | 0.312          | .125*                           | —              | 1/4-28  |     |                          |                                        |
| 3/4              | 6.350              | 15.88             | 11.13             | 19.05          |                | 7.92           | 3.18                            |                |         |     | CR-10-1                  | CRS-10-1                               |
|                  | 0.2500             | 0.625             | 0.438             | 0.750          | —              | 0.312          | .125*                           | —              | 1/4-28  |     |                          |                                        |
| 3/4              | 9.525              | 19.05             | 12.70             | 22.23          | 6.35           | 9.53           | 3.18                            |                |         |     | CR-12                    | CRS-12                                 |
|                  | 0.3750             | 0.750             | 0.500             | 0.875          | 0.250          | 0.375          | 0.188                           | 0.094          | 3/8-24  |     |                          |                                        |
| 7/8              | 9.525              | 22.23             | 12.70             | 22.23          | 6.35           | 9.53           | 3.18                            | 2.39           |         |     | CR-14                    | CRS-14                                 |
|                  | 0.3750             | 0.875             | 0.500             | 0.875          | 0.250          | 0.375          | 0.188                           | 0.094          | 3/8-24  |     |                          |                                        |
| 1                | 11.113             | 25.40             | 15.88             | 25.40          | 6.35           | 12.70          | 3.18                            | 3.18           |         |     | CR-16                    | CRS-16                                 |
|                  | 0.4375             | 1.000             | 0.625             | 1.000          | 0.250          | 0.500          | 0.188                           | 0.125          | 7/16-20 |     |                          |                                        |
| 1 1/8            | 11.113             | 28.58             | 15.88             | 25.40          | 6.35           | 12.70          | 3.18                            | 3.18           |         |     | CR-18                    | CRS-18                                 |
|                  | 0.4375             | 1.125             | 0.625             | 1.000          | 0.250          | 0.500          | 0.188                           | 0.125          | 7/16-20 |     |                          |                                        |
| 1 1/4            | 12.700             | 31.75             | 19.05             | 31.75          | 7.92           | 15.88          | 3.18                            | 3.18           |         |     | CR-20                    | CRS-20                                 |
|                  | 0.5000             | 1.250             | 0.750             | 1.250          | 0.312          | 0.625          | 0.188                           | 0.125          | 1/2-20  |     |                          |                                        |
| 1 3/8            | 12.700             | 34.93             | 19.05             | 31.75          | 7.92           | 15.88          | 3.18                            | 3.18           |         |     | CR-22                    | CRS-22                                 |
|                  | 0.5000             | 1.375             | 0.750             | 1.250          | 0.312          | 0.625          | 0.188                           | 0.125          | 1/2-20  |     |                          |                                        |
| 1 1/2            | 15.875             | 38.10             | 22.23             | 38.10          | 9.53           | 19.05          | 3.18                            | 2.39           |         |     | CR-24                    | CRS-24                                 |
|                  | 0.6250             | 1.500             | 0.875             | 1.500          | 0.375          | 0.750          | 0.188                           | 0.094          | 5/8-18  |     |                          |                                        |
| 1 5/8            | 15.875             | 41.28             | 22.23             | 38.10          | 9.53           | 19.05          | 3.18                            | 2.39           |         |     | CR-26                    | CRS-26                                 |
|                  | 0.6250             | 1.625             | 0.875             | 1.500          | 0.375          | 0.750          | 0.188                           | 0.094          | 5/8-18  |     |                          |                                        |
| 1 3/4            | 19.050             | 44.45             | 25.40             | 44.45          | 11.13          | 22.23          | 3.18                            | 2.39           |         |     | CR-28                    | CRS-28                                 |
|                  | 0.7500             | 1.750             | 1.000             | 1.750          | 0.438          | 0.875          | 0.188                           | 0.094          | 3/4-16  |     |                          |                                        |
| 1 7/8            | 19.050             | 47.63             | 25.40             | 44.45          | 11.13          | 22.23          | 3.18                            | 2.39           |         |     | CR-30                    | CRS-30                                 |
|                  | 0.7500             | 1.875             | 1.000             | 1.750          | 0.438          | 0.875          | 0.188                           | 0.094          | 3/4-16  |     |                          |                                        |
| 2                | 22.225             | 50.80             | 31.75             | 50.80          | 12.70          | 25.40          | 3.18                            | 3.18           |         |     | CR-32                    | CRS-32                                 |
|                  | 0.8750             | 2.000             | 1.250             | 2.000          | 0.500          | 1.000          | 0.188                           | 0.125          | 7/8-14  |     |                          |                                        |
| 2 1/4            | 22.225             | 57.15             | 31.75             | 50.80          | 12.70          | 25.40          | 3.18                            | 3.18           |         |     | CR-36                    | CRS-36                                 |
|                  | 0.8750             | 2.250             | 1.250             | 2.000          | 0.500          | 1.000          | 0.188                           | 0.125          | 7/8-14  |     |                          |                                        |



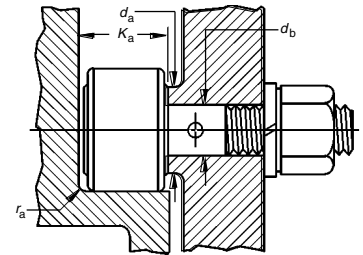
## Stud Type and Yoke Type Track Rollers



CR and CRS -12 to -64



CR and CRS -8 to -10-1



Note: Clamping torque is based on lubricated threads. If threads are dry, the torque values listed below may be doubled.

| Load Rating kN/lbf. |                          |                           |                     |                      | Limiting Speed<br>Grease<br>RPM | Mounting Dimensions mm/in.                            |                     |                |                | Clamping Torque<br>N*m/lbf. • in. | Wt.<br>kg/lbs.<br>Approx. |
|---------------------|--------------------------|---------------------------|---------------------|----------------------|---------------------------------|-------------------------------------------------------|---------------------|----------------|----------------|-----------------------------------|---------------------------|
| As a Bearing        |                          | As a Track Roller         |                     |                      |                                 | Bore Dia.<br>for Stud<br>+0.013 +0.0005<br>-0 -0.0000 | Max.                | Min.           | Min.           |                                   |                           |
| Dynamic<br>C        | Static<br>C <sub>0</sub> | Dynamic<br>C <sub>w</sub> | F <sub>r perm</sub> | F <sub>0r perm</sub> |                                 | d <sub>b</sub>                                        | r <sub>as max</sub> | K <sub>a</sub> | d <sub>a</sub> |                                   |                           |
| 4.44<br>999         | 4.94<br>1110             | 3.01<br>677               | 1.04<br>233         | 2.49<br>560          | 7000                            | 4.826<br>0.1900                                       | 0.25<br>0.010       | 10.41<br>0.41  | 7.52<br>0.296  | 0.90<br>8                         | 0.010<br>0.022            |
| 4.98<br>1120        | 5.69<br>1280             | 3.38<br>759               | 1.21<br>272         | 2.90<br>652          | 7000                            | 4.826<br>0.1900                                       | 0.25<br>0.010       | 11.18<br>0.44  | 7.52<br>0.296  | 0.90<br>8                         | 0.010<br>0.023            |
| 6.05<br>1360        | 7.87<br>1770             | 4.37<br>982               | 2.26<br>508         | 5.43<br>1220         | 5500                            | 6.350<br>0.2500                                       | 0.38<br>0.015       | 11.94<br>0.47  | 9.12<br>0.359  | 2.26<br>20                        | 0.019<br>0.041            |
| 6.58<br>1480        | 8.76<br>1970             | 4.76<br>1070              | 2.53<br>569         | 6.09<br>1370         | 5500                            | 6.350<br>0.2500                                       | 0.38<br>0.015       | 12.70<br>0.50  | 9.12<br>0.359  | 2.26<br>20                        | 0.020<br>0.045            |
| 10.4<br>2330        | 15.2<br>3410             | 6.45<br>1450              | 2.88<br>647         | 6.89<br>1550         | 3900                            | 9.525<br>0.3750                                       | 0.38<br>0.015       | 14.22<br>0.56  | 12.70<br>0.500 | 6.21<br>55                        | 0.034<br>0.076            |
| 10.4<br>2330        | 15.2<br>3410             | 7.56<br>1700              | 4.80<br>1080        | 11.5<br>2590         | 3900                            | 9.525<br>0.3750                                       | 0.38<br>0.015       | 14.22<br>0.56  | 12.70<br>0.500 | 6.21<br>55                        | 0.044<br>0.097            |
| 13.3<br>2980        | 22.3<br>5010             | 8.94<br>2010              | 6.05<br>1360        | 14.5<br>3260         | 3000                            | 11.113<br>0.4375                                      | 0.76<br>0.030       | 17.53<br>0.69  | 15.09<br>0.594 | 16.95<br>150                      | 0.073<br>0.161            |
| 13.3<br>2980        | 22.3<br>5010             | 9.88<br>2220              | 8.67<br>1950        | 18.3<br>4120         | 3000                            | 11.113<br>0.4375                                      | 0.76<br>0.030       | 17.53<br>0.69  | 15.09<br>0.594 | 16.95<br>150                      | 0.089<br>0.197            |
| 21.5<br>4840        | 33.18<br>7460            | 15.1<br>3400              | 9.30<br>2090        | 24.3<br>5470         | 2600                            | 12.700<br>0.5000                                      | 0.76<br>0.030       | 20.57<br>0.81  | 19.05<br>0.750 | 23.16<br>205                      | 0.137<br>0.301            |
| 21.5<br>4840        | 33.2<br>7460             | 16.4<br>3680              | 12.6<br>2840        | 28.6<br>6420         | 2600                            | 12.700<br>0.5000                                      | 0.76<br>0.030       | 20.57<br>0.81  | 19.05<br>0.750 | 23.16<br>205                      | 0.161<br>0.354            |
| 28.4<br>6380        | 40.8<br>9160             | 20.1<br>4520              | 10.8<br>2440        | 26.0<br>5850         | 2300                            | 15.875<br>0.6250                                      | 0.76<br>0.030       | 23.88<br>0.94  | 22.63<br>0.891 | 44.06<br>390                      | 0.239<br>0.528            |
| 28.4<br>6380        | 40.8<br>9160             | 21.5<br>4840              | 14.1<br>3170        | 33.8<br>7610         | 2300                            | 15.875<br>0.6250                                      | 0.76<br>0.030       | 23.88<br>0.94  | 22.63<br>0.891 | 44.06<br>390                      | 0.274<br>0.605            |
| 35.8<br>8040        | 56.9<br>12800            | 25.9<br>5830              | 17.7<br>3980        | 42.5<br>9560         | 1900                            | 19.050<br>0.7500                                      | 1.02<br>0.040       | 26.92<br>1.06  | 26.59<br>1.047 | 84.74<br>750                      | 0.385<br>0.848            |
| 35.8<br>8040        | 56.9<br>12800            | 27.4<br>6150              | 22.0<br>4940        | 49.4<br>11100        | 1900                            | 19.050<br>0.7500                                      | 1.02<br>0.040       | 26.92<br>1.06  | 26.59<br>1.047 | 84.74<br>750                      | 0.430<br>0.947            |
| 43.5<br>9770        | 76.1<br>17100            | 31.8<br>7160              | 26.0<br>5850        | 60.5<br>13600        | 1700                            | 22.225<br>0.8750                                      | 1.27<br>0.050       | 33.78<br>1.33  | 30.56<br>1.203 | 101.69<br>900                     | 0.621<br>1.37             |
| 43.5<br>9770        | 76.1<br>17100            | 34.6<br>7770              | 36.7<br>8250        | 71.2<br>16000        | 1700                            | 22.225<br>0.8750                                      | 1.27<br>0.050       | 33.78<br>1.33  | 30.56<br>1.203 | 101.69<br>900                     | 0.757<br>1.67             |

\* No lubrication hole in threaded end.  
§ UNS instead of UNF threads.

Continued on next page.





# NEEDLE ROLLER BEARINGS

## STUD TYPE TRACK ROLLERS

### CR, CRS SERIES – *continued*

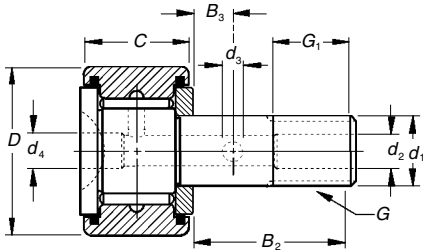
#### INCH SERIES

- Screwdriver slot in head facilitates mounting.
- Nonseparable, sealed unit with outer ring, full complement of needle rollers, stud seals, self-lubricating resin internal thrust washers, and stud-fastened retaining washer.
- Seals help retain lubricant and exclude foreign matter (CRS Series).
- Relubrication via axially drilled hole through stud with cross-drilled holes in stud raceway and shank.
- Recessed axial hole accepts standard nominal inch drive-type grease lubrication fitting.
- Lubrication fitting plugs furnished to close off unused holes.
- Tolerance limits for outside diameters of stud and outer ring refer to “single mean diameter” (see engineering section).
- A close fit between stud and hole required for mounting.
- Bore dimensions given below result in varying fit (0.0010 in. tight to 0.0005 in. loose).
- Retaining washer should be firmly backed up by flat housing shoulder (perpendicular to the stud axis).
- Shoulder diameter should be at least same size as minimum clamping diameter listed.
- May be mounted with two thin lock nuts or nut and lock washer.

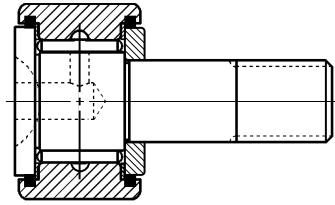
| Outside Diameter | Dimensions mm/in.                 |                                  |                                 |                |                |                |                |                                 |                | Track Roller Designation |                                        |        |
|------------------|-----------------------------------|----------------------------------|---------------------------------|----------------|----------------|----------------|----------------|---------------------------------|----------------|--------------------------|----------------------------------------|--------|
|                  | +0.25<br>-0<br>+0.0010<br>-0.0000 | +0<br>-0.025<br>+0.000<br>-0.001 | +0<br>-0.13<br>+0.000<br>-0.005 | (nom.)         | Min.           |                |                |                                 |                | Without Seals            | With Seals And Internal Thrust Washers |        |
|                  | in.                               | d <sub>1</sub>                   | D                               | C              | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> , d <sub>2</sub> | d <sub>3</sub> | G                        |                                        |        |
| 2 1/2            | 25.400<br>1.0000                  | 63.50<br>2.500                   | 38.10<br>1.500                  | 57.15<br>2.250 | 14.27<br>0.562 | 28.58<br>1.125 | 3.18<br>0.188  | 3.18<br>0.125                   |                | 1-14§                    | CR-40                                  | CRS-40 |
| 2 3/4            | 25.400<br>1.0000                  | 69.85<br>2.750                   | 38.10<br>1.500                  | 57.15<br>2.250 | 14.27<br>0.562 | 28.58<br>1.125 | 3.18<br>0.188  | 3.18<br>0.125                   |                | 1-14§                    | CR-44                                  | CRS-44 |
| 3                | 31.750<br>1.2500                  | 76.20<br>3.000                   | 44.45<br>1.750                  | 63.50<br>2.500 | 15.88<br>0.625 | 31.75<br>1.250 | 3.18<br>0.250  | 3.18<br>0.125                   |                | 1 1/4-12                 | CR-48                                  | CRS-48 |
| 3 1/4            | 31.750<br>1.2500                  | 82.55<br>3.250                   | 44.45<br>1.750                  | 63.50<br>2.500 | 15.88<br>0.625 | 31.75<br>1.250 | 3.18<br>0.250  | 3.18<br>0.125                   |                | 1 1/4-12                 | CR-52                                  | CRS-52 |
| 3 1/2            | 34.925<br>1.3750                  | 88.90<br>3.500                   | 50.80<br>2.000                  | 69.85<br>2.750 | 17.48<br>0.688 | 34.93<br>1.375 | 3.18<br>0.250  | 3.18<br>0.125                   |                | 1 3/8-12                 | CR-56                                  | CRS-56 |
| 4                | 38.100<br>1.5000                  | 101.60<br>4.000                  | 57.15<br>2.250                  | 88.90<br>3.500 | 19.05<br>0.750 | 38.10<br>1.500 | 3.18<br>0.250  | 3.18<br>0.125                   |                | 1 1/2-12                 | CR-64                                  | CRS-64 |

§ UNS instead of UNF threads.

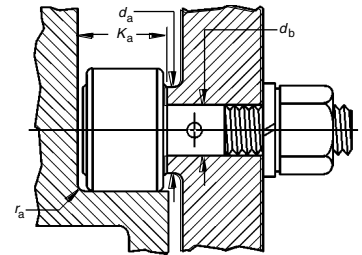
## Stud Type and Yoke Type Track Rollers



CR and CRS -12 to -64



CR and CRS -8 to -10-1



Note: Clamping torque is based on lubricated threads. If threads are dry, the torque values listed below may be doubled.

| As a Bearing  |                      | Load Rating kN/lbf.  |                           |                            | Limiting Speed<br>Grease<br>RPM | Mounting Dimensions mm/in.                            |                           |                      |                      | Clamping Torque<br>N*m/lbf. • in. | Wt.<br>kg/lbs.<br>Approx. |
|---------------|----------------------|----------------------|---------------------------|----------------------------|---------------------------------|-------------------------------------------------------|---------------------------|----------------------|----------------------|-----------------------------------|---------------------------|
| Dynamic       | Static               | Dynamic              | Static                    | Static                     |                                 | Bore Dia.<br>for Stud<br>+0.013 +0.0005<br>-0 -0.0000 | Max.                      | Min.                 | Min.                 |                                   |                           |
| <b>C</b>      | <b>C<sub>0</sub></b> | <b>C<sub>w</sub></b> | <b>F<sub>r perm</sub></b> | <b>F<sub>0r perm</sub></b> |                                 | <b>d<sub>b</sub></b>                                  | <b>r<sub>as max</sub></b> | <b>K<sub>a</sub></b> | <b>d<sub>a</sub></b> |                                   |                           |
| 58.7<br>13200 | 118<br>26600         | 44.5<br>10000        | 51.6<br>11600             | 101<br>22700               | 1400                            | 25.400<br>1.0000                                      | 2.29<br>0.090             | 40.13<br>1.58        | 34.93<br>1.375       | 152.53<br>1 350                   | 1.134<br>2.50             |
| 58.7<br>13200 | 118<br>26600         | 47.2<br>10600        | 66.7<br>15000             | 113<br>25500               | 1400                            | 25.400<br>1.0000                                      | 2.29<br>0.090             | 40.13<br>1.58        | 34.93<br>1.375       | 152.53<br>1 350                   | 1.329<br>2.93             |
| 74.7<br>16800 | 179<br>40200         | 51.6<br>11600        | 64.0<br>14400             | 127<br>28600               | 990                             | 31.750<br>1.2500                                      | 2.29<br>0.090             | 46.48<br>1.83        | 44.45<br>1.750       | 231.62<br>2 050                   | 1.905<br>4.20             |
| 74.7<br>16800 | 179<br>40200         | 54.7<br>12300        | 80.1<br>18000             | 143<br>32100               | 990                             | 31.750<br>1.2500                                      | 2.29<br>0.090             | 46.48<br>1.83        | 44.45<br>1.750       | 231.62<br>2 050                   | 2.182<br>4.81             |
| 111<br>24900  | 227<br>51000         | 82.3<br>18500        | 89.8<br>20200             | 187<br>42000               | 950                             | 34.925<br>1.3750                                      | 2.29<br>0.090             | 52.83<br>2.08        | 48.82<br>1.922       | 282.46<br>2 500                   | 2.912<br>6.42             |
| 138<br>31100  | 321<br>72200         | 99.2<br>22300        | 121<br>27200              | 245<br>55000               | 780                             | 38.100<br>1.5000                                      | 2.29<br>0.090             | 59.18<br>2.33        | 57.94<br>2.281       | 338.95<br>3 000                   | 4.291<br>9.46             |



# NEEDLE ROLLER BEARINGS

## STUD TYPE TRACK ROLLERS CRSB SERIES

### INCH SERIES

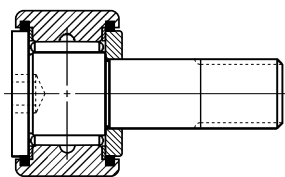
- Nonseparable, sealed unit with outer ring, full complement of needle rollers, stud seals, self-lubricating resin internal thrust washers, and stud-fastened retaining washer.
- Seals help retain lubricant and exclude foreign matter (CRS Series).
- Hexagonal wrench socket in stud head for mounting
- Relubrication via axially drilled hole through stud with cross-drilled holes in stud raceway and shank.
- Recessed axial hole accepts standard nominal inch drive-type grease lubrication fitting.
- Lubrication fitting plugs furnished to close off unused holes.
- Tolerance limits for outside diameters of stud and outer ring refer to "single mean diameter" (see engineering section).
- A close fit between stud and hole required for mounting.
- Bore dimensions given below result in varying fit (0.0010 in. tight to 0.0005 in. loose).
- Retaining washer should be firmly backed up by flat housing shoulder (perpendicular to the stud axis).
- Shoulder diameter should be at least same size as minimum clamping diameter listed.
- May be mounted with two thin lock nuts or nut and lock washer.

| Outside Diameter | Dimensions mm/in.                 |                                  |                                 |                |                |                |                |                |                |         | Bearing Designation |
|------------------|-----------------------------------|----------------------------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|---------|---------------------|
|                  | +0.25<br>-0<br>+0.0010<br>-0.0000 | +0<br>-0.025<br>+0.000<br>-0.001 | +0<br>-0.13<br>+0.000<br>-0.005 | (nom.)         | Min.           |                |                |                |                |         |                     |
| in.              | d <sub>1</sub>                    | D                                | C                               | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> | d <sub>2</sub> | d <sub>3</sub> | G       |                     |
| 1/2              | 4.826<br>0.1900                   | 12.70<br>0.500                   | 8.74<br>0.344                   | 12.70<br>0.500 | —              | 6.35<br>0.250  | —              | —              | —              | 10-32   | CRSB-8              |
|                  | 4.826<br>0.1900                   | 12.70<br>0.500                   | 9.53<br>0.375                   | 15.88<br>0.625 | —              | 6.35<br>0.250  | —              | —              | —              | 10-32   | CRSB-8-1            |
| 5/8              | 6.350<br>0.2500                   | 15.88<br>0.625                   | 10.31<br>0.406                  | 15.88<br>0.625 | —              | 7.92<br>0.312  | —              | —              | —              | 1/4-28  | CRSB-10             |
|                  | 6.350<br>0.2500                   | 15.88<br>0.625                   | 11.13<br>0.438                  | 19.05<br>0.750 | —              | 7.92<br>0.312  | —              | —              | —              | 1/4-28  | CRSB-10-1           |
| 3/4              | 9.525<br>0.3750                   | 19.05<br>0.750                   | 12.70<br>0.500                  | 22.23<br>0.875 | 6.35<br>0.250  | 9.53<br>0.375  | 4.78<br>0.188  | 4.78<br>0.188  | 2.39<br>0.094  | 3/8-24  | CRSB-12             |
| 7/8              | 9.525<br>0.3750                   | 22.23<br>0.875                   | 12.70<br>0.500                  | 22.23<br>0.875 | 6.35<br>0.250  | 9.53<br>0.375  | 4.78<br>0.188  | 4.78<br>0.188  | 2.39<br>0.094  | 3/8-24  | CRSB-14             |
| 1                | 11.113<br>0.4375                  | 25.40<br>1.000                   | 15.88<br>0.625                  | 25.40<br>1.000 | 6.35<br>0.250  | 12.70<br>0.500 | 6.35<br>0.250  | 4.78<br>0.188  | 3.18<br>0.125  | 7/16-20 | CRSB-16             |
| 1 1/8            | 11.113<br>0.4375                  | 28.58<br>1.125                   | 15.88<br>0.625                  | 25.40<br>1.000 | 6.35<br>0.250  | 12.70<br>0.500 | 6.35<br>0.250  | 4.78<br>0.188  | 3.18<br>0.125  | 7/16-20 | CRSB-18             |
| 1 1/4            | 12.700<br>0.5000                  | 31.75<br>1.250                   | 19.05<br>0.750                  | 31.75<br>1.250 | 7.92<br>0.312  | 15.88<br>0.625 | 6.35<br>0.250  | 4.78<br>0.188  | 3.18<br>0.125  | 1/2-20  | CRSB-20             |
| 1 3/8            | 12.700<br>0.5000                  | 34.93<br>1.375                   | 19.05<br>0.750                  | 31.75<br>1.250 | 7.92<br>0.312  | 15.88<br>0.625 | 6.35<br>0.250  | 4.78<br>0.188  | 3.18<br>0.125  | 1/2-20  | CRSB-22             |
| 1 1/2            | 15.875<br>0.6250                  | 38.10<br>1.500                   | 22.23<br>0.875                  | 38.10<br>1.500 | 9.53<br>0.375  | 19.05<br>0.750 | —              | 4.78<br>0.188  | 2.39<br>0.094  | 5/8-18  | CRSB-24             |
| 1 5/8            | 15.875<br>0.6250                  | 41.28<br>1.625                   | 22.23<br>0.875                  | 38.10<br>1.500 | 9.53<br>0.375  | 19.05<br>0.750 | —              | 4.78<br>0.188  | 2.39<br>0.094  | 5/8-18  | CRSB-26             |
| 1 3/4            | 19.050<br>0.7500                  | 44.45<br>1.750                   | 25.40<br>1.000                  | 44.45<br>1.750 | 11.13<br>0.438 | 22.23<br>0.875 | —              | 4.78<br>0.188  | 2.39<br>0.094  | 3/4-16  | CRSB-28             |
| 1 7/8            | 19.050<br>0.7500                  | 47.63<br>1.875                   | 25.40<br>1.000                  | 44.45<br>1.750 | 11.13<br>0.438 | 22.23<br>0.875 | —              | 4.78<br>0.188  | 2.39<br>0.094  | 3/4-16  | CRSB-30             |
| 2                | 22.225<br>0.8750                  | 50.80<br>2.000                   | 31.75<br>1.250                  | 50.80<br>2.000 | 12.70<br>0.500 | 25.40<br>1.000 | —              | 4.78<br>0.188  | 3.18<br>0.125  | 7/8-14  | CRSB-32             |
| 2 1/4            | 22.225<br>0.8750                  | 57.15<br>2.250                   | 31.75<br>1.250                  | 50.80<br>2.000 | 12.70<br>0.500 | 25.40<br>1.000 | —              | 4.78<br>0.188  | 3.18<br>0.125  | 7/8-14  | CRSB-36             |
| 2 1/2            | 25.400<br>1.0000                  | 63.50<br>2.500                   | 38.10<br>1.500                  | 63.50<br>2.500 | 14.27<br>0.562 | 28.58<br>1.125 | —              | 4.78<br>0.188  | 3.18<br>0.125  | 1-14§   | CRSB-40             |

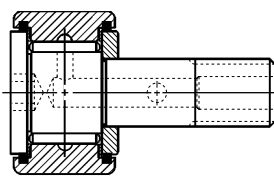
§ UNS instead of UNF threads.

## Stud Type and Yoke Type Track Rollers

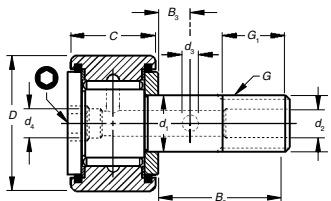
For hexagonal wrench sizes, see page C210.



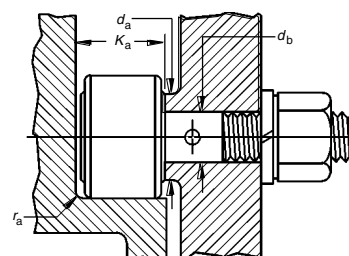
CRSB -8 to -10-1



CRSB -24 to -44



CRSB -12 to -22  
CRSB -48 to -64



Note: Clamping torque is based on lubricated threads. If threads are dry, the torque values listed below may be doubled.

| Load Rating kN/lbf.  |                        |                      |                      |                      | Limiting Speed<br>Grease<br>RPM | Mounting Dimensions mm/in.                            |                       |                     |                       | Clamping Torque<br>N*m/lbf. • in. | Wt.<br>kg/lbs.<br>Approx. |
|----------------------|------------------------|----------------------|----------------------|----------------------|---------------------------------|-------------------------------------------------------|-----------------------|---------------------|-----------------------|-----------------------------------|---------------------------|
| As a Bearing         |                        | As a Track Roller    |                      |                      |                                 | Bore Dia.<br>for Stud<br>+0.013 +0.0005<br>-0 -0.0000 | Max.<br>ras max       | Min.<br>Ka          | Min.<br>da            |                                   |                           |
| Dynamic<br>C         | Static<br>C0           | Dynamic<br>Cw        | Static<br>Fr perm    | Static<br>F0r perm   |                                 |                                                       |                       |                     |                       |                                   |                           |
| <b>4.44</b><br>999   | <b>4.94</b><br>1110    | <b>3.01</b><br>677   | <b>1.04</b><br>233   | <b>2.49</b><br>560   | <b>7000</b>                     | <b>4.826</b><br>0.1900                                | <b>0.25</b><br>0.010  | <b>10.4</b><br>0.41 | <b>7.54</b><br>0.297  | <b>0.90</b><br>8.00               | <b>0.010</b><br>0.022     |
| <b>4.98</b><br>1120  | <b>5.69</b><br>1280    | <b>3.38</b><br>759   | <b>1.21</b><br>272   | <b>2.90</b><br>652   | <b>7000</b>                     | <b>4.826</b><br>0.1900                                | <b>0.25</b><br>0.010  | <b>11.2</b><br>0.44 | <b>7.54</b><br>0.297  | <b>0.90</b><br>8.00               | <b>0.010</b><br>0.023     |
| <b>6.05</b><br>1360  | <b>7.87</b><br>1770    | <b>4.37</b><br>982   | <b>2.26</b><br>508   | <b>5.43</b><br>1220  | <b>5500</b>                     | <b>6.350</b><br>0.2500                                | <b>0.38</b><br>0.015  | <b>11.9</b><br>0.47 | <b>9.12</b><br>0.359  | <b>2.26</b><br>20.0               | <b>0.019</b><br>0.041     |
| <b>6.58</b><br>1480  | <b>8.76</b><br>1970    | <b>4.76</b><br>1070  | <b>2.53</b><br>569   | <b>6.09</b><br>1370  | <b>5500</b>                     | <b>6.350</b><br>0.2500                                | <b>0.38</b><br>0.015  | <b>12.7</b><br>0.50 | <b>9.12</b><br>0.359  | <b>2.26</b><br>20.0               | <b>0.020</b><br>0.045     |
| <b>10.4</b><br>2330  | <b>15.2</b><br>3410    | <b>6.45</b><br>1450  | <b>2.88</b><br>647   | <b>6.89</b><br>1550  | <b>3900</b>                     | <b>9.525</b><br>0.3750                                | <b>0.38</b><br>0.015  | <b>14.2</b><br>0.56 | <b>12.70</b><br>0.500 | <b>6.21</b><br>55.0               | <b>0.034</b><br>0.076     |
| <b>10.4</b><br>2330  | <b>15.2</b><br>3410    | <b>7.56</b><br>1700  | <b>4.80</b><br>1080  | <b>11.5</b><br>2590  | <b>3900</b>                     | <b>9.525</b><br>0.3750                                | <b>0.38</b><br>0.015  | <b>17.5</b><br>0.69 | <b>12.70</b><br>0.500 | <b>6.21</b><br>55.0               | <b>0.044</b><br>0.097     |
| <b>13.3</b><br>2980  | <b>22.3</b><br>5010    | <b>8.94</b><br>2010  | <b>6.05</b><br>1360  | <b>14.5</b><br>3260  | <b>3000</b>                     | <b>11.113</b><br>0.4375                               | <b>0.76</b><br>0.030  | <b>17.5</b><br>0.69 | <b>15.09</b><br>0.594 | <b>16.95</b><br>150               | <b>0.073</b><br>0.161     |
| <b>13.3</b><br>2980  | <b>22.3</b><br>5010    | <b>9.88</b><br>2220  | <b>8.67</b><br>1950  | <b>18.3</b><br>4120  | <b>3000</b>                     | <b>11.113</b><br>0.4375                               | <b>0.76</b><br>0.030  | <b>20.6</b><br>0.81 | <b>15.09</b><br>0.594 | <b>16.95</b><br>150               | <b>0.089</b><br>0.197     |
| <b>21.5</b><br>4840  | <b>33.2</b><br>7460    | <b>15.1</b><br>3400  | <b>9.30</b><br>2090  | <b>24.3</b><br>5470  | <b>2600</b>                     | <b>12.700</b><br>0.5000                               | <b>0.76</b><br>0.030  | <b>20.6</b><br>0.81 | <b>19.05</b><br>0.750 | <b>23.16</b><br>205               | <b>0.137</b><br>0.301     |
| <b>21.5</b><br>4840  | <b>33.2</b><br>7460    | <b>16.4</b><br>3680  | <b>12.6</b><br>2840  | <b>28.6</b><br>6420  | <b>2600</b>                     | <b>12.700</b><br>0.5000                               | <b>0.76</b><br>0.030  | <b>23.9</b><br>0.94 | <b>19.05</b><br>0.750 | <b>23.16</b><br>205               | <b>0.161</b><br>0.354     |
| <b>4 840</b><br>6380 | <b>7 460</b><br>9160   | <b>3 680</b><br>4520 | <b>2 840</b><br>2440 | <b>6 420</b><br>5850 |                                 | <b>0.5000</b><br>0.6250                               | <b>0.030</b><br>0.030 | <b>0.94</b><br>0.94 | <b>0.750</b><br>0.891 | <b>205</b><br>390                 | <b>0.354</b><br>0.528     |
| <b>28.4</b><br>6380  | <b>40.8</b><br>9160    | <b>21.5</b><br>4840  | <b>14.1</b><br>3170  | <b>33.8</b><br>7610  | <b>2300</b>                     | <b>15.875</b><br>0.6250                               | <b>0.76</b><br>0.030  | <b>26.9</b><br>1.06 | <b>22.63</b><br>0.891 | <b>44.06</b><br>390               | <b>0.274</b><br>0.605     |
| <b>35.8</b><br>8040  | <b>56.94</b><br>12800  | <b>25.9</b><br>5830  | <b>17.7</b><br>3980  | <b>42.5</b><br>9560  | <b>1900</b>                     | <b>19.050</b><br>0.7500                               | <b>1.02</b><br>0.040  | <b>26.9</b><br>1.06 | <b>26.59</b><br>1.047 | <b>84.74</b><br>750               | <b>0.385</b><br>0.848     |
| <b>35.8</b><br>8040  | <b>56.94</b><br>12800  | <b>27.4</b><br>6150  | <b>22.0</b><br>4940  | <b>49.4</b><br>11100 | <b>1900</b>                     | <b>19.050</b><br>0.7500                               | <b>1.02</b><br>0.040  | <b>33.8</b><br>1.33 | <b>26.59</b><br>1.047 | <b>84.74</b><br>750               | <b>0.430</b><br>0.947     |
| <b>43.5</b><br>9770  | <b>76.06</b><br>17100  | <b>31.8</b><br>7160  | <b>26.0</b><br>5850  | <b>60.5</b><br>13600 | <b>1700</b>                     | <b>22.225</b><br>0.8750                               | <b>1.27</b><br>0.050  | <b>33.8</b><br>1.33 | <b>30.56</b><br>1.203 | <b>101.69</b><br>900              | <b>0.621</b><br>1.370     |
| <b>43.5</b><br>9770  | <b>76.06</b><br>17100  | <b>34.6</b><br>7770  | <b>36.7</b><br>8250  | <b>71.2</b><br>16000 | <b>1700</b>                     | <b>22.225</b><br>0.8750                               | <b>1.27</b><br>0.050  | <b>40.1</b><br>1.58 | <b>30.56</b><br>1.203 | <b>101.69</b><br>900              | <b>0.757</b><br>1.670     |
| <b>58.7</b><br>13200 | <b>118.32</b><br>26600 | <b>44.5</b><br>10000 | <b>51.6</b><br>11600 | <b>101</b><br>22700  | <b>1400</b>                     | <b>25.400</b><br>1.0000                               | <b>2.29</b><br>0.090  | <b>40.1</b><br>1.58 | <b>34.93</b><br>1.375 | <b>152.53</b><br>1 350            | <b>1.134</b><br>2.500     |

Continued on next page.



## NEEDLE ROLLER BEARINGS

### STUD TYPE TRACK ROLLERS

#### CRSB SERIES — *continued*

##### INCH SERIES

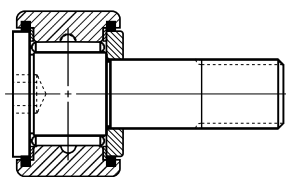
- Nonseparable, sealed unit with outer ring, full complement of needle rollers, stud seals, self-lubricating resin internal thrust washers, and stud-fastened retaining washer.
- Seals help retain lubricant and exclude foreign matter (CRS Series).
- Hexagonal wrench socket in stud head for mounting
- Relubrication via axially drilled hole through stud with cross-drilled holes in stud raceway and shank.
- Recessed axial hole accepts standard nominal inch drive-type grease lubrication fitting.
- Lubrication fitting plugs furnished to close off unused holes.
- Tolerance limits for outside diameters of stud and outer ring refer to “single mean diameter” (see engineering section).
- A close fit between stud and hole required for mounting.
- Bore dimensions given below result in varying fit (0.0010 in. tight to 0.0005 in. loose).
- Retaining washer should be firmly backed up by flat housing shoulder (perpendicular to the stud axis).
- Shoulder diameter should be at least same size as minimum clamping diameter listed.
- May be mounted with two thin lock nuts or nut and lock washer.

| Outside Diameter | Dimensions mm/in.                 |                                  |                                 |                |                |                |                |                |                |          | Bearing Designation |
|------------------|-----------------------------------|----------------------------------|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------|
|                  | +0.25<br>-0<br>+0.0010<br>-0.0000 | +0<br>-0.025<br>+0.000<br>-0.001 | +0<br>-0.13<br>+0.000<br>-0.005 | (nom.)         | Min.           | UNF            |                |                |                |          |                     |
| in.              | d <sub>1</sub>                    | D                                | C                               | B <sub>2</sub> | B <sub>3</sub> | G <sub>1</sub> | d <sub>4</sub> | d <sub>2</sub> | d <sub>3</sub> | G        |                     |
| 2 3/4            | 25.400<br>1.0000                  | 69.85<br>2.750                   | 38.10<br>1.500                  | 63.50<br>2.500 | 14.27<br>0.562 | 28.58<br>1.125 | —              | 4.78<br>0.188  | 3.18<br>0.125  | 1-14§    | CRSB-44             |
| 3                | 31.750<br>1.2500                  | 76.20<br>3.000                   | 44.45<br>1.750                  | 63.50<br>2.500 | 15.88<br>0.625 | 31.75<br>1.250 | 6.35<br>0.250  | 6.35<br>0.250  | 3.18<br>0.125  | 1 1/4-12 | CRSB-48             |
| 3 1/4            | 31.750<br>1.2500                  | 82.55<br>3.250                   | 44.45<br>1.750                  | 63.50<br>2.500 | 15.88<br>0.625 | 31.75<br>1.250 | 6.35<br>0.250  | 6.35<br>0.250  | 3.18<br>0.125  | 1 1/4-12 | CRSB-52             |
| 3 1/2            | 34.925<br>1.3750                  | 88.90<br>3.500                   | 50.80<br>2.000                  | 69.85<br>2.75  | 17.48<br>0.688 | 34.93<br>1.375 | 6.35<br>0.250  | 6.35<br>0.250  | 3.18<br>0.125  | 1 3/8-12 | CRSB-56             |
| 4                | 38.100<br>1.5000                  | 101.60<br>4.000                  | 57.15<br>2.250                  | 88.90<br>3.500 | 19.05<br>0.750 | 38.10<br>1.500 | 6.35<br>0.250  | 6.35<br>0.250  | 3.18<br>0.125  | 1 1/2-12 | CRSB-64             |

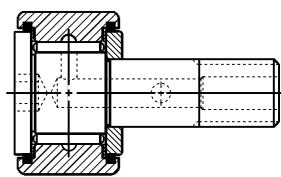
§ UNS instead of UNF threads.

## Stud Type and Yoke Type Track Rollers

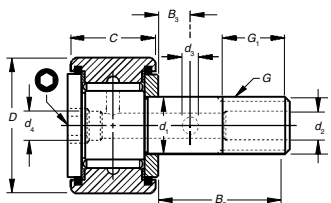
For hexagonal wrench sizes, see page C208.



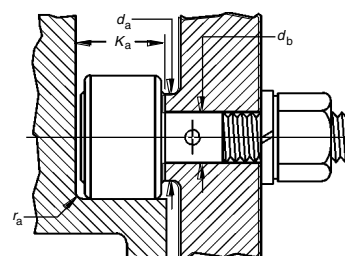
CRSB -8 to -10-1



CRSB -24 to -44



CRSB -12 to -22  
CRSB -48 to -64



Note: Clamping torque is based on lubricated threads. If threads are dry, the torque values listed below may be doubled.

| Load Rating kN/lbf. |                          |                           |                     |                                | Limiting Speed<br>Grease<br>RPM | Mounting Dimensions mm/in.                            |                             |                        |                        | Clamping Torque<br>N*m/lbf. • in. | Wt.<br>kg/lbs.<br>Approx. |
|---------------------|--------------------------|---------------------------|---------------------|--------------------------------|---------------------------------|-------------------------------------------------------|-----------------------------|------------------------|------------------------|-----------------------------------|---------------------------|
| As a Bearing        |                          | As a Track Roller         |                     |                                |                                 | Bore Dia.<br>for Stud<br>+0.013 +0.0005<br>-0 -0.0000 | Max.<br>r <sub>as max</sub> | Min.<br>K <sub>a</sub> | Min.<br>d <sub>a</sub> |                                   |                           |
| Dynamic<br>C        | Static<br>C <sub>0</sub> | Dynamic<br>C <sub>w</sub> | F <sub>T perm</sub> | Static<br>F <sub>0r perm</sub> |                                 |                                                       |                             |                        |                        |                                   |                           |
| 58.7<br>13200       | 118.32<br>26600          | 47.2<br>10600             | 66.7<br>15000       | 113<br>25500                   | 1400                            | 25.400<br>1.0000                                      | 2.29<br>0.090               | 44.5<br>1.75           | 34.93<br>1.375         | 152.53<br>1 350                   | 1.329<br>2.930            |
| 74.7<br>16800       | 178.82<br>40200          | 51.6<br>11600             | 64.0<br>14400       | 127<br>28600                   | 990                             | 31.750<br>1.2500                                      | 2.29<br>0.090               | 46.5<br>1.83           | 44.45<br>1.750         | 231.62<br>2 050                   | 1.905<br>4.200            |
| 74.7<br>16800       | 178.82<br>40200          | 54.7<br>12300             | 80.1<br>18000       | 143<br>32100                   | 990                             | 31.750<br>1.2500                                      | 2.29<br>0.090               | 46.5<br>1.83           | 44.45<br>1.750         | 231.62<br>2 050                   | 2.182<br>4.810            |
| 110.8<br>24900      | 226.86<br>51000          | 82.3<br>18500             | 89.8<br>20200       | 187<br>42000                   | 950                             | 34.925<br>1.3750                                      | 2.29<br>0.090               | 52.8<br>2.08           | 48.82<br>1.922         | 282.46<br>2 500                   | 2.912<br>6.420            |
| 138.3<br>31100      | 321.16<br>72200          | 99.2<br>22300             | 121<br>27200        | 245<br>55000                   | 780                             | 38.100<br>1.5000                                      | 2.29<br>0.090               | 59.2<br>2.33           | 57.94<br>2.281         | 338.95<br>3 000                   | 4.291<br>9.460            |



# NEEDLE ROLLER BEARINGS

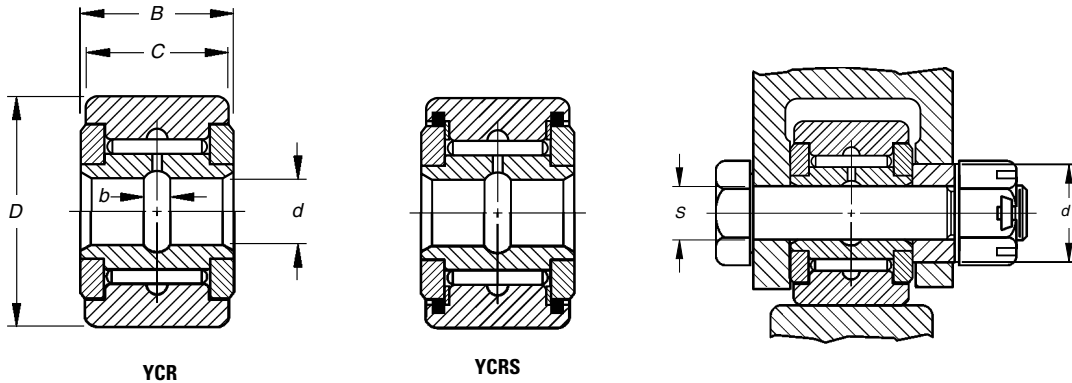
## YOKE TYPE TRACK ROLLERS YCR, YCRS SERIES

### INCH SERIES

- Non-separable unit with outer ring, a full complement of needle rollers, inner ring, self-lubricating resin internal thrust washers, and two retaining washers securely fastened to the inner ring.
- Seals in counterbores of outer ring seal against the retaining washers; retain lubricant and exclude foreign matter (YCRS Series).
- Dimensions shown are for unplated finished unit.
- Tolerance limits for outside diameters of stud and outer ring refer to "single mean diameter" (see engineering section).
- A close fit between stud and hole required for mounting bore dimensions given below result in varying fit (0.0010" tight to 0.0005" loose).
- Machine element must be sufficiently rigid in area of mounting bolt holes to resist local crushing under the applied load and resist bending causing uneven loading of rollers.
- Unit should be clamped endwise between parallel faces (perpendicular to axis) to prevent retaining washers from coming off under load.
- If the unit cannot be clamped, yoke requires a close axial fit.

| Outside Diameter | Dimensions mm/in.         |                  |                  |                                  |                           |               | Track Roller Designation |                                        |
|------------------|---------------------------|------------------|------------------|----------------------------------|---------------------------|---------------|--------------------------|----------------------------------------|
|                  | +0 +0.000<br>-0.03 -0.001 | Max.             | Min.             | +0.130 +0.0050<br>-0.250 -0.0100 | +0 +0.000<br>-0.13 -0.005 | (nom.)        | Without Seals            | With Seals and Internal Thrust Washers |
|                  | in.                       | D                | d                | B                                | C                         | b             |                          |                                        |
| 3/4              | 19.05<br>0.75             | 6.355<br>0.2502  | 6.34<br>0.2496   | 14.288<br>0.5625                 | 12.7<br>0.5               | 3.18<br>0.125 | YCR-12                   | YCRS-12                                |
| 7/8              | 22.23<br>0.875            | 6.355<br>0.2502  | 6.34<br>0.2496   | 14.288<br>0.5625                 | 12.7<br>0.5               | 3.18<br>0.125 | YCR-14                   | YCRS-14                                |
| 1                | 25.4<br>1                 | 7.943<br>0.3127  | 7.927<br>0.3121  | 17.463<br>0.6875                 | 15.88<br>0.625            | 3.18<br>0.125 | YCR-16                   | YCRS-16                                |
| 1 1/8            | 28.58<br>1.125            | 7.943<br>0.3127  | 7.927<br>0.3121  | 17.463<br>0.6875                 | 15.88<br>0.625            | 3.18<br>0.125 | YCR-18                   | YCRS-18                                |
| 1 1/4            | 31.75<br>1.25             | 9.53<br>0.3752   | 9.515<br>0.3746  | 20.638<br>0.8125                 | 19.05<br>0.75             | 4.78<br>0.188 | YCR-20                   | YCRS-20                                |
| 1 3/8            | 34.93<br>1.375            | 9.53<br>0.3752   | 9.515<br>0.3746  | 20.638<br>0.8125                 | 19.05<br>0.75             | 4.78<br>0.188 | YCR-22                   | YCRS-22                                |
| 1 1/2            | 38.1<br>1.5               | 11.118<br>0.4377 | 11.102<br>0.4371 | 23.813<br>0.9375                 | 22.23<br>0.875            | 3.18<br>0.125 | YCR-24                   | YCRS-24                                |
| 1 5/8            | 41.28<br>1.625            | 11.118<br>0.4377 | 11.102<br>0.4371 | 23.813<br>0.9375                 | 22.23<br>0.875            | 3.18<br>0.125 | YCR-26                   | YCRS-26                                |
| 1 3/4            | 44.45<br>1.75             | 12.705<br>0.5002 | 12.69<br>0.4996  | 26.988<br>1.0625                 | 25.4<br>1                 | 3.18<br>0.125 | YCR-28                   | YCRS-28                                |
| 1 7/8            | 47.63<br>1.875            | 12.705<br>0.5002 | 12.69<br>0.4996  | 26.988<br>1.0625                 | 25.4<br>1                 | 3.18<br>0.125 | YCR-30                   | YCRS-30                                |
| 2                | 50.8<br>2                 | 15.88<br>0.6252  | 15.865<br>0.6246 | 33.338<br>1.3125                 | 31.75<br>1.25             | 3.18<br>0.125 | YCR-32                   | YCRS-32                                |
| 2 1/4            | 57.15<br>2.25             | 15.88<br>0.6252  | 15.865<br>0.6246 | 33.338<br>1.3125                 | 31.75<br>1.25             | 3.18<br>0.125 | YCR-36                   | YCRS-36                                |
| 2 1/2            | 63.5<br>2.5               | 19.055<br>0.7502 | 19.04<br>0.7496  | 39.688<br>1.5625                 | 38.1<br>1.5               | 3.68<br>0.145 | YCR-40                   | YCRS-40                                |
| 2 3/4            | 69.85<br>2.75             | 19.055<br>0.7502 | 19.04<br>0.7496  | 39.688<br>1.5625                 | 38.1<br>1.5               | 3.68<br>0.145 | YCR-44                   | YCRS-44                                |
| 3                | 76.2<br>3                 | 25.403<br>1.0001 | 25.387<br>0.9995 | 46.038<br>1.8125                 | 44.45<br>1.75             | 3.68<br>0.145 | YCR-48                   | YCRS-48                                |
| 3 1/4            | 82.55<br>3.25             | 25.403<br>1.0001 | 25.387<br>0.9995 | 46.038<br>1.8125                 | 44.45<br>1.75             | 3.68<br>0.145 | YCR-52                   | YCRS-52                                |
| 3 1/2            | 88.9<br>3.5               | 28.578<br>1.1251 | 28.562<br>1.1245 | 52.388<br>2.0625                 | 50.8<br>2                 | 3.68<br>0.145 | YCR-56                   | YCRS-56                                |
| 4                | 101.6<br>4                | 31.753<br>1.2501 | 31.737<br>1.2495 | 58.738<br>2.3125                 | 57.15<br>2.25             | 3.68<br>0.145 | YCR-64                   | YCRS-64                                |

## Stud Type and Yoke Type Track Rollers



YCR

YCRS

| Load Ratings kN/lbf. |                      |                      |                           |                           | Limiting Speed<br>Grease<br>RPM | Mounting Dimensions mm/in. |                |                |                   | Clamping Diameter<br>$d_a$ | Wt. Approx.<br>kg/lbs. |                    |
|----------------------|----------------------|----------------------|---------------------------|---------------------------|---------------------------------|----------------------------|----------------|----------------|-------------------|----------------------------|------------------------|--------------------|
| As a Bearing         |                      | As a Track Roller    |                           |                           |                                 | Shaft Bolt diameter        |                |                |                   |                            |                        |                    |
| Dynamic              | Static               | Dynamic              | Static                    | Dynamic                   |                                 | Static                     | Loose Fit (f7) | Tight Fit (h6) | Clamping Diameter |                            |                        |                    |
| <b>C</b>             | <b>C<sub>0</sub></b> | <b>C<sub>w</sub></b> | <b>F<sub>r perm</sub></b> | <b>F<sub>0 perm</sub></b> | <b>RPM</b>                      | <b>Max.</b>                | <b>Min.</b>    | <b>Max.</b>    | <b>Min.</b>       | <b>S</b>                   | <b>d<sub>a</sub></b>   | <b>Wt. Approx.</b> |
| 10.4                 | 15.2                 | 6.45                 | 2.88                      | 6.89                      | 3900                            | 6.342                      | 6.332          | 6.363          | 6.353             | 0.06                       | 0.027                  |                    |
| 2330                 | 3410                 | 1450                 | 647                       | 1550                      |                                 | 0.2497                     | 0.2493         | 0.2505         | 0.2501            | 0.5                        | 0.06                   |                    |
| 10.4                 | 15.2                 | 7.56                 | 4.8                       | 11.5                      | 3900                            | 6.342                      | 6.332          | 6.363          | 6.353             | 0.06                       | 0.036                  |                    |
| 2330                 | 3410                 | 1700                 | 1080                      | 2590                      |                                 | 0.2497                     | 0.2493         | 0.2505         | 0.2501            | 0.5                        | 0.08                   |                    |
| 13.3                 | 22.3                 | 8.94                 | 6.05                      | 14.5                      | 3000                            | 7.93                       | 7.92           | 7.95           | 7.94              | 0.07                       | 0.068                  |                    |
| 2980                 | 5010                 | 2010                 | 1360                      | 3260                      |                                 | 0.3122                     | 0.3118         | 0.313          | 0.3126            | 0.594                      | 0.15                   |                    |
| 13.3                 | 22.3                 | 9.88                 | 8.67                      | 18.3                      | 3000                            | 7.93                       | 7.92           | 7.95           | 7.94              | 0.07                       | 0.077                  |                    |
| 2980                 | 5010                 | 2220                 | 1950                      | 4120                      |                                 | 0.3122                     | 0.3118         | 0.313          | 0.3126            | 0.594                      | 0.17                   |                    |
| 21.5                 | 33.2                 | 15.1                 | 9.3                       | 24.3                      | 2600                            | 9.517                      | 9.507          | 9.538          | 9.528             | 0.08                       | 0.109                  |                    |
| 4840                 | 7460                 | 3400                 | 2090                      | 5470                      |                                 | 0.3747                     | 0.3743         | 0.3755         | 0.3751            | 0.75                       | 0.24                   |                    |
| 21.5                 | 33.2                 | 16.4                 | 12.6                      | 28.6                      | 2600                            | 9.517                      | 9.507          | 9.538          | 9.528             | 0.08                       | 0.136                  |                    |
| 4840                 | 7460                 | 3680                 | 2840                      | 6420                      |                                 | 0.3747                     | 0.3743         | 0.3755         | 0.3751            | 0.75                       | 0.3                    |                    |
| 28.4                 | 40.7                 | 20.1                 | 10.8                      | 26                        | 2300                            | 11.105                     | 11.095         | 11.125         | 11.115            | 0.1                        | 0.186                  |                    |
| 6380                 | 9160                 | 4520                 | 2440                      | 5850                      |                                 | 0.4372                     | 0.4368         | 0.438          | 0.4376            | 0.891                      | 0.41                   |                    |
| 28.4                 | 40.7                 | 21.5                 | 14.1                      | 33.8                      | 2300                            | 11.105                     | 11.095         | 11.125         | 11.115            | 0.1                        | 0.227                  |                    |
| 6380                 | 9160                 | 4840                 | 3170                      | 7610                      |                                 | 0.4372                     | 0.4368         | 0.438          | 0.4376            | 0.891                      | 0.5                    |                    |
| 35.8                 | 56.9                 | 25.9                 | 17.7                      | 42.5                      | 1900                            | 12.692                     | 12.682         | 12.718         | 12.708            | 0.12                       | 0.29                   |                    |
| 8040                 | 12800                | 5830                 | 3980                      | 9560                      |                                 | 0.4997                     | 0.4993         | 0.5007         | 0.5003            | 1.047                      | 0.64                   |                    |
| 35.8                 | 56.9                 | 27.4                 | 22                        | 49.4                      | 1900                            | 12.692                     | 12.682         | 12.718         | 12.708            | 0.12                       | 0.363                  |                    |
| 8040                 | 12800                | 6150                 | 4940                      | 11100                     |                                 | 0.4997                     | 0.4993         | 0.5007         | 0.5003            | 1.047                      | 0.8                    |                    |
| 43.5                 | 76.1                 | 31.8                 | 26                        | 60.5                      | 1700                            | 15.867                     | 15.857         | 15.893         | 15.883            | 0.14                       | 0.476                  |                    |
| 9770                 | 17100                | 7160                 | 5850                      | 13600                     |                                 | 0.6247                     | 0.6243         | 0.6257         | 0.6253            | 1.203                      | 1.05                   |                    |
| 43.5                 | 76.1                 | 34.6                 | 36.7                      | 71.2                      | 1700                            | 15.867                     | 15.857         | 15.893         | 15.883            | 0.14                       | 0.599                  |                    |
| 9770                 | 17100                | 7770                 | 8250                      | 16000                     |                                 | 0.6247                     | 0.6243         | 0.6257         | 0.6253            | 1.203                      | 1.32                   |                    |
| 58.7                 | 118                  | 44.5                 | 51.6                      | 100                       | 1400                            | 19.042                     | 19.032         | 19.068         | 19.058            | 0.16                       | 0.816                  |                    |
| 13200                | 26600                | 10000                | 11600                     | 22700                     |                                 | 0.7497                     | 0.7493         | 0.7507         | 0.7503            | 1.375                      | 1.8                    |                    |
| 58.7                 | 118                  | 47.2                 | 66.7                      | 113                       | 1400                            | 19.042                     | 19.032         | 19.068         | 19.058            | 0.16                       | 1.021                  |                    |
| 13200                | 26600                | 10600                | 15000                     | 25500                     |                                 | 0.7497                     | 0.7493         | 0.7507         | 0.7503            | 1.375                      | 2.25                   |                    |
| 74.7                 | 179                  | 51.6                 | 64                        | 127                       | 990                             | 25.39                      | 25.377         | 25.42          | 25.408            | 0.2                        | 1.406                  |                    |
| 16800                | 40200                | 11600                | 14400                     | 28600                     |                                 | 0.9996                     | 0.9991         | 1.0008         | 1.0003            | 1.75                       | 3.1                    |                    |
| 74.7                 | 179                  | 54.7                 | 80.1                      | 143                       | 990                             | 25.39                      | 25.377         | 25.42          | 25.408            | 0.2                        | 1.642                  |                    |
| 16800                | 40200                | 12300                | 18000                     | 32100                     |                                 | 0.9996                     | 0.9991         | 1.0008         | 1.0003            | 1.75                       | 3.62                   |                    |
| 111                  | 227                  | 82.3                 | 89.8                      | 187                       | 950                             | 28.565                     | 28.552         | 28.595         | 28.583            | 0.22                       | 2.245                  |                    |
| 24900                | 51000                | 18500                | 20200                     | 42000                     |                                 | 1.1246                     | 1.1241         | 1.1258         | 1.1253            | 1.922                      | 4.95                   |                    |
| 138                  | 321                  | 99.2                 | 121                       | 245                       | 780                             | 31.74                      | 31.727         | 31.77          | 31.758            | 0.26                       | 3.198                  |                    |
| 31100                | 72200                | 22300                | 27200                     | 55000                     |                                 | 1.2496                     | 1.2491         | 1.2508         | 1.2503            | 2.281                      | 7.05                   |                    |





## **NEEDLE ROLLER BEARINGS**



### **NOTES**

C



## THRUST BEARINGS, ASSEMBLIES, WASHERS

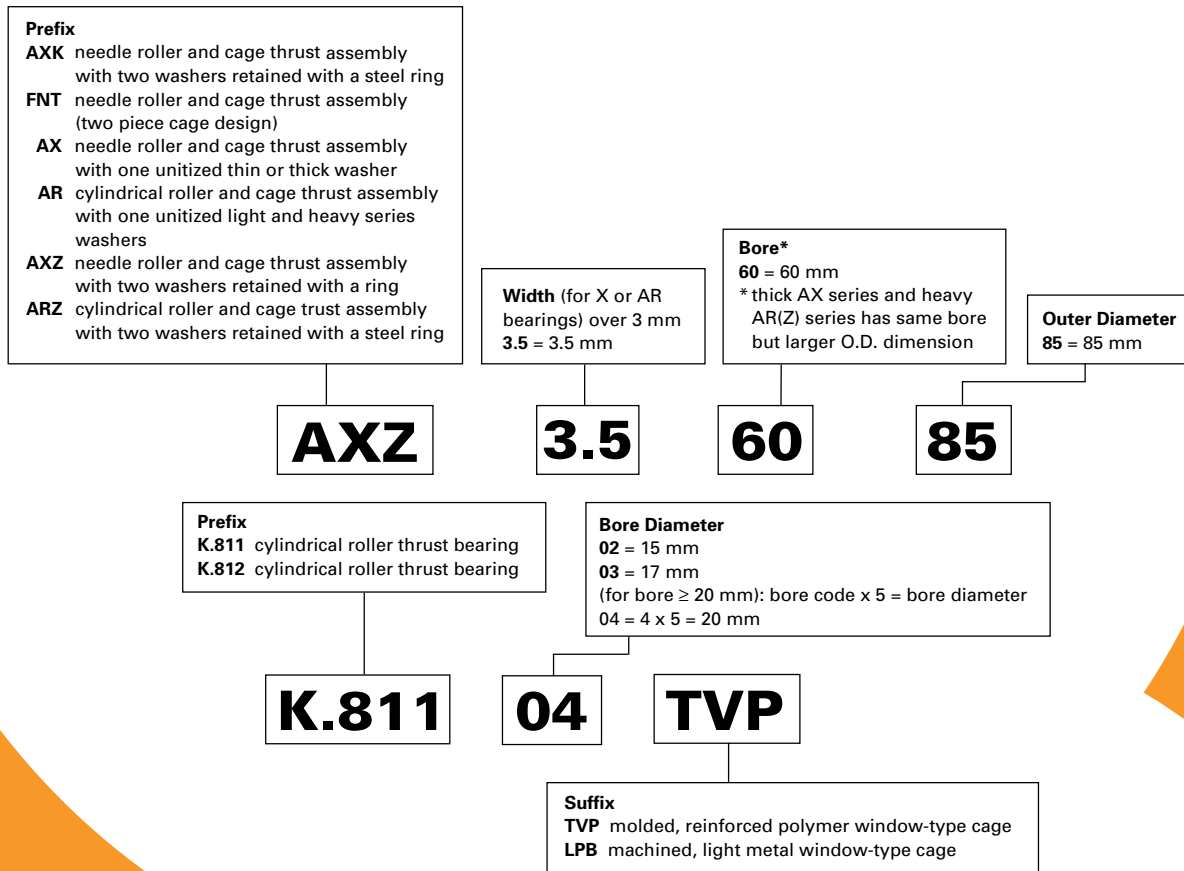
**Overview:** Needle roller and cage thrust assemblies are complements of small diameter needle rollers arranged in a spoke-like configuration. Needle rollers are equally spaced by means of a cage whose web section separates the rollers and provides guidance to keep them tracking in an orbital path. The purpose of these assemblies is to transmit a thrust load between two relatively rotating objects while greatly reducing friction.

Needle roller and cage thrust assemblies can also be unitized with lipped washers which service as raceway surfaces for the needle rollers. Washers can be supplied separately or can be mechanically unitized to the needle roller thrust assemblies for ease of handling.

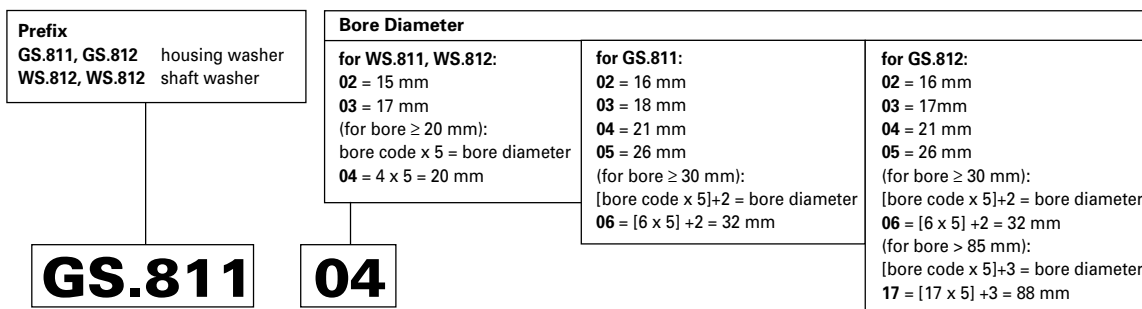
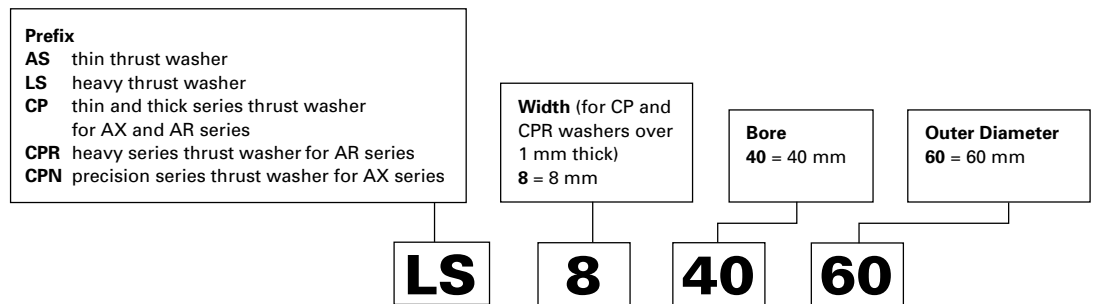
- **Sizes:** 6 mm - 140 mm (0.2362 in. - 5.5118 in.).
- **Markets:** Automotive automatic and manual transmissions, automotive accessories (compressors, steering gears, etc.) agricultural and construction equipment.
- **Features:** One-way fool-proof assembly features, anti-rotation locking features and lubrication flow enhancements.
- **Benefits:** High-speed performance and application flexibility.



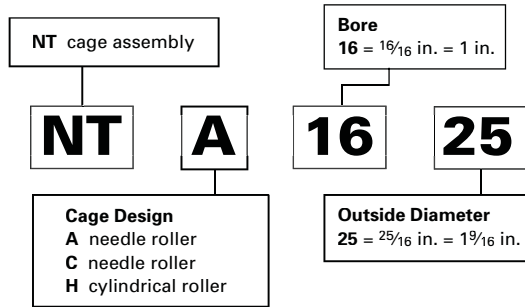
## Needle Roller Thrust Bearings – Metric Nominal Dimensions



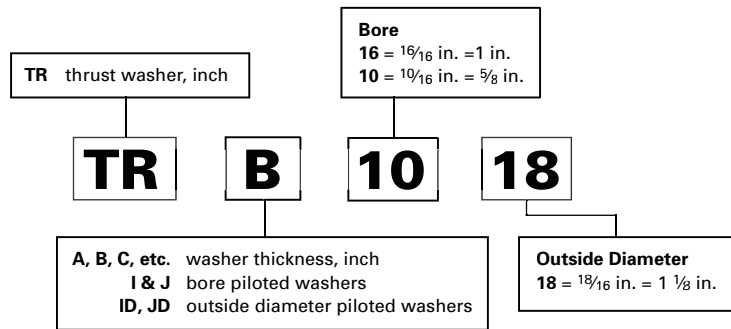
## Thrust Washers – Metric Nominal Dimensions



## Thrust Bearings – Inch Nominal Dimensions



## Thrust Washers – Inch Nominal Dimensions



C



# Thrust Bearings, Assemblies and Washers



## **NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES AND THRUST WASHERS – METRIC SERIES** *Page*

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| Unitized Thrust Bearing Type FNTK . . . . .                           | C239 |
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| Unitized Thrust Bearings . . . . .                                    | C242 |

## **CYLINDRICAL ROLLER THRUST BEARINGS**

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| Cylindrical Roller Thrust Bearings<br>Cylindrical Roller and Cage Thrust Assemblies<br>Metric Series . . . . . | C254 |
| Needle or Roller Thrust Bearings . . . . .                                                                     | C260 |
| Unitized Roller Thrust Bearing Assemblies . . . . .                                                            | C262 |

## **THRUST ASSEMBLIES AND THRUST BEARINGS – INCH SERIES**

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| Needle Roller and Cage Thrust Assemblies,<br>Thrust Washers – Metric and Inch Series . . . . . | C270 |
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## NEEDLE ROLLER BEARINGS

### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES AND THRUST WASHERS –

#### METRIC SERIES

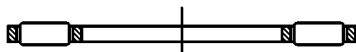
Needle roller and cage thrust assemblies are available in a variety of sizes. They all have very small cross-sections. This catalog includes the most popular, standardized and non-standard designs. If back up surface cannot be used as a raceway, hardened washers are available.

#### REFERENCE STANDARDS ARE:

- **ISO 3031** – Rolling bearings – Needle roller and cage thrust assemblies, thrust washers – Dimensions and tolerances
- **DIN 5405 Part 2** – Rolling bearings – Needle bearings – Thrust needle roller and cage assemblies.
- **DIN 5405 Part 3** – Rolling bearings – Needle bearings – Thrust washers
- **ANSI/ABMA Std. 21.1-1988** – Thrust needle roller and cage assemblies and thrust washers – Metric design.

Before selecting specific needle roller and cage thrust assemblies, the engineering section of this catalog should be reviewed.

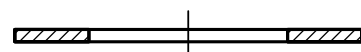
#### TYPES OF METRIC SERIES NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES AND THRUST WASHERS



**AXK, FNT**  
Needle roller & cage thrust assembly



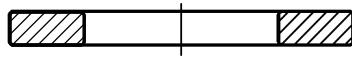
**LS**  
Heavy thrust washer



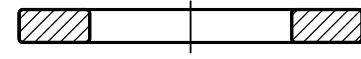
**AS**  
Thin thrust washer



**FNTKF (FNTK, FNTF)**  
Unitized thrust bearing assembly



**WS.811**  
Shaft piloted washer



**GS.811**  
Housing piloted washer

### CONSTRUCTION

#### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

The needle roller and cage thrust assembly (Series FNT) has a two piece steel cage and through hardened needle rollers which are precision finished to close tolerances for optimum load distribution. The cage is comprised of two mating pieces that are securely fastened together.

Series AXK needle roller and cage thrust assembly, which can be used interchangeably with the FNT assembly, has a one piece cage. The cage is similar in design to the successful profiled radial steel cages.

These cage assemblies have a very thin section and when they must run directly against the back up surface raceways their section may be 2 to 5 mm (0.08 to 0.20 in.) which is equivalent to the diameter of the needle rollers used.

When the back up surfaces cannot be hardened and ground, hardened washers of different thicknesses are available.

#### UNITIZED THRUST BEARING ASSEMBLIES

Thrust bearing assemblies of the FNTK, FNTF and FNTKF Series have been specially designed for use in applications where a unitized assembly allows for ease of installation and eliminates the need for heat treatment and precision finishing of one or both thrust bearing backup surfaces.

Each FNTK, FNTF or FNTKF assembly consists of a FNT needle roller and cage thrust assembly with one or two special lipped washers that snap over the cage to produce a unitized thrust bearing assembly. The FNTK and FNTF assembly has one such washer, the FNTKF assembly has a washer on each side of the bearing.

The backup surfaces for these unitized thrust bearing assemblies should meet the limits of permissible out-of-squareness and coning or dishing as shown in figures 1 and 2 on C232. Oil is the preferred lubricant for these assemblies, however they are also available pregreased for applications that do not allow for oil lubrication.

The rolling elements of the AX Series thrust bearings are retained and guided in radial pockets within the cage. The cage is retained in relation to the thrust washer by means of a retaining cap. The design of a one-piece steel cage employs a special curvature that guides the rolling elements by their ends along their centerlines.

In addition, this special curvature gives the steel cage great rigidity while providing maximum lubricant space. This unitized assembly of components facilitates installation and provides a high axial load capacity while occupying only minimal space. Note that the AX Series is not interchangeable with the AXK Series or FNT Series needle roller and cage thrust assemblies.

Standard AX Series needle thrust bearings combined with a thick washer provide rotational accuracy and axial run-out to Class 6 levels according to ISO Standard 199 for ball thrust bearings. They can be supplied in High Precision "HP" quality, providing a precision grade above Class 5. AX Series needle thrust bearings with a thin washer are of minimal thickness and provide excellent economy. They should be considered whenever the degree of support and rotational accuracy requirement allow.

### THRUST WASHERS

Ideally, a thrust washer should be stationary with respect to, and piloted by, its supporting or backing member, whether or not this is an integral part of the shaft or housing. There should be no rubbing action between the thrust washer and any other machine member. Some thrust washers are designed for bore piloting others may be piloted by their outside diameter.

### THIN THRUST WASHERS (AS)

The metric series thin thrust washers are made of hardened spring steel. They may be out of flat due to heat treatment, but will flatten under load. Thin washers are used when the supporting or backing members cannot be adequately prepared as raceways for the needle rollers. These washers are only 1 mm (0.04 in.) thick (dimensions) and provide a very compact and cost-effective bearing arrangement. Although they are usually guided on the shaft, they may be housing-guided when required by application.

### HEAVY THRUST WASHERS (LS)

These metric series thrust washers are made of bearing quality steel, hardened and precision ground on the flat raceway surfaces. Their bores and outside diameters are not ground but provide satisfactory surfaces for shaft piloting or housing piloting arrangements.

### SHAFT PILOTED WASHERS (WS.811) AND HOUSING PILOTED WASHERS (GS.811)

These shaft piloted and housing piloted metric series thrust washers are primarily for use with metric series cylindrical roller thrust bearings of Series 811. They are made of bearing quality steel with, hardened and precision ground and lapped flat raceway surfaces. The tolerances of the thrust bearing bore and outside diameter shown in the engineering section apply to shaft and housing piloted washers.

### THIN (CP) AND THICK (CPR) THRUST WASHERS

The washer incorporated in the AX Series thrust bearing is made from hardened bearing steel and forms one of the raceways for the rolling elements. The opposing raceway is generally provided by a separate thrust washer of similar design supplied by Timken. When the AX Series thrust bearing is piloted by the revolving part, the thrust washer must be piloted by the stationary part and vice versa. If the revolving part and the stationary part are noticeably eccentric to each other, the thrust bearing with integral washer must, without exception, be piloted by the revolving part.

The second raceway for the rolling elements may also be formed by the face of a shoulder or an inserted washer, provided these have the correct hardness and geometric dimensions.





## DIMENSIONAL ACCURACY

### TOLERANCES FOR NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

Pages C234 to C237 list the nominal outside diameter, bore diameter and needle roller diameter for the FNT and AXK Series of needle roller and cage thrust assemblies and also the nominal outside diameter and bore diameter of the series AS, LS, WS and GS thrust washers. Thickness tolerances for the AS and LS thrust washers are also included.

Tolerances for the outside and bore diameters of series FNT and AXK needle roller and cage thrust assemblies are given in Table 1. The needle rollers in any one assembly have a group tolerance of 2  $\mu\text{m}$  (80  $\mu\text{in.}$ ).

**TABLE 1 – TOLERANCES FOR OUTSIDE DIAMETER ( $D_c$ ) AND BORE DIAMETER ( $D_{c1}$ ) OF SERIES FNT AND AXK NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES**

| $D_c$<br>mm |        | Deviations of<br>max. outside dia.<br>(c12)<br>$\mu\text{m}$ |      | $D_{c1}$<br>mm |        | Deviations of<br>min. bore dia.<br>(E11)<br>$\mu\text{m}$ |      |
|-------------|--------|--------------------------------------------------------------|------|----------------|--------|-----------------------------------------------------------|------|
| >           | $\leq$ | high                                                         | low  | >              | $\leq$ | low                                                       | high |
| 18          | 30     | -110                                                         | -320 | 3              | 6      | +20                                                       | +95  |
| 30          | 40     | -120                                                         | -370 | 6              | 10     | +25                                                       | +115 |
| 40          | 50     | -130                                                         | -380 | 10             | 18     | +32                                                       | +142 |
| 50          | 65     | -140                                                         | -440 | 18             | 30     | +40                                                       | +170 |
| 65          | 80     | -150                                                         | -450 | 30             | 50     | +50                                                       | +210 |
| 80          | 100    | -170                                                         | -520 | 50             | 80     | +60                                                       | +250 |
| 100         | 120    | -180                                                         | -530 | 80             | 120    | +72                                                       | +292 |
| 120         | 140    | -200                                                         | -600 |                |        |                                                           |      |

**TABLE 1B - AX SERIES THICKNESS AND AXIAL RUN-OUT TOLERANCES**

|                                   | Bore $D_{c1}$<br>mm     | Thickness<br>Tolerance $\mu\text{m}$ | Axial run-out $\mu\text{m}$ |         |     |
|-----------------------------------|-------------------------|--------------------------------------|-----------------------------|---------|-----|
| Needle thrust<br>bearings (thin)  | $\leq 60$               | +30 / -40 <sup>(1)</sup>             | 20                          |         |     |
|                                   | $60 < D_{c1} \leq 90$   | +50 / -60 <sup>(2)</sup>             | 25                          |         |     |
|                                   | $90 < D_{c1} \leq 120$  | +50 / -60 <sup>(2)</sup>             | 30                          |         |     |
| Needle thrust<br>bearings (thick) | $D_{c1} \leq 60$        | +30 / -30 <sup>(1)</sup>             | 20                          | Quality |     |
|                                   | $60 < D_{c1} \leq 90$   | +50 / -50 <sup>(2)</sup>             | 25                          | HP      | HSP |
|                                   | $90 < D_{c1} \leq 120$  | +50 / -50 <sup>(2)</sup>             | 30                          | 2       | 1   |
| Thrust washers<br>(thin) [thick]  | $D_{c1} \leq 120$       | +50 / -60[-50]                       | 5*                          | 3       | 1.5 |
|                                   | $120 < D_{c1} \leq 180$ | +50 / -110[-100]                     | 7*                          | 4       | 2   |
|                                   | $180 < D_{c1} \leq 250$ | +30 / -160[-150]                     | 10*                         |         |     |

\*HP Quality

<sup>(1)</sup> Under min. load of 150 N

<sup>(2)</sup> Under min. load of 250 N

### BORE INSPECTION PROCEDURE FOR ASSEMBLY

If an inspection of the bore diameter is desired, the bore diameter ( $D_{c1}$ ) of the assembly should be checked with "go" and "no go" plug gages. The "go" plug gage size is the minimum bore diameter of the assembly. The "no go" plug gage size is the maximum bore diameter of the assembly.

The assembly, under its own weight, must fall freely from the "go" plug gage. The "no go" plug gage must not enter the bore. Where the "no go" plug gage can be forced through the bore, the assembly must not fall from the gage under its own weight.

### TOLERANCES FOR THRUST WASHERS

Tolerances for the bore diameters of series WS, shaft piloted thrust washers are given in the engineering section. Tolerances for the outside diameters of Series GS, housing piloted thrust washers are given in the engineering section.

Tolerances for the outside and bore diameters of Series AS thrust washers are given in Table 2. Thickness tolerance for Series AS thrust washers is  $\pm 0.05$  mm ( $\pm 0.002$  in.).

### BORE INSPECTION PROCEDURE FOR SERIES AS AND LS THRUST WASHERS

If an inspection of the thrust washer bore diameter ( $d$ ) is desired, it should be checked with "go" and "no go" plug gages. The "go" plug gage size is the minimum bore diameter of the thrust washer. The "no go" plug gage size is the maximum bore diameter of the thrust washer.

The thrust washer, under its own weight, must fall freely from the "go" plug gage. The "no go" plug gage must not enter the bore. Where the "no go" plug gage can be forced through the bore, the thrust washer must not fall from the gage under its own weight.

**TABLE 2 – TOLERANCES FOR OUTSIDE DIAMETER (d<sub>1</sub>) AND BORE DIAMETER (d) OF SERIES AS THRUST WASHERS.**

| d <sub>1</sub><br>mm |     | Deviations of max. outside dia. (e13) μm |      | d<br>mm |     | Deviations of min. bore dia. (E12) μm |      |
|----------------------|-----|------------------------------------------|------|---------|-----|---------------------------------------|------|
| >                    | ≤   | high                                     | low  | >       | ≤   | low                                   | high |
| 18                   | 30  | -40                                      | -370 | 3       | 6   | +20                                   | +140 |
| 30                   | 50  | -50                                      | -440 | 6       | 10  | +25                                   | +175 |
| 50                   | 80  | -60                                      | -520 | 10      | 18  | +32                                   | +212 |
| 80                   | 120 | -72                                      | -612 | 18      | 30  | +40                                   | +250 |
| 120                  | 180 | -85                                      | -715 | 30      | 50  | +50                                   | +300 |
| 180                  | 250 | -100                                     | -820 | 50      | 80  | +60                                   | +360 |
|                      |     |                                          |      | 80      | 120 | +72                                   | +422 |
|                      |     |                                          |      | 120     | 180 | +85                                   | +485 |

Tolerances for the outside and bore diameters of series LS heavy thrust washers are given in Table 3. Thickness tolerances for series LS heavy thrust washers are given in tabular pages.

**TABLE 3 – TOLERANCES FOR OUTSIDE DIAMETER (d<sub>1</sub>) AND BORE DIAMETER (d) OF SERIES LS HEAVY THRUST WASHERS.**

| d <sub>1</sub><br>mm |     | Deviations of max. outside dia. (a12) μm |       | d<br>mm |     | Deviations of min. bore dia. (E12) μm |      |
|----------------------|-----|------------------------------------------|-------|---------|-----|---------------------------------------|------|
| >                    | ≤   | high                                     | low   | >       | ≤   | low                                   | high |
| 18                   | 30  | -300                                     | -510  | 3       | 6   | +20                                   | +140 |
| 30                   | 40  | -310                                     | -560  | 6       | 10  | +25                                   | +175 |
| 40                   | 50  | -320                                     | -570  | 10      | 18  | +32                                   | +212 |
| 50                   | 65  | -340                                     | -640  | 18      | 30  | +40                                   | +250 |
| 65                   | 80  | -360                                     | -660  | 30      | 50  | +50                                   | +300 |
| 80                   | 100 | -380                                     | -730  | 50      | 80  | +60                                   | +360 |
| 100                  | 120 | -410                                     | -760  | 80      | 120 | +72                                   | +422 |
| 120                  | 140 | -460                                     | -860  | 120     | 180 | +85                                   | +485 |
| 140                  | 160 | -520                                     | -920  |         |     |                                       |      |
| 160                  | 180 | -580                                     | -980  |         |     |                                       |      |
| 180                  | 200 | -660                                     | -1120 |         |     |                                       |      |

**TABLE 4 – MOUNTING TOLERANCES FOR SHAFTS AND HOUSINGS FOR METRIC SERIES COMPONENTS.**

| Bearing Components                                                                          | Shaft Tolerance (shaft piloting) | Housing Tolerance (housing piloting) | Piloting Member |
|---------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------|-----------------|
| Cylindrical roller & needle roller cage thrust assembly<br>Types: AXK, FNT, K.811 and K.812 | h8                               | H10                                  | shaft           |
| Cylindrical roller & needle roller cage thrust assembly<br>Types: AX, AR, AXZ, and ARZ      | h10                              | H10                                  | shaft           |
| Thin thrust washer<br>Type: AS                                                              | h10                              | H11                                  | shaft           |
| Heavy thrust washer<br>Type: LS                                                             | h10                              | H11                                  | shaft           |
| Shaft piloted thrust washer<br>Type: WS.811                                                 | h6 (j6)                          | clearance                            | shaft           |
| Housing piloted thrust washer<br>Type: GS.811                                               | Clearance                        | H7 (K7)                              | housing         |
| Thick, thin and heavy series thrust washers<br>Types: CP and CPR                            | h10                              | H10                                  | as required     |



## MOUNTING TOLERANCES

### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES – METRIC SERIES

On FNT and AXK Series needle roller and cage thrust assemblies, the cage bore has a closer tolerance than the outside diameter, therefore bore piloting is preferred for these assemblies. To reduce wear it is suggested that the piloting surface for the cage be hardened to an equivalent of at least 55 HRC. Where design requirements prevent bore piloting, the FNT or AXK Series needle roller and cage thrust assemblies may be piloted on the outside diameters. For such cases, suitable O.D. piloting dimensions should be determined. Mounting tolerances are given in Table 4.

### THRUST WASHERS

The mounting tolerances for series AS, LS, WS and GS thrust washers for use with needle roller and cage thrust assemblies are given in Table 4.

As for the FNT and AXK Series thrust assemblies, to reduce wear, the piloting surface for the thrust washers should also be hardened to an equivalent of at least 55 HRC.

### BACK UP SURFACES

In some applications, it is desirable to use the back up surfaces as raceways for the needle rollers of the needle roller and cage thrust assemblies. In such designs these surfaces should be parallel and must be hardened to at least 58 HRC. If this hardness cannot be achieved, and thrust washers cannot be used, the load ratings must be reduced, as explained in the engineering section.

Thrust raceway surfaces must be ground to a surface finish of  $0.2 \mu\text{m } R_a$  ( $79 \mu\text{in } R_a$ ). When this requirement cannot be met, thrust washers must be used.

The raceways against which the needle rollers operate, or the surface against which the thrust washers bear must be square with the axis of the shaft. Equally important, the raceway, or surface backing the thrust washer, must not be dished or coned. The permissible limits of out-of-squareness and dishing or coning are shown in Figures 1 and 2.

Raceway contact dimensions  $E_a$  and  $E_b$  are given in the tabular pages. For the thin series AS thrust washers, full back up between the dimensions  $E_a$  and  $E_b$  should be provided.

For AX Series thrust bearings, the maximum out of square must be of no more than 0.0005 mm (maximum angle no more than 1 min. 43 sec.), see Figure 1.

Thin series needle thrust bearings and thin thrust washers must be supported on a flat, rigid, and continuous face throughout the area of circulation of the needles bounded by dimensions  $E_b$  and  $E_a$ .

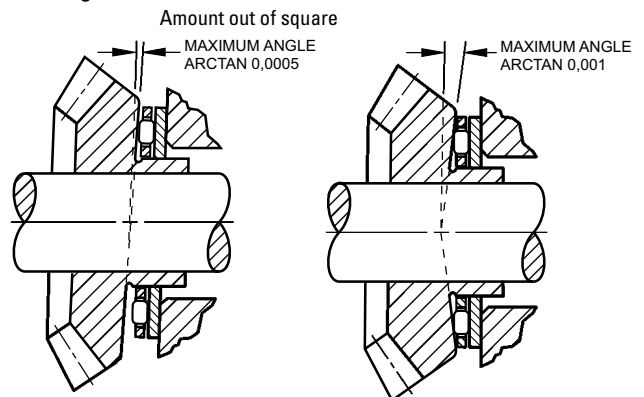
Thick series needle thrust bearings and thick thrust washers can be supported on a more restricted or discontinuous shoulder, provided that the deflection of the washer under load does not impede the smooth operation of the thrust bearing or the required axial run-out.

When an application does not involve the use of a thrust washer, the surface forming the second raceway must:

- extend at least across the whole area of circulation of the rolling elements between dimensions  $E_b$  and  $E_a$ , and,
- possess a suitable surface finish ( $\leq 0.2 \mu\text{m } R_a$  or  $\leq 79 \mu\text{in } R_a$ ) and sufficient hardness in relation to the load to be supported. A hardness of 58 HRC (min.) enables thrust bearings to carry their full load capacity. Lower hardness values reduce the capacities shown in the tables of dimensions (see tabulated sizes).

### TOLERANCES FOR PILOTING SURFACES (AX SERIES)

- Piloting on the shaft : h10 on dimensions  $D_{c1}$  for thrust bearings or dimension  $d$  for thrust washers.
- Piloting in the housing : H10 on dimensions  $D$  for thrust bearings or dimension  $d_1$  for thrust washers.



Out of Square Surface  
Figure 1

Dished or Coned Surface  
Figure 2

## LOAD RATINGS

### MINIMUM AXIAL LOAD

Slippage can occur if the applied axial load is too light and the operating speed of the needle roller and cage thrust assembly is high, particularly if accompanied by inadequate lubrication. For satisfactory operation, a certain minimum load must be applied to a needle roller and cage thrust assembly which can be calculated from:

$$F_{a \text{ min}} = C_0/2200 \text{ [kN]}$$

where

$C_0$  - static load rating [kN]  
 $F_{a \text{ min}}$  - minimum axial load [kN]

### COEFFICIENT OF FRICTION

In general, the coefficient of friction of a thrust bearing (consisting of a needle roller and cage thrust assembly and thrust washers) is defined as the friction torque divided by the product of the applied load and the bearing pitch radius. This coefficient of friction is not a constant value but will vary considerably with load, speed and lubricant. Generally the coefficient of friction becomes smaller as the load is increased and larger as the speed is increased. It is suggested that a value of 0.003 to 0.004 be used for needle thrust bearings and 0.004 to 0.005 be used for roller thrust bearings as a conservative estimate.

### LUBRICATION

Oil is the preferred lubricant for needle roller and cage thrust assemblies and an ample oil flow is absolutely necessary for high speeds, or for moderate speeds when the load is relatively high.

When the application must utilize grease lubrication the needle roller and cage thrust assembly should be ordered pregreased. When the speeds are low, and rotation is not continuous, the initial charge of grease may be suitable for the life of the application. When the speeds are moderate, however, the designer must provide for frequent regreasing. Since the needle rollers tend to expel the lubricant radially outward, relubrication passages should be directed to the bore of the cage whether oil or grease is used as the lubricant.

### SPECIAL DESIGNS

Needle roller and cage thrust assemblies and thrust washers are also made to special dimensions and configurations, as well as from special materials, when quantities permit economical manufacture.

Needle roller and cage thrust assemblies are particularly adaptable to low cost integral combination with special thrust washers. When the use of such special designs is considered, the following pages should be reviewed for evaluation of proposed arrangements.

### TYPE AXJ BEARINGS

Needle thrust bearings type AXJ have been developed by Timken to run at very high rotational speed. They comprise two rows of needles retained and guided in hardened steel cages. These assemblies are retained on either side of a common washer by inserted retaining caps which serve to center them with adequate clearance in relation to the washer.

The special feature of these thrust bearings is the self-piloting action to which each rotating ring of needles is submitted. This self-piloting is transmitted to the washer which is "floating" in relation to the shaft. For this reason, the relative speed of each ring of needles relative to its raceway and the speed of the washer relative to the rotating shaft are reduced by about half.

With a well-designed oil circulation, type AXJ thrust bearings permit speeds approximately twice that achieved with normal thrust bearings.

To ensure the axial position of a shaft in both directions, two AXJ thrust bearings should be mounted on either side of an intermediate washer with oil hole (type PMH), piloted in the housing. Please consult your Timken representative for applications involving the use of these special thrust bearings.

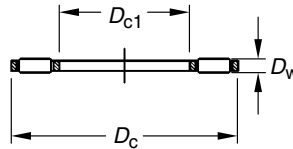




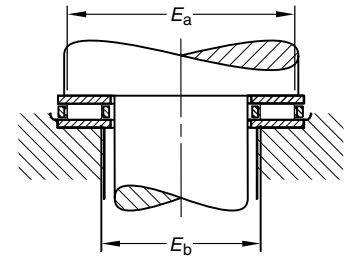
**NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS**

**METRIC SERIES**

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C232 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).



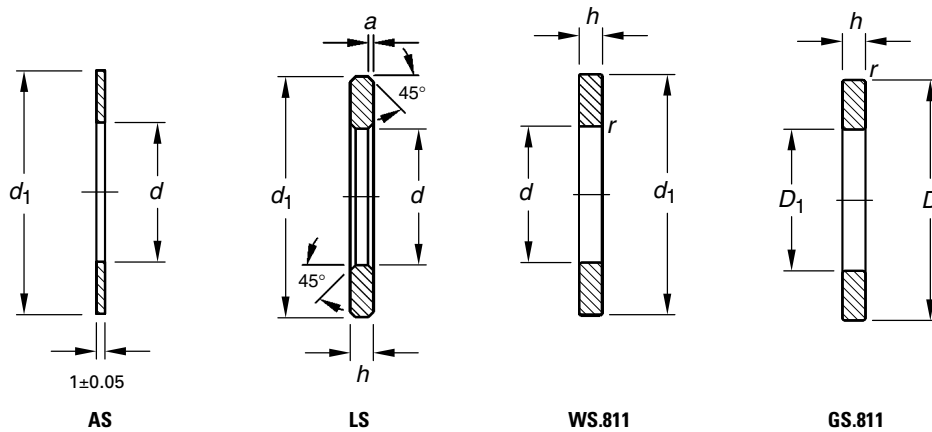
FNT, AXK



Raceway contact dimensions

| Shaft Diameter | Dimensions mm/in. |          |       |       |       |       | Assembly Designation | Wt. kg/lbs.    | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM |
|----------------|-------------------|----------|-------|-------|-------|-------|----------------------|----------------|----------------------|----------------|------------------------|
|                | mm                | $d_{c1}$ | $D_c$ | $D_w$ | $E_b$ | $E_a$ |                      |                | $r_{as\ max}$        | C              |                        |
| 8              | 8                 | 21       | 2     | 9.6   | 18.6  | 0.3   | AXK0821TN            | 0.001<br>0.002 | 8.34<br>1870         | 21.1<br>4740   | 20000                  |
| 10             | 10                | 24       | 2     | 11.0  | 22.5  | 0.3   | AXK1024              | 0.003<br>0.007 | 9.32<br>2100         | 25.9<br>5820   | 17000                  |
| 12             | 12                | 26       | 2     | 13.0  | 24.5  | 0.3   | AXK1226              | 0.004<br>0.009 | 10.8<br>2430         | 32.3<br>7260   | 15000                  |
| 15             | 15                | 28       | 2     | 17.0  | 27.0  | 0.3   | AXK1528              | 0.004<br>0.009 | 11.1<br>2500         | 35.2<br>7910   | 15000                  |
| 17             | 17                | 30       | 2     | 22.0  | 34.0  | 0.3   | AXK1730TN            | 0.004<br>0.009 | 11.7<br>2630         | 38.7<br>8700   | 14000                  |
| 20             | 20                | 35       | 2     | 22.0  | 34.0  | 0.3   | AXK2035              | 0.001<br>0.001 | 12.8<br>2880         | 45.4<br>10200  | 12000                  |
| 25             | 25                | 42       | 2     | 29.0  | 41.0  | 0.6   | AXK2542              | 0.007<br>0.015 | 14.3<br>3210         | 56.8<br>12800  | 10000                  |
| 30             | 30                | 47       | 2     | 35.0  | 46.0  | 0.6   | AXK3047              | 0.009<br>0.020 | 16.0<br>3600         | 68.1<br>15300  | 9000                   |
| 35             | 35                | 52       | 2     | 40.0  | 51.0  | 0.6   | AXK3552              | 0.010<br>0.022 | 17.4<br>3910         | 79.5<br>17900  | 8100                   |
| 40             | 40                | 60       | 3     | 45.0  | 58.0  | 0.6   | AXK4060              | 0.016<br>0.035 | 27.1<br>6090         | 110.0<br>24700 | 7000                   |
| 45             | 45                | 65       | 3     | 50.0  | 63.0  | 0.6   | AXK4565              | 0.020<br>0.044 | 29.0<br>6520         | 124.0<br>27900 | 6500                   |
| 50             | 50                | 70       | 3     | 55.0  | 68.0  | 0.6   | AXK5070              | 0.020<br>0.044 | 30.8<br>6920         | 137.0<br>30800 | 6000                   |
| 55             | 55                | 78       | 3     | 60.0  | 76.0  | 0.6   | AXK5578              | 0.026<br>0.057 | 39.4<br>8860         | 195.0<br>43800 | 5300                   |
| 60             | 60                | 85       | 3     | 65.0  | 83.0  | 0.6   | AXK6085              | 0.035<br>0.077 | 44.5<br>10000        | 234.0<br>52600 | 4900                   |
| 65             | 65                | 90       | 3     | 70.0  | 88.0  | 0.6   | AXK6590              | 0.036<br>0.079 | 46.7<br>10500        | 254<br>57100   | 4600                   |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in. |                   |                |               | Washer Designation | Wt. kg/lbs.    | Washer Designation | mm/in. Chamfer | Wt. kg/lbs.    | Washer Designation Shaft Piloted | Washer Designation Housing Piloted | Radius mm/in.      | Wt. kg/lbs.    |
|-------------------|-------------------|----------------|---------------|--------------------|----------------|--------------------|----------------|----------------|----------------------------------|------------------------------------|--------------------|----------------|
| d                 | D, d <sub>1</sub> | D <sub>1</sub> | h             | Thin               |                | Heavy              | a              |                |                                  |                                    | r <sub>s min</sub> |                |
| 8<br>0.3150       | 21<br>0.8268      |                | 2.75<br>0.108 | AS0821             | 0.002<br>0.004 | LS0821             | 0.30<br>0.012  | 0.004<br>0.009 |                                  |                                    |                    |                |
| 10<br>0.3937      | 24<br>0.9449      |                | 2.75<br>0.108 | AS1024             | 0.003<br>0.007 | LS1024             | 0.50<br>0.020  | 0.008<br>0.018 |                                  |                                    |                    |                |
| 12<br>0.4724      | 26<br>1.0236      |                | 2.75<br>0.108 | AS1226             | 0.003<br>0.007 | LS1226             | 0.50<br>0.020  | 0.009<br>0.020 |                                  |                                    |                    |                |
| 15<br>0.5906      | 28<br>1.1024      | 16<br>0.6299   | 2.75<br>0.108 | AS1528             | 0.003<br>0.007 | LS1528             | 0.50<br>0.020  | 0.010<br>0.022 | WS.81102                         | GS.81102                           | 0.30<br>0.012      | 0.010<br>0.022 |
| 17<br>0.6693      | 30<br>1.1811      | 18<br>0.7087   | 2.75<br>0.108 | AS1730             | 0.003<br>0.007 | LS1730             | 0.50<br>0.020  | 0.011<br>0.024 | WS.81103                         | GS.81103                           | 0.30<br>0.012      | 0.011<br>0.024 |
| 20<br>0.7874      | 35<br>1.3780      | 21<br>0.8268   | 2.75<br>0.108 | AS2035             | 0.005<br>0.011 | LS2035             | 0.50<br>0.020  | 0.014<br>0.031 | WS.81104                         | GS.81104                           | 0.30<br>0.012      | 0.014<br>0.031 |
| 25<br>0.9843      | 42<br>1.6535      | 26<br>1.0236   | 3.00<br>0.118 | AS2542             | 0.007<br>0.015 | LS2542             | 1.00<br>0.039  | 0.021<br>0.046 | WS.81105                         | GS.81105                           | 0.60<br>0.024      | 0.021<br>0.046 |
| 30<br>1.1811      | 47<br>1.8504      | 32<br>1.2598   | 3.00<br>0.118 | AS3047             | 0.008<br>0.018 | LS3047             | 1.00<br>0.039  | 0.023<br>0.051 | WS.81106                         | GS.81106                           | 0.60<br>0.024      | 0.023<br>0.051 |
| 35<br>1.3780      | 52<br>2.0472      | 37<br>1.4567   | 3.50<br>0.138 | AS3552             | 0.009<br>0.020 | LS3552             | 1.00<br>0.039  | 0.030<br>0.066 | WS.81107                         | GS.81107                           | 0.60<br>0.024      | 0.032<br>0.071 |
| 40<br>1.5748      | 60<br>2.3622      | 42<br>1.6535   | 3.50<br>0.138 | AS4060             | 0.012<br>0.026 | LS4060             | 1.00<br>0.039  | 0.041<br>0.090 | WS.81108                         | GS.81108                           | 0.60<br>0.024      | 0.043<br>0.095 |
| 45<br>1.7717      | 65<br>2.5591      | 47<br>1.8504   | 4.00<br>0.157 | AS4565             | 0.013<br>0.029 | LS4565             | 1.00<br>0.039  | 0.052<br>0.115 | WS.81109                         | GS.81109                           | 0.60<br>0.024      | 0.054<br>0.119 |
| 50<br>1.9685      | 70<br>2.7559      | 52<br>2.0472   | 4.00<br>0.157 | AS5070             | 0.014<br>0.031 | LS5070             | 1.00<br>0.039  | 0.056<br>0.123 | WS.81110                         | GS.81110                           | 0.60<br>0.024      | 0.059<br>0.130 |
| 55<br>2.1654      | 78<br>3.0709      | 57<br>2.2441   | 5.00<br>0.197 | AS5578             | 0.018<br>0.040 | LS5578             | 1.00<br>0.039  | 0.091<br>0.201 | WS.81111                         | GS.81111                           | 0.60<br>0.024      | 0.094<br>0.207 |
| 60<br>2.3622      | 85<br>3.3465      | 62<br>2.4409   | 4.75<br>0.187 | AS6085             | 0.022<br>0.049 | LS6085             | 1.50<br>0.059  | 0.102<br>0.225 | WS.81112                         | GS.81112                           | 1.00<br>0.039      | 0.106<br>0.234 |
| 65<br>2.5591      | 90<br>3.5433      | 67<br>2.6378   | 5.25<br>0.207 | AS6590             | 0.023<br>0.051 | LS6590             | 1.50<br>0.059  | 0.121<br>0.267 | WS.81113                         | GS.81113                           | 1.00<br>0.039      | 0.125<br>0.276 |

Continued on next page.

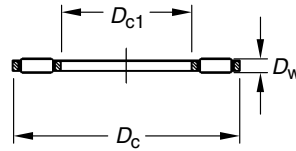




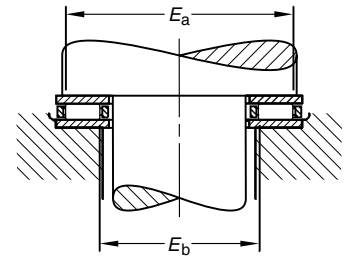
**NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS - continued**

**METRIC SERIES**

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C232 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).



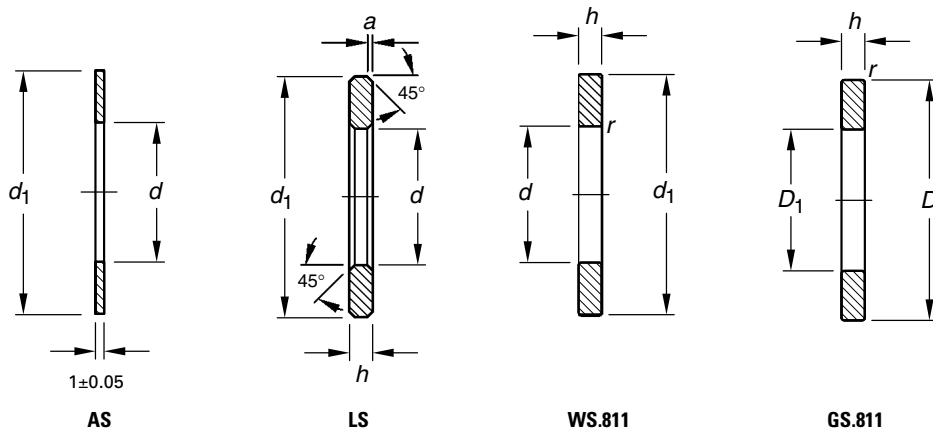
FNT, AXK



Raceway contact dimensions

| Shaft Diameter | Dimensions mm/in. |          |       |       |       |       | Assembly Designation | Wt. kg/lbs.    | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM |
|----------------|-------------------|----------|-------|-------|-------|-------|----------------------|----------------|----------------------|----------------|------------------------|
|                | mm                | $d_{c1}$ | $D_c$ | $D_w$ | $E_b$ | $E_a$ |                      |                | $r_{as\ max}$        | C              |                        |
| 70             | 70                | 95       | 4     | 74.0  | 93.0  | 0.6   | AXK7095              | 0.055<br>0.121 | 53.8<br>12100        | 253<br>56900   | 4400                   |
| 75             | 75                | 100      | 4     | 79.0  | 98.0  | 0.6   | AXK75100             | 0.058<br>0.128 | 55.1<br>12400        | 266<br>59800   | 4200                   |
| 80             | 80                | 105      | 4     | 84.0  | 103.0 | 0.6   | AXK80105             | 0.092<br>0.203 | 56.4<br>12700        | 279<br>62700   | 4000                   |
| 85             | 85                | 110      | 4     | 89.0  | 108.0 | 0.6   | AXK85110             | 0.063<br>0.139 | 57.6<br>12900        | 291<br>65400   | 3800                   |
| 90             | 90                | 120      | 4     | 94.0  | 118.0 | 0.6   | AXK90120             | 0.081<br>0.179 | 72.9<br>16400        | 405<br>91000   | 3500                   |
| 100            | 100               | 135      | 4     | 105.0 | 133.0 | 0.6   | AXK100135            | 0.106<br>0.234 | 90.2<br>20300        | 552<br>124000  | 3100                   |
| 110            | 110               | 145      | 4     | 115.0 | 143.0 | 0.6   | AXK110145            | 0.117<br>0.258 | 93.2<br>21000        | 591<br>133000  | 2800                   |
| 120            | 120               | 155      | 4     | 125.0 | 153.0 | 0.6   | AXK120155            | 0.126<br>0.278 | 98.5<br>22100        | 650<br>146000  | 2700                   |
| 130            | 130               | 170      | 5     | 136.0 | 167.0 | 0.6   | AXK130170            | 0.198<br>0.437 | 132<br>29700         | 829<br>186000  | 2400                   |
| 140            | 140               | 180      | 5     | 146.0 | 177.0 | 0.6   | AXK140180            | 0.221<br>0.487 | 136<br>30600         | 887<br>199000  | 2300                   |
| 150            | 150               | 190      | 5     | 156.0 | 187.0 | 0.6   | AXK150190            | 0.225<br>0.496 | 141<br>31700         | 944<br>212000  | 2200                   |
| 160            | 160               | 200      | 5     | 166.0 | 197.0 | 0.6   | AXK160200            | 0.249<br>0.549 | 146<br>32800         | 1000<br>225000 | 2100                   |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in.    |                      |                     |                      | Washer Designation | Wt. kg/lbs.           | Washer Designation | mm/in. Chamfer       | Wt. kg/lbs.           | Washer Designation Shaft Piloted | Washer Designation Housing Piloted | Radius mm/in.        | Wt. kg/lbs.           |
|----------------------|----------------------|---------------------|----------------------|--------------------|-----------------------|--------------------|----------------------|-----------------------|----------------------------------|------------------------------------|----------------------|-----------------------|
| d                    | D, d <sub>1</sub>    | D <sub>1</sub>      | h                    | Thin               |                       | Heavy              | a                    |                       |                                  |                                    | r <sub>s</sub> min   |                       |
| <b>70</b><br>2.7559  | <b>95</b><br>3.7402  | <b>72</b><br>2.8346 | <b>5.25</b><br>0.207 | <b>AS7095</b>      | <b>0.025</b><br>0.055 | <b>LS7095</b>      | <b>1.50</b><br>0.059 | <b>0.128</b><br>0.282 | <b>WS.81114</b>                  | <b>GS.81114</b>                    | <b>1.00</b><br>0.039 | <b>0.133</b><br>0.293 |
| <b>75</b><br>2.9528  | <b>100</b><br>3.9370 | <b>77</b><br>3.0315 | <b>5.75</b><br>0.226 | <b>AS75100</b>     | <b>0.027</b><br>0.060 | <b>LS75100</b>     | <b>1.50</b><br>0.059 | <b>0.150</b><br>0.331 | <b>WS.81115</b>                  | <b>GS.81115</b>                    | <b>1.00</b><br>0.039 | <b>0.155</b><br>0.342 |
| <b>80</b><br>3.1496  | <b>105</b><br>4.1339 | <b>82</b><br>3.2283 | <b>5.75</b><br>0.226 | <b>AS80105</b>     | <b>0.028</b><br>0.062 | <b>LS80105</b>     | <b>1.50</b><br>0.059 | <b>0.158</b><br>0.348 | <b>WS.81116</b>                  | <b>GS.81116</b>                    | <b>1.00</b><br>0.039 | <b>0.165</b><br>0.364 |
| <b>85</b><br>3.3465  | <b>110</b><br>4.3307 | <b>87</b><br>3.4252 | <b>5.75</b><br>0.226 | <b>AS85110</b>     | <b>0.028</b><br>0.062 | <b>LS85110</b>     | <b>1.50</b><br>0.059 | <b>0.166</b><br>0.366 | <b>WS.81117</b>                  | <b>GS.81117</b>                    | <b>1.00</b><br>0.039 | <b>0.173</b><br>0.381 |
| <b>90</b><br>3.5433  | <b>120</b><br>4.7244 | <b>92</b><br>3.6220 | <b>6.50</b><br>0.256 | <b>AS90120</b>     | <b>0.038</b><br>0.084 | <b>LS90120</b>     | <b>1.50</b><br>0.059 | <b>0.245</b><br>0.540 | <b>WS.81118</b>                  | <b>GS.81118</b>                    | <b>1.00</b><br>0.039 | <b>0.253</b><br>0.558 |
| <b>100</b><br>3.9370 | <b>135</b><br>5.3150 |                     |                      | <b>AS100135</b>    | <b>0.050</b><br>0.110 |                    |                      |                       |                                  |                                    |                      |                       |
| <b>110</b><br>4.3307 | <b>145</b><br>5.7087 |                     | <b>7.00</b><br>0.276 | <b>AS110145</b>    | <b>0.055</b><br>0.121 | <b>LS110145</b>    | <b>1.50</b><br>0.059 | <b>0.373</b><br>0.822 |                                  |                                    |                      |                       |
| <b>120</b><br>4.7244 | <b>155</b><br>6.1024 |                     |                      | <b>AS120155</b>    | <b>0.059</b><br>0.130 |                    |                      |                       |                                  |                                    |                      |                       |
| <b>130</b><br>5.1181 | <b>170</b><br>6.6929 |                     | <b>9.00</b><br>0.354 | <b>AS130170</b>    | <b>0.074</b><br>0.163 | <b>LS130170</b>    | <b>1.50</b><br>0.059 | <b>0.065</b><br>0.143 |                                  |                                    |                      |                       |
| <b>140</b><br>5.5118 | <b>180</b><br>7.0866 |                     |                      | <b>AS140180</b>    | <b>0.078</b><br>0.172 |                    |                      |                       |                                  |                                    |                      |                       |
| <b>150</b><br>5.9055 | <b>190</b><br>7.4803 |                     |                      | <b>AS150190</b>    | <b>0.083</b><br>0.183 |                    |                      |                       |                                  |                                    |                      |                       |
| <b>160</b><br>6.2992 | <b>200</b><br>7.8740 |                     |                      | <b>AS160200</b>    | <b>0.089</b><br>0.196 |                    |                      |                       |                                  |                                    |                      |                       |



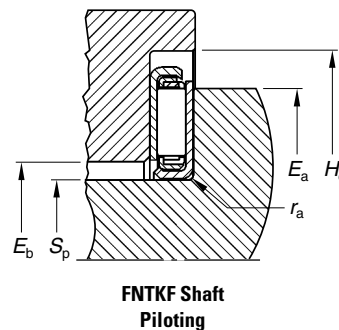
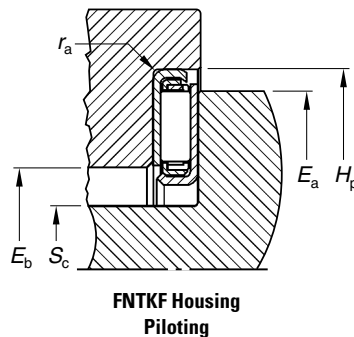
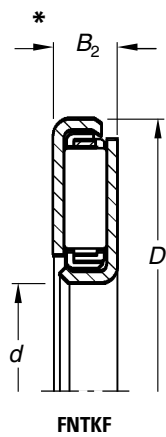




**UNITIZED THRUST BEARING TYPE FNTKF**

**METRIC SERIES**

- Combines low friction and thin cross-section with the convenience of complete packaged assembly.
- Used where both thrust backup surfaces are not suitably hardened or ground.
- Backup surfaces should meet limits of permissible out-of-squareness, dishing or coning (see Figures 1 and 2 on page C232).
- Assembly can be either shaft or housing piloted, but not both (see mounting dimensions shown on the opposite page).
- Many special sizes available – contact your Timken representative.
- Call for availability.



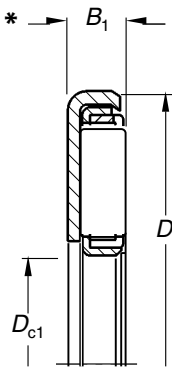
| Shaft Diameter | Dimensions mm/in. |              |                  | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed Oil | Mounting Dimensions mm/in. |                    |                |                | Nominal        |                |
|----------------|-------------------|--------------|------------------|----------------------|----------------------|----------------|--------------------|----------------------------|--------------------|----------------|----------------|----------------|----------------|
|                | E13               | e13          | -0.2, -.002      |                      | Dynamic              | Static         |                    | Housing Piloting H10       | Shaft Piloting h10 | Max.           | Min.           |                |                |
| mm             | d                 | D            | B <sub>2</sub> * |                      | C                    | C <sub>0</sub> | RPM                | H                          | S <sub>c</sub>     | S <sub>p</sub> | H <sub>c</sub> | E <sub>a</sub> | E <sub>b</sub> |
| 10             | 10<br>0.3937      | 28<br>1.1024 | 3.7<br>0.146     | FNTKF-1028           | 9.88<br>2220         | 29.0<br>6520   | 16000              | 28<br>1.102                | 8<br>0.31496       | 10<br>0.394    | 30<br>1.181    | 25<br>0.984    | 14<br>0.551    |
| 13             | 13<br>0.5118      | 30<br>1.1811 | 3.7<br>0.146     | FNTKF-1330           | 10.1<br>2270         | 31.3<br>7040   | 15000              | 30<br>1.181                | 11<br>0.433        | 13<br>0.512    | 32<br>1.260    | 27<br>1.063    | 17<br>0.669    |
| 15             | 15<br>0.5906      | 32<br>1.2598 | 3.7<br>0.146     | FNTKF-1532           | 10.8<br>2430         | 34.8<br>7820   | 14000              | 32<br>1.260                | 13<br>0.512        | 15<br>0.591    | 34<br>1.339    | 29<br>1.142    | 19<br>0.748    |
| 18             | 18<br>0.7087      | 37<br>1.4567 | 3.7<br>0.146     | FNTKF-1837           | 13.8<br>3100         | 50.3<br>11300  | 12000              | 37<br>1.457                | 16<br>0.630        | 18<br>0.709    | 39<br>1.535    | 34<br>1.339    | 22<br>0.866    |
| 23             | 23<br>0.9055      | 44<br>1.7323 | 3.7<br>0.146     | FNTKF-2344           | 18.0<br>4050         | 75.3<br>16900  | 9700               | 44<br>1.732                | 21<br>0.827        | 23<br>0.906    | 46<br>1.811    | 41<br>1.614    | 27<br>1.063    |
| 28             | 28<br>1.1024      | 49<br>1.9291 | 3.7<br>0.146     | FNTKF-2849           | 18.6<br>4180         | 82.4<br>18500  | 8900               | 49<br>1.929                | 26<br>1.024        | 28<br>1.102    | 51<br>2.008    | 46<br>1.811    | 32<br>1.260    |
| 33             | 33<br>1.2992      | 54<br>2.126  | 3.7<br>0.146     | FNTKF-3354           | 21.6<br>4860         | 104<br>23400   | 7900               | 54<br>2.126                | 31<br>1.220        | 33<br>1.299    | 56<br>2.205    | 51<br>2.008    | 37<br>1.457    |
| 38             | 38<br>1.4961      | 62<br>2.4409 | 4.7<br>0.185     | FNTKF-3862           | 31.4<br>7060         | 132<br>29700   | 7100               | 62<br>2.441                | 36<br>1.417        | 38<br>1.496    | 64<br>2.520    | 57<br>2.244    | 43<br>1.693    |
| 43             | 43<br>1.6929      | 67<br>2.6378 | 4.7<br>0.185     | FNTKF-4367           | 37.8<br>8500         | 173<br>38900   | 6400               | 67<br>2.638                | 41<br>1.614        | 43<br>1.693    | 69<br>2.717    | 63<br>2.480    | 47<br>1.850    |
| 48             | 48<br>1.890       | 72<br>2.8346 | 4.7<br>0.185     | FNTKF-4872           | 37.9<br>8520         | 179<br>40200   | 5900               | 72<br>2.835                | 46<br>1.811        | 48<br>1.890    | 74<br>2.913    | 68<br>2.677    | 52<br>2.047    |
| 53             | 53<br>2.0866      | 80<br>3.150  | 4.7<br>0.185     | FNTKF-5380           | 48.5<br>10900        | 254<br>57100   | 5300               | 80<br>3.150                | 51<br>2.008        | 53<br>2.087    | 82<br>3.228    | 76<br>2.992    | 57<br>2.244    |

\* To be measured under a 1.5 kN (0.34 lb.) load.

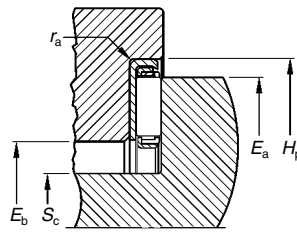
## UNITIZED THRUST BEARING TYPE FNTK

### METRIC SERIES

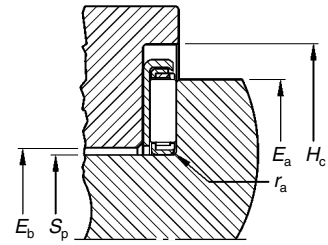
- Combine low friction and thin cross-section with the convenience of complete packaged assembly.
- Integral washer allows use where one thrust backup surfaces is not suitably hardened or ground.
- Backup surface should meet limits of permissible out-of-squareness, dishing or coning (see Figures 1 and 2 on page C232).
- Backup surface finish of 0.2  $\mu\text{m}$   $R_a$  (min.) or 8.0  $\mu\text{m}$   $R_a$  (min.) required.
- Assembly can be either shaft or housing piloted, but not both (see mounting dimensions shown on the opposite page).
- Many special sizes available – contact your Timken representative.
- Call for availability.



FNTK



FNTK Housing Piloting



FNTK Shaft Piloting

| Shaft Diameter | Dimensions mm/in. |              |                | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM | Mounting Dimensions mm/in. |                |                    |                | Nominal        |                |
|----------------|-------------------|--------------|----------------|----------------------|----------------------|----------------|------------------------|----------------------------|----------------|--------------------|----------------|----------------|----------------|
|                | E13               | e13          | -0.2, -.002    |                      | Dynamic              | Static         |                        | Housing Piloting H10       | Max.           | Shaft Piloting h10 | Min.           | E <sub>a</sub> | E <sub>b</sub> |
| mm             | d                 | D            | B <sub>2</sub> |                      | C                    | C <sub>0</sub> |                        | H                          | S <sub>c</sub> | S <sub>p</sub>     | H <sub>c</sub> | E <sub>a</sub> | E <sub>b</sub> |
| 12             | 12<br>0.4724      | 28<br>1.1024 | 2.85<br>0.1122 | FNTK-1228            | 9.88<br>2220         | 29.0<br>6520   | 16000                  | 28<br>1.102                | 10.5<br>0.413  | 12<br>0.4724       | 29.5<br>1.161  | 25<br>0.9843   | 14<br>0.5512   |
| 15             | 15<br>0.5906      | 30<br>1.1811 | 2.85<br>0.1122 | FNTK-1530            | 10.1<br>2270         | 31.3<br>7040   | 15000                  | 30<br>1.181                | 13.5<br>0.531  | 15<br>0.5906       | 31.5<br>1.240  | 27<br>1.063    | 17<br>0.6693   |
| 17             | 17<br>0.6693      | 32<br>1.260  | 2.85<br>0.1122 | FNTK-1732            | 10.8<br>2430         | 34.8<br>7820   | 14000                  | 32<br>1.260                | 15.5<br>0.610  | 17<br>0.6693       | 33.5<br>1.319  | 29<br>1.1417   | 19<br>0.748    |
| 20             | 20<br>0.7874      | 37<br>1.4567 | 2.85<br>0.1122 | FNTK-2037            | 13.8<br>3100         | 50.3<br>11300  | 12000                  | 37<br>1.457                | 18.5<br>0.728  | 20<br>0.7874       | 38.5<br>1.516  | 34<br>1.3386   | 22<br>0.8661   |
| 25             | 25<br>0.9843      | 44<br>1.7323 | 2.85<br>0.1122 | FNTK-2544            | 18.0<br>4050         | 75.3<br>16900  | 9700                   | 44<br>1.732                | 23.5<br>0.925  | 25<br>0.9843       | 45.5<br>1.791  | 41<br>1.6142   | 27<br>1.063    |
| 30             | 30<br>1.1811      | 49<br>1.9291 | 2.85<br>0.1122 | FNTK-3049            | 18.6<br>4180         | 82.4<br>18500  | 8900                   | 49<br>1.929                | 28.5<br>1.122  | 30<br>1.1811       | 50.5<br>1.988  | 46<br>1.811    | 32<br>1.260    |
| 35             | 35<br>1.378       | 54<br>2.126  | 2.85<br>0.1122 | FNTK-3554            | 21.6<br>4860         | 104<br>23400   | 7900                   | 54<br>2.126                | 33.5<br>1.319  | 35<br>1.378        | 55.5<br>2.185  | 51<br>2.0079   | 37<br>1.4567   |
| 40             | 40<br>1.5748      | 62<br>2.4409 | 3.85<br>0.1516 | FNTK-4062            | 31.4<br>7060         | 132<br>29700   | 7100                   | 62<br>2.441                | 38.5<br>1.516  | 40<br>1.5748       | 63.5<br>2.500  | 57<br>2.2441   | 43<br>1.6929   |
| 45             | 45<br>1.7717      | 67<br>2.6378 | 3.85<br>0.1516 | FNTK-4567            | 37.8<br>8500         | 173<br>38900   | 6400                   | 67<br>2.638                | 43.5<br>1.713  | 45<br>1.7717       | 68.5<br>2.697  | 63<br>2.480    | 47<br>1.850    |
| 50             | 50<br>1.9685      | 72<br>2.8346 | 3.85<br>0.1516 | FNTK-5072            | 37.9<br>8520         | 179<br>40200   | 5900                   | 72<br>2.835                | 48.5<br>1.909  | 50<br>1.9685       | 73.5<br>2.894  | 68<br>2.6772   | 52<br>2.0472   |
| 55             | 55<br>2.1654      | 80<br>3.150  | 3.85<br>0.1516 | FNTK-5580            | 48.5<br>10900        | 254<br>57100   | 5300                   | 80<br>3.150                | 53.5<br>2.106  | 55<br>2.1654       | 81.5<br>3.209  | 76<br>2.9921   | 57<br>2.2441   |

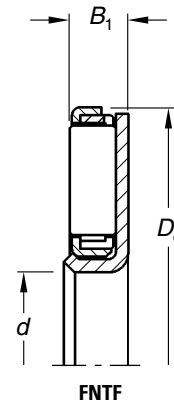
\* To be measured under a 1.5 kN (0.34 lb.) load.



**UNITIZED THRUST BEARING ASSEMBLIES**

**METRIC SERIES**

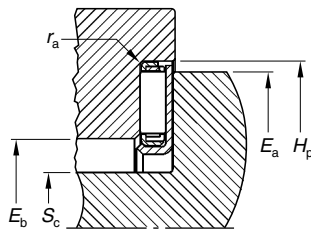
- Combine low friction and thin cross-section with the convenience of complete packaged assembly.
- Integral washer allows use where one thrust backup surfaces is not suitably hardened or ground.
- Backup surface should meet limits of permissible out-of-squareness, dishing or coning (see Figures 1 and 2 on page C232).
- Backup surface finish of 0.2  $\mu\text{m}$   $R_a$  (min.) or 8.0  $\mu\text{in}$   $R_a$  (min.) required.
- Assembly can be either shaft or housing piloted, but not both (see mounting dimensions shown on the opposite page).
- Many special sizes available – contact your Timken representative.



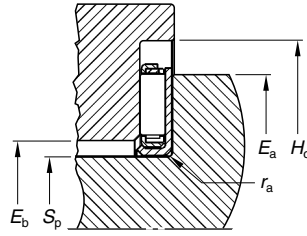
| Shaft Diameter | Dimensions mm/in.  |                    |                      | Assembly Designation | Load Ratings kN/lbf  |                      | Limiting Speed Oil RPM |
|----------------|--------------------|--------------------|----------------------|----------------------|----------------------|----------------------|------------------------|
|                | (E13)              | (C12)              | (-0.1)               |                      | Dynamic              | Static               |                        |
|                | d                  | $D_c$              | $B_1^*$              |                      | C                    | $C_0$                |                        |
| <b>10</b>      | <b>10</b><br>0.394 | <b>26</b><br>1.024 | <b>2.85</b><br>0.112 | <b>FNTF-1026</b>     | <b>9.88</b><br>2220  | <b>29.0</b><br>6520  | <b>16000</b>           |
| <b>13</b>      | <b>13</b><br>0.512 | <b>28</b><br>1.102 | <b>2.85</b><br>0.112 | <b>FNTF-1328</b>     | <b>10.1</b><br>2270  | <b>31.3</b><br>7040  | <b>15000</b>           |
| <b>15</b>      | <b>15</b><br>0.591 | <b>30</b><br>1.181 | <b>2.85</b><br>0.112 | <b>FNTF-1530</b>     | <b>10.8</b><br>2430  | <b>34.8</b><br>7820  | <b>14000</b>           |
| <b>18</b>      | <b>18</b><br>0.709 | <b>35</b><br>1.378 | <b>2.85</b><br>0.112 | <b>FNTF-1835</b>     | <b>13.8</b><br>3100  | <b>50.3</b><br>11300 | <b>12000</b>           |
| <b>23</b>      | <b>23</b><br>0.906 | <b>42</b><br>1.654 | <b>2.85</b><br>0.112 | <b>FNTF-2342</b>     | <b>18.0</b><br>4050  | <b>75.3</b><br>16900 | <b>9700</b>            |
| <b>28</b>      | <b>28</b><br>1.102 | <b>47</b><br>1.850 | <b>2.85</b><br>0.112 | <b>FNTF-2847</b>     | <b>18.6</b><br>4180  | <b>82.4</b><br>18500 | <b>8900</b>            |
| <b>33</b>      | <b>33</b><br>1.299 | <b>52</b><br>2.047 | <b>2.85</b><br>0.112 | <b>FNTF-3352</b>     | <b>21.6</b><br>4860  | <b>104</b><br>23400  | <b>7900</b>            |
| <b>38</b>      | <b>38</b><br>1.496 | <b>60</b><br>2.362 | <b>3.85</b><br>0.152 | <b>FNTF-3860</b>     | <b>31.4</b><br>7060  | <b>132</b><br>29700  | <b>7100</b>            |
| <b>43</b>      | <b>43</b><br>1.693 | <b>65</b><br>2.559 | <b>3.85</b><br>0.152 | <b>FNTF-4365</b>     | <b>37.8</b><br>8500  | <b>173</b><br>38900  | <b>6400</b>            |
| <b>48</b>      | <b>48</b><br>1.890 | <b>70</b><br>2.756 | <b>3.85</b><br>0.152 | <b>FNTF-4870</b>     | <b>37.9</b><br>8520  | <b>179</b><br>40200  | <b>5900</b>            |
| <b>53</b>      | <b>53</b><br>2.087 | <b>78</b><br>3.071 | <b>3.85</b><br>0.152 | <b>FNTF-5378</b>     | <b>48.5</b><br>10900 | <b>254</b><br>57100  | <b>5300</b>            |

\* To be measured under a 1.5 kN (0.34 lb.) load.  
Timken manufactures many special sizes of Unitized Needle Roller Thrust Bearing Assemblies.  
Please contact your Timken representative for availability.

## Needle Roller Thrust Bearings, Assemblies, Washers



FNTF Housing Piloting



FNTF Shaft Piloting

| Housing Piloting   |                      | Mounting Dimensions mm/in. |                      |                    |                    |
|--------------------|----------------------|----------------------------|----------------------|--------------------|--------------------|
| (H10)              | (Max.)               | Shaft Piloting             |                      | (Nom.)             | (Nom.)             |
| H <sub>p</sub>     | S <sub>c</sub>       | S <sub>p</sub>             | H <sub>c</sub>       | E <sub>a</sub>     | E <sub>b</sub>     |
| <b>26</b><br>1.024 | <b>8.5</b><br>0.335  | <b>10</b><br>0.394         | <b>27.5</b><br>1.083 | <b>25</b><br>0.984 | <b>14</b><br>0.551 |
| <b>28</b><br>1.102 | <b>11.5</b><br>0.453 | <b>13</b><br>0.512         | <b>29.5</b><br>1.161 | <b>27</b><br>1.063 | <b>17</b><br>0.669 |
| <b>30</b><br>1.181 | <b>13.5</b><br>0.531 | <b>15</b><br>0.591         | <b>31.5</b><br>1.240 | <b>29</b><br>1.142 | <b>19</b><br>0.748 |
| <b>35</b><br>1.378 | <b>16.5</b><br>0.650 | <b>18</b><br>0.709         | <b>36.5</b><br>1.437 | <b>34</b><br>1.339 | <b>22</b><br>0.866 |
| <b>42</b><br>1.654 | <b>21.5</b><br>0.846 | <b>23</b><br>0.906         | <b>43.5</b><br>1.713 | <b>41</b><br>1.614 | <b>27</b><br>1.063 |
| <b>47</b><br>1.850 | <b>26.5</b><br>1.043 | <b>28</b><br>1.102         | <b>48.5</b><br>1.909 | <b>46</b><br>1.811 | <b>32</b><br>1.260 |
| <b>52</b><br>2.047 | <b>31.5</b><br>1.240 | <b>33</b><br>1.299         | <b>53.5</b><br>2.106 | <b>51</b><br>2.008 | <b>37</b><br>1.457 |
| <b>60</b><br>2.362 | <b>36.5</b><br>1.437 | <b>38</b><br>1.496         | <b>61.5</b><br>2.421 | <b>57</b><br>2.244 | <b>43</b><br>1.693 |
| <b>65</b><br>2.559 | <b>41.5</b><br>1.634 | <b>43</b><br>1.693         | <b>66.5</b><br>2.618 | <b>63</b><br>2.480 | <b>47</b><br>1.850 |
| <b>70</b><br>2.756 | <b>46.5</b><br>1.831 | <b>48</b><br>1.890         | <b>71.5</b><br>2.815 | <b>68</b><br>2.677 | <b>52</b><br>2.047 |
| <b>78</b><br>3.071 | <b>51.5</b><br>2.028 | <b>53</b><br>2.087         | <b>79.5</b><br>3.130 | <b>76</b><br>2.992 | <b>57</b><br>2.244 |

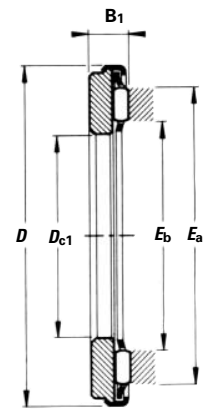
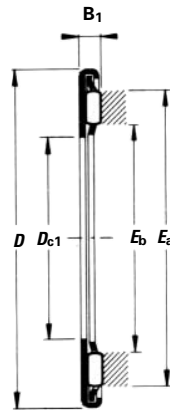
$r_{as} = 1.0 \text{ mm max. (0.039 in. max.)}$





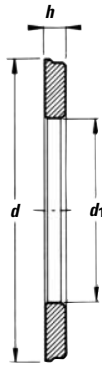
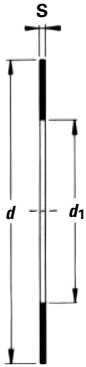
**UNITIZED THRUST BEARINGS**

**METRIC SERIES**



| Shaft Diameter | Dimensions mm/in. |                 |      |                |                | Bearing Designation |             | Wt. kg/lbs. | Load Ratings kN/lbf. |         | Limiting Speed Oil RPM |
|----------------|-------------------|-----------------|------|----------------|----------------|---------------------|-------------|-------------|----------------------|---------|------------------------|
|                | mm                | D <sub>c1</sub> | D    | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub>      | Thin Series |             | Thick Series         | Dynamic |                        |
| 5              | 5                 | 13              | 10.9 | 6.3            | 2.3            | AX 5 13             | 1.3         | 3.00        | 5.70                 | 25000   |                        |
|                | 0.205             | 0.513           | 0.43 | 0.25           | 0.090          |                     | 0.003       | 670         | 1280                 |         |                        |
| 5              | 13                | 10.9            | 6.3  | 3.5            | 0.138          | AX 3,5 5 13         | 2.3         | 3.00        | 5.70                 | 25000   |                        |
|                | 0.205             | 0.513           | 0.43 | 0.25           | 0.138          |                     | 0.005       | 670         | 1280                 |         |                        |
| 6              | 6                 | 14              | 11.9 | 7.3            | 2.3            | AX 6 14             | 1.4         | 3.15        | 6.35                 | 22000   |                        |
|                | 0.244             | 0.553           | 0.47 | 0.29           | 0.090          |                     | 0.003       | 710         | 1430                 |         |                        |
|                | 6                 | 14              | 11.9 | 7.3            | 3.5            | AX 3,5 6 14         | 2.4         | 3.15        | 6.35                 | 22000   |                        |
|                | 0.243             | 0.553           | 0.47 | 0.29           | 0.138          |                     | 0.005       | 710         | 1430                 |         |                        |
| 7              | 7                 | 15              | 12.9 | 8.3            | 2.3            | AX 7 15             | 1.7         | 3.55        | 7.60                 | 22000   |                        |
|                | 0.283             | 0.592           | 0.51 | 0.33           | 0.090          |                     | 0.004       | 800         | 1710                 |         |                        |
|                | 7                 | 15              | 12.9 | 8.3            | 3.5            | AX 3,5 7 15         | 2.9         | 3.55        | 7.60                 | 22000   |                        |
|                | 0.282             | 0.592           | 0.51 | 0.33           | 0.138          |                     | 0.006       | 800         | 1710                 |         |                        |
| 8              | 8                 | 16              | 13.9 | 9.3            | 2.3            | AX 8 16             | 1.7         | 3.70        | 8.30                 | 22000   |                        |
|                | 0.323             | 0.631           | 0.55 | 0.37           | 0.090          |                     | 0.004       | 830         | 1870                 |         |                        |
|                | 8                 | 16              | 13.9 | 9.3            | 3.5            | AX 3,5 8 16         | 3           | 3.70        | 8.30                 | 22000   |                        |
|                | 0.321             | 0.631           | 0.55 | 0.37           | 0.138          |                     | 0.007       | 830         | 1870                 |         |                        |
| 9              | 9                 | 17              | 14.9 | 10.3           | 2.3            | AX 9 17             | 2.1         | 4.05        | 9.50                 | 19000   |                        |
|                | 0.362             | 0.671           | 0.59 | 0.41           | 0.090          |                     | 0.005       | 910         | 2140                 |         |                        |
|                | 9                 | 17              | 14.9 | 10.3           | 3.5            | AX 3,5 9 17         | 3.6         | 4.05        | 9.50                 | 19000   |                        |
|                | 0.361             | 0.671           | 0.59 | 0.41           | 0.138          |                     | 0.008       | 910         | 2140                 |         |                        |
| 10             | 10                | 22              | 18.6 | 12.0           | 4.0            | AX 4 10 22          | 6.6         | 5.00        | 10.90                | 15500   |                        |
|                | 0.400             | 0.868           | 0.73 | 0.47           | 0.157          |                     | 0.015       | 1120        | 2450                 |         |                        |
| 12             | 12                | 26              | 22.6 | 15.0           | 2.8            | AX 12 26            | 6           | 6.90        | 17.70                | 13000   |                        |
|                | 0.481             | 1.025           | 0.89 | 0.59           | 0.110          |                     | 0.013       | 1550        | 3980                 |         |                        |
|                | 12                | 26              | 22.6 | 15.0           | 4.0            | AX 4 12 26          | 10          | 6.90        | 17.70                | 13000   |                        |
|                | 0.479             | 1.025           | 0.89 | 0.59           | 0.157          |                     | 0.022       | 1550        | 3980                 |         |                        |
| 13             | 13                | 26              | 22.6 | 15.0           | 2.8            | AX 13 26            | 6           | 6.90        | 17.70                | 13000   |                        |
|                | 0.521             | 1.025           | 0.89 | 0.59           | 0.110          |                     | 0.013       | 1550        | 3980                 |         |                        |
|                | 13                | 26              | 22.6 | 15.0           | 4.0            | AX 4 13 26          | 9.8         | 6.90        | 17.70                | 13000   |                        |
|                | 0.519             | 1.025           | 0.89 | 0.59           | 0.157          |                     | 0.022       | 1550        | 3980                 |         |                        |
| 14             |                   |                 |      |                |                |                     |             |             |                      |         |                        |
| 15             | 15                | 28              | 24.6 | 17.0           | 2.8            | AX 15 28            | 6.9         | 7.40        | 20.00                | 11500   |                        |
|                | 0.600             | 1.104           | 0.97 | 0.67           | 0.110          |                     | 0.015       | 1660        | 4500                 |         |                        |
|                | 15                | 28              | 24.6 | 17.0           | 4.0            | AX 4 15 28          | 9           | 7.40        | 20.00                | 11500   |                        |
|                | 0.598             | 1.104           | 0.97 | 0.67           | 0.157          |                     | 0.020       | 1660        | 4500                 |         |                        |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in. |               |              | Thin<br>Wt.<br>kg/lbs. | Washer Designation |            | Thick<br>Wt.<br>kg/lbs. | Washer<br>Designation<br>Precision | mm/in.      | Precision<br>Wt.<br>kg/lbs. | Shaft<br>mm    |        |
|-------------------|---------------|--------------|------------------------|--------------------|------------|-------------------------|------------------------------------|-------------|-----------------------------|----------------|--------|
| $d$               | $d_1$         | $s$          |                        | Thin               | Thick      |                         |                                    |             |                             |                | mm/in. |
| 5<br>0.201        | 12.4<br>0.488 | 0.8<br>0.031 | 0.001<br>0.001         | CP 5 13            |            |                         |                                    |             |                             | 5              |        |
|                   |               |              |                        |                    | CP 2 5 13  | 2.0<br>0.079            | 0.002<br>0.004                     |             |                             |                |        |
| 6<br>0.240        | 13.4<br>0.528 | 0.8<br>0.031 | 0.001<br>0.002         | CP 6 14            |            |                         |                                    |             |                             | 6              |        |
|                   |               |              |                        |                    | CP 2 6 14  | 2.0<br>0.079            | 0.002<br>0.004                     |             |                             |                |        |
| 7<br>0.280        | 14.4<br>0.567 | 0.8<br>0.031 | 0.001<br>0.002         | CP 7 15            |            |                         |                                    |             |                             | 7              |        |
|                   |               |              |                        |                    | CP 2 7 15  | 2.0<br>0.079            | 0.002<br>0.004                     |             |                             |                |        |
| 8<br>0.319        | 15.4<br>0.606 | 0.8<br>0.031 | 0.001<br>0.002         | CP 8 16            |            |                         |                                    |             |                             | 8              |        |
|                   |               |              |                        |                    | CP 2 8 16  | 2.0<br>0.079            | 0.002<br>0.005                     |             |                             |                |        |
| 9<br>0.358        | 16.4<br>0.646 | 0.8<br>0.031 | 0.001<br>0.002         | CP 9 17            |            |                         |                                    |             |                             | 9              |        |
|                   |               |              |                        |                    | CP 2 9 17  | 2.0<br>0.079            | 0.002<br>0.005                     |             |                             |                |        |
| 10<br>0.396       | 21.2<br>0.836 |              |                        |                    | CP 2 10 22 | 2.0<br>0.079            | 0.002<br>0.004                     |             |                             | 10             |        |
| 12<br>0.474       | 25.5<br>1.003 | 0.8<br>0.031 | 0.003<br>0.006         | CP 12 26           |            |                         |                                    | CPN 2 12 26 | 2.0<br>0.079                | 0.006<br>0.013 | 12     |
|                   |               |              |                        |                    | CP 2 12 26 | 2.0<br>0.079            | 0.006<br>0.014                     |             |                             |                |        |
| 13<br>0.514       | 25.5<br>1.003 | 0.8<br>0.031 | 0.002<br>0.005         | CP 13 26           |            |                         |                                    |             |                             | 13             |        |
|                   |               |              |                        |                    | CP 2 13 26 | 2.0<br>0.079            | 0.006<br>0.013                     |             |                             |                |        |
| 14<br>0.553       | 25.5<br>1.003 | 0.8<br>0.031 | 0.002<br>0.005         | CP 14 26           |            |                         |                                    |             |                             |                |        |
|                   |               |              |                        |                    | CP 2 14 26 | 2.0<br>0.079            | 0.006<br>0.012                     |             |                             |                |        |
| 15<br>0.593       | 27.5<br>1.081 | 0.8<br>0.031 | 0.003<br>0.006         | CP 15 28           |            |                         |                                    | CPN 2 15 28 | 2.0<br>0.079                | 0.006<br>0.013 | 15     |
|                   |               |              |                        |                    | CP 2 15 28 | 2.0<br>0.079            | 0.006<br>0.013                     |             |                             |                |        |

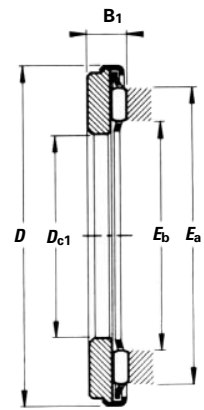
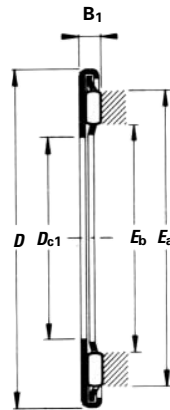
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# NEEDLE ROLLER BEARINGS

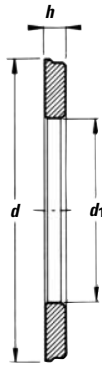
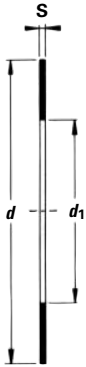
## UNITIZED THRUST BEARINGS — *continued*

### METRIC SERIES



| Shaft Diameter | Dimensions mm/in. |             |                |                |                | Bearing Designation |              | Wt. kg/lbs.   | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM |
|----------------|-------------------|-------------|----------------|----------------|----------------|---------------------|--------------|---------------|----------------------|----------------|------------------------|
|                | D <sub>c1</sub>   | D           | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> | Thin Series         | Thick Series |               | Dynamic              | Static         |                        |
| mm             | D <sub>c1</sub>   | D           | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> |                     |              | C             | C <sub>0</sub>       |                |                        |
| 17             | 17<br>0.678       | 30<br>1.183 | 26.6<br>1.05   | 19.0<br>0.75   | 2.8<br>0.110   | AX 17 30            |              | 7.6<br>0.017  | 7.80<br>1750         | 22.00<br>4950  | 10500                  |
|                | 17<br>0.677       | 30<br>1.183 | 26.6<br>1.05   | 19.0<br>0.75   | 4.0<br>0.157   |                     | AX 4 17 30   | 10<br>0.022   | 7.80<br>1750         | 22.00<br>4950  | 10500                  |
| 18             |                   |             |                |                |                |                     |              |               |                      |                |                        |
| 19             | 19<br>0.757       | 32<br>1.261 | 28.6<br>1.13   | 21.0<br>0.83   | 2.8<br>0.110   | AX 19 32            |              | 8.6<br>0.019  | 8.00<br>1800         | 23.30<br>5240  | 10000                  |
|                | 19<br>0.756       | 32<br>1.261 | 28.6<br>1.13   | 21.0<br>0.83   | 4.0<br>0.157   |                     | AX 4 19 32   | 13<br>0.029   | 8.00<br>1800         | 23.30<br>5240  | 10000                  |
| 20             | 20<br>0.795       | 35<br>1.379 | 31.6<br>1.24   | 22.0<br>0.87   | 5.0<br>0.197   |                     | AX 5 20 35   | 18<br>0.040   | 11.80<br>2650        | 39.00<br>8770  | 9000                   |
|                | 25                | 25<br>0.994 | 42<br>1.655    | 37.4<br>1.47   | 27.7<br>1.09   | 2.8<br>0.110        | AX 25 42     |               | 11.5<br>0.025        | 13.30<br>2990  | 49.00<br>11000         |
|                |                   | 25<br>0.992 | 42<br>1.655    | 37.4<br>1.47   | 27.7<br>1.09   | 5.0<br>0.197        |              | 25<br>0.055   | 13.30<br>2990        | 49.00<br>11000 | 7500                   |
| 27             | 27<br>1.073       | 44<br>1.734 | 39.6<br>1.56   | 30.0<br>1.18   | 2.8<br>0.110   | AX 27 44            |              | 12.1<br>0.027 | 13.70<br>3080        | 52.00<br>11690 | 7200                   |
| 30             | 30<br>1.193       | 47<br>1.852 | 42.4<br>1.67   | 32.7<br>1.29   | 2.8<br>0.110   | AX 30 47            |              | 13.7<br>0.030 | 14.50<br>3260        | 57.00<br>12800 | 6500                   |
|                |                   | 30<br>1.189 | 47<br>1.852    | 42.4<br>1.67   | 32.7<br>1.29   | 5.0<br>0.197        |              | 29<br>0.064   | 14.50<br>3260        | 57.00<br>12800 | 6500                   |
| 31             | 35<br>1.385       | 52<br>2.048 | 49.0<br>1.93   | 37.2<br>1.46   | 2.8<br>0.110   | AX 35 52            |              | 18.5<br>0.041 | 18.90<br>4250        | 84.00<br>18900 | 5500                   |
| 35             | 35<br>1.386       | 52<br>2.048 | 49.0<br>1.93   | 37.2<br>1.46   | 5.0<br>0.197   |                     | AX 5 35 52   | 35<br>0.077   | 18.90<br>4250        | 84.00<br>18900 | 5500                   |
|                | 35<br>1.390       | 53<br>2.088 | 49.0<br>1.93   | 37.2<br>1.46   | 2.8<br>0.110   | AX 35 53            |              | 19.3<br>0.043 | 18.90<br>4250        | 84.00<br>18900 | 5500                   |
|                | 35<br>1.386       | 53<br>2.088 | 49.0<br>1.93   | 37.2<br>1.46   | 5.0<br>0.197   |                     | AX 5 35 53   | 36<br>0.079   | 18.90<br>4250        | 84.00<br>18900 | 5500                   |
| 40             | 40<br>1.587       | 60<br>2.363 | 54.9<br>2.16   | 43.0<br>1.69   | 2.8<br>0.110   | AX 40 60            |              | 23.9<br>0.053 | 20.40<br>4590        | 96.00<br>21600 | 5000                   |
|                | 40<br>1.583       | 60<br>2.363 | 54.9<br>2.16   | 43.0<br>1.69   | 5.0<br>0.197   |                     | AX 5 40 60   | 46<br>0.101   | 20.40<br>4590        | 96.00<br>21600 | 5000                   |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in.  |                      |                     | Thin Wt.<br>kg/lbs.   | Washer Designation |                   | Thick Wt.<br>kg/lbs. | Washer Designation<br>Precision | Precision Wt.<br>kg/lbs. | Shaft                 |                       |           |
|--------------------|----------------------|---------------------|-----------------------|--------------------|-------------------|----------------------|---------------------------------|--------------------------|-----------------------|-----------------------|-----------|
| d                  | d <sub>1</sub>       | s                   |                       | Thin               | Thick             |                      |                                 |                          |                       | mm/in.                | mm/in.    |
| <b>17</b><br>0.671 | <b>29.5</b><br>1.160 | <b>0.8</b><br>0.031 | <b>0.003</b><br>0.006 | <b>CP 17 30</b>    |                   |                      | <b>CPN 7 17 30</b>              | <b>7.0</b><br>0.276      | <b>0.025</b><br>0.055 | <b>17</b>             |           |
|                    |                      |                     |                       |                    | <b>CP 2 17 30</b> | <b>2.0</b><br>0.079  | <b>0.007</b><br>0.015           |                          |                       |                       |           |
| <b>18</b><br>0.711 | <b>29.5</b><br>1.160 | <b>0.8</b><br>0.031 | <b>0.003</b><br>0.006 | <b>CP 18 30</b>    |                   |                      |                                 |                          |                       |                       |           |
|                    |                      |                     |                       |                    | <b>CP 2 18 30</b> | <b>2.0</b><br>0.079  | <b>0.007</b><br>0.015           |                          |                       |                       |           |
| <b>19</b><br>0.750 | <b>31.5</b><br>1.239 | <b>0.8</b><br>0.031 | <b>0.004</b><br>0.008 | <b>CP 19 32</b>    |                   |                      |                                 |                          |                       | <b>19</b>             |           |
|                    |                      |                     |                       |                    | <b>CP 2 19 32</b> | <b>2.0</b><br>0.079  | <b>0.009</b><br>0.020           |                          |                       |                       |           |
| <b>20</b><br>0.789 | <b>34.5</b><br>1.357 |                     |                       |                    | <b>CP 3 20 35</b> | <b>3.0</b><br>0.118  | <b>0.013</b><br>0.029           | <b>CPN 3 20 35</b>       | <b>3.0</b><br>0.118   | <b>0.013</b><br>0.029 | <b>20</b> |
|                    |                      |                     |                       |                    |                   |                      |                                 |                          |                       |                       |           |
| <b>25</b><br>0.988 | <b>41.5</b><br>1.634 | <b>0.8</b><br>0.031 | <b>0.005</b><br>0.012 | <b>CP 25 42</b>    |                   |                      | <b>CPN 3 25 42</b>              | <b>3.0</b><br>0.118      | <b>0.019</b><br>0.042 | <b>25</b>             |           |
|                    |                      |                     |                       |                    |                   | <b>3.0</b><br>0.118  | <b>0.019</b><br>0.042           |                          |                       |                       |           |
| <b>27</b><br>1.065 | <b>43.7</b><br>1.719 | <b>0.8</b><br>0.031 | <b>0.006</b><br>0.013 | <b>CP 27 44</b>    |                   |                      |                                 |                          |                       | <b>27</b>             |           |
| <b>30</b><br>1.183 | <b>46.5</b><br>1.830 | <b>0.8</b><br>0.031 | <b>0.006</b><br>0.013 | <b>CP 30 47</b>    |                   |                      | <b>CPN 5 30 47</b>              | <b>5.0</b><br>0.197      | <b>0.037</b><br>0.082 | <b>30</b>             |           |
|                    |                      |                     |                       |                    |                   | <b>3.0</b><br>0.118  | <b>0.022</b><br>0.049           |                          |                       |                       |           |
| <b>35</b><br>1.380 | <b>51.5</b><br>2.026 | <b>0.8</b><br>0.031 | <b>0.007</b><br>0.015 | <b>CP 35 52</b>    |                   |                      | <b>CPN 3 35 52</b>              | <b>3.0</b><br>0.118      | <b>0.027</b><br>0.060 | <b>31</b>             |           |
|                    |                      |                     |                       |                    |                   | <b>3.0</b><br>0.118  | <b>0.026</b><br>0.057           |                          |                       | <b>35</b>             |           |
|                    |                      | <b>0.8</b><br>0.031 | <b>0.007</b><br>0.016 | <b>CP 35 53</b>    |                   |                      |                                 |                          |                       |                       |           |
|                    |                      |                     |                       |                    |                   | <b>3.0</b><br>0.118  | <b>0.027</b><br>0.060           |                          |                       |                       |           |
| <b>40</b><br>1.577 | <b>59.5</b><br>2.341 | <b>0.8</b><br>0.031 | <b>0.009</b><br>0.021 | <b>CP 40 60</b>    |                   |                      | <b>CPN 3 40 60</b>              | <b>3.0</b><br>0.118      | <b>0.034</b><br>0.075 | <b>40</b>             |           |

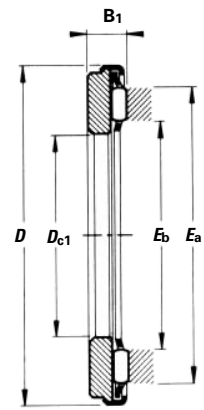
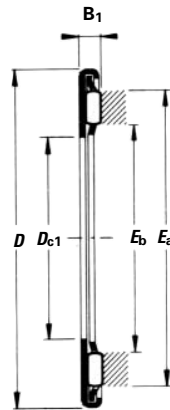
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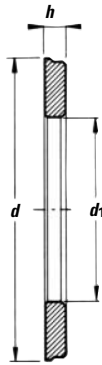
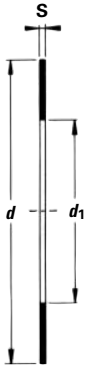
**UNITIZED THRUST BEARINGS** — *continued*

**METRIC SERIES**



| Shaft Diameter | Dimensions mm/in. |       |                |                |                | Bearing Designation |              | Wt. kg/lbs. | Load Ratings kN/lbf. |        | Limiting Speed Oil RPM |
|----------------|-------------------|-------|----------------|----------------|----------------|---------------------|--------------|-------------|----------------------|--------|------------------------|
|                | D <sub>c1</sub>   | D     | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> | Thin Series         | Thick Series |             | Dynamic              | Static |                        |
| mm             | D <sub>c1</sub>   | D     | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> |                     |              | C           | C <sub>0</sub>       |        |                        |
| 45             | 45                | 65    | 59.9           | 48.0           | 2.8            | AX 45 65            |              | 21.80       | 109                  | 4500   |                        |
|                | 1.783             | 2.560 | 2.36           | 1.89           | 0.110          |                     |              | 4900        | 24500                |        |                        |
|                | 45                | 65    | 59.9           | 48.0           | 5.0            | AX 5 45 65          |              | 21.80       | 109                  | 4500   |                        |
|                | 1.780             | 2.560 | 2.36           | 1.89           | 0.197          |                     |              | 4900        | 24500                |        |                        |
| 50             | 50                | 70    | 65.7           | 53.3           | 2.8            | AX 50 70            |              | 22.50       | 118                  | 4000   |                        |
|                | 1.982             | 2.757 | 2.59           | 2.10           | 0.110          |                     |              | 5060        | 26500                |        |                        |
|                | 50                | 70    | 65.7           | 53.3           | 5.0            | AX 5 50 70          |              | 22.50       | 118                  | 4000   |                        |
|                | 1.976             | 2.757 | 2.59           | 2.10           | 0.197          |                     |              | 5060        | 26500                |        |                        |
| 55             | 55                | 78    | 72.5           | 58.4           | 2.8            | AX 55 78            |              | 28.50       | 164                  | 3800   |                        |
|                | 2.179             | 3.072 | 2.85           | 2.30           | 0.110          |                     |              | 6410        | 36900                |        |                        |
|                | 55                | 78    | 72.5           | 58.4           | 6.0            | AX 6 55 78          |              | 28.50       | 164                  | 3800   |                        |
|                | 2.174             | 3.072 | 2.85           | 2.30           | 0.236          |                     |              | 6410        | 36900                |        |                        |
| 60             | 60                | 85    | 79.2           | 63.5           | 6.0            | AX 6 60 85          |              | 31.50       | 193                  | 3500   |                        |
|                | 2.371             | 3.347 | 3.12           | 2.50           | 0.236          |                     |              | 7080        | 43400                |        |                        |
| 65             | 65                | 90    | 84.2           | 68.5           | 3.5            | AX 3,5 65 90        |              | 33.50       | 210                  | 3200   |                        |
|                | 2.573             | 3.544 | 3.31           | 2.70           | 0.138          |                     |              | 7530        | 47200                |        |                        |
|                | 65                | 90    | 84.2           | 68.5           | 6.0            | AX 6 65 90          |              | 33.50       | 210                  | 3200   |                        |
|                | 2.568             | 3.544 | 3.31           | 2.70           | 0.236          |                     |              | 7530        | 47200                |        |                        |
| 70             | 70                | 95    | 89.2           | 73.5           | 3.5            | AX 3,5 70 95        |              | 34.50       | 223                  | 3000   |                        |
|                | 2.770             | 3.741 | 3.51           | 2.89           | 0.138          |                     |              | 7760        | 50100                |        |                        |
|                | 70                | 95    | 89.2           | 73.5           | 6.0            | AX 6 70 95          |              | 34.50       | 223                  | 3000   |                        |
|                | 2.765             | 3.741 | 3.51           | 2.89           | 0.236          |                     |              | 7760        | 50100                |        |                        |
| 75             | 75                | 100   | 94.2           | 78.5           | 3.5            | AX 3,5 75 100       |              | 36.00       | 240                  | 2900   |                        |
|                | 2.967             | 3.938 | 3.71           | 3.09           | 0.138          |                     |              | 8090        | 54000                |        |                        |
|                | 75                | 100   | 94.2           | 78.5           | 6.0            | AX 6 75 100         |              | 36.00       | 240                  | 2900   |                        |
|                | 2.961             | 3.938 | 3.71           | 3.09           | 0.236          |                     |              | 8090        | 54000                |        |                        |
| 80             | 80                | 105   | 99.2           | 83.5           | 3.5            | AX 3,5 80 105       |              | 36.50       | 253                  | 2700   |                        |
|                | 3.165             | 4.135 | 3.91           | 3.29           | 0.138          |                     |              | 8210        | 56900                |        |                        |
|                | 80                | 105   | 99.2           | 83.5           | 6.0            | AX 6 80 105         |              | 36.50       | 253                  | 2700   |                        |
|                | 3.158             | 4.135 | 3.91           | 3.29           | 0.236          |                     |              | 8210        | 56900                |        |                        |
| 85             | 85                | 110   | 104.2          | 88.5           | 3.5            | AX 3,5 85 110       |              | 38.00       | 270                  | 2600   |                        |
|                | 3.362             | 4.332 | 4.10           | 3.48           | 0.138          |                     |              | 8540        | 60700                |        |                        |
|                | 85                | 110   | 104.2          | 88.5           | 6.0            | AX 6 85 110         |              | 38.00       | 270                  | 2600   |                        |
|                | 3.356             | 4.332 | 4.10           | 3.48           | 0.236          |                     |              | 8540        | 60700                |        |                        |
| 90             | 90                | 120   | 112.9          | 94.2           | 4.5            | AX 4,5 90 120       |              | 59.00       | 360                  | 2400   |                        |
|                | 3.559             | 4.725 | 4.44           | 3.71           | 0.177          |                     |              | 13300       | 80900                |        |                        |
|                | 90                | 120   | 112.9          | 94.2           | 8.0            | AX 8 90 120         |              | 59.00       | 360                  | 2400   |                        |
|                | 3.553             | 4.725 | 4.44           | 3.71           | 0.315          |                     |              | 13300       | 80900                |        |                        |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in. |               |              | Thin Wt.<br>kg/lbs. | Washer Designation |       | Thick Wt.<br>kg/lbs. | Washer Designation<br>Precision | mm/in.      | Precision Wt.<br>kg/lbs. | Shaft<br>mm    |     |
|-------------------|---------------|--------------|---------------------|--------------------|-------|----------------------|---------------------------------|-------------|--------------------------|----------------|-----|
| $d$               | $d_1$         | $s$          |                     | Thin               | Thick |                      |                                 |             |                          |                | $h$ |
|                   |               |              |                     | CP 3 40 60         |       | 3.0<br>0.118         | 0.034<br>0.075                  |             |                          |                |     |
| 45<br>1.774       | 64.3<br>2.533 | 0.8<br>0.031 | 0.010<br>0.022      | CP 45 65           |       |                      |                                 | CPN 3 45 65 | 3.0<br>0.118             | 0.037<br>0.082 | 45  |
|                   |               |              |                     | CP 3 45 65         | 3.0   | 0.037<br>0.118       | 0.082                           |             |                          |                |     |
| 50<br>1.970       | 69.4<br>2.731 | 0.8<br>0.031 | 0.011<br>0.024      | CP 50 70           |       |                      |                                 |             |                          |                | 50  |
|                   |               |              |                     | CP 3 50 70         | 3.0   | 0.040<br>0.118       | 0.088                           |             |                          |                |     |
| 55<br>2.167       | 77.4<br>3.046 | 0.8<br>0.031 | 0.014<br>0.031      | CP 55 78           |       |                      |                                 |             |                          |                | 55  |
|                   |               |              |                     | CP 4 55 78         |       | 4.0<br>0.157         | 0.069<br>0.152                  |             |                          |                |     |
| 60<br>2.366       | 84.3<br>3.318 |              |                     | CP 4 60 85         | 4.0   | 0.083<br>0.157       | 0.183                           |             | 60                       |                |     |
| 65<br>2.563       | 89.3<br>3.515 | 1.5<br>0.059 | 0.033<br>0.073      | CP 1,5 65 90       |       |                      |                                 |             |                          |                | 65  |
|                   |               |              |                     | CP 4 65 90         |       | 4.0<br>0.157         | 0.088<br>0.194                  |             |                          |                |     |
| 70<br>2.760       | 94.3<br>3.711 | 1.5<br>0.059 | 0.034<br>0.076      | CP 1,5 70 95       |       |                      |                                 | CPN 4 70 95 | 4.0<br>0.157             | 0.093<br>0.205 | 70  |
|                   |               |              |                     | CP 4 70 95         |       | 4.0<br>0.157         | 0.093<br>0.205                  |             |                          |                |     |
| 75<br>2.961       | 99<br>3.901   | 1.5<br>0.059 | 0.037<br>0.082      | CP 1,5 75 100      |       |                      |                                 |             |                          |                | 75  |
|                   |               |              |                     | CP 4 75 100        |       | 4.0<br>0.157         | 0.099<br>0.218                  |             |                          |                |     |
| 80<br>3.157       | 104<br>4.098  | 1.5<br>0.059 | 0.039<br>0.086      | CP 1,5 80 105      |       |                      |                                 |             |                          |                | 80  |
|                   |               |              |                     | CP 4 80 105        |       | 4.0<br>0.157         | 0.104<br>0.229                  |             |                          |                |     |
| 85<br>3.350       | 109<br>4.302  | 1.5<br>0.059 | 0.047<br>0.103      | CP 1,5 85 110      |       |                      |                                 |             |                          |                | 85  |
|                   |               |              |                     | CP 4 85 110        |       | 4.0<br>0.157         | 0.111<br>0.245                  |             |                          |                |     |
| 90<br>3.544       | 119<br>4.676  | 1.5<br>0.059 | 0.052<br>0.115      | CP 1,5 90 120      |       |                      |                                 |             |                          |                | 90  |

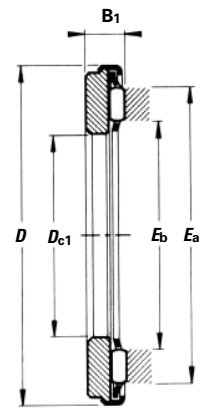
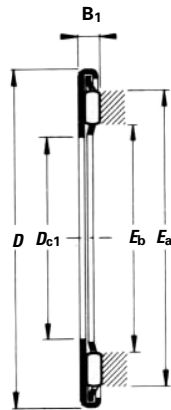
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# NEEDLE ROLLER BEARINGS

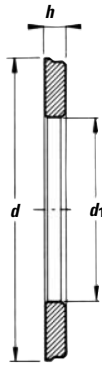
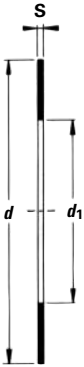
## UNITIZED THRUST BEARINGS — *continued*

### METRIC SERIES



| Shaft Diameter | Dimensions mm/in. |               |                |                |                | Bearing Designation |              | Wt. kg/lbs.   | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM |
|----------------|-------------------|---------------|----------------|----------------|----------------|---------------------|--------------|---------------|----------------------|----------------|------------------------|
|                | D <sub>c1</sub>   | D             | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> | Thin Series         | Thick Series |               | Dynamic              | Static         |                        |
| mm             | D <sub>c1</sub>   | D             | E <sub>a</sub> | E <sub>b</sub> | B <sub>1</sub> |                     |              | C             | C <sub>0</sub>       |                |                        |
| 100            | 100<br>3.947      | 135<br>5.316  | 127.3<br>5.01  | 104.2<br>4.10  | 9.0<br>0.354   | AX 9 100 135        |              | 364<br>0.802  | 73.00<br>16400       | 490<br>110000  | 2100                   |
| 110            | 110<br>4.346      | 145<br>5.709  | 137.3<br>5.41  | 114.2<br>4.50  | 4.5<br>0.177   | AX 4,5 110 145      |              | 168<br>0.370  | 77.00<br>17300       | 550<br>124000  | 2000                   |
|                | 110<br>4.341      | 145<br>5.709  | 137.3<br>5.41  | 114.2<br>4.50  | 9.0<br>0.354   | AX 9 110 145        |              | 393<br>0.866  | 77.00<br>17300       | 550<br>124000  | 2000                   |
| 120            | 120<br>4.740      | 155<br>6.103  | 147.3<br>5.80  | 124.2<br>4.89  | 4.5<br>0.177   | AX 4,5 120 155      |              | 182<br>0.401  | 80.00<br>18000       | 590<br>133000  | 1800                   |
|                | 120<br>4.734      | 155<br>6.103  | 147.3<br>5.80  | 124.2<br>4.89  | 9.0<br>0.354   | AX 9 120 155        |              | 424<br>0.935  | 80.00<br>18000       | 590<br>133000  | 1800                   |
| 130            | 130<br>5.129      | 170<br>6.694  | 161.0<br>6.34  | 135.0<br>5.31  | 11.0<br>0.432  | AX 11 130 170       |              | 660<br>1.455  | 106<br>23800         | 710<br>160000  | 1700                   |
| 140            | 140<br>5.522      | 180<br>7.087  | 171.0<br>6.73  | 145.0<br>5.71  | 9.0<br>0.353   | AX 11 140 180       |              | 670<br>1.477  | 111<br>25000         | 770<br>173000  | 1600                   |
| 150            | 150<br>5.916      | 190<br>7.481  | 181.0<br>7.13  | 155.0<br>6.10  | 9.0<br>0.353   | AX 11 150 190       |              | 710<br>1.565  | 115<br>25900         | 830<br>187000  | 1500                   |
| 160            | 160<br>6.310      | 200<br>7.874  | 191.0<br>7.52  | 165.0<br>6.50  | 9.0<br>0.353   | AX 11 160 200       |              | 760<br>1.676  | 118<br>26500         | 870<br>196000  | 1400                   |
| 170            | 170<br>6.704      | 215<br>8.465  | 207.0<br>8.15  | 175.0<br>6.89  | 12.0<br>0.471  | AX 12 170 215       |              | 1000<br>2.205 | 165<br>37100         | 1160<br>261000 | 1300                   |
| 180            | 180<br>7.097      | 225<br>8.859  | 217.0<br>8.54  | 185.0<br>7.28  | 12.0<br>0.471  | AX 12 180 225       |              | 1050<br>2.315 | 173<br>38900         | 1250<br>281000 | 1200                   |
| 190            | 190<br>7.493      | 240<br>9.449  | 232.0<br>9.13  | 196.0<br>7.72  | 13.9<br>0.549  | AX 14 190 240       |              | 1400<br>3.086 | 230<br>51700         | 1650<br>371000 | 1200                   |
| 200            | 200<br>7.886      | 250<br>9.843  | 242.0<br>9.53  | 206.0<br>8.11  | 13.9<br>0.549  | AX 14 200 250       |              | 1500<br>3.307 | 239<br>53700         | 1730<br>389000 | 1100                   |
| 220            | 220<br>8.674      | 270<br>10.630 | 262.0<br>10.31 | 226.0<br>8.90  | 13.9<br>0.549  | AX 14 220 270       |              | 1600<br>3.527 | 248<br>55800         | 1850<br>416000 | 1000                   |
| 240            | 240<br>9.461      | 300<br>11.811 | 286.0<br>11.26 | 246.0<br>9.69  | 14.9<br>0.588  | AX 15 240 300       |              | 2300<br>5.071 | 280<br>62900         | 2240<br>504000 | 900                    |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Dimensions mm/in.   |                        |                     | Thin Wt.<br>kg/lbs.   | Washer Designation |                | Thick Wt.<br>kg/lbs. | Washer Designation<br>Precision | mm/in. | Precision Wt.<br>kg/lbs. | Shaft<br>mm |
|---------------------|------------------------|---------------------|-----------------------|--------------------|----------------|----------------------|---------------------------------|--------|--------------------------|-------------|
| $d$                 | $d_1$                  | $s$                 |                       | Thin               | Thick          |                      |                                 |        |                          |             |
|                     |                        |                     |                       |                    | CP 5 90 120    | 5.0<br>0.197         | 0.173<br>0.381                  |        |                          |             |
| <b>100</b><br>3.938 | <b>133.8</b><br>5.266  |                     |                       |                    | CP 6 100 135   | 6.0<br>0.236         | 0.277<br>0.611                  |        |                          | <b>100</b>  |
| <b>110</b><br>4.333 | <b>143.8</b><br>5.660  | <b>1.5</b><br>0.059 | <b>0.075</b><br>0.165 |                    | CP 1,5 110 145 |                      |                                 |        |                          | <b>110</b>  |
|                     |                        |                     |                       |                    | CP 6 110 145   | 6.0<br>0.236         | 0.300<br>0.661                  |        |                          |             |
| <b>120</b><br>4.726 | <b>153.8</b><br>6.054  | <b>1.5</b><br>0.059 | <b>0.081</b><br>0.179 |                    | CP 1,5 120 155 |                      |                                 |        |                          | <b>120</b>  |
|                     |                        |                     |                       |                    | CP 6 120 155   | 6.0<br>0.236         | 0.323<br>0.712                  |        |                          |             |
| <b>130</b><br>5.122 | <b>168.7</b><br>6.640  |                     |                       |                    | CP 7 130 170   | 7.0<br>0.276         | 0.480<br>1.058                  |        |                          | <b>130</b>  |
| <b>140</b><br>5.516 | <b>178.7</b><br>7.034  |                     |                       |                    | CP 7 140 180   | 7.0<br>0.276         | 0.500<br>1.102                  |        |                          | <b>140</b>  |
| <b>150</b><br>5.909 | <b>188.7</b><br>7.428  |                     |                       |                    | CP 7 150 190   | 7.0<br>0.276         | 0.530<br>1.168                  |        |                          | <b>150</b>  |
| <b>160</b><br>6.303 | <b>198.7</b><br>7.821  |                     |                       |                    | CP 7 160 200   | 7.0<br>0.276         | 0.560<br>1.235                  |        |                          | <b>160</b>  |
| <b>170</b><br>6.697 | <b>213.5</b><br>8.404  |                     |                       |                    | CP 7 170 215   | 7.0<br>0.276         | 0.700<br>1.543                  |        |                          | <b>170</b>  |
| <b>180</b><br>7.091 | <b>223.5</b><br>8.798  |                     |                       |                    | CP 7 180 225   | 7.0<br>0.276         | 0.735<br>1.620                  |        |                          | <b>180</b>  |
| <b>190</b><br>7.484 | <b>238.3</b><br>9.380  |                     |                       |                    | CP 8 190 240   | 8.0<br>0.315         | 0.950<br>2.094                  |        |                          | <b>190</b>  |
| <b>200</b><br>7.878 | <b>248.3</b><br>9.774  |                     |                       |                    | CP 8 200 250   | 8.0<br>0.315         | 1.000<br>2.205                  |        |                          | <b>200</b>  |
| <b>220</b><br>8.665 | <b>268.3</b><br>10.563 |                     |                       |                    | CP 8 220 270   | 8.0<br>0.315         | 1.100<br>2.425                  |        |                          | <b>220</b>  |

C





# NEEDLE ROLLER BEARINGS

## CYLINDRICAL ROLLER THRUST BEARINGS AND THEIR COMPONENTS

### METRIC SERIES

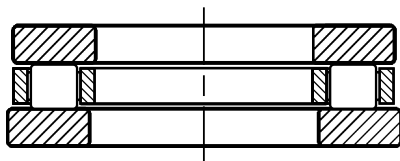
Cylindrical roller thrust bearings provide rolling bearing arrangements which can accommodate high dynamic axial loads as well as shock loads. The simple geometry of the bearing components allows the use of many design arrangements. As an example, for less demanding applications it is possible to combine metric series cylindrical roller and cage thrust assemblies with the metric series heavy thrust washers (LS,CPR) and even metric series thin thrust washers (AS, CP). These two thrust washer types are more commonly used with needle roller and cage thrust assemblies. Cylindrical roller and cage thrust assemblies can also be used without bearing thrust washers if the adjacent machine components can be prepared to serve as suitable raceways.

Cylindrical roller thrust bearings may be used where the load carrying capability of needle roller and cage thrust assemblies is insufficient. Also the bearings can accommodate high dynamic and static axial loads in one direction but they are not suitable to transmit radial loads.

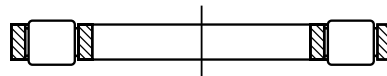
### REFERENCE STANDARDS ARE:

- **ISO 104** – Rolling bearings – Thrust Bearings – Boundary dimensions, general plan.
- **ISO 199** – Rolling bearings – Thrust ball bearings – Tolerances.
- **DIN 616** – Rolling bearings – General Plans of Boundary Dimensions
- **DIN 722** – Single direction thrust cylindrical roller bearings

### TYPES OF METRIC SERIES CYLINDRICAL ROLLER THRUST BEARINGS AND THEIR COMPONENTS.



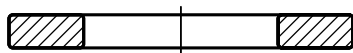
**811, 812 Series**  
Cylindrical roller thrust bearings



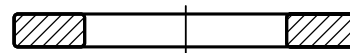
**K.811, K.812**  
Cylindrical roller and cage thrust assemblies



**ARZ Series**  
Unitized cylindrical roller thrust bearing



**WS.811, WS.812**  
Shaft washers



**GS.811, GS.812**  
Housing washers

### Suffixes

|            |                                                    |
|------------|----------------------------------------------------|
| <b>LPB</b> | machined light metal window type cage.             |
| <b>TVP</b> | molded window type cage of glass reinforced nylon. |

## CONSTRUCTION

### BASIC DESIGNS

Cylindrical roller thrust bearings of dimension Series 811 and 812 comprise of a cylindrical roller and cage thrust assembly (K), a shaft washer (WS) and a housing washer (GS). Providing the back up surfaces can be hardened and ground they can be used as raceways for the cylindrical rollers of the cylindrical roller and cage thrust assembly, resulting in a compact bearing arrangement.

Series AR are available with thin or thick CP washers or heavy CPR thrust washers.

### THRUST BEARINGS WITH TWO THRUST WASHERS

Thrust bearing type AXZ and ARZ each have two thrust washers retained by an integral cap, giving protection against the entry of dirt and metal particles while helping to retain the lubricant.

### CAGE DESIGNS

Metric series 811 and 812 cylindrical roller thrust bearings use molded cages of glass fiber reinforced nylon 6/6 (suffix TVP), or machined cages of light metal (suffix LPB). The cages are designed to be piloted on the shaft. The reinforced nylon cages can be used at temperatures up to 120° C (250° F) continuously for extended periods. When lubricating these bearings with oil it should be ensured that the oil does not contain additives detrimental to the cage over extended life at operating temperatures higher than 100° C (212° F). Also, care should be exercised that oil change intervals are observed as old oil may reduce cage life at such temperatures.

The rolling elements of the AR Series thrust bearings are retained and guided in radial pockets within the cage. The cage is retained in relation to the thrust washer by means of a retaining cap. The design of a one-piece steel cage employs a special curvature that guides the rolling elements by their ends along their centerlines.

In addition, this special curvature gives the steel cage great rigidity while providing maximum lubricant space. This unitized assembly of components facilitates installation and provides a high axial load capacity while occupying only minimal space.

AR Series needle thrust bearings with a thin washer are of minimal thickness and provide excellent economy. They should be considered whenever the degree of support and rotational accuracy requirement allow.

## BEARING THRUST WASHERS

### SHAFT WASHERS AND HOUSING WASHERS

Shaft washers of types WS.811 and WS.812 as well as housing washers of types GS.811 and GS.812 are components of the metric series cylindrical roller thrust bearings of series 811 and 812. They are made of bearing quality steel, with hardened and precision ground and lapped flat raceway surfaces. The tolerances of the thrust bearing bore and outside diameter shown in the engineering section apply to shaft and housing piloted metric series washers.

### HEAVY THRUST WASHERS (LS), THIN THRUST WASHERS (AS)

These thrust washers, more frequently used with needle roller and cage thrust assemblies of metric series FNT or AXK, are also suitable for use with the cylindrical roller and cage thrust assemblies K.811. The heavy thrust washer of series LS are made of bearing quality steel, hardened and precision ground on the flat raceway surfaces. The bore and outside diameters of the heavy thrust washers are not ground, therefore, when used with K.811 type assemblies they are only suggested where accurate centering is not required. The thin thrust washers of series AS may be used in applications where the loads are light. Both types of these washers are listed in the tabular part of the metric series needle roller and cage thrust assemblies section.

### THIN (CP) AND THICK (CPR) THRUST WASHERS

The washer incorporated in the AR Series thrust bearing is made from hardened bearing steel and forms one of the raceways for the rolling elements. The opposing raceway is generally provided by a separate thrust washer of similar design supplied by Timken. When the AR Series thrust bearing is piloted by the revolving part, the thrust washer must be piloted by the stationary part and vice versa. If the revolving part and the stationary part are noticeably eccentric to each other, the thrust bearing with integral washer must, without exception, be piloted by the revolving part.

The second raceway for the rolling elements may also be formed by the face of a shoulder or an inserted washer, provided these have the correct hardness and geometrical dimensions.

C



**DIMENSIONAL ACCURACY**

The tolerances for the metric series cylindrical roller thrust bearing bore and outside diameter shown in the engineering section apply to shaft piloted washers of series WS.811 and WS.812 as well as housing piloted washers of series GS.811 and GS.812. Tolerances for the bore diameter of series K.811 and K.812 thrust assemblies are given on tabular page C254.

The tolerances for the bore and outside diameter of series AS thrust washers are shown in Table 2 below. The tolerances for the bore and outside diameter of series LS thrust washers are given in Table 3. Bore inspection procedures for thin thrust washers (AS) and heavy thrust washers (LS) are given on page C230.

**TABLE 2 – TOLERANCES FOR OUTSIDE DIAMETER (d<sub>1</sub>) AND BORE DIAMETER (d) OF SERIES AS THRUST WASHERS.**

| d <sub>1</sub><br>mm |     | Deviations of<br>max. outside dia.<br>(e13)<br>µm |      | d<br>mm |     | Deviations of<br>min. bore dia.<br>(E12)<br>µm |      |
|----------------------|-----|---------------------------------------------------|------|---------|-----|------------------------------------------------|------|
| >                    | ≤   | high                                              | low  | >       | ≤   | low                                            | high |
| 18                   | 30  | -40                                               | -370 | 3       | 6   | +20                                            | +140 |
| 30                   | 50  | -50                                               | -440 | 6       | 10  | +25                                            | +175 |
| 50                   | 80  | -60                                               | -520 | 10      | 18  | +32                                            | +212 |
| 80                   | 120 | -72                                               | -612 | 18      | 30  | +40                                            | +250 |
| 120                  | 180 | -85                                               | -715 | 30      | 50  | +50                                            | +300 |
| 180                  | 250 | -100                                              | -820 | 50      | 80  | +60                                            | +360 |
|                      |     |                                                   |      | 80      | 120 | +72                                            | +422 |
|                      |     |                                                   |      | 120     | 180 | +85                                            | +485 |

Tolerances for the outside and bore diameters of series LS heavy thrust washers are given in Table 3. Thickness tolerances for series LS heavy thrust washers are given in tabular pages.

**TABLE 3 – TOLERANCES FOR OUTSIDE DIAMETER (d<sub>1</sub>) AND BORE DIAMETER (d) OF SERIES LS HEAVY THRUST WASHERS.**

| d <sub>1</sub><br>mm |     | Deviations of<br>max. outside dia.<br>(a12)<br>µm |       | d<br>mm |     | Deviations of<br>min. bore dia.<br>(E12)<br>µm |      |
|----------------------|-----|---------------------------------------------------|-------|---------|-----|------------------------------------------------|------|
| >                    | ≤   | high                                              | low   | >       | ≤   | low                                            | high |
| 18                   | 30  | -300                                              | -510  | 3       | 6   | +20                                            | +140 |
| 30                   | 40  | -310                                              | -560  | 6       | 10  | +25                                            | +175 |
| 40                   | 50  | -320                                              | -570  | 10      | 18  | +32                                            | +212 |
| 50                   | 65  | -340                                              | -640  | 18      | 30  | +40                                            | +250 |
| 65                   | 80  | -360                                              | -660  | 30      | 50  | +50                                            | +300 |
| 80                   | 100 | -380                                              | -730  | 50      | 80  | +60                                            | +360 |
| 100                  | 120 | -410                                              | -760  | 80      | 120 | +72                                            | +422 |
| 120                  | 140 | -460                                              | -860  | 120     | 180 | +85                                            | +485 |
| 140                  | 160 | -520                                              | -920  |         |     |                                                |      |
| 160                  | 180 | -580                                              | -980  |         |     |                                                |      |
| 180                  | 200 | -660                                              | -1120 |         |     |                                                |      |

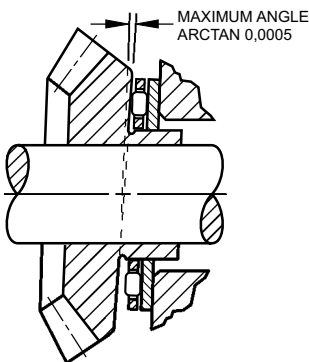
## MOUNTING TOLERANCES

Shaft and housing tolerances for mounting metric series cylindrical roller and cage thrust assemblies are given in Table 4 shown below. If the cylindrical rollers of the cylindrical roller and cage thrust assemblies are to run directly on the adjacent support surfaces, these must be hardened to at least 58 HRC. Raceway contact dimensions  $E_a$  and  $E_b$  must be observed.

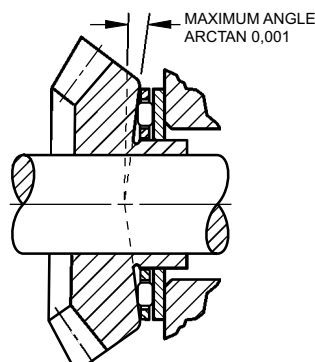
TABLE 4 – MOUNTING TOLERANCES FOR SHAFTS AND HOUSINGS FOR METRIC SERIES COMPONENTS.

| Bearing Components                                                                          | Shaft Tolerance (shaft piloting) | Housing Tolerance (housing piloting) | Piloting Member |
|---------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------|-----------------|
| Cylindrical roller & needle roller cage thrust assembly<br>Types: AXK, FNT, K.811 and K.812 | h8                               | H10                                  | shaft           |
| Cylindrical roller & needle roller cage thrust assembly<br>Types: AX, AR, AXZ, and ARZ      | h10                              | H10                                  | shaft           |
| Thin thrust washer<br>Type: AS                                                              | h10                              | H11                                  | shaft           |
| Heavy thrust washer<br>Type: LS                                                             | h10                              | H11                                  | shaft           |
| Shaft piloted thrust washer<br>Type: WS.811                                                 | h6 (j6)                          | clearance                            | shaft           |
| Housing piloted thrust washer<br>Type: GS.811                                               | Clearance                        | H7 (K7)                              | housing         |
| Thick, thin and heavy series thrust washers<br>Types: CP and CPR                            | h10                              | H10                                  | as required     |

The backup surfaces for the shaft washers WS.811 and WS.812 as well as the housing washers GS.811 and GS.812 of cylindrical roller thrust bearings must be square with the axis of the shaft. Equally important, the raceway or the surface backing the thrust washer, must not be dished or coned. The permissible limits of the squareness and dishing or coning are shown in figures 1 and 2. When using the thin (AS) thrust washers the cylindrical rollers of the thrust cage assembly must be supported over their entire length.



Out of Square Surface  
Figure 1



Dished or Coned Surface  
Figure 2

Bearing thrust washers should make close contact with the shaft or housing shoulder and must not touch the fillet radius. Therefore the maximum fillet radius  $r_{as\ max}$  must be no greater than the minimum chamfer  $r_{s\ min}$  of the shaft washer (WS) and the housing washer (GS). See tabular page C255.

Since roller thrust bearings generally run under considerable loads, their incorporated washer (and thrust washer) should be supported on a shoulder covering the whole area of circulation of the rollers bounded by dimensions  $E_b$  and  $E_a$ .

## LOAD RATINGS

### MINIMUM AXIAL LOAD

To prevent slippage a cylindrical roller thrust bearing must always be axially loaded. For satisfactory operation a certain minimum load must be applied between the cylindrical rollers and their raceways. This can be calculated from:

$$F_{a\ min} = 0.1 \cdot C_0 / 2200 \quad (\text{kN})$$

where

$C_0$  – static load rating (kN)

$F_{a\ min}$  – minimum axial load (kN)

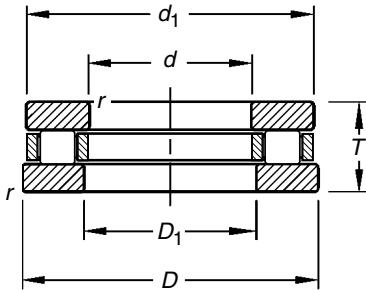




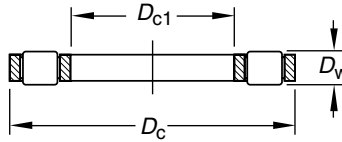


**CYLINDRICAL ROLLER THRUST BEARINGS  
CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES**

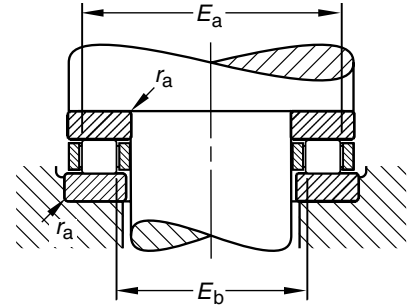
**METRIC SERIES**



811, 812



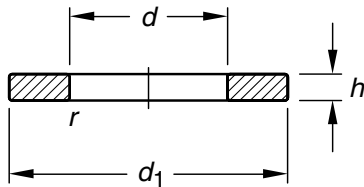
K811, K812



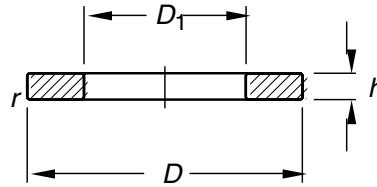
Raceway contact dimensions

| Shaft Diameter | Dimensions mm/in. |        |        |       |       |         | Assembly Designation | Load Ratings kN/lbf. |           | Limiting Speed Oil RPM | Wt. kg/lbs. |
|----------------|-------------------|--------|--------|-------|-------|---------|----------------------|----------------------|-----------|------------------------|-------------|
|                | E11               | a13    |        |       |       |         |                      | Dynamic C            | Static Co |                        |             |
| mm             | Dc1               | Dc     | Dw     | Eb    | Ea    | ras max |                      |                      |           |                        |             |
| 15             | 15                | 28     | 3.5    | 18    | 25    | 0.3     | K.81102LPB           | 12.8                 | 28.6      | 12000                  | 0.006       |
|                | 0.5906            | 1.1024 | 0.1378 | 0.709 | 0.984 | 0.012   |                      | 2880                 | 6430      |                        |             |
| 15             | 15                | 28     | 3.5    | 18    | 25    | 0.3     | K.81102TVP           | 12.8                 | 28.6      | 12000                  | 0.006       |
|                | 0.5906            | 1.1024 | 0.1378 | 0.709 | 0.984 | 0.012   |                      | 2880                 | 6430      |                        |             |
| 17             | 17                | 30     | 3.5    | 20    | 27    | 0.3     | K.81103LPB           | 14.2                 | 33.4      | 11000                  | 0.008       |
|                | 0.6693            | 1.1811 | 0.1378 | 0.787 | 1.063 | 0.012   |                      | 3190                 | 7510      |                        |             |
| 17             | 17                | 30     | 3.5    | 20    | 27    | 0.3     | K.81103TVP           | 14.2                 | 33.4      | 11000                  | 0.008       |
|                | 0.6693            | 1.1811 | 0.1378 | 0.787 | 1.063 | 0.012   |                      | 3190                 | 7510      |                        |             |
| 20             | 20                | 35     | 4.5    | 23    | 32    | 0.3     | K.81104TVP           | 23.6                 | 56.8      | 9500                   | 0.009       |
|                | 0.7874            | 1.3780 | 0.1772 | 0.906 | 1.260 | 0.012   |                      | 5310                 | 12800     |                        |             |
| 25             | 25                | 42     | 5.0    | 28    | 39    | 0.6     | K.81105TVP           | 31.2                 | 81.0      | 8000                   | 0.014       |
|                | 0.9843            | 1.6535 | 0.1969 | 1.102 | 1.535 | 0.024   |                      | 7010                 | 18200     |                        |             |
| 30             | 30                | 47     | 5.0    | 33    | 44    | 0.6     | K.81106LPB           | 33.0                 | 91.1      | 6700                   | 0.026       |
|                | 1.1811            | 1.8504 | 0.1969 | 1.299 | 1.732 | 0.024   |                      | 7420                 | 20500     |                        |             |
| 30             | 30                | 47     | 5.0    | 33    | 44    | 0.6     | K.81106TVP           | 33.0                 | 91.1      | 6700                   | 0.016       |
|                | 1.1811            | 1.8504 | 0.1969 | 1.299 | 1.732 | 0.024   |                      | 7420                 | 20500     |                        |             |
| 30             | 30                | 52     | 7.5    | 33    | 49    | 0.6     | K.81206LPB           | 56.9                 | 141       | 6300                   | 0.052       |
|                | 1.1811            | 2.0472 | 0.2953 | 1.299 | 1.929 | 0.024   |                      | 12800                | 31700     |                        |             |
| 30             | 30                | 52     | 7.5    | 33    | 49    | 0.6     | K.81206TVP           | 56.9                 | 141       | 6300                   | 0.034       |
|                | 1.1811            | 2.0472 | 0.2953 | 1.299 | 1.929 | 0.024   |                      | 12800                | 31700     |                        |             |
| 35             | 35                | 52     | 5.0    | 38    | 49    | 0.6     | K.81107LPB           | 34.8                 | 101       | 6000                   | 0.025       |
|                | 1.3780            | 2.0472 | 0.1969 | 1.496 | 1.929 | 0.024   |                      | 7820                 | 22700     |                        |             |
| 35             | 35                | 52     | 5.0    | 38    | 49    | 0.6     | K.81107TVP           | 34.8                 | 101       | 6000                   | 0.020       |
|                | 1.3780            | 2.0472 | 0.1969 | 1.496 | 1.929 | 0.024   |                      | 7820                 | 22700     |                        |             |
| 35             | 35                | 62     | 7.5    | 41    | 56    | 1.0     | K.81207LPB           | 61.6                 | 164       | 5300                   | 0.073       |
|                | 1.3780            | 2.4409 | 0.2953 | 1.614 | 2.205 | 0.039   |                      | 13800                | 36900     |                        |             |
| 35             | 35                | 62     | 7.5    | 41    | 56    | 1.0     | K.81207TVP           | 61.6                 | 164       | 5300                   | 0.055       |
|                | 1.3780            | 2.4409 | 0.2953 | 1.614 | 2.205 | 0.039   |                      | 13800                | 36900     |                        |             |
| 40             | 40                | 60     | 6.0    | 44    | 56    | 0.6     | K.81108LPB           | 49.8                 | 148       | 5300                   | 0.044       |
|                | 1.5748            | 2.3622 | 0.2362 | 1.732 | 2.205 | 0.024   |                      | 11200                | 33300     |                        |             |
| 40             | 40                | 60     | 6.0    | 44    | 56    | 0.6     | K.81108TVP           | 49.8                 | 148       | 5300                   | 0.031       |
|                | 1.5748            | 2.3622 | 0.2362 | 1.732 | 2.205 | 0.024   |                      | 11200                | 33300     |                        |             |
| 40             | 40                | 68     | 9.0    | 45    | 63    | 1.0     | K.81208TVP           | 86.8                 | 233       | 4800                   | 0.076       |
|                | 1.5748            | 2.6772 | 0.3543 | 1.772 | 2.480 | 0.039   |                      | 19500                | 52400     |                        |             |
| 45             | 45                | 65     | 6.0    | 49    | 61    | 0.6     | K.81109LPB           | 52.3                 | 163       | 4800                   | 0.035       |
|                | 1.7717            | 2.5591 | 0.2362 | 1.929 | 2.402 | 0.024   |                      | 11800                | 36600     |                        |             |
| 45             | 45                | 65     | 6.0    | 49    | 61    | 0.6     | K.81109TVP           | 52.3                 | 163       | 4800                   | 0.035       |
|                | 1.7717            | 2.5591 | 0.2362 | 1.929 | 2.402 | 0.024   |                      | 11800                | 36600     |                        |             |
| 45             | 45                | 73     | 9.0    | 50    | 68    | 1.0     | K.81209TVP           | 94.2                 | 266       | 4500                   | 0.083       |
|                | 1.7717            | 2.8740 | 0.3543 | 1.969 | 2.677 | 0.039   |                      | 21200                | 59800     |                        |             |

## Needle Roller Thrust Bearings, Assemblies, Washers



WS.811, WS.812



GS.811, GS.812

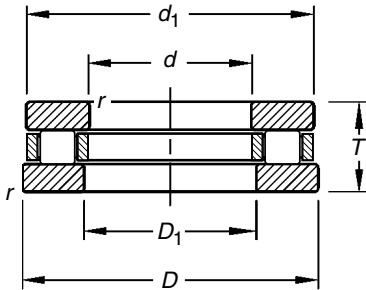
| Dimensions mm/in. |                |                               | Max.          | Min.          | $r_s$ min    | Assembly Designation |          | Wt. kg/lbs.    | Shaft Diameter mm |
|-------------------|----------------|-------------------------------|---------------|---------------|--------------|----------------------|----------|----------------|-------------------|
| d                 | D <sub>1</sub> | D <sub>1</sub> d <sub>1</sub> |               |               |              | h                    |          |                |                   |
| 15<br>0.591       | 16<br>0.630    | 28<br>1.102                   | 2.75<br>0.108 | 2.64<br>0.104 | 0.3<br>0.012 | WS.81102             | GS.81102 | 0.010<br>0.022 | 15                |
| 15<br>0.591       | 16<br>0.630    | 28<br>1.102                   | 2.75<br>0.108 | 2.64<br>0.104 | 0.3<br>0.012 | WS.81102             | GS.81102 | 0.010<br>0.022 |                   |
| 17<br>0.669       | 18<br>0.709    | 30<br>1.181                   | 2.75<br>0.108 | 2.64<br>0.104 | 0.3<br>0.012 | WS.81103             | GS.81103 | 0.011<br>0.024 | 17                |
| 17<br>0.669       | 18<br>0.709    | 30<br>1.181                   | 2.75<br>0.108 | 2.64<br>0.104 | 0.3<br>0.012 | WS.81103             | GS.81103 | 0.011<br>0.024 |                   |
| 20<br>0.787       | 21<br>0.827    | 35<br>1.378                   | 2.75<br>0.108 | 2.62<br>0.103 | 0.3<br>0.012 | WS.81104             | GS.81104 | 0.014<br>0.031 | 20                |
| 25<br>0.984       | 26<br>1.024    | 42<br>1.654                   | 3.00<br>0.118 | 2.87<br>0.113 | 0.6<br>0.024 | WS.81105             | GS.81105 | 0.021<br>0.046 | 25                |
| 30<br>1.181       | 32<br>1.260    | 47<br>1.850                   | 3.00<br>0.118 | 2.87<br>0.113 | 0.6<br>0.024 | WS.81106             | GS.81106 | 0.023<br>0.051 | 30                |
| 30<br>1.181       | 32<br>1.260    | 47<br>1.850                   | 3.00<br>0.118 | 2.87<br>0.113 | 0.6<br>0.024 | WS.81106             | GS.81106 | 0.023<br>0.051 |                   |
| 30<br>1.181       | 32<br>1.260    | 52<br>2.047                   | 4.25<br>0.167 | 4.12<br>0.162 | 0.6<br>0.024 | WS.81206             | GS.81206 | 0.047<br>0.104 |                   |
| 30<br>1.181       | 32<br>1.260    | 52<br>2.047                   | 4.25<br>0.167 | 4.12<br>0.162 | 0.6<br>0.024 | WS.81206             | GS.81206 | 0.047<br>0.104 |                   |
| 35<br>1.378       | 37<br>1.457    | 52<br>2.047                   | 3.50<br>0.138 | 3.34<br>0.131 | 0.6<br>0.024 | WS.81107             | GS.81107 | 0.032<br>0.071 | 35                |
| 35<br>1.378       | 37<br>1.457    | 52<br>2.047                   | 3.50<br>0.138 | 3.34<br>0.131 | 0.6<br>0.024 | WS.81107             | GS.81107 | 0.032<br>0.071 |                   |
| 35<br>1.378       | 37<br>1.457    | 62<br>2.441                   | 5.25<br>0.207 | 5.09<br>0.200 | 1.0<br>0.039 | WS.81207             | GS.81207 | 0.085<br>0.187 |                   |
| 35<br>1.378       | 37<br>1.457    | 62<br>2.441                   | 5.25<br>0.207 | 5.09<br>0.200 | 1.0<br>0.039 | WS.81207             | GS.81207 | 0.085<br>0.187 |                   |
| 40<br>1.575       | 42<br>1.654    | 60<br>2.362                   | 3.50<br>0.138 | 3.34<br>0.131 | 0.6<br>0.024 | WS.81108             | GS.81108 | 0.043<br>0.095 | 40                |
| 40<br>1.575       | 42<br>1.654    | 60<br>2.362                   | 3.50<br>0.138 | 3.34<br>0.131 | 0.6<br>0.024 | WS.81108             | GS.81108 | 0.043<br>0.095 |                   |
| 40<br>1.575       | 42<br>1.654    | 68<br>2.677                   | 5.00<br>0.197 | 4.84<br>0.191 | 1.0<br>0.039 | WS.81208             | GS.81208 | 0.093<br>0.205 |                   |
| 45<br>1.772       | 47<br>1.850    | 65<br>2.559                   | 4.00<br>0.157 | 3.84<br>0.151 | 0.6<br>0.024 | WS.81109             | GS.81109 | 0.054<br>0.119 | 45                |
| 45<br>1.772       | 47<br>1.850    | 65<br>2.559                   | 4.00<br>0.157 | 3.84<br>0.151 | 0.6<br>0.024 | WS.81109             | GS.81109 | 0.054<br>0.119 |                   |
| 45<br>1.772       | 47<br>1.850    | 73<br>2.874                   | 5.50<br>0.217 | 5.34<br>0.210 | 1.0<br>0.039 | WS.81209             | GS.81209 | 0.112<br>0.247 |                   |

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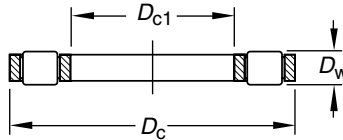


**CYLINDRICAL ROLLER THRUST BEARINGS  
CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES – continued**

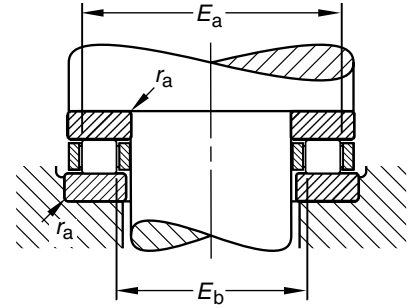
**METRIC SERIES**



811, 812



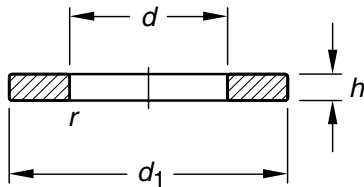
K811, K812



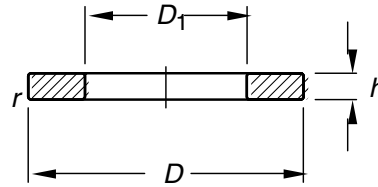
Raceway contact dimensions

| Shaft Diameter | Dimensions mm/in. |               |                |             |              |              | Assembly Designation | Load Ratings kN/lbf. |               | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|---------------|----------------|-------------|--------------|--------------|----------------------|----------------------|---------------|------------------------|----------------|
|                | E11               | a13           |                |             |              | ras max      |                      | Dynamic C            | Static Co     |                        |                |
| mm             | Dc1               | Dc            | Dw             | Eb          | Ea           |              |                      |                      |               |                        |                |
| 50             | 50<br>1.9685      | 70<br>2.7559  | 6.0<br>0.2362  | 54<br>2.126 | 66<br>2.598  | 0.6<br>0.024 | K.81110LPB           | 54.8<br>12300        | 177<br>39800  | 4300                   | 0.052<br>0.115 |
|                | 50<br>1.9685      | 70<br>2.7559  | 6.0<br>0.2362  | 54<br>2.126 | 66<br>2.598  | 0.6<br>0.024 | K.81110TVP           | 54.8<br>12300        | 177<br>39800  |                        | 0.042<br>0.093 |
| 55             | 50<br>1.9685      | 78<br>3.0709  | 9.0<br>0.3543  | 55<br>2.165 | 73<br>2.874  | 1.0<br>0.039 | K.81210TVP           | 101<br>22700         | 299<br>67200  | 4000                   | 0.089<br>0.196 |
|                | 55<br>2.1654      | 78<br>3.0709  | 6.0<br>0.2362  | 60<br>2.362 | 73<br>2.874  | 0.6<br>0.024 | K.81111TVP           | 60.3<br>13600        | 207<br>46500  |                        | 0.066<br>0.146 |
| 55             | 55<br>2.1654      | 90<br>3.5433  | 11.0<br>0.4331 | 61<br>2.402 | 84<br>3.307  | 1.0<br>0.039 | K.81211LPB           | 138<br>31000         | 403<br>90600  | 3600                   | 0.156<br>0.344 |
|                | 55<br>2.1654      | 90<br>3.5433  | 11.0<br>0.4331 | 61<br>2.402 | 84<br>3.307  | 1.0<br>0.039 | K.81211TVP           | 138<br>31000         | 403<br>90600  |                        | 0.140<br>0.309 |
| 60             | 60<br>2.3622      | 85<br>3.3465  | 7.5<br>0.2953  | 65<br>2.559 | 80<br>3.150  | 1.0<br>0.039 | K.81112TVP           | 84.4<br>19000        | 281<br>63200  | 3600                   | 0.103<br>0.227 |
|                | 60<br>2.3622      | 95<br>3.7402  | 11.0<br>0.4331 | 66<br>2.598 | 89<br>3.504  | 1.0<br>0.039 | K.81212LPB           | 129<br>29000         | 378<br>85000  |                        | 0.166<br>0.366 |
| 65             | 65<br>2.5591      | 90<br>3.5433  | 7.5<br>0.2953  | 70<br>2.756 | 85<br>3.346  | 1.0<br>0.039 | K.81113TVP           | 88.3<br>19900        | 305<br>68600  | 3400                   | 0.109<br>0.240 |
|                | 65<br>2.5591      | 100<br>3.9370 | 11.0<br>0.4331 | 71<br>2.795 | 94<br>3.701  | 1.0<br>0.039 | K.81213LPB           | 134<br>30100         | 403<br>90600  |                        | 0.176<br>0.388 |
| 70             | 70<br>2.7559      | 95<br>3.7402  | 7.5<br>0.2953  | 75<br>2.953 | 90<br>3.543  | 1.0<br>0.039 | K.81114TVP           | 92.1<br>20700        | 328<br>73700  | 3200                   | 0.056<br>0.123 |
|                | 70<br>2.7559      | 105<br>4.1339 | 11.0<br>0.4331 | 76<br>2.992 | 99<br>3.898  | 1.0<br>0.039 | K.81214LPB           | 138<br>31000         | 428<br>96200  |                        | 0.186<br>0.410 |
| 75             | 75<br>2.9528      | 100<br>3.9370 | 7.5<br>0.2953  | 80<br>3.150 | 95<br>3.740  | 1.0<br>0.039 | K.81115LPB           | 86.1<br>19400        | 305<br>68600  | 3000                   | 0.091<br>0.201 |
|                | 75<br>2.9528      | 110<br>4.3307 | 11.0<br>0.4331 | 81<br>3.189 | 104<br>4.094 | 1.0<br>0.039 | K.81215LPB           | 143<br>32100         | 453<br>101800 |                        | 0.197<br>0.434 |
| 80             | 80<br>3.1496      | 105<br>4.1339 | 7.5<br>0.2953  | 85<br>3.346 | 100<br>3.937 | 1.0<br>0.039 | K.81116LPB           | 87.5<br>19700        | 316<br>71000  | 2800                   | 0.103<br>0.227 |
|                | 80<br>3.1496      | 115<br>4.5276 | 11.0<br>0.4331 | 86<br>3.386 | 109<br>4.291 | 1.0<br>0.039 | K.81216LPB           | 147<br>33000         | 478<br>107500 |                        | 0.208<br>0.459 |
| 85             | 85<br>3.3465      | 110<br>4.3307 | 7.5<br>0.2953  | 90<br>3.543 | 105<br>4.134 | 1.0<br>0.039 | K.81117LPB           | 88.9<br>20000        | 328<br>73700  | 2600                   | 0.108<br>0.238 |
|                | 85<br>3.3465      | 125<br>4.9213 | 12.0<br>0.4724 | 93<br>3.661 | 117<br>4.606 | 1.0<br>0.039 | K.81217LPB           | 174<br>39100         | 572<br>128600 |                        | 0.376<br>0.829 |
| 90             | 90<br>3.5433      | 120<br>4.7244 | 9.0<br>0.3543  | 96<br>3.780 | 114<br>4.488 | 1.0<br>0.039 | K.81118LPB           | 119<br>26800         | 432<br>97100  | 2400                   | 0.156<br>0.344 |
|                | 90<br>3.5433      | 135<br>5.3150 | 14.0<br>0.5512 | 98<br>3.858 | 127<br>5.000 | 1.0<br>0.039 | K.81218LPB           | 215<br>48300         | 691<br>155300 |                        | 0.540<br>1.190 |

## Needle Roller Thrust Bearings, Assemblies, Washers



WS.811, WS.812



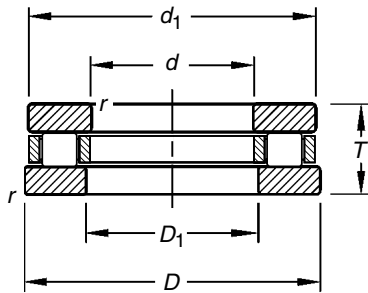
GS.811, GS.812

| Dimensions mm/in. |             |              | Max.           | Min.           | $r_s$ min    | Assembly Designation |          | Wt.<br>kg/lbs. | Shaft<br>Diameter<br>mm |
|-------------------|-------------|--------------|----------------|----------------|--------------|----------------------|----------|----------------|-------------------------|
| d                 | $D_1$       | $D_1$ $d_1$  |                |                |              | h                    |          |                |                         |
| 50<br>1.969       | 52<br>2.047 | 70<br>2.756  | 4.00<br>0.157  | 3.84<br>0.151  | 0.6<br>0.024 | WS.81110             | GS.81110 | 0.059<br>0.130 | 50                      |
| 50<br>1.969       | 52<br>2.047 | 70<br>2.756  | 4.00<br>0.157  | 3.84<br>0.151  | 0.6<br>0.024 | WS.81110             | GS.81110 | 0.059<br>0.130 |                         |
| 50<br>1.969       | 52<br>2.047 | 78<br>3.071  | 6.5<br>0.256   | 6.34<br>0.250  | 1.0<br>0.039 | WS.81210             | GS.81210 | 0.144<br>0.317 | 55                      |
| 55<br>2.165       | 57<br>2.244 | 78<br>3.071  | 5.00<br>0.197  | 4.81<br>0.189  | 0.6<br>0.024 | WS.81111             | GS.81111 | 0.094<br>0.207 |                         |
| 55<br>2.165       | 57<br>2.244 | 90<br>3.543  | 7.00<br>0.276  | 6.81<br>0.268  | 1.0<br>0.039 | WS.81211             | GS.81211 | 0.219<br>0.483 |                         |
| 55<br>2.165       | 57<br>2.244 | 90<br>3.543  | 7.00<br>0.276  | 6.81<br>0.268  | 1.0<br>0.039 | WS.81211             | GS.81211 | 0.219<br>0.483 |                         |
| 60<br>2.362       | 62<br>2.441 | 85<br>3.346  | 4.75<br>0.187  | 4.56<br>0.180  | 1.0<br>0.039 | WS.81112             | GS.81112 | 0.106<br>0.234 | 60                      |
| 60<br>2.362       | 62<br>2.441 | 95<br>3.740  | 7.50<br>0.295  | 7.31<br>0.288  | 1.0<br>0.039 | WS.81212             | GS.81212 | 0.251<br>0.553 |                         |
| 65<br>2.559       | 67<br>2.638 | 90<br>3.543  | 5.25<br>0.207  | 5.06<br>0.199  | 1.0<br>0.039 | WS.81113             | GS.81113 | 0.125<br>0.276 | 65                      |
| 65<br>2.559       | 67<br>2.638 | 100<br>3.937 | 8.00<br>0.315  | 7.81<br>0.307  | 1.0<br>0.039 | WS.81213             | GS.81213 | 0.285<br>0.628 |                         |
| 70<br>2.756       | 72<br>2.835 | 95<br>3.740  | 5.25<br>0.207  | 5.06<br>0.199  | 1.0<br>0.039 | WS.81114             | GS.81114 | 0.133<br>0.293 | 70                      |
| 70<br>2.756       | 72<br>2.835 | 105<br>4.134 | 8.00<br>0.315  | 7.81<br>0.307  | 1.0<br>0.039 | WS.81214             | GS.81214 | 0.302<br>0.666 |                         |
| 75<br>2.953       | 77<br>3.031 | 100<br>3.937 | 5.75<br>0.226  | 5.56<br>0.219  | 1.0<br>0.039 | WS.81115             | GS.81115 | 0.155<br>0.342 | 75                      |
| 75<br>2.953       | 77<br>3.031 | 110<br>4.331 | 8.00<br>0.315  | 7.81<br>0.307  | 1.0<br>0.039 | WS.81215             | GS.81215 | 0.319<br>0.703 |                         |
| 80<br>3.150       | 82<br>3.228 | 105<br>4.134 | 5.75<br>0.226  | 5.56<br>0.219  | 1.0<br>0.039 | WS.81116             | GS.81116 | 0.165<br>0.364 | 80                      |
| 80<br>3.150       | 82<br>3.228 | 115<br>4.528 | 8.50<br>0.335  | 8.31<br>0.327  | 1.0<br>0.039 | WS.81216             | GS.81216 | 0.357<br>0.787 |                         |
| 85<br>3.346       | 87<br>3.425 | 110<br>4.331 | 5.75<br>0.226  | 5.53<br>0.218  | 1.0<br>0.039 | WS.81117             | GS.81117 | 0.173<br>0.381 | 85                      |
| 85<br>3.346       | 88<br>3.465 | 125<br>4.921 | 9.50<br>0.374  | 9.28<br>0.365  | 1.0<br>0.039 | WS.81217             | GS.81217 | 0.492<br>1.085 |                         |
| 90<br>3.543       | 92<br>3.622 | 120<br>4.724 | 6.50<br>0.256  | 6.28<br>0.247  | 1.0<br>0.039 | WS.81118             | GS.81118 | 0.253<br>0.558 | 90                      |
| 90<br>3.543       | 93<br>3.661 | 135<br>5.315 | 10.50<br>0.413 | 10.28<br>0.405 | 1.1<br>0.043 | WS.81218             | GS.81218 | 0.655<br>1.444 |                         |

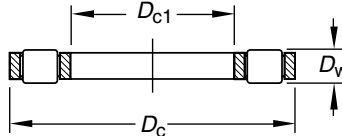


**CYLINDRICAL ROLLER THRUST BEARINGS  
CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES**

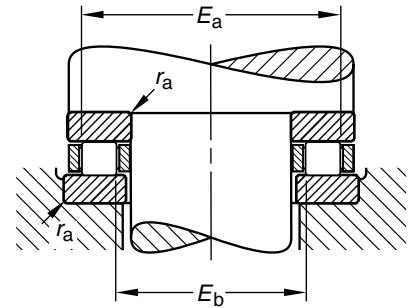
**METRIC SERIES**



**811, 812**



**K811, K812**



**Raceway contact dimensions**

| Shaft Diameter | Dimensions mm/in. |        |        |                |       |                |                | Bearing Designation | Load Ratings N/lbf. |       | Limiting Speed Oil RPM | Wt. kg/lbs. |
|----------------|-------------------|--------|--------|----------------|-------|----------------|----------------|---------------------|---------------------|-------|------------------------|-------------|
|                | mm                | d      | D      | D <sub>w</sub> | T     | E <sub>b</sub> | E <sub>a</sub> |                     | r as max            | C     |                        |             |
| 15             | 15                | 28     | 3.5    | 9              | 18    | 25             | 0.3            | 81102LPB            | 12.8                | 28.6  | 12000                  | 0.029       |
|                | 0.5906            | 1.1024 | 0.1378 | 0.354          | 0.709 | 0.984          | 0.012          |                     | 2880                | 6430  |                        |             |
| 15             | 15                | 28     | 3.5    | 9              | 18    | 25             | 0.3            | 81102TVP            | 12.8                | 28.6  | 12000                  | 0.022       |
|                | 0.5906            | 1.1024 | 0.1378 | 0.354          | 0.709 | 0.984          | 0.012          |                     | 2880                | 6430  |                        |             |
| 17             | 17                | 30     | 3.5    | 9              | 20    | 27             | 0.3            | 81103TVP            | 14.2                | 33.4  | 11000                  | 0.000       |
|                | 0.6693            | 1.1811 | 0.1378 | 0.354          | 0.787 | 1.063          | 0.012          |                     | 3190                | 7510  |                        |             |
| 20             | 20                | 35     | 4.5    | 10             | 23    | 32             | 0.3            | 81104TVP            | 23.6                | 56.8  | 9500                   | 0.040       |
|                | 0.7874            | 1.3780 | 0.1772 | 0.394          | 0.906 | 1.260          | 0.012          |                     | 5310                | 12800 |                        |             |
| 25             | 25                | 42     | 5.0    | 11             | 28    | 39             | 0.6            | 81105TVP            | 31.2                | 81.0  | 8000                   | 0.070       |
|                | 0.9843            | 1.6535 | 0.1969 | 0.433          | 1.102 | 1.535          | 0.024          |                     | 7010                | 18200 |                        |             |
| 30             | 30                | 47     | 5.0    | 11             | 33    | 44             | 0.6            | 81106TVP            | 33.0                | 91.1  | 6700                   | 0.060       |
|                | 1.1811            | 1.8504 | 0.1969 | 0.433          | 1.299 | 1.732          | 0.024          |                     | 7420                | 20500 |                        |             |
| 30             | 30                | 52     | 7.5    | 16             | 33    | 49             | 0.6            | 81206TVP            | 56.9                | 141   | 6300                   | 0.128       |
|                | 1.1811            | 2.0472 | 0.2953 | 0.630          | 1.299 | 1.929          | 0.024          |                     | 12800               | 31700 |                        |             |
| 35             | 35                | 52     | 5.0    | 12             | 38    | 49             | 0.6            | 81107TVP            | 34.8                | 101   | 6000                   | 0.081       |
|                | 1.3780            | 2.0472 | 0.1969 | 0.472          | 1.496 | 1.929          | 0.024          |                     | 7820                | 22700 |                        |             |
| 35             | 35                | 62     | 7.5    | 18             | 41    | 56             | 1.0            | 81207TVP            | 61.6                | 164   | 5300                   | 0.250       |
|                | 1.3780            | 2.4409 | 0.2953 | 0.709          | 1.614 | 2.205          | 0.039          |                     | 13800               | 36900 |                        |             |
| 40             | 40                | 60     | 6.0    | 13             | 44    | 56             | 0.6            | 81108TVP            | 49.8                | 148   | 5300                   | 0.100       |
|                | 1.5748            | 2.3622 | 0.2362 | 0.512          | 1.732 | 2.205          | 0.024          |                     | 11200               | 33300 |                        |             |
| 40             | 40                | 68     | 9.0    | 19             | 45    | 63             | 1.0            | 81208TVP            | 86.8                | 233   | 4800                   | 0.266       |
|                | 1.5748            | 2.6772 | 0.3543 | 0.748          | 1.772 | 2.480          | 0.039          |                     | 19500               | 52400 |                        |             |
| 45             | 45                | 65     | 6.0    | 14             | 49    | 61             | 0.6            | 81109TVP            | 52.3                | 163   | 4800                   | 0.141       |
|                | 1.7717            | 2.5591 | 0.2362 | 0.551          | 1.929 | 2.402          | 0.024          |                     | 11800               | 36600 |                        |             |
| 50             | 50                | 70     | 6.0    | 14             | 54    | 66             | 0.6            | 81110LPB            | 54.8                | 177   | 4300                   | 0.152       |
|                | 1.9685            | 2.7559 | 0.2362 | 0.551          | 2.126 | 2.598          | 0.024          |                     | 12300               | 39800 |                        |             |
| 50             | 50                | 70     | 6.0    | 14             | 54    | 66             | 0.6            | 81110TVP            | 54.8                | 177   | 4300                   | 0.160       |
|                | 1.9685            | 2.7559 | 0.2362 | 0.551          | 2.126 | 2.598          | 0.024          |                     | 12300               | 39800 |                        |             |
| 50             | 50                | 78     | 9.0    | 22             | 55    | 73             | 1.0            | 81210TVP            | 101                 | 299   | 4000                   | 0.437       |
|                | 1.9685            | 3.0709 | 0.3543 | 0.866          | 2.165 | 2.874          | 0.039          |                     | 22700               | 67200 |                        |             |
| 55             | 55                | 78     | 6.0    | 16             | 60    | 73             | 0.6            | 81111TVP            | 60.3                | 207   | 4000                   | 0.233       |
|                | 2.1654            | 3.0709 | 0.2362 | 0.630          | 2.362 | 2.874          | 0.024          |                     | 13600               | 46500 |                        |             |
| 55             | 55                | 90     | 11.0   | 25             | 61    | 84             | 1.0            | 81211TVP            | 138                 | 403   | 3600                   | 0.584       |
|                | 2.1654            | 3.5433 | 0.4331 | 0.984          | 2.402 | 3.307          | 0.039          |                     | 31000               | 90600 |                        |             |

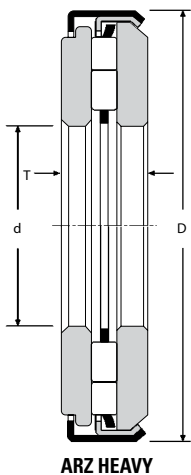
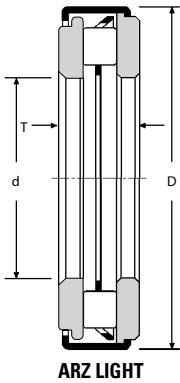
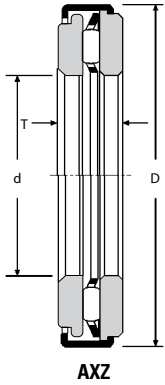
## Needle Roller Thrust Bearings, Assemblies, Washers

C

| Shaft Diameter | Dimensions mm/in. |        |        |                |       |                |                | Bearing Designation | Load Ratings kN/lbf. |        | Limiting Speed Oil | Wt. kg/lbs. |
|----------------|-------------------|--------|--------|----------------|-------|----------------|----------------|---------------------|----------------------|--------|--------------------|-------------|
|                | mm                | d      | D      | D <sub>w</sub> | T     | E <sub>b</sub> | E <sub>a</sub> |                     | r <sub>as max</sub>  | C      |                    |             |
| 60             | 60                | 85     | 7.5    | 17             | 65    | 80             | 1.0            | 81112TVP            | 84.4                 | 281    | 3600               | 0.315       |
|                | 2.3622            | 3.3465 | 0.2953 | 0.669          | 2.559 | 3.150          | 0.039          |                     | 19000                | 63200  |                    |             |
| 60             | 60                | 95     | 11.0   | 26             | 66    | 89             | 1.0            | 81212LPB            | 129                  | 378    | 3400               | 0.770       |
|                | 2.3622            | 3.7402 | 0.4331 | 1.024          | 2.598 | 3.504          | 0.039          |                     | 29000                | 85000  |                    |             |
| 65             | 65                | 90     | 7.5    | 18             | 70    | 85             | 1.0            | 81113TVP            | 88.3                 | 305    | 3400               | 0.360       |
|                | 2.5591            | 3.5433 | 0.2953 | 0.709          | 2.756 | 3.346          | 0.039          |                     | 19900                | 68600  |                    |             |
| 65             | 65                | 100    | 11.0   | 27             | 71    | 94             | 1.0            | 81213LPB            | 134                  | 403    | 3200               | 0.805       |
|                | 2.5591            | 3.9370 | 0.4331 | 1.063          | 2.795 | 3.701          | 0.039          |                     | 30100                | 90600  |                    |             |
| 70             | 70                | 95     | 7.5    | 18             | 75    | 90             | 1.0            | 81114TVP            | 92.1                 | 328    | 3200               | 0.352       |
|                | 2.7559            | 3.7402 | 0.2953 | 0.709          | 2.953 | 3.543          | 0.039          |                     | 20700                | 73700  |                    |             |
| 70             | 70                | 105    | 11.0   | 27             | 76    | 99             | 1.0            | 81214LPB            | 138                  | 428    | 3000               | 0.868       |
|                | 2.7559            | 4.1339 | 0.4331 | 1.063          | 2.992 | 3.898          | 0.039          |                     | 31000                | 96200  |                    |             |
| 75             | 75                | 100    | 7.5    | 19             | 80    | 95             | 1.0            | 81115LPB            | 86.1                 | 305    | 3000               | 0.405       |
|                | 2.9528            | 3.9370 | 0.2953 | 0.748          | 3.150 | 3.740          | 0.039          |                     | 19400                | 68600  |                    |             |
| 75             | 75                | 110    | 11.0   | 27             | 81    | 104            | 1.0            | 81215LPB            | 143                  | 453    | 2800               | 0.780       |
|                | 2.9528            | 4.3307 | 0.4331 | 1.063          | 3.189 | 4.094          | 0.039          |                     | 32100                | 102000 |                    |             |
| 80             | 80                | 105    | 7.5    | 19             | 85    | 100            | 1.0            | 81116LPB            | 87.5                 | 316    | 2800               | 0.412       |
|                | 3.1496            | 4.1339 | 0.2953 | 0.748          | 3.346 | 3.937          | 0.039          |                     | 19700                | 71000  |                    |             |
| 80             | 80                | 115    | 11.0   | 28             | 86    | 109            | 1.0            | 81216LPB            | 147                  | 478    | 2600               | 1.080       |
|                | 3.1496            | 4.5276 | 0.4331 | 1.102          | 3.386 | 4.291          | 0.039          |                     | 33000                | 107000 |                    |             |
| 85             | 85                | 110    | 7.5    | 19             | 90    | 105            | 1.0            | 81117LPB            | 88.9                 | 328    | 2600               | 0.480       |
|                | 3.3465            | 4.3307 | 0.2953 | 0.748          | 3.543 | 4.134          | 0.039          |                     | 20000                | 73700  |                    |             |
| 85             | 85                | 125    | 12.0   | 31             | 93    | 117            | 1.0            | 81217LPB            | 174                  | 572    | 2400               | 1.360       |
|                | 3.3465            | 4.9213 | 0.4724 | 1.220          | 3.661 | 4.606          | 0.039          |                     | 39100                | 129000 |                    |             |
| 90             | 90                | 120    | 9.0    | 22             | 96    | 114            | 1.0            | 81118LPB            | 119                  | 432    | 2400               | 0.710       |
|                | 3.5433            | 4.7244 | 0.3543 | 0.866          | 3.780 | 4.488          | 0.039          |                     | 26800                | 97100  |                    |             |
| 90             | 90                | 135    | 14.0   | 35             | 98    | 127            | 1.0            | 81218LPB            | 215                  | 691    | 2400               | 1.850       |
|                | 3.5433            | 5.3150 | 0.5512 | 1.378          | 3.858 | 5.000          | 0.039          |                     | 48300                | 155000 |                    |             |

**NEEDLE OR ROLLER THRUST BEARINGS**

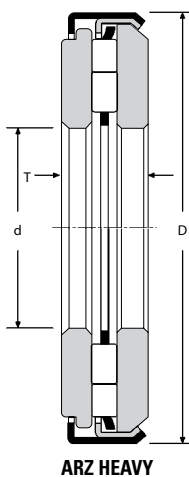
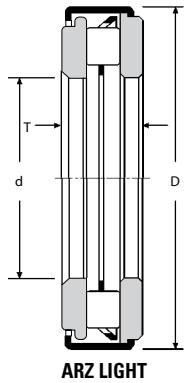
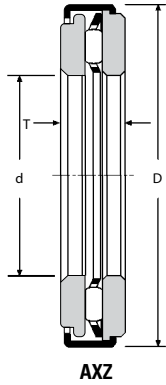
**METRIC SERIES**



| Shaft Diameter | mm/in. |       |       | AXZ             | ARZ Light | ARZ Heavy | Load Ratings |       | Limiting Speed Oil | Wt. kg/lbs. |
|----------------|--------|-------|-------|-----------------|-----------|-----------|--------------|-------|--------------------|-------------|
|                | mm     | d     | D     |                 |           |           | T            | C     |                    |             |
| 5              | 5      | 13    | 5.5   | AXZ 5,5 5 13    |           |           | 3.00         | 5.70  | 25000              | 0.004       |
|                | 0.197  | 0.512 | 0.217 |                 |           |           | 670          | 1300  |                    |             |
| 6              | 6      | 14    | 5.5   | AXZ 5,5 6 14    |           |           | 3.15         | 6.35  | 22000              | 0.004       |
|                | 0.236  | 0.551 | 0.217 |                 |           |           | 710          | 1400  |                    |             |
| 7              | 7      | 15    | 5.5   | AXZ 5,5 7 15    |           |           | 3.55         | 7.60  | 22000              | 0.005       |
|                | 0.276  | 0.591 | 0.217 |                 |           |           | 800          | 1700  |                    |             |
| 8              | 8      | 16    | 5.5   | AXZ 5,5 8 16    |           |           | 3.70         | 8.30  | 22000              | 0.005       |
|                | 0.315  | 0.630 | 0.217 |                 |           |           | 830          | 1900  |                    |             |
| 9              | 9      | 17    | 5.5   | AXZ 5,5 9 17    |           |           | 4.05         | 9.50  | 19000              | 0.005       |
|                | 0.354  | 0.669 | 0.217 |                 |           |           | 910          | 2100  |                    |             |
| 10             | 10     | 22.4  | 6.5   | ARZ 6,5 10 22,4 |           |           | 8.20         | 17.9  | 15500              | 0.012       |
|                | 0.394  | 0.882 | 0.256 |                 |           |           | 1840         | 4000  |                    |             |
| 10             | 10     | 22.4  | 6     | AXZ 6 10 22,4   |           |           | 5.00         | 10.9  | 15500              | 0.011       |
|                | 0.394  | 0.882 | 0.236 |                 |           |           | 1120         | 2500  |                    |             |
| 12             | 12     | 26.4  | 6     | AXZ 6 12 26,4   |           |           | 6.90         | 17.7  | 13000              | 0.017       |
|                | 0.472  | 1.039 | 0.236 |                 |           |           | 1550         | 4000  |                    |             |
| 12             | 12     | 26.4  | 7     | ARZ 7 12 26,4   |           |           | 12.7         | 29.5  | 13000              | 0.017       |
|                | 0.472  | 1.039 | 0.275 |                 |           |           | 2860         | 6600  |                    |             |
| 15             | 15     | 28.4  | 6     | AXZ 6 15 28,4   |           |           | 7.40         | 20.0  | 11500              | 0.016       |
|                | 0.591  | 1.118 | 0.236 |                 |           |           | 1660         | 4500  |                    |             |
| 15             | 15     | 28.4  | 7     | ARZ 7 15 28,4   |           |           | 14.0         | 34.0  | 11500              | 0.019       |
|                | 0.591  | 1.118 | 0.275 |                 |           |           | 3150         | 7600  |                    |             |
| 17             | 17     | 30    | 6     | AXZ 6 17 30,4   |           |           | 7.80         | 22.0  | 10500              | 0.018       |
|                | 0.669  | 1.197 | 0.236 |                 |           |           | 1750         | 4900  |                    |             |
| 17             | 17     | 30.4  | 7     | ARZ 7 17 30,4   |           |           | 15.0         | 39.0  | 10500              | 0.022       |
|                | 0.669  | 1.197 | 0.275 |                 |           |           | 3370         | 8800  |                    |             |
| 20             | 20     | 35    | 8     | AXZ 8 20 35,4   |           |           | 11.80        | 39.0  | 9000               | 0.033       |
|                | 0.787  | 1.394 | 0.315 |                 |           |           | 2650         | 8800  |                    |             |
| 20             | 20     | 35.4  | 10    | ARZ 10 20 35,4  |           |           | 22.0         | 54.0  | 9000               | 0.038       |
|                | 0.787  | 1.394 | 0.394 |                 |           |           | 4950         | 12100 |                    |             |
| 25             | 25     | 43    | 8     | AXZ 8 25 43     |           |           | 13.30        | 49.0  | 7500               | 0.047       |
|                | 0.984  | 1.693 | 0.315 |                 |           |           | 2990         | 11000 |                    |             |
| 25             | 25     | 43    | 10    | ARZ 10 25 43    |           |           | 25.5         | 70.0  | 7500               | 0.057       |
|                | 0.984  | 1.693 | 0.394 |                 |           |           | 5730         | 15700 |                    |             |
| 25             | 25     | 53    | 11    | ARZ 11 25 53    |           |           | 32.5         | 122   | 6500               | 0.122       |
|                | 0.984  | 2.087 | 0.433 |                 |           |           | 7310         | 27400 |                    |             |
| 30             | 30     | 48    | 8     | AXZ 8 30 48     |           |           | 14.50        | 57.0  | 6500               | 0.054       |
|                | 1.181  | 1.890 | 0.315 |                 |           |           | 3260         | 12800 |                    |             |
| 30             | 30     | 48    | 10    | ARZ 10 30 48    |           |           | 26.5         | 77.0  | 6500               | 0.065       |
|                | 1.181  | 1.890 | 0.394 |                 |           |           | 5960         | 17300 |                    |             |
| 30             | 30     | 61    | 14    | ARZ 14 30 61    |           |           | 46.0         | 162   | 5600               | 0.196       |
|                | 1.181  | 2.402 | 0.551 |                 |           |           | 10340        | 36400 |                    |             |
| 35             | 35     | 54    | 8     | AXZ 8 35 54     |           |           | 18.90        | 84.0  | 5500               | 0.066       |
|                | 1.378  | 2.126 | 0.315 |                 |           |           | 4250         | 18900 |                    |             |
| 35             | 35     | 54    | 11    | ARZ 11 35 54    |           |           | 33.8         | 94.0  | 5500               | 0.087       |
|                | 1.378  | 2.126 | 0.433 |                 |           |           | 7600         | 21100 |                    |             |
| 35             | 35     | 69    | 14    | ARZ 14 35 69    |           |           | 51.0         | 194.0 | 4900               | 0.246       |
|                | 1.378  | 2.717 | 0.551 |                 |           |           | 11470        | 43600 |                    |             |

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## Needle Roller Thrust Bearings, Assemblies, Washers



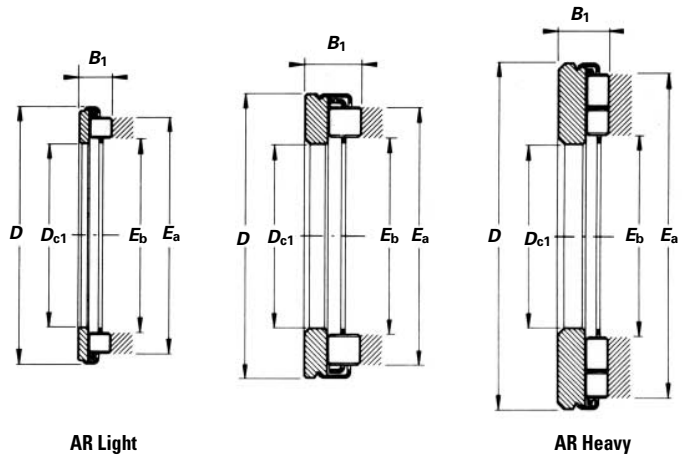
| Shaft Diameter | mm/in. |       |       | AXZ           | ARZ Light     | ARZ Heavy | Load Ratings |        | Limiting Speed Oil | Wt. kg/lbs. |
|----------------|--------|-------|-------|---------------|---------------|-----------|--------------|--------|--------------------|-------------|
|                | mm     | d     | D     |               |               |           | T            | C      |                    |             |
| 40             | 40     | 61    | 8     | AXZ 8 40 61   | ARZ 12 40 61  |           | 20.40        | 96.0   | 5000               | 0.084       |
|                | 1.575  | 2.402 | 0.315 |               |               |           | 4590         | 21600  |                    |             |
|                | 40     | 61    | 12    |               |               |           | 46.0         | 129    | 5000               | 0.114       |
|                | 1.575  | 2.402 | 0.472 |               |               |           | 10340        | 29000  |                    | 0.251       |
| 45             | 40     | 79    | 17    | AXZ 8 45 66   | ARZ 17 40 79  |           | 71.0         | 265    | 4200               | 0.387       |
|                | 1.575  | 3.110 | 0.669 |               |               |           | 15960        | 59600  |                    |             |
|                | 45     | 66    | 8     |               |               |           | 21.80        | 109    | 4500               | 0.092       |
|                | 1.772  | 2.598 | 0.315 |               |               |           | 4900         | 24500  |                    | 0.203       |
| 45             | 45     | 66    | 12    | AXZ 8 45 66   | ARZ 12 45 66  |           | 49.0         | 143    | 4500               | 0.126       |
|                | 1.772  | 2.598 | 0.472 |               |               |           | 11000        | 32100  |                    |             |
|                | 45     | 86    | 22    |               |               |           | 92.0         | 340    | 3800               | 0.595       |
|                | 1.772  | 3.386 | 0.866 |               |               |           | 20700        | 76400  |                    | 1.312       |
| 50             | 50     | 71    | 8     | AXZ 8 50 71   | ARZ 12 50 71  |           | 22.50        | 118    | 4000               | 0.100       |
|                | 1.969  | 2.795 | 0.315 |               |               |           | 5100         | 26500  |                    |             |
|                | 50     | 71    | 12    |               |               |           | 51.0         | 157    | 4000               | 0.137       |
|                | 1.969  | 2.795 | 0.472 |               |               |           | 11500        | 35300  |                    | 0.302       |
| 50             | 50     | 96    | 22    | AXZ 8 50 71   | ARZ 22 50 96  |           | 108.0        | 430    | 3400               | 0.756       |
|                | 1.969  | 3.780 | 0.866 |               |               |           | 24300        | 96700  |                    |             |
|                | 55     | 106   | 22    |               |               |           | 125.0        | 530    | 3100               | 0.917       |
|                | 2.165  | 4.173 | 0.866 |               |               |           | 28100        | 119100 |                    | 2.022       |
| 60             | 60     | 86    | 10    | AXZ 10 60 86  | ARZ 14 60 86  |           | 31.50        | 193    | 3500               | 0.194       |
|                | 2.362  | 3.386 | 0.394 |               |               |           | 7100         | 43400  |                    |             |
|                | 60     | 86    | 14    |               |               |           | 71.0         | 255    | 3500               | 0.246       |
|                | 2.362  | 3.386 | 0.551 |               |               |           | 16000        | 57300  |                    | 0.542       |
| 60             | 60     | 111   | 22    | AXZ 10 60 86  | ARZ 22 60 111 |           | 130.0        | 580    | 2900               | 0.977       |
|                | 2.362  | 4.370 | 0.866 |               |               |           | 29200        | 130400 |                    |             |
|                | 65     | 116   | 22    |               |               |           | 135.0        | 620    | 2800               | 1.040       |
|                | 2.559  | 4.567 | 0.866 |               |               |           | 30300        | 139400 |                    | 2.29        |
| 70             | 70     | 96    | 10    | AXZ 10 70 96  | ARZ 14 70 96  |           | 34.50        | 223    | 3000               | 0.220       |
|                | 2.756  | 3.780 | 0.394 |               |               |           | 7800         | 50100  |                    |             |
|                | 70     | 96    | 14    |               |               |           | 77.0         | 295    | 3000               | 0.279       |
|                | 2.756  | 3.780 | 0.551 |               |               |           | 17300        | 66300  |                    | 0.615       |
| 80             | 80     | 106   | 10    | AXZ 10 80 106 | ARZ 14 80 106 |           | 36.50        | 253    | 2700               | 0.256       |
|                | 3.150  | 4.173 | 0.394 |               |               |           | 8200         | 56900  |                    |             |
|                | 80     | 106   | 14    |               |               |           | 82.0         | 330    | 2700               | 0.312       |
|                | 3.150  | 4.173 | 0.551 |               |               |           | 18400        | 74200  |                    | 0.688       |





# NEEDLE ROLLER BEARINGS

## UNITIZED ROLLER THRUST BEARING ASSEMBLIES METRIC SERIES

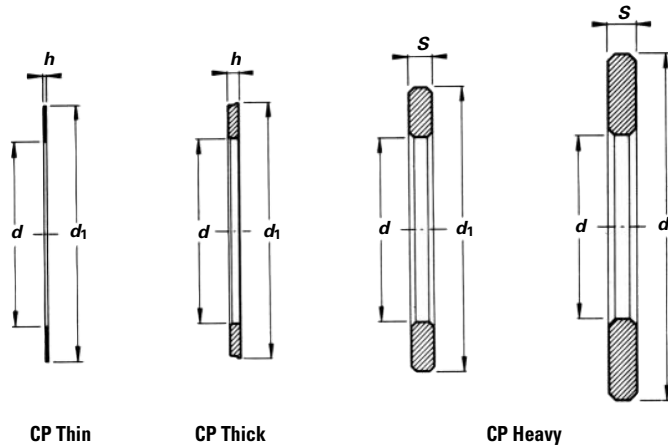


AR Light

AR Heavy

| Shaft Diameter | mm/in.             |                     |                     |                     |                     | Light Series         | Heavy Series          | Wt. kg/lbs.           | Load Ratings kN/lbf.   |              | Limiting Speed Oil RPM |
|----------------|--------------------|---------------------|---------------------|---------------------|---------------------|----------------------|-----------------------|-----------------------|------------------------|--------------|------------------------|
|                | $D_{c1}$           | $D$                 | $B_1$               | $E_a$               | $E_b$               |                      |                       |                       | Dynamic C              | Static $C_0$ |                        |
| <b>10</b>      | <b>10</b><br>0.394 | <b>22</b><br>0.866  | <b>4.5</b><br>0.177 | <b>18.5</b><br>0.73 | <b>12.2</b><br>0.48 | <b>AR 4,5 10 22</b>  | <b>0.007</b><br>0.016 | <b>8.2</b><br>1840    | <b>17.9</b><br>4020    | <b>15500</b> |                        |
| <b>12</b>      | <b>12</b><br>0.472 | <b>26</b><br>1.024  | <b>5</b><br>0.197   | <b>22.9</b><br>0.90 | <b>14.8</b><br>0.58 | <b>AR 5 12 26</b>    | <b>0.011</b><br>0.024 | <b>12.7</b><br>2860   | <b>29.5</b><br>6630    | <b>13000</b> |                        |
| <b>15</b>      | <b>15</b><br>0.591 | <b>28</b><br>1.103  | <b>5</b><br>0.197   | <b>24.9</b><br>0.98 | <b>16.8</b><br>0.66 | <b>AR 5 15 28</b>    | <b>0.011</b><br>0.024 | <b>14.0</b><br>3150   | <b>34.0</b><br>7640    | <b>11500</b> |                        |
| <b>17</b>      | <b>17</b><br>0.669 | <b>30</b><br>1.181  | <b>5</b><br>0.197   | <b>26.9</b><br>1.06 | <b>18.8</b><br>0.74 | <b>AR 5 17 30</b>    | <b>0.013</b><br>0.028 | <b>15.0</b><br>3370   | <b>39.0</b><br>8770    | <b>10500</b> |                        |
| <b>20</b>      | <b>20</b><br>0.787 | <b>35</b><br>1.378  | <b>7</b><br>0.276   | <b>31.6</b><br>1.24 | <b>22.0</b><br>0.87 | <b>AR 7 20 35</b>    | <b>0.022</b><br>0.049 | <b>22.0</b><br>4950   | <b>54.0</b><br>12100   | <b>9000</b>  |                        |
| <b>25</b>      | <b>25</b><br>0.984 | <b>42</b><br>1.654  | <b>7</b><br>0.276   | <b>37.3</b><br>1.47 | <b>27.7</b><br>1.09 | <b>AR 7 25 42</b>    | <b>0.031</b><br>0.068 | <b>25.5</b><br>5730   | <b>70.0</b><br>15700   | <b>7500</b>  |                        |
|                | <b>25</b><br>0.984 | <b>52</b><br>2.047  | <b>7</b><br>0.276   | <b>47.0</b><br>1.85 | <b>29.0</b><br>1.14 | <b>AR 7 25 52</b>    | <b>0.070</b><br>0.154 | <b>32.5</b><br>7310   | <b>122.0</b><br>27400  | <b>6500</b>  |                        |
| <b>30</b>      | <b>30</b><br>1.181 | <b>47</b><br>1.851  | <b>7</b><br>0.276   | <b>42.3</b><br>1.67 | <b>32.7</b><br>1.29 | <b>AR 7 30 47</b>    | <b>0.036</b><br>0.079 | <b>26.5</b><br>5960   | <b>77.0</b><br>17300   | <b>6500</b>  |                        |
|                | <b>30</b><br>1.181 | <b>60</b><br>2.362  | <b>9</b><br>0.354   | <b>53.5</b><br>2.11 | <b>33.5</b><br>1.32 | <b>AR 9 30 60</b>    | <b>0.113</b><br>0.249 | <b>46.0</b><br>10340  | <b>162.0</b><br>36400  | <b>5600</b>  |                        |
| <b>35</b>      | <b>35</b><br>1.378 | <b>53</b><br>2.103  | <b>8</b><br>0.315   | <b>47.8</b><br>1.88 | <b>37.8</b><br>1.49 | <b>AR 8 35 53,4</b>  | <b>0.052</b><br>0.115 | <b>33.8</b><br>7600   | <b>94.0</b><br>21100   | <b>5500</b>  |                        |
|                | <b>35</b><br>1.378 | <b>68</b><br>2.677  | <b>9</b><br>0.354   | <b>60.6</b><br>2.39 | <b>39.0</b><br>1.54 | <b>AR 9 35 68</b>    | <b>0.144</b><br>0.317 | <b>51.0</b><br>11500  | <b>194.0</b><br>43600  | <b>4900</b>  |                        |
| <b>40</b>      | <b>40</b><br>1.575 | <b>60</b><br>2.378  | <b>9</b><br>0.354   | <b>54.8</b><br>2.16 | <b>42.8</b><br>1.69 | <b>AR 9 40 60,4</b>  | <b>0.070</b><br>0.154 | <b>46.0</b><br>10300  | <b>129.0</b><br>29000  | <b>5000</b>  |                        |
|                | <b>40</b><br>1.575 | <b>78</b><br>3.071  | <b>11</b><br>0.433  | <b>70.0</b><br>2.76 | <b>44.0</b><br>1.73 | <b>AR 11 40 78</b>   | <b>0.225</b><br>0.496 | <b>71.0</b><br>16000  | <b>265.0</b><br>59600  | <b>4200</b>  |                        |
| <b>45</b>      | <b>45</b><br>1.772 | <b>65</b><br>2.575  | <b>9</b><br>0.354   | <b>59.8</b><br>2.35 | <b>47.8</b><br>1.88 | <b>AR 9 45 65,4</b>  | <b>0.077</b><br>0.170 | <b>49.0</b><br>11000  | <b>143.0</b><br>32100  | <b>4500</b>  |                        |
|                | <b>45</b><br>1.772 | <b>85</b><br>3.347  | <b>14</b><br>0.551  | <b>77.0</b><br>3.03 | <b>49.0</b><br>1.93 | <b>AR 14 45 85</b>   | <b>0.350</b><br>0.772 | <b>92.0</b><br>20700  | <b>340.0</b><br>76400  | <b>3800</b>  |                        |
| <b>50</b>      | <b>50</b><br>1.968 | <b>70</b><br>2.772  | <b>9</b><br>0.354   | <b>64.8</b><br>2.55 | <b>52.8</b><br>2.08 | <b>AR 9 50 70,4</b>  | <b>0.082</b><br>0.181 | <b>51.0</b><br>11500  | <b>157.0</b><br>35300  | <b>4000</b>  |                        |
|                | <b>50</b><br>1.968 | <b>95</b><br>3.740  | <b>14</b><br>0.551  | <b>86.0</b><br>3.39 | <b>54.0</b><br>2.13 | <b>AR 14 50 95</b>   | <b>0.448</b><br>0.988 | <b>108.0</b><br>24300 | <b>430.0</b><br>96700  | <b>3400</b>  |                        |
| <b>55</b>      | <b>55</b><br>2.165 | <b>78</b><br>3.087  | <b>10</b><br>0.394  | <b>72.5</b><br>2.85 | <b>58.5</b><br>2.30 | <b>AR 10 55 78,4</b> | <b>0.125</b><br>0.276 | <b>61.0</b><br>13700  | <b>203.0</b><br>45600  | <b>3800</b>  |                        |
|                | <b>55</b><br>2.165 | <b>105</b><br>4.134 | <b>14</b><br>0.551  | <b>96.2</b><br>3.79 | <b>60.2</b><br>2.37 | <b>AR 14 55 105</b>  | <b>0.537</b><br>1.184 | <b>125.0</b><br>28100 | <b>530.0</b><br>119100 | <b>3100</b>  |                        |

## Needle Roller Thrust Bearings, Assemblies, Washers



CP Thin

CP Thick

CP Heavy

| mm/in.             |                     | Thin Series     | mm/in.              |                       | Thick Series      | mm/in.            |                       | Heavy Series        | mm/in.            |                       | Shaft Diameter |
|--------------------|---------------------|-----------------|---------------------|-----------------------|-------------------|-------------------|-----------------------|---------------------|-------------------|-----------------------|----------------|
| d                  | d <sub>1</sub>      |                 | Wt. kg/lbs.         | S <sup>1</sup>        |                   | Wt.               | h <sup>2</sup>        |                     | Wt. kg/lbs.       | h <sup>2</sup>        |                |
| <b>10</b><br>0.396 | <b>22</b><br>0.846  | <b>CP 10 22</b> | <b>0.8</b><br>0.031 | <b>0.004</b><br>0.009 | <b>CP 2 10 22</b> | <b>2</b><br>0.079 | <b>0.002</b><br>0.004 |                     |                   |                       | <b>10</b>      |
| <b>12</b><br>0.474 | <b>25</b><br>1.003  | <b>CP 12 26</b> | <b>0.8</b><br>0.031 | <b>0.003</b><br>0.006 | <b>CP 2 12 26</b> | <b>2</b><br>0.079 | <b>0.006</b><br>0.014 |                     |                   |                       | <b>12</b>      |
| <b>15</b><br>0.593 | <b>27</b><br>1.081  | <b>CP 15 28</b> | <b>0.8</b><br>0.031 | <b>0.003</b><br>0.006 | <b>CP 2 15 28</b> | <b>2</b><br>0.079 | <b>0.006</b><br>0.013 |                     |                   |                       | <b>15</b>      |
| <b>17</b><br>0.671 | <b>29</b><br>1.160  | <b>CP 17 30</b> | <b>0.8</b><br>0.031 | <b>0.003</b><br>0.006 | <b>CP 2 17 30</b> | <b>2</b><br>0.079 | <b>0.007</b><br>0.015 |                     |                   |                       | <b>17</b>      |
| <b>20</b><br>0.789 | <b>34</b><br>1.357  | <b>CP 20 35</b> | <b>0.8</b><br>0.031 | <b>0.004</b><br>0.008 | <b>CP 3 20 35</b> | <b>3</b><br>0.118 | <b>0.013</b><br>0.029 |                     |                   |                       | <b>20</b>      |
| <b>25</b><br>0.988 | <b>42</b><br>1.634  | <b>CP 25 42</b> | <b>0.8</b><br>0.031 | <b>0.005</b><br>0.012 | <b>CP 3 25 42</b> | <b>3</b><br>0.118 | <b>0.019</b><br>0.042 |                     |                   |                       | <b>25</b>      |
| <b>25</b><br>0.992 | <b>52</b><br>2.045  |                 |                     |                       |                   |                   |                       | <b>CPR 4 25 52</b>  | <b>4</b><br>0.157 | <b>0.052</b><br>0.115 | <b>25</b>      |
| <b>30</b><br>1.183 | <b>46</b><br>1.830  | <b>CP 30 47</b> | <b>0.8</b><br>0.031 | <b>0.006</b><br>0.013 | <b>CP 3 30 47</b> | <b>3</b><br>0.118 | <b>0.022</b><br>0.049 |                     |                   |                       | <b>30</b>      |
| <b>30</b><br>1.189 | <b>60</b><br>2.360  |                 |                     |                       |                   |                   |                       | <b>CPR 5 30 60</b>  | <b>5</b><br>0.197 | <b>0.083</b><br>0.183 |                |
| <b>35</b><br>1.380 | <b>51</b><br>2.026  | <b>CP 35 52</b> | <b>0.8</b><br>0.031 | <b>0.007</b><br>0.015 | <b>CP 3 35 52</b> | <b>3</b><br>0.118 | <b>0.026</b><br>0.057 |                     |                   |                       | <b>35</b>      |
| <b>35</b><br>1.386 | <b>68</b><br>2.675  |                 |                     |                       |                   |                   |                       | <b>CPR 5 35 68</b>  | <b>5</b><br>0.197 | <b>0.102</b><br>0.225 |                |
| <b>40</b><br>1.577 | <b>59</b><br>2.341  | <b>CP 40 60</b> | <b>0.8</b><br>0.031 | <b>0.009</b><br>0.021 | <b>CP 3 40 60</b> | <b>3</b><br>0.118 | <b>0.034</b><br>0.075 |                     |                   |                       | <b>40</b>      |
| <b>40</b><br>1.583 | <b>78</b><br>3.069  |                 |                     |                       |                   |                   |                       | <b>CPR 6 40 78</b>  | <b>6</b><br>0.236 | <b>0.162</b><br>0.357 |                |
| <b>45</b><br>1.774 | <b>64</b><br>2.533  | <b>CP 45 65</b> | <b>0.8</b><br>0.031 | <b>0.010</b><br>0.022 | <b>CP 3 45 65</b> | <b>3</b><br>0.118 | <b>0.037</b><br>0.082 |                     |                   |                       | <b>45</b>      |
| <b>45</b><br>1.780 | <b>85</b><br>3.344  |                 |                     |                       |                   |                   |                       | <b>CPR 8 45 85</b>  | <b>8</b><br>0.315 | <b>0.245</b><br>0.540 |                |
| <b>50</b><br>1.970 | <b>69</b><br>2.731  | <b>CP 50 70</b> | <b>0.8</b><br>0.031 | <b>0.011</b><br>0.024 | <b>CP 3 50 70</b> | <b>3</b><br>0.118 | <b>0.040</b><br>0.088 |                     |                   |                       | <b>50</b>      |
| <b>50</b><br>1.970 | <b>95</b><br>2.731  |                 |                     |                       |                   |                   |                       | <b>CPR 8 50 95</b>  | <b>8</b><br>0.315 | <b>0.308</b><br>0.679 |                |
| <b>55</b><br>2.167 | <b>77</b><br>3.046  | <b>CP 55 78</b> | <b>0.8</b><br>0.031 | <b>0.014</b><br>0.031 | <b>CP 4 55 78</b> | <b>4</b><br>0.157 | <b>0.069</b><br>0.152 |                     |                   |                       | <b>55</b>      |
| <b>55</b><br>2.174 | <b>105</b><br>4.131 |                 |                     |                       |                   |                   |                       | <b>CPR 8 55 105</b> | <b>8</b><br>0.315 | <b>0.380</b><br>0.838 |                |

<sup>(1)</sup> ±0.03 mm (±0.0012") under 150 N (34 lbs.) load

<sup>(2)</sup> ±0.05 mm (±0.0020") under 250 N (56 lbs.) load

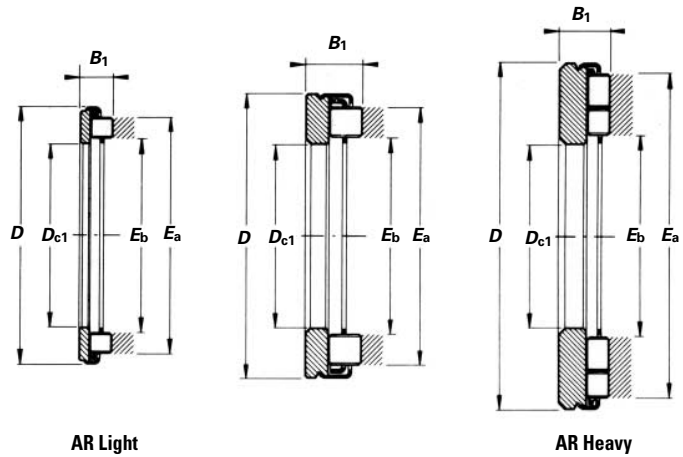
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# NEEDLE ROLLER BEARINGS

## UNITIZED ROLLER THRUST BEARING ASSEMBLIES — continued

### METRIC SERIES

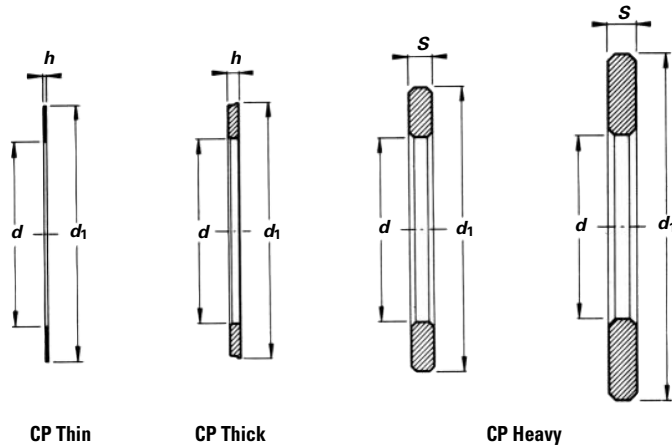


AR Light

AR Heavy

| Shaft Diameter | mm/in.          |       |                |                |                | Light Series   | Heavy Series | Wt. kg/lbs.    | Load Ratings kN/lbf. |                       | Limiting Speed Oil RPM |
|----------------|-----------------|-------|----------------|----------------|----------------|----------------|--------------|----------------|----------------------|-----------------------|------------------------|
|                | D <sub>c1</sub> | D     | B <sub>1</sub> | E <sub>a</sub> | E <sub>b</sub> |                |              |                | Dynamic C            | Static C <sub>0</sub> |                        |
| 60             | 60              | 85    | 10             | 79.5           | 63.5           | AR 10 60 85,4  |              | 0.150<br>0.331 | 71.0                 | 255.0                 | 3500                   |
|                | 2.362           | 3.362 | 0.394          | 3.13           | 2.50           |                |              |                | 16000                | 57300                 |                        |
| 60             | 60              | 110   | 14             | 101.2          | 65.2           | AR 14 60 110   |              | 0.572<br>1.261 | 130.0                | 580.0                 | 2900                   |
|                | 2.362           | 4.331 | 0.551          | 3.98           | 2.57           |                |              |                | 29200                | 130400                |                        |
| 65             | 65              | 90    | 10             | 84.5           | 68.5           | AR 10 65 90,4  |              | 0.160<br>0.353 | 74.0                 | 275.0                 | 3200                   |
|                | 2.559           | 3.559 | 0.394          | 3.33           | 2.70           |                |              |                | 16600                | 61800                 |                        |
| 65             | 65              | 115   | 14             | 106.2          | 70.2           | AR 14 65 115   |              | 0.610<br>1.345 | 135.0                | 620.0                 | 2800                   |
|                | 2.559           | 4.528 | 0.551          | 4.18           | 2.76           |                |              |                | 30300                | 139400                |                        |
| 70             | 70              | 95    | 10             | 89.5           | 73.5           | AR 10 70 95,4  |              | 0.170<br>0.375 | 77.0                 | 295.0                 | 3000                   |
|                | 2.756           | 3.756 | 0.394          | 3.52           | 2.89           |                |              |                | 17300                | 66300                 |                        |
| 70             | 70              | 125   | 16             | 116.0          | 76.0           | AR 16 70 125   |              | 0.775<br>1.709 | 174.0                | 710.0                 | 2600                   |
|                | 2.756           | 4.921 | 0.630          | 4.57           | 2.99           |                |              |                | 39100                | 159600                |                        |
| 75             | 75              | 100   | 10             | 94.5           | 78.5           | AR 10 75 100,4 |              | 0.180<br>0.397 | 80.0                 | 313.0                 | 2800                   |
|                | 2.953           | 3.938 | 0.394          | 3.72           | 3.09           |                |              |                | 18000                | 70400                 |                        |
| 75             | 75              | 135   | 16             | 126.0          | 82.0           | AR 16 75 135   |              | 0.893<br>1.969 | 198.0                | 860.0                 | 2400                   |
|                | 2.953           | 5.315 | 0.630          | 4.96           | 3.23           |                |              |                | 44500                | 193300                |                        |
| 80             | 80              | 105   | 10             | 99.5           | 83.5           | AR 10 80 105,4 |              | 0.190<br>0.419 | 82.0                 | 330.0                 | 2700                   |
|                | 3.150           | 4.150 | 0.394          | 3.92           | 3.29           |                |              |                | 18400                | 74200                 |                        |
| 80             | 80              | 140   | 16             | 131.0          | 87.0           | AR 16 80 140   |              | 0.960<br>2.116 | 208.0                | 940.0                 | 2300                   |
|                | 3.150           | 5.512 | 0.630          | 5.16           | 3.43           |                |              |                | 46800                | 211300                |                        |
| 85             | 85              | 150   | 18             | 138.0          | 92.0           | AR 18 85 150   |              | 1.256<br>2.769 | 230.0                | 1010.0                | 2100                   |
| 90             | 90              | 155   | 18             | 143.0          | 97.0           | AR 18 90 155   |              | 1.330<br>2.932 | 245.0                | 1090.0                | 2000                   |
| 100            | 100             | 170   | 20             | 157.0          | 109.0          | AR 20 100 170  |              | 1.740<br>3.836 | 280.0                | 1250.0                | 1800                   |
| 110            | 110             | 190   | 24             | 178.0          | 118.0          | AR 24 110 190  |              | 2.500<br>5.512 | 365.0                | 1600.0                | 1700                   |
| 120            | 120             | 210   | 24             | 199.0          | 127.0          | AR 24 120 210  |              | 3.200<br>7.055 | 470.0                | 2300.0                | 1500                   |
| 130            | 130             | 225   | 24             | 214.0          | 138.0          | AR 24 130 225  |              | 3.600<br>7.937 | 510.0                | 2640.0                | 1400                   |
| 140            |                 |       |                |                |                |                |              |                |                      |                       |                        |

## Needle Roller Thrust Bearings, Assemblies, Washers



| mm/in.       |                | Thin Series   | mm/in.       |                | Thick Series | mm/in.     |                | Heavy Series   | mm/in.      |                | Shaft Diameter |
|--------------|----------------|---------------|--------------|----------------|--------------|------------|----------------|----------------|-------------|----------------|----------------|
| d            | d <sub>1</sub> |               | Wt. kg/lbs.  | S <sup>1</sup> |              | Wt.        | h <sup>2</sup> |                | Wt. kg/lbs. | h <sup>2</sup> |                |
| 60<br>2.366  | 84<br>3.318    | CP 60 85      | 0.8<br>0.031 | 0.017<br>0.037 | CP 4 60 85   | 4<br>0.157 | 0.083<br>0.183 | CPR 8 60 110   | 8<br>0.315  | 0.405<br>0.893 | 60             |
| 60<br>2.371  | 110<br>4.328   |               |              |                |              |            |                |                |             |                |                |
| 65<br>2.563  | 89<br>3.515    | CP 1,5 65 90  | 1.5<br>0.059 | 0.033<br>0.073 | CP 4 65 90   | 4<br>0.157 | 0.088<br>0.194 | CPR 8 65 115   | 8<br>0.315  | 0.430<br>0.948 | 65             |
| 65<br>2.568  | 115<br>4.525   |               |              |                |              |            |                |                |             |                |                |
| 70<br>2.760  | 94<br>3.711    | CP 1,5 70 95  | 1.5<br>0.059 | 0.034<br>0.076 | CP 4 70 95   | 4<br>0.157 | 0.093<br>0.205 | CPR 8 70 125   | 8<br>0.315  | 0.510<br>1.12  | 70             |
| 70<br>2.765  | 125<br>4.918   |               |              |                |              |            |                |                |             |                |                |
| 75<br>2.967  | 99<br>3.894    | CP 1,5 75 100 | 1.5<br>0.059 | 0.037<br>0.082 | CP 4 75 100  | 4<br>0.157 | 0.099<br>0.218 | CPR 8 75 135   | 8<br>0.315  | 0.595<br>1.31  | 75             |
| 75<br>2.961  | 135<br>5.312   |               |              |                |              |            |                |                |             |                |                |
| 80<br>3.163  | 104<br>4.091   | CP 1,5 80 105 | 1.5<br>0.059 | 0.039<br>0.086 | CP 4 80 105  | 4<br>0.157 | 0.104<br>0.229 | CPR 8 80 140   | 8<br>0.315  | 0.630<br>1.39  | 80             |
| 80<br>3.159  | 140<br>5.508   |               |              |                |              |            |                |                |             |                |                |
| 85<br>3.356  | 150<br>5.902   |               |              |                |              |            |                | CPR 9 85 150   | 9<br>0.354  | 0.815<br>1.80  | 85             |
| 90<br>3.553  | 155<br>6.099   |               |              |                |              |            |                | CPR 9 90 155   | 9<br>0.354  | 0.840<br>1.85  | 90             |
| 100<br>3.946 | 170<br>6.690   |               |              |                |              |            |                | CPR 10 100 170 | 10<br>0.394 | 1.13<br>2.49   | 100            |
| 110<br>4.340 | 190<br>7.476   |               |              |                |              |            |                | CPR 12 110 190 | 12<br>0.472 | 1.70<br>3.75   | 110            |
| 120<br>4.735 | 210<br>8.264   |               |              |                |              |            |                | CPR 12 120 210 | 12<br>0.472 | 2.10<br>4.63   | 120            |
| 130<br>5.128 | 225<br>8.854   |               |              |                |              |            |                | CPR 12 130 225 | 12<br>0.472 | 2.40<br>5.29   | 130            |
| 140<br>5.522 | 240<br>9.445   |               |              |                |              |            |                | CPR 14 140 240 | 14<br>0.550 | 3.20<br>7.05   | 140            |

<sup>(1)</sup> ±0.03 mm (±0.0012") under 150 N (34 lbs.) load

<sup>(2)</sup> ±0.05 mm (±0.0020") under 250 N (56 lbs.) load



## NEEDLE ROLLER BEARINGS

### THRUST ASSEMBLIES AND THRUST BEARINGS – INCH SERIES

#### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES CYLINDRICAL ROLLER THRUST BEARINGS THRUST WASHERS

Thrust assemblies and thrust bearings of inch series are available in a variety of sizes. This catalog includes the most popular, standardized designs. If the back up surfaces cannot be used as raceways, hardened thrust washers are available.

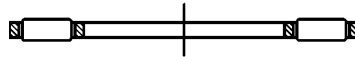
#### REFERENCE STANDARDS ARE:

- **ANSI/ABMA Std. 21.2** – Thrust needle roller and case assemblies and thrust washers - Inch design
- **ANSI/ABMA Std. 24.2** – Thrust bearings of ball and cylindrical roller types - Inch design.

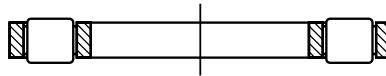
Before selecting specific thrust assemblies or thrust bearings, the engineering section of the catalog should be reviewed.

C

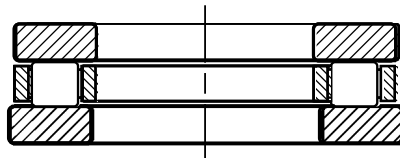
### TYPES OF INCH SERIES THRUST ASSEMBLIES, THRUST BEARINGS AND THRUST WASHERS.



**NTA**  
Needle roller and cage thrust assembly



**NTH**  
Cylindrical roller and cage thrust assembly



**NTHA**  
Cylindrical roller thrust bearing



**TRA...TRD**  
Thrust washers

## IDENTIFICATION

NTA is the complete prefix code for a needle roller and cage thrust assembly with inch nominal dimensions using needle rollers of the smallest practical diameter.

Cylindrical roller and cage thrust assemblies with inch nominal dimensions are identified by the prefix letters NTH. They use large diameter cylindrical rollers providing higher load ratings.

Thrust washers of inch nominal dimensions are identified by the prefix letters TR, followed by another letter such as A, B, or C etc. indicating washer thickness. TRA is the complete prefix code for the thinnest thrust washer made to inch nominal dimensions.

Most thrust washers are intended to be piloted on their bores. Some washers, however, are designed to be piloted on their outside diameters. Such washers are identified by the letter D following the thickness code letter. Thus TRJD is the complete prefix code for a thrust washer with inch nominal dimensions of J thickness and designed to be piloted by its outside diameter.

Cylindrical roller thrust bearings with prefix code NTHA are made up of one NTH assembly, one TRI or TRJ bore piloted washer and one TRID or TRJD outside diameter piloted washer.

Since the bearing designation for thrust assemblies does not appear on the bearing itself, the manufacturer's parts list or another reliable source should always be consulted when ordering bearings for service or field replacement, to make certain that the correct bearing with the correct lubricant is used.

## CONSTRUCTION

Needle roller and cage thrust assemblies (NTA) and cylindrical roller and cage thrust assemblies (NTH) have hardened cages and through hardened, precision ground rollers. The cages are securely fastened assemblies of two mating pieces. This construction minimizes cage stress and assures that the roller retaining function of the cage is unaffected by normal wear. The needle rollers and the cylindrical rollers are precision ground and lapped to close tolerance for optimum load distribution.

Thrust washers for the needle roller and cage thrust assemblies are designed for bore piloting. The thinner thrust washers are tumble burnished and may be out of flat due to heat treatment, but will flatten under load. The raceway surfaces of thick thrust washers are ground and lapped.

Thrust washers for the cylindrical roller and cage thrust assemblies are available in both bore piloted and outside diameter piloted types. Their piloting surfaces are ground and raceway surfaces are ground and lapped.

## DIMENSIONAL ACCURACY

### TOLERANCES FOR NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

Pages C270-C278 list the nominal outside diameter, bore diameter and the needle roller diameter for the inch needle roller and cage thrust assemblies and their corresponding thrust washers appear in the tabular data.

Tolerances for the bore diameters and outside diameters of inch thrust assemblies are given in Table 1.

TABLE 1 – TOLERANCES FOR BORE ( $D_{c1}$ ) AND OUTSIDE ( $D_c$ ) DIAMETERS OF NOMINAL INCH (NTA) NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

| Needle Roller Diameter ( $D_w$ ) | Deviations                 |       |        |       |                            |       |        |      |        |
|----------------------------------|----------------------------|-------|--------|-------|----------------------------|-------|--------|------|--------|
|                                  | Bore Diameter ( $D_{c1}$ ) |       |        |       | Outside Diameter ( $D_c$ ) |       |        |      |        |
|                                  | low                        |       | high   |       | low                        |       | high   |      |        |
| (nominal)                        |                            |       |        |       |                            |       |        |      |        |
| mm                               | inch                       | mm    | inch   | mm    | inch                       | mm    | inch   | mm   | inch   |
| 1.984                            | 0.0781                     | +0.05 | +0.002 | +0.18 | +0.007                     | -0.25 | -0.010 | 0.50 | -0.020 |
| 2.175                            | 0.1250                     | +0.05 | +0.002 | +0.25 | +0.010                     | -0.25 | -0.010 | 0.63 | -0.025 |

### BORE INSPECTION PROCEDURE FOR ASSEMBLY

The bore diameter ( $D_{c1}$ ) of the assembly should be checked with "go" and "no go" plug gages. The "go" plug gage size is the minimum bore diameter of the assembly. The "no go" plug gage size is the maximum bore diameter of the assembly.

The assembly, under its own free weight, must fall freely from the "go" plug gage. The "no go" plug gage must not enter the bore. Where the "no go" plug gage can be forced through the bore, the assembly must not fall from the gage under its own weight.

### TOLERANCES FOR THRUST WASHERS

Tolerances for the outside diameters and bore diameters of nominal inch thrust washers are given in Tables 2 and 2A.

TABLE 2 – TOLERANCES FOR OUTSIDE DIAMETER ( $d_1$ ) OF NOMINAL INCH (TRA, TRB ETC.) THRUST WASHERS.

| Nominal o.d. |      |       |      | Deviations |        |       |        |
|--------------|------|-------|------|------------|--------|-------|--------|
| >            |      | ≤     |      | high       |        | low   |        |
| mm           | inch | mm    | inch | mm         | inch   | mm    | inch   |
| 6.0          | 0.24 | 133.4 | 5.25 | -0.25      | -0.010 | -0.76 | -0.030 |

TABLE 2A – TOLERANCES FOR BORE DIAMETER ( $d$ ) OF NOMINAL INCH (TRA, TRB, ETC.) THRUST WASHERS.

| Nominal Bore Diameter |      |       |      | Deviations |        |       |        |
|-----------------------|------|-------|------|------------|--------|-------|--------|
| >                     |      | ≤     |      | high       |        | low   |        |
| mm                    | inch | mm    | inch | mm         | inch   | mm    | inch   |
| 6.0                   | 0.24 | 57.2  | 2.25 | 0.05       | +0.002 | +0.30 | +0.012 |
| 57.2                  | 2.25 | 133.4 | 5.25 | +0.05      | +0.002 | +0.43 | +0.017 |



## BORE INSPECTION PROCEDURE FOR THRUST WASHER

The bore diameter (d) of the thrust washer should be checked with “go” and “no go” plug gages. The “go” plug gage size is the minimum bore diameter of the thrust washer. The “no go” plug gage size is the maximum bore diameter of the thrust washer.

The thrust washer, under its own weight, must fall freely from the “go” plug gage. The “no go” plug gage must not enter the bore. Where the “no go” plug gage can be forced through the bore, the thrust washer must not fall from the gage under its own weight.

## TOLERANCES FOR CYLINDRICAL ROLLER THRUST BEARINGS

The tolerances for inch series cylindrical roller thrust bearings, cylindrical roller cage and thrust assemblies and their corresponding component thrust washers appear in the tabular data.

## MOUNTING TOLERANCES

### NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

On NTA inch type needle roller and cage thrust assemblies the cage bore has a larger contact area and a closer tolerance than the outside diameter. Therefore, bore piloting is preferred for these assemblies. To reduce wear it is suggested that the piloting surface for the cage be hardened to an equivalent of at least 55 HRC.

Where design requirements prevent bore piloting, the NTA needle roller and cage thrust assemblies may be piloted on the outside diameters. It should be noted that the “diameter to clear washer O.D.” given in the tabular data is not suitable for outside diameter piloting. For such cases suitable O.D. piloting dimensions should be determined in consultation with your Timken representative.

### THRUST WASHERS FOR USE WITH NTA NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES

Ideally, a thrust washer should be stationary with respect to, and piloted by, its supporting or backing member, whether or not this is an integral part of the shaft or housing. There should be no rubbing action between the thrust washer and any other machine member. The economics of design, however, often preclude these ideal conditions and thrust washers must be employed in another manner. In such cases design details should be determined in consultation with your Timken representative.

## CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES

Type NTH assembly cage has a relatively large contact area on both the bore and the outside diameter. Thus these assemblies can be piloted by either the shaft or the housing. To reduce wear it is suggested that the piloting surface for the cage be hardened to an equivalent of at least 55 HRC.

When the shaft is used as the piloting surface, the outside diameter of the cage must clear the housing under all conditions. Conversely, when the housing is the piloting surface, the shaft must clear the cage bore under all conditions. It will be noted that the mounting dimensions are given in the tabular data for both shaft and housing piloting. Bore inspection procedure for the assembly given on page C267 should be used for checking the bore of NTH assemblies.

## THRUST WASHERS FOR USE WITH CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES

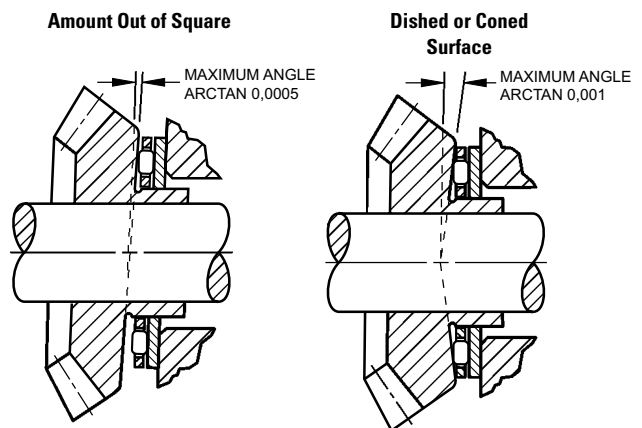
Types TRID and TRJD thrust washers for use with cylindrical roller and cage thrust assemblies are designed to pilot from the housing and to clear the shaft. Types TRI and TRJ thrust washers are designed to pilot from the shaft and clear the housing. The thrust washers should be stationary with respect to their piloting (or locating) machine members. There should be no rubbing action between the washer and any other machine member.

## BACKUP SURFACES

In some applications it is desirable to use the back up surfaces as raceways for the rollers of the thrust assemblies. When this is done, these surfaces must be hardened to an equivalent of at least 58 HRC. If this hardness cannot be achieved and thrust washers cannot be used, the load ratings must be reduced as explained in the engineering section of this catalog.

Thrust raceway surfaces must be ground to a surface of  $8 \mu\text{in } R_a$  ( $0.20 \mu\text{m } R_a$ ). When this requirement cannot be met, thrust washers must be used.

The raceways against which the rollers operate, or the surfaces against which the thrust washers bear, must be square with the axis of the shaft. Equally important, the raceway, or surface backing the thrust washer, must not be dished or coned. The permissible limits of out-of-squareness and dishing or coning are shown in figures below.



**TYPE NTHA CYLINDRICAL ROLLER THRUST BEARING**

The NTHA cylindrical roller thrust bearing consists of the NTH cylindrical roller and cage thrust assembly and two thrust washers. This bearing is sold as a unit.

A typical mounting of the thrust bearing when the shaft rotates is shown in Figure a. The bore of the rotating, shaft supported thrust washer is ground for an accurate fit on the shaft. The outside diameter of the stationary, housing supported thrust washer is ground for a proper fit in the housing.

The NTHA cylindrical roller thrust bearing cage is normally shaft piloted. In the event it is necessary to pilot the cage by the housing, Figure b illustrates a possible mounting arrangement. When other mounting arrangements are dictated by the application they should be determined in consultation with your Timken representative.

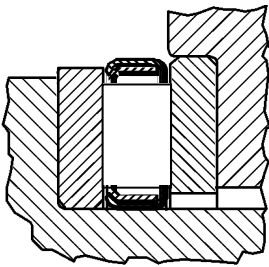


Figure a

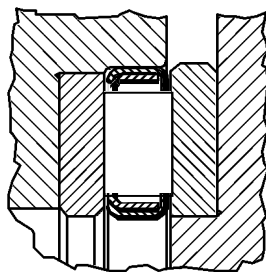


Figure b

**LOAD RATINGS**

**MINIMUM AXIAL LOAD**

Slippage can occur if the applied axial load is too light and the operating speed of the needle roller and cage thrust assembly is high, particularly if accompanied by inadequate lubrication. For satisfactory operation a certain minimum load must be applied to a needle roller and cage thrust assembly which can be calculated from:

$$F_{amin} = C_0/2200 \text{ [lbf]}$$

where

- $C_0$  – static load rating [lbf]
- $F_{amin}$  – minimum axial load [lbf]

**Coefficient Of Friction**

In general, the coefficient of friction of a thrust bearing (consisting of a needle roller or a cylindrical roller and cage thrust assembly and thrust washers) is defined as the friction torque divided by the product of the applied load and the bearing pitch radius. This coefficient of friction is not a constant value, but will vary considerably with load, speed and lubricant. Generally, the coefficient of friction becomes smaller as the load is increased and larger as the speed is increased. It is suggested that a value of 0.004 to 0.005 be used as a conservative estimate.

**LUBRICATION**

Oil is the preferred lubricant for needle roller or cylindrical roller and cage thrust assemblies and an ample oil flow is absolutely necessary for high speeds, or for moderate speeds when the load is relatively high.

When the application must utilize grease lubrication the needle roller and cage thrust assembly should be ordered pregreased. When the speeds are low and rotation is not continuous, the initial charge of grease may be suitable for the life of the application. When the speeds are moderate, however, the designer must provide for frequent regreasing. Since the rollers tend to expel the lubricant radially outward, relubrication passages should be directed to the bore of the cage whether oil or grease is used as the lubricant.

**SPECIAL DESIGNS**

Needle roller and cage thrust assemblies and thrust washers are also made to special dimensions and configurations, as well as from special materials, when quantities permit economical manufacture.

Needle roller and cage thrust assemblies are particularly adaptable to low cost integral combinations with special thrust washers. When the use of such special designs are considered, the following pages should be reviewed for evaluation of proposed arrangements.





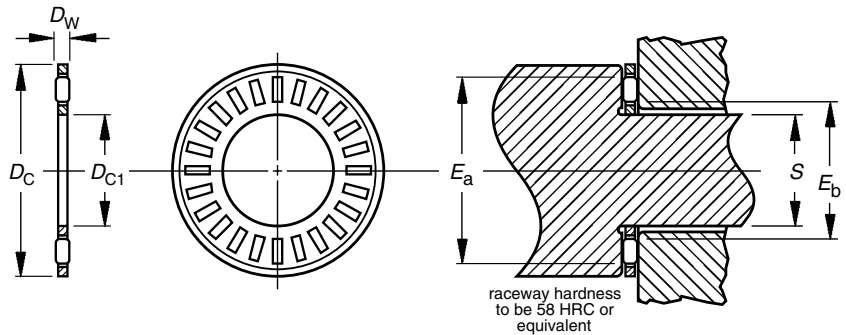


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS

### METRIC AND INCH SERIES

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C268 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).

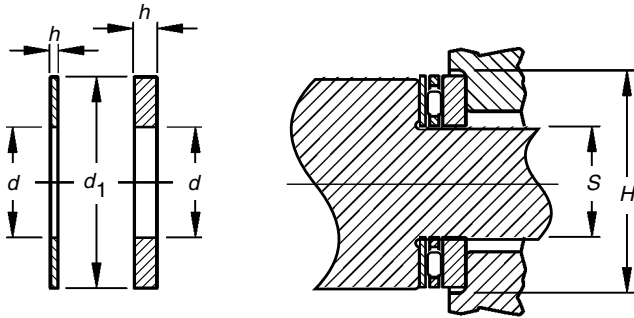


| Shaft Diameter | Dimensions mm/in. |                 |                  |                |                 | Assembly Designation | Load Ratings kN/lbf. |               | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|-----------------|------------------|----------------|-----------------|----------------------|----------------------|---------------|------------------------|----------------|
|                | $D_{c1}$          | $D_c$           | $D_w$            | $E_b$          | $E_a$           |                      | C                    | $C_0$         |                        |                |
| 1/4            | 6.35<br>0.250     | 17.45<br>0.687  | 1.984<br>0.0781  | 8.636<br>0.340 | 14.732<br>0.580 | NTA-411              | 5.12<br>1150         | 10.76<br>2420 | 26000                  | 0.001<br>0.003 |
| 5/16           | 7.92<br>0.312     | 19.05<br>0.75   | 1.984<br>0.0781  | 10.16<br>0.400 | 16.256<br>0.640 | NTA-512              | 5.83<br>1310         | 13.17<br>2960 | 24000                  | 0.002<br>0.004 |
| 3/8            | 9.53<br>0.375     | 20.625<br>0.812 | 1.984<br>0.0781  | 11.68<br>0.460 | 18.034<br>0.710 | NTA-613              | 6.05<br>1360         | 14.32<br>3220 | 22000                  | 0.002<br>0.004 |
| 1/2            | 12.70<br>0.500    | 23.80<br>0.937  | 1.984<br>0.0781  | 14.99<br>0.590 | 21.08<br>0.830  | NTA-815              | 7.16<br>1610         | 19.13<br>4300 | 19000                  | 0.002<br>0.005 |
| 9/16           | 14.275<br>0.562   | 25.40<br>1.000  | 1.9837<br>0.0781 | 16.51<br>0.650 | 22.606<br>0.890 | NTA-916              | 7.70<br>1730         | 21.53<br>4840 | 18000                  | 0.003<br>0.006 |
| 5/8            | 15.88<br>0.625    | 28.575<br>1.125 | 1.9837<br>0.0781 | 18.03<br>0.710 | 25.908<br>1.020 | NTA-1018             | 9.79<br>2200         | 30.38<br>6830 | 15000                  | 0.003<br>0.007 |
| 3/4            | 19.05<br>0.750    | 31.75<br>1.250  | 1.9837<br>0.0781 | 21.34<br>0.840 | 28.956<br>1.140 | NTA-1220             | 10.90<br>2450        | 36.48<br>8200 | 14000                  | 0.004<br>0.009 |

Limiting speeds listed are based on adequate oil lubrication. See page C269 for lubrication information.

Suggestions for an application requiring O.D. piloting should be determined in consultation with your Timken representative.

## Needle Roller Thrust Bearings, Assemblies, Washers



| Thrust Washer Designation | Dimensions mm/in. |                |               |               | Piloting Dimensions |                | Dia. To Clear O.D. | Washer Wt. kg/lbs. | Shaft Diameter |
|---------------------------|-------------------|----------------|---------------|---------------|---------------------|----------------|--------------------|--------------------|----------------|
|                           | d                 | d <sub>1</sub> | Min.          | Max.          | Min.                | Max.           |                    |                    |                |
|                           | d                 | d <sub>1</sub> | h             |               | S                   |                | H                  |                    | in.            |
| TRA-411                   | 6.35<br>0.250     | 17.45<br>0.687 | 0.76<br>0.030 | 0.81<br>0.032 | 6.27<br>0.247       | 6.35<br>0.250  | 18.26<br>0.719     | 0.001<br>0.003     | 1/4            |
| TRB-411                   |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.002<br>0.005     |                |
| TRC-411                   |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.004<br>0.008     |                |
| TRA-512                   | 7.92<br>0.312     | 19.05<br>0.750 | 0.76<br>0.030 | 0.81<br>0.032 | 7.85<br>0.309       | 7.92<br>0.312  | 19.84<br>0.781     | 0.001<br>0.003     | 5/16           |
| TRB-512                   |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.003<br>0.006     |                |
| TRA-613                   | 9.53<br>0.375     | 20.62<br>0.812 | 0.76<br>0.030 | 0.81<br>0.032 | 9.45<br>0.372       | 9.53<br>0.375  | 21.44<br>0.844     | 0.001<br>0.003     | 3/8            |
| TRB-613                   |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.003<br>0.006     |                |
| TRC-613                   |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.004<br>0.009     |                |
| TRA-815                   | 12.70<br>0.500    | 23.80<br>0.937 | 0.76<br>0.030 | 0.81<br>0.032 | 12.62<br>0.497      | 12.70<br>0.500 | 24.61<br>0.969     | 0.002<br>0.004     | 1/2            |
| TRB-815                   |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.004<br>0.008     |                |
| TRC-815                   |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.005<br>0.012     |                |
| TRA-916                   | 14.27<br>0.562    | 25.40<br>1.000 | 0.76<br>0.030 | 0.81<br>0.032 | 14.20<br>0.559      | 14.27<br>0.562 | 26.19<br>1.031     | 0.002<br>0.005     | 9/16           |
| TRB-916                   |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.004<br>0.008     |                |
| TRC-916                   |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.006<br>0.013     |                |
| TRA-1018                  | 15.88<br>0.625    | 28.58<br>1.125 | 0.76<br>0.030 | 0.81<br>0.032 | 15.80<br>0.622      | 15.88<br>0.625 | 29.36<br>1.156     | 0.003<br>0.006     | 5/8            |
| TRB-1018                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.005<br>0.012     |                |
| TRC-1018                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.008<br>0.018     |                |
| TRD-1018                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126 |                     |                |                    | 0.011<br>0.024     |                |
| TRE-1018                  |                   |                | 3.91<br>0.154 | 3.99<br>0.157 |                     |                |                    | 0.013<br>0.029     |                |
| TRA-1220                  | 19.05<br>0.750    | 31.75<br>1.250 | 0.76<br>0.030 | 0.81<br>0.032 | 18.97<br>0.747      | 19.05<br>0.750 | 32.54<br>1.281     | 0.003<br>0.007     | 3/4            |

Δ If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

*Continued on next page.*

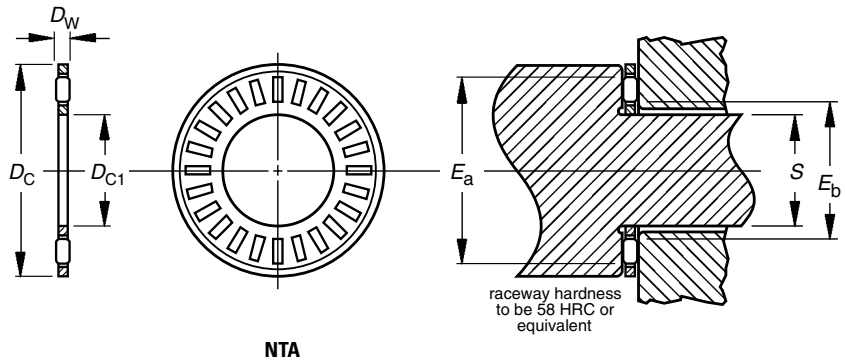


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS — *continued*

### METRIC AND INCH SERIES

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C270 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).

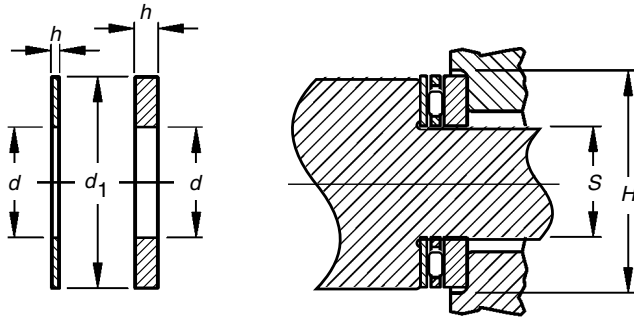


| Shaft Diameter | Dimensions mm/in. |                 |                  |                |                 | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|-----------------|------------------|----------------|-----------------|----------------------|----------------------|----------------|------------------------|----------------|
|                | $D_{c1}$          | $D_c$           | $D_w$            | $E_b$          | $E_a$           |                      | C                    | $C_0$          |                        |                |
| 7/8            | 22.23<br>0.875    | 36.50<br>1.437  | 1.984<br>0.0781  | 24.38<br>0.960 | 33.782<br>1.330 | NTA-1423             | 13.43<br>3020        | 49.82<br>11200 | 12000                  | 0.005<br>0.011 |
|                | 22.23<br>0.875    | 42.85<br>1.687  | 1.984<br>0.0781  | 25.91<br>1.020 | 39.878<br>1.570 | NTC-1427             | 18.46<br>4150        | 78.29<br>17600 | 9800                   | 0.008<br>0.017 |
| 1              | 25.40<br>1.000    | 39.675<br>1.562 | 1.984<br>0.0781  | 27.69<br>1.090 | 36.83<br>1.450  | NTA-1625             | 13.83<br>3110        | 53.82<br>12100 | 11000                  | 0.006<br>0.013 |
| 1 1/8          | 28.58<br>1.125    | 44.45<br>1.75   | 1.9837<br>0.0781 | 30.73<br>1.210 | 41.656<br>1.640 | NTA-1828             | 16.68<br>3750        | 71.17<br>16000 | 9600                   | 0.009<br>0.019 |
| 1 1/4          | 31.75<br>1.250    | 49.20<br>1.937  | 1.9837<br>0.0781 | 34.04<br>1.340 | 46.228<br>1.820 | NTA-2031             | 20.15<br>4530        | 93.41<br>21000 | 8600                   | 0.010<br>0.021 |

Limiting speeds listed are based on adequate oil lubrication. See page C269 for lubrication information.

Suggestions for an application requiring O.D. piloting should be determined in consultation with your Timken representative.

## Needle Roller Thrust Bearings, Assemblies, Washers



| Thrust Washer Designation | Dimensions mm/in. |                |               | Piloting Dimensions |                | Dia. To Clear O.D. | Washer Wt. kg/lbs. | Shaft Diameter |       |
|---------------------------|-------------------|----------------|---------------|---------------------|----------------|--------------------|--------------------|----------------|-------|
|                           | d                 | d <sub>1</sub> | h             | Min.                | Max.           |                    |                    |                |       |
| TRB-1220                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.006<br>0.013     |                |       |
| TRC-1220                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.010<br>0.021     |                |       |
| TRD-1220                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.012<br>0.026     |                |       |
| TRE-1220                  |                   |                | 3.91<br>0.154 | 3.99<br>0.157       |                |                    | 0.015<br>0.033     |                |       |
| TRA-1423                  | 22.23<br>0.875    | 36.50<br>1.437 | 0.76<br>0.030 | 0.81<br>0.032       | 22.15<br>0.872 | 22.23<br>0.875     | 37.31<br>1.469     | 0.004<br>0.009 | 7/8   |
| TRB-1423                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.008<br>0.017     |                |       |
| TRC-1423                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.012<br>0.026     |                |       |
| TRD-1423                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.015<br>0.034     |                |       |
| TRB-1427                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.013<br>0.029     |                |       |
| TRC-1427                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.020<br>0.044     |                |       |
| TRD-1427                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.026<br>0.057     |                |       |
| TRA-1625                  | 25.40<br>1.000    | 39.67<br>1.562 | 0.76<br>0.030 | 0.81<br>0.032       | 25.32<br>0.997 | 25.40<br>1.000     | 40.49<br>1.594     | 0.005<br>0.010 | 1     |
| TRB-1625                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.009<br>0.019     |                |       |
| TRD-1625                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.017<br>0.038     |                |       |
| TRE-1625                  |                   |                | 3.91<br>0.154 | 3.99<br>0.157       |                |                    | 0.021<br>0.047     |                |       |
| TRA-1828                  | 28.58<br>1.125    | 44.45<br>1.750 | 0.76<br>0.030 | 0.81<br>0.032       | 28.50<br>1.122 | 28.58<br>1.125     | 45.24<br>1.781     | 0.006<br>0.013 | 1 1/8 |
| TRB-1828                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.011<br>0.024     |                |       |
| TRC-1828                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.017<br>0.037     |                |       |
| TRD-1828                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.022<br>0.048     |                |       |
| TRA-2031                  | 31.75<br>1.250    | 49.20<br>1.937 | 0.76<br>0.030 | 0.81<br>0.032       | 31.67<br>1.247 | 31.75<br>1.250     | 50.01<br>1.969     | 0.007<br>0.015 | 1 1/4 |

Δ If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

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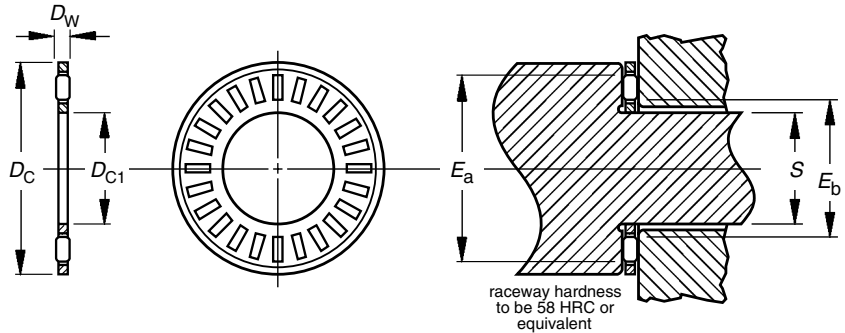


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS — *continued*

### METRIC AND INCH SERIES

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C268 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).

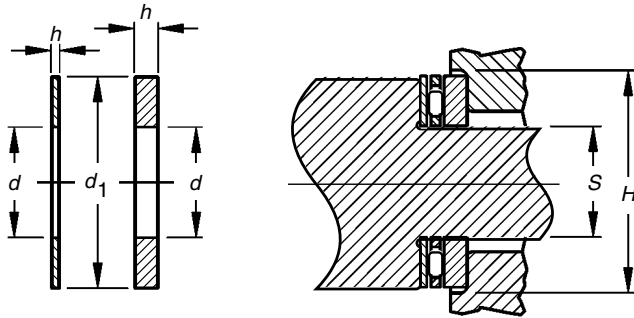


| Shaft Diameter | Dimensions mm/in. |                 |                  |                |                 | Assembly Designation | Load Ratings kN/lbf. |                 | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|-----------------|------------------|----------------|-----------------|----------------------|----------------------|-----------------|------------------------|----------------|
|                | D <sub>c1</sub>   | D <sub>c</sub>  | D <sub>w</sub>   | E <sub>b</sub> | E <sub>a</sub>  |                      | C                    | C <sub>0</sub>  |                        |                |
| 1 3/8          | 34.93<br>1.375    | 52.375<br>2.062 | 1.9837<br>0.0781 | 37.08<br>1.460 | 49.53<br>1.950  | NTA-2233             | 21.35<br>4800        | 103.20<br>23200 | 8000                   | 0.010<br>0.023 |
| 1 1/2          | 38.10<br>1.500    | 55.55<br>2.187  | 1.9837<br>0.0781 | 40.39<br>1.590 | 52.578<br>2.070 | NTA-2435             | 23.22<br>5220        | 117.88<br>26500 | 7600                   | 0.011<br>0.025 |
| 1 3/4          | 44.45<br>1.750    | 63.50<br>2.500  | 1.984<br>0.0781  | 46.74<br>1.840 | 58.928<br>2.320 | NTA-2840             | 25.31<br>5690        | 137.45<br>30900 | 6800                   | 0.014<br>0.031 |

Limiting speeds listed are based on adequate oil lubrication. See page C269 for lubrication information.

Recommendation for an application requiring O.D. piloting should be determined in consultation with your Timken representative.

## Needle Roller Thrust Bearings, Assemblies, Washers



| Thrust Washer Designation | Dimensions mm/in. |                |               | Piloting Dimensions |                | Dia. To Clear O.D. | Washer Wt. kg/lbs. | Shaft Diameter |       |
|---------------------------|-------------------|----------------|---------------|---------------------|----------------|--------------------|--------------------|----------------|-------|
|                           | d                 | d <sub>1</sub> | Min. Max.     | Min.                | Max.           |                    |                    |                |       |
|                           |                   |                | h             | S                   | H              |                    |                    | in.            |       |
| TRB-2031                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.014<br>0.030     |                |       |
| TRC-2031                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.020<br>0.044     |                |       |
| TRD-2031                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.026<br>0.058     |                |       |
| TRF-2031                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188       |                |                    | 0.041<br>0.090     |                |       |
| TRA-2233                  | 34.93<br>1.375    | 52.37<br>2.062 | 0.76<br>0.030 | 0.81<br>0.032       | 34.85<br>1.372 | 34.93<br>1.375     | 53.19<br>2.094     | 0.007<br>0.016 | 1 3/8 |
| TRB-2233                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.015<br>0.033     |                |       |
| TRC-2233                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.018<br>0.040     |                |       |
| TRD-2233                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.029<br>0.065     |                |       |
| TRE-2233                  |                   |                | 3.91<br>0.154 | 3.99<br>0.157       |                |                    | 0.037<br>0.081     |                |       |
| TRF-2233                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188       |                |                    | 0.044<br>0.097     |                |       |
| TRA-2435                  | 38.10<br>1.500    | 55.55<br>2.187 | 0.76<br>0.030 | 0.81<br>0.032       | 38.02<br>1.497 | 38.10<br>1.500     | 56.36<br>2.219     | 0.008<br>0.017 | 1 1/2 |
| TRB-2435                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.015<br>0.034     |                |       |
| TRC-2435                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.023<br>0.050     |                |       |
| TRD-2435                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.030<br>0.067     |                |       |
| TRF-2435                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188       |                |                    | 0.045<br>0.100     |                |       |
| TRA-2840                  | 44.45<br>1.750    | 63.50<br>2.500 | 0.76<br>0.030 | 0.81<br>0.032       | 44.37<br>1.747 | 44.45<br>1.750     | 64.29<br>2.531     | 0.010<br>0.021 | 1 3/4 |
| TRB-2840                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063       |                |                    | 0.020<br>0.044     |                |       |
| TRC-2840                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095       |                |                    | 0.029<br>0.063     |                |       |
| TRD-2840                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126       |                |                    | 0.038<br>0.084     |                |       |
| TRF-2840                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188       |                |                    | 0.057<br>0.126     |                |       |

Δ If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

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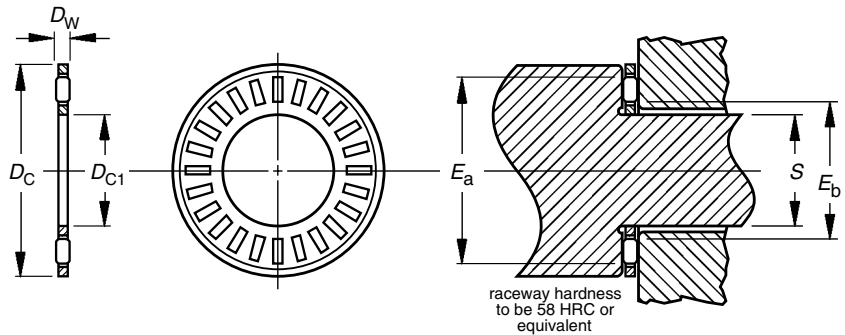


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS — *continued*

### METRIC AND INCH SERIES

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C268 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).



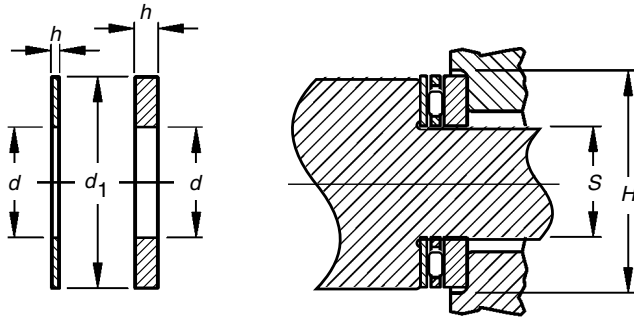
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| Shaft Diameter | Dimensions mm/in. |                 |                  |                |                 | Assembly Designation | Load Ratings kN/lbf. |                 | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|-----------------|------------------|----------------|-----------------|----------------------|----------------------|-----------------|------------------------|----------------|
|                | D <sub>c1</sub>   | D <sub>c</sub>  | D <sub>w</sub>   | E <sub>b</sub> | E <sub>a</sub>  |                      | C                    | C <sub>0</sub>  |                        |                |
| 2              | 50.80<br>2.000    | 69.85<br>2.750  | 1.9837<br>0.0781 | 53.09<br>2.090 | 65.278<br>2.570 | NTA-3244             | 24.02<br>5400        | 132.56<br>29800 | 6100                   | 0.015<br>0.033 |
| 2 1/8          | 53.98<br>2.125    | 73.025<br>2.875 | 1.984<br>0.0781  | 56.39<br>2.220 | 68.58<br>2.700  | NTA-3446             | 24.42<br>5490        | 137.45<br>30900 | 5800                   | 0.016<br>0.036 |
| 2 1/4          | 57.15<br>2.250    | 76.20<br>3.000  | 1.984<br>0.0781  | 59.44<br>2.340 | 71.628<br>2.820 | NTA-3648             | 24.78<br>5570        | 142.34<br>32000 | 5600                   | 0.017<br>0.038 |
| 2 3/4          | 63.50<br>2.500    | 82.55<br>3.250  | 1.9837<br>0.0781 | 65.79<br>2.590 | 77.978<br>3.070 | NTA-4052             | 25.53<br>5740        | 152.13<br>34200 | 5100                   | 0.019<br>0.041 |
| 2 3/4          | 69.85<br>2.750    | 92.075<br>3.625 | 3.175<br>0.1250  | 72.64<br>2.860 | 87.884<br>3.460 | NTA-4458             | 47.60<br>10700       | 255.8<br>57500  | 4600                   | 0.037<br>0.082 |

Limiting speeds listed are based on adequate oil lubrication. See page C269 for lubrication information.

Suggestions for an application requiring O.D. piloting should be determined in consultation with your Timken representative.

## Needle Roller Thrust Bearings, Assemblies, Washers



| Thrust Washer Designation | Dimensions mm/in. |                |               |               | Piloting Dimensions |                | Dia. To Clear O.D. | Washer Wt. kg/lbs. | Shaft Diameter |
|---------------------------|-------------------|----------------|---------------|---------------|---------------------|----------------|--------------------|--------------------|----------------|
|                           | d                 | d <sub>1</sub> | Min.          | Max.          | Min.                | Max.           |                    |                    |                |
|                           | d                 | d <sub>1</sub> | h             |               | S                   |                | H                  |                    | in.            |
| TRA-3244                  | 50.80<br>2.000    | 69.85<br>2.750 | 0.76<br>0.030 | 0.81<br>0.032 | 50.72<br>1.997      | 50.80<br>2.000 | 70.64<br>2.781     | 0.011<br>0.024     | 2              |
| TRB-3244                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.022<br>0.048     |                |
| TRC-3244                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.033<br>0.072     |                |
| TRD-3244                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126 |                     |                |                    | 0.044<br>0.096     |                |
| TRF-3244                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188 |                     |                |                    | 0.066<br>0.145     |                |
| TRA-3446                  | 53.98<br>2.125    | 73.03<br>2.875 | 0.76<br>0.030 | 0.81<br>0.032 | 53.90<br>2.122      | 53.98<br>2.125 | 73.81<br>2.906     | 0.012<br>0.026     | 2 1/8          |
| TRB-3446                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.024<br>0.052     |                |
| TRC-3446                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.035<br>0.078     |                |
| TRD-3446                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126 |                     |                |                    | 0.047<br>0.103     |                |
| TRA-3648                  | 57.15<br>2.250    | 76.20<br>3.000 | 0.76<br>0.030 | 0.81<br>0.032 | 57.07<br>2.247      | 57.15<br>2.250 | 76.99<br>3.031     | 0.012<br>0.026     | 2 1/4          |
| TRB-3648                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.022<br>0.048     |                |
| TRC-3648                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.037<br>0.081     |                |
| TRD-3648                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126 |                     |                |                    | 0.048<br>0.105     |                |
| TRF-3648                  |                   |                | 4.70<br>0.185 | 4.78<br>0.188 |                     |                |                    | 0.071<br>0.157     |                |
| —                         | —                 | —              | —             | 2.247         | 2.250               | 3.156          |                    |                    | 2 1/4          |
| TRA-4052                  | 63.50<br>2.500    | 82.55<br>3.250 | 0.76<br>0.030 | 0.81<br>0.032 | 63.42<br>2.497      | 63.50<br>2.500 | 83.34<br>3.281     | 0.013<br>0.029     | 2 1/2          |
| TRB-4052                  |                   |                | 1.52<br>0.060 | 1.60<br>0.063 |                     |                |                    | 0.027<br>0.059     |                |
| TRC-4052                  |                   |                | 2.34<br>0.092 | 2.41<br>0.095 |                     |                |                    | 0.041<br>0.09      |                |
| TRC-4052                  |                   |                | 3.12<br>0.123 | 3.20<br>0.126 |                     |                |                    | 0.054<br>0.119     |                |
| TRA-4458                  | 69.85<br>2.750    | 92.08<br>3.625 | 0.76<br>0.030 | 0.81<br>0.032 | 69.77<br>2.747      | 69.85<br>2.750 | 92.86<br>3.656     | 0.018<br>0.039     | 2 3/4          |

Δ If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.

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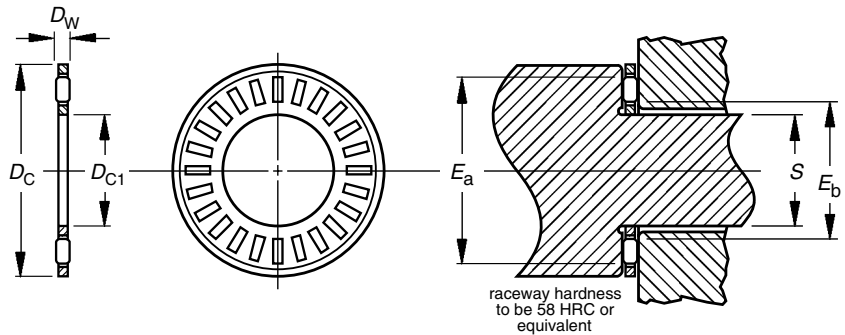


# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CAGE THRUST ASSEMBLIES, THRUST WASHERS — *continued*

### METRIC AND INCH SERIES

- Dimensions for bore and O.D. of thrust assemblies and washers are nominal.
- See page C268 for details on piloting and backup surfaces.
- Thrust washers burnished at least one-quarter of bore area (remainder is rough breakaway finish).
- O.D. finish of washers will be as blanked.
- Thinner washers may be out of flat due to distortion in hardening in the free state (expected to flatten out under load).



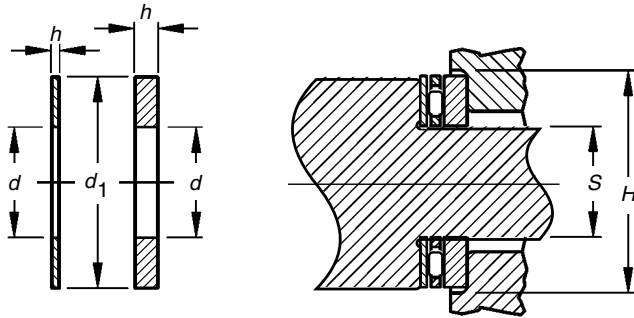
NTA

| Shaft Diameter | Dimensions mm/in. |                 |                  |                 |                 | Assembly Designation | Load Ratings kN/lbf. |                | Limiting Speed Oil RPM | Wt. kg/lbs.    |
|----------------|-------------------|-----------------|------------------|-----------------|-----------------|----------------------|----------------------|----------------|------------------------|----------------|
|                | D <sub>c1</sub>   | D <sub>c</sub>  | D <sub>w</sub>   | E <sub>b</sub>  | E <sub>a</sub>  |                      | C                    | C <sub>0</sub> |                        |                |
| 3              | 76.20<br>3.000    | 95.25<br>3.750  | 1.9837<br>0.0781 | 78.49<br>3.090  | 90.678<br>3.570 | NTA-4860             | 26.96<br>6060        | 172.1<br>38700 | 4400                   | 0.022<br>0.048 |
| 3 1/4          | 82.55<br>3.250    | 104.78<br>4.125 | 3.175<br>0.1250  | 85.34<br>3.360  | 100.58<br>3.960 | NTA-5266             | 51.60<br>11600       | 294.9<br>66300 | 4000                   | 0.042<br>0.092 |
| 3 3/4          | 95.25<br>3.750    | 117.48<br>4.625 | 3.175<br>0.1250  | 98.04<br>3.860  | 113.28<br>4.460 | NTA-6074             | 56.05<br>12600       | 344.3<br>77400 | 3500                   | 0.050<br>0.11  |
| 4 1/8          | 104.78<br>4.125   | 128.57<br>5.062 | 3.175<br>0.125   | 107.44<br>4.230 | 124.46<br>4.900 | NTA-6681             | 63.61<br>14300       | 414.6<br>93200 | 3200                   | 0.062<br>0.136 |

Limiting speeds listed are based on adequate oil lubrication. See page C269 for lubrication information.

Suggestions for an application requiring O.D. piloting should be determined in consultation with your Timken representative.

## Needle Roller Thrust Bearings, Assemblies, Washers



| Thrust Washer Designation | Dimensions mm/in. |                 |               | Piloting Dimensions |                 | Dia. To Clear O.D. | Washer Wt. kg/lbs. | Shaft Diameter |       |
|---------------------------|-------------------|-----------------|---------------|---------------------|-----------------|--------------------|--------------------|----------------|-------|
|                           | d                 | d <sub>1</sub>  | h             | Min.                | Max.            |                    |                    |                |       |
| TRB-4458                  |                   |                 | 1.52<br>0.060 | 1.60<br>0.063       |                 |                    | 0.035<br>0.077     |                |       |
| TRC-4458                  |                   |                 | 2.34<br>0.092 | 2.41<br>0.095       |                 |                    | 0.051<br>0.113     |                |       |
| TRD-4458                  |                   |                 | 3.12<br>0.123 | 3.20<br>0.126       |                 |                    | 0.069<br>0.152     |                |       |
| TRF-4458                  |                   |                 | 4.70<br>0.185 | 4.78<br>0.188       |                 |                    | 0.104<br>0.229     |                |       |
| TRA-4860                  | 76.20<br>3.000    | 95.25<br>3.750  | 0.76<br>0.030 | 0.81<br>0.032       | 76.12<br>2.997  | 76.20<br>3.000     | 96.04<br>3.781     | 0.015<br>0.034 | 3     |
| TRB-4860                  |                   |                 | 1.52<br>0.060 | 1.60<br>0.063       |                 |                    | 0.032<br>0.07      |                |       |
| TRD-4860                  |                   |                 | 3.12<br>0.123 | 3.20<br>0.126       |                 |                    | 0.061<br>0.135     |                |       |
| TRA-5266                  | 82.55<br>3.250    | 104.78<br>4.125 | 0.76<br>0.030 | 0.81<br>0.032       | 82.47<br>3.247  | 82.55<br>3.250     | 105.56<br>4.156    | 0.020<br>0.044 | 3 1/4 |
| TRD-5266                  |                   |                 | 3.12<br>0.123 | 3.20<br>0.126       |                 |                    | 0.080<br>0.176     |                |       |
| TRA-6074<br>3.750         | 95.25<br>4.625    | 117.48<br>0.030 | 0.76<br>0.032 | 0.81<br>3.747       | 95.17<br>3.750  | 95.25<br>4.656     | 118.26<br>0.05     | 0.023          | 3 3/4 |
| TRB-6074                  |                   |                 | 1.52<br>0.060 | 1.60<br>0.063       |                 |                    | 0.046<br>0.101     |                |       |
| TRC-6074                  |                   |                 | 2.34<br>0.092 | 2.41<br>0.095       |                 |                    | 0.069<br>0.152     |                |       |
| TRD-6074                  |                   |                 | 3.12<br>0.123 | 3.20<br>0.126       |                 |                    | 0.092<br>0.202     |                |       |
| TRA-6681                  | 104.78<br>4.125   | 128.57<br>5.062 | 0.76<br>0.030 | 0.81<br>0.032       | 104.70<br>4.122 | 104.78<br>4.125    | 129.39<br>5.094    | 0.027<br>0.059 | 4 1/8 |
| TRC-6681                  |                   |                 | 2.34<br>0.092 | 2.41<br>0.095       |                 |                    | 0.081<br>0.178     |                |       |
| TRD-6681                  |                   |                 | 3.12<br>0.123 | 3.20<br>0.126       |                 |                    | 0.109<br>0.24      |                |       |
| TRF-6681                  |                   |                 | 4.70<br>0.185 | 4.78<br>0.188       |                 |                    | 0.161<br>0.354     |                |       |

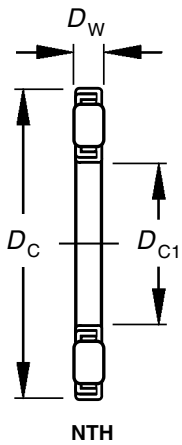
△ If the shaft and the housing adjacent to the bearing O.D. are not concentric, the T.I.R. between the shaft and housing should be added to this dimension.



**CYLINDRICAL ROLLER AND CAGE THRUST ASSEMBLIES**

**INCH SERIES**

C



| Shaft Diameter | Dimensions mm/in.       |                                |                               | Bearing Designation | Load Ratings kN/lbf. |                 | Limiting Speed Oil |
|----------------|-------------------------|--------------------------------|-------------------------------|---------------------|----------------------|-----------------|--------------------|
|                | +0.38, -0.015<br>-0, -0 | -0.13, -0.005<br>-0.51, -0.020 | +0, +0.000<br>-0.005, -0.0002 |                     | Dynamic              | Static          |                    |
| in.            | $D_{c1}$                | $d_c$                          | $D_w$                         |                     | C                    | $C_0$           | RPM                |
| 1 1/2          | 38.15<br>1.502          | 75.44<br>2.970                 | 6.35<br>0.250                 | NTH-2448            | 81.8<br>18400        | 280<br>62900    | 5700               |
| 2              | 50.85<br>2.002          | 91.31<br>3.595                 | 9.53<br>0.375                 | NTH-3258            | 129<br>29000         | 407<br>91600    | 4700               |
| 2 1/8          | 54.03<br>2.127          | 94.49<br>3.720                 | 9.53<br>0.375                 | NTH-3460            | 133<br>30000         | 433<br>97400    | 4500               |
| 2 1/4          | 57.20<br>2.252          | 97.66<br>3.845                 | 9.53<br>0.375                 | NTH-3662            | 138<br>31100         | 458<br>103000   | 4400               |
| 2 3/8          | 60.38<br>2.377          | 100.84<br>3.970                | 9.53<br>0.375                 | NTH-3864            | 143<br>32100         | 484.9<br>109000 | 4200               |
| 2 1/2          | 63.55<br>2.502          | 104.01<br>4.095                | 9.53<br>0.375                 | NTH-4066            | 147<br>33000         | 511<br>115000   | 4100               |
| 2 5/8          | 66.73<br>2.627          | 109.60<br>4.315                | 9.53<br>0.375                 | NTH-4270            | 156<br>35100         | 556<br>125000   | 3900               |
| 2 3/4          | 69.98<br>2.755          | 112.78<br>4.440                | 9.53<br>0.375                 | NTH-4472            | 161<br>36100         | 587<br>132000   | 3800               |
| 3              | 76.33<br>3.005          | 119.13<br>4.690                | 9.53<br>0.375                 | NTH-4876            | 169<br>38000         | 641<br>144000   | 3600               |
| 3 1/4          | 82.68<br>3.255          | 125.48<br>4.940                | 9.53<br>0.375                 | NTH-5280            | 178<br>39900         | 698<br>157000   | 3400               |
| 3 1/2          | 89.03<br>3.505          | 132.26<br>5.207                | 9.53<br>0.375                 | NTH-5684            | 180.<br>40500        | 725<br>163000   | 3200               |

Limiting speeds listed are based on adequate oil lubrication.  
See page C269 for lubrication information.

Needle Roller Thrust Bearings, Assemblies, Washers

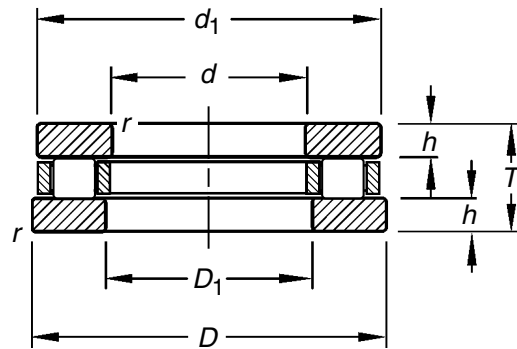
C

| Assembly<br>Wt. kg/lbs. | Shaft Piloting              |                        | Piloting Dimensions mm/in.<br>Housing Piloting |                             | Raceway Contact       |                        | Shaft<br>Diameter<br>in. |
|-------------------------|-----------------------------|------------------------|------------------------------------------------|-----------------------------|-----------------------|------------------------|--------------------------|
|                         | +0, +0.000<br>- .13, -0.005 | Min.                   | Max.                                           | - .13, -0.005<br>-0, -0.000 | E <sub>b</sub>        | E <sub>a</sub>         |                          |
|                         | S <sub>p</sub>              | H <sub>c</sub>         | S <sub>c</sub>                                 | H <sub>p</sub>              |                       |                        |                          |
| <b>0.10</b><br>0.23     | <b>38.10</b><br>1.500       | <b>76.96</b><br>3.030  | <b>36.63</b><br>1.442                          | <b>75.57</b><br>2.975       | <b>44.70</b><br>1.760 | <b>68.83</b><br>2.710  | <b>1 1/2</b>             |
| <b>0.21</b><br>0.47     | <b>50.80</b><br>2.000       | <b>92.84</b><br>3.655  | <b>49.33</b><br>1.942                          | <b>91.44</b><br>3.600       | <b>57.40</b><br>2.260 | <b>84.33</b><br>3.320  | <b>2</b>                 |
| <b>0.22</b><br>0.49     | <b>53.98</b><br>2.125       | <b>96.01</b><br>3.780  | <b>52.5</b><br>2.067                           | <b>94.62</b><br>3.725       | <b>60.71</b><br>2.390 | <b>87.38</b><br>3.440  | <b>2 1/8</b>             |
| <b>0.24</b><br>0.52     | <b>57.15</b><br>2.250       | <b>99.19</b><br>3.905  | <b>55.68</b><br>2.192                          | <b>97.79</b><br>3.850       | <b>63.75</b><br>2.510 | <b>90.68</b><br>3.570  | <b>2 1/4</b>             |
| <b>0.24</b><br>0.54     | <b>60.33</b><br>2.375       | <b>102.36</b><br>4.030 | <b>58.85</b><br>2.317                          | <b>100.97</b><br>3.975      | <b>67.06</b><br>2.640 | <b>93.73</b><br>3.690  | <b>2 3/8</b>             |
| <b>0.26</b><br>0.57     | <b>63.50</b><br>2.500       | <b>105.54</b><br>4.155 | <b>62.03</b><br>2.442                          | <b>104.14</b><br>4.100      | <b>70.10</b><br>2.760 | <b>97.03</b><br>3.820  | <b>2 1/2</b>             |
| <b>0.28</b><br>0.62     | <b>66.68</b><br>2.625       | <b>111.13</b><br>4.375 | <b>65.2</b><br>2.567                           | <b>109.73</b><br>4.320      | <b>73.41</b><br>2.890 | <b>102.36</b><br>4.030 | <b>2 5/8</b>             |
| <b>0.29</b><br>0.64     | <b>69.85</b><br>2.750       | <b>114.30</b><br>4.500 | <b>68.45</b><br>2.695                          | <b>112.90</b><br>4.445      | <b>76.45</b><br>3.010 | <b>105.66</b><br>4.160 | <b>2 3/4</b>             |
| <b>0.31</b><br>0.69     | <b>76.20</b><br>3.000       | <b>120.65</b><br>4.750 | <b>74.8</b><br>2.945                           | <b>119.25</b><br>4.695      | <b>82.80</b><br>3.260 | <b>112.01</b><br>4.410 | <b>3</b>                 |
| <b>0.34</b><br>0.75     | <b>82.55</b><br>3.250       | <b>127.00</b><br>5.000 | <b>81.15</b><br>3.195                          | <b>125.60</b><br>4.945      | <b>89.15</b><br>3.510 | <b>118.36</b><br>4.660 | <b>3 1/4</b>             |
| <b>0.37</b><br>0.81     | <b>88.90</b><br>3.500       | <b>133.78</b><br>5.267 | <b>87.5</b><br>3.445                           | <b>132.38</b><br>5.212      | <b>95.76</b><br>3.770 | <b>125.73</b><br>4.950 | <b>3 1/2</b>             |



**CYLINDRICAL ROLLER THRUST BEARINGS**

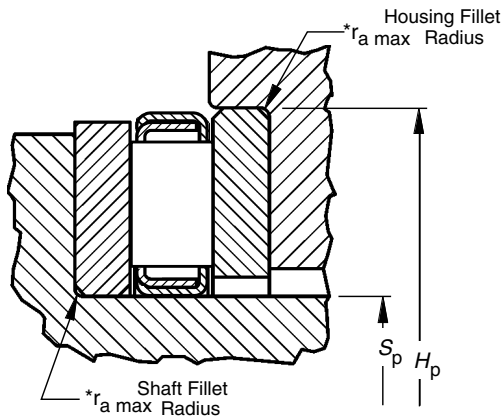
- Check for availability.
- The NTHA thrust cylindrical roller bearing consists of an NTH cage and roller assembly, one bore piloted washer and one O.D. piloted washer. The NTHA bearing is identified and sold as a unit, and is manufactured to inch nominal dimensions only.
- Load ratings given are identical to the corresponding NTH thrust cylindrical roller and cage assembly.
- It is suggested that the cage and roller assembly be bore piloted when applying NTHA bearings. When different arrangements of piloting are required, please contact your Timken representative.
- Back-up surfaces should be flat and square with the center line of the shaft.
- To order individual thrust washers see washer designation below.



**NTHA**

| Shaft Diameter | Dimensions mm/in.    |                  |                     |                        |                     |                     | Bearing Designation | Bearing Wt. kg/lbs.       |
|----------------|----------------------|------------------|---------------------|------------------------|---------------------|---------------------|---------------------|---------------------------|
|                | Shaft Piloted Washer |                  |                     | Housing Piloted Washer |                     |                     |                     |                           |
| in.            | Min. d               | Max. d           | Nom. d <sub>1</sub> | Max. D                 | Min. D <sub>1</sub> | Nom. D <sub>1</sub> | T                   |                           |
| 1 1/2          | 38.082<br>1.4993     | 38.100<br>1.5000 | 74.613<br>2 15/16   | 76.218<br>3.0007       | 76.200<br>3.0000    | 39.688<br>1 9/16    | 20.62<br>0.812      | NTHA-2448<br>0.47<br>1.03 |
| 2              | 50.775<br>1.9990     | 50.800<br>2.0000 | 90.488<br>3 9/16    | 92.098<br>3.6259       | 92.075<br>3.6250    | 52.388<br>2 1/16    | 25.40<br>1.000      | NTHA-3258<br>0.76<br>1.68 |
| 2 1/8          | 53.950<br>2.1240     | 53.975<br>2.1250 | 93.663<br>3 11/16   | 95.278<br>3.7511       | 95.250<br>3.7500    | 55.563<br>2 3/16    | 25.40<br>1.000      | NTHA-3460<br>0.80<br>1.76 |
| 2 1/4          | 57.122<br>2.2489     | 57.150<br>2.2500 | 96.838<br>3 13/16   | 98.453<br>3.8761       | 98.425<br>3.8750    | 58.738<br>2 5/16    | 25.40<br>1.000      | NTHA-3662<br>0.83<br>1.84 |
| 2 3/8          | 60.297<br>2.3739     | 60.325<br>2.3750 | 100.013<br>3 15/16  | 101.628<br>4.0011      | 101.600<br>4.0000   | 61.913<br>2 7/16    | 25.40<br>1.000      | NTHA-3864<br>0.87<br>1.91 |
| 2 1/2          | 63.472<br>2.4989     | 63.500<br>2.5000 | 103.188<br>4 1/16   | 104.808<br>4.1263      | 104.775<br>4.1250   | 65.088<br>2 9/16    | 25.40<br>1.000      | NTHA-4066<br>0.90<br>1.99 |
| 2 5/8          | 66.645<br>2.6238     | 66.675<br>2.6250 | 108.744<br>4 9/32   | 110.345<br>4.3443      | 110.312<br>4.3430   | 68.263<br>2 11/16   | 25.40<br>1.000      | NTHA-4270<br>1.01<br>2.22 |
| 2 3/4          | 69.820<br>2.7488     | 69.850<br>2.7500 | 111.919<br>4 13/32  | 113.520<br>4.4693      | 113.487<br>4.4680   | 71.438<br>2 13/16   | 25.40<br>1.000      | NTHA-4472<br>1.04<br>2.29 |
| 3              | 76.170<br>2.9988     | 76.200<br>3.0000 | 118.269<br>4 21/32  | 119.875<br>4.7195      | 119.837<br>4.7180   | 77.788<br>3 1/16    | 25.40<br>1.000      | NTHA-4876<br>1.12<br>2.46 |
| 3 1/4          | 82.517<br>3.2487     | 82.550<br>3.2500 | 124.619<br>4 29/32  | 126.225<br>4.9695      | 126.187<br>4.9680   | 84.138<br>3 5/16    | 25.40<br>1.000      | NTHA-5280<br>1.19<br>2.62 |
| 3 1/2          | 88.867<br>3.4987     | 88.900<br>3.5000 | 130.969<br>5 5/32   | 132.575<br>5.2195      | 132.537<br>5.2180   | 90.488<br>3 9/16    | 25.40<br>1.000      | NTHA-5684<br>1.27<br>2.80 |

## Needle Roller Thrust Bearings, Assemblies, Washers



| Load Ratings kN/lbf. |                      | Limiting Speed Oil | Dimensions mm/in.             |                               |               |                 | Bore Piloted Washer | Washer Wt. kg/lbs. | O.D. Piloted Washer | Washer Wt. kg/lbs. | Shaft Diameter |
|----------------------|----------------------|--------------------|-------------------------------|-------------------------------|---------------|-----------------|---------------------|--------------------|---------------------|--------------------|----------------|
| Dynamic              | Static               |                    | +0, +0.000<br>-0.127, -0.0050 | +0.127, +0.0050<br>-0, -0.000 | $r_s$ min     | h               |                     |                    |                     |                    |                |
| <b>C</b>             | <b>C<sub>0</sub></b> | <b>RPM</b>         | <b>S<sub>p</sub></b>          | <b>H<sub>p</sub></b>          |               |                 |                     |                    |                     | <b>in.</b>         |                |
| 81.8<br>18400        | 280<br>62900         | 5700               | 38.082<br>1.4993              | 76.218<br>3.0007              | 0.81<br>0.032 | 7.137<br>0.2810 | TRI-2448            | 9.91<br>0.39       | TRID-2448           | 9.91<br>0.39       | 1 1/2          |
| 129<br>29000         | 408<br>91600         | 4700               | 50.775<br>1.9990              | 92.098<br>3.6259              | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-3258            | 14.48<br>0.57      | TRJD-3258           | 14.99<br>0.59      | 2              |
| 133<br>30000         | 433<br>97400         | 4500               | 53.950<br>2.1240              | 95.278<br>3.7511              | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-3460            | 15.24<br>0.60      | TRJD-3460           | 15.49<br>0.61      | 2 1/8          |
| 138<br>31100         | 458<br>103000        | 4400               | 57.122<br>2.2489              | 98.453<br>3.8761              | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-3662            | 15.75<br>0.62      | TRJD-3662           | 16.26<br>0.64      | 2 1/4          |
| 143<br>32100         | 485<br>109000        | 4200               | 60.297<br>2.3739              | 101.628<br>4.0011             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-3864            | 16.51<br>0.65      | TRJD-3864           | 16.76<br>0.66      | 2 3/8          |
| 147<br>33000         | 512<br>115000        | 4100               | 63.472<br>2.4989              | 104.808<br>4.1263             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-4066            | 17.02<br>0.67      | TRJD-4066           | 17.53<br>0.69      | 2 1/2          |
| 156<br>35100         | 556<br>125000        | 3900               | 66.645<br>2.6238              | 110.345<br>4.3443             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-4270            | 19.05<br>0.75      | TRJD-4270           | 19.56<br>0.77      | 2 5/8          |
| 161<br>36100         | 587<br>132000        | 3800               | 69.820<br>2.7488              | 113.520<br>4.4693             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-4472            | 19.81<br>0.78      | TRJD-4472           | 20.32<br>0.80      | 2 3/4          |
| 169<br>38000         | 641<br>144000        | 3600               | 76.170<br>2.9988              | 119.875<br>4.7195             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-4876            | 21.08<br>0.83      | TRJD-4876           | 21.59<br>0.85      | 3              |
| 177<br>39900         | 698<br>157000        | 3400               | 82.517<br>3.2487              | 126.225<br>4.9695             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-5280            | 22.61<br>0.89      | TRJD-5280           | 23.11              | 3 1/4          |
| 180<br>40500         | 725<br>163000        | 3200               | 88.867<br>3.4987              | 132.575<br>5.2195             | 1.57<br>0.062 | 7.938<br>0.3125 | TRJ-5684            |                    | TRJD-5284           | 23.88<br>0.94      | 3 1/2          |

\*  $r_{as\ max}$  is equal to minimum washer chamfer  $r_{s\ min}$ .



## **NEEDLE ROLLER BEARINGS**



### **NOTES**

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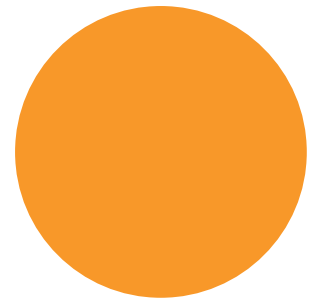
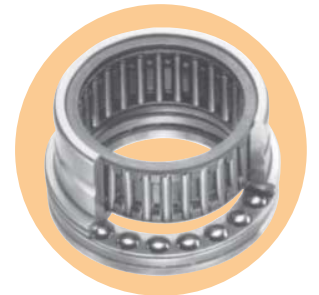
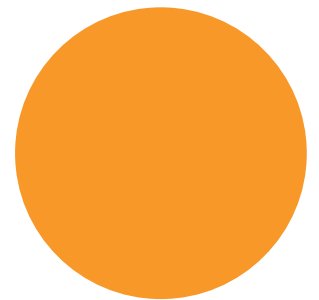




## COMBINATION BEARINGS

**Overview:** Combined bearings incorporate a radial needle roller bearing and a thrust roller bearing into a convenient unitized package.

- **Sizes:** 5 mm - 70 mm (0.197 in. - 2.756 in.) bore.
- **Markets:** Industrial applications, machine tools, and automotive transmissions.
- **Features:** Available with needle roller or cylindrical roller thrust component, machined and drawn outer rings are available, some sizes available with integral dust caps.
- **Benefits:** An effective alternative to separate radial and thrust bearings.



C





## Combined Needle Roller Bearings - Metric Nominal Dimensions

**Prefix**  
**RAX** radial needle roller and thrust needle (or cylindrical) roller bearing without inner ring or thrust washer  
**RAXF** closed end drawn cup design radial needle roller and needle thrust roller bearing without inner ring or thrust washer  
**RAXZ** unitized machined outer ring thrust cylindrical roller and radial needle roller bearing

**RAXF** **7** **15** **TC**

**Suffix**  
**TB** radial play under rollers set to lower half of F6 tolerance  
**TC** radial play under rollers set to upper half of F6 tolerance

**NAXR** **20** **Z.TN**

**Suffix**  
**TN** molded polymer retainer  
**Z** thrust washer retaining dust cap

**Bore diameter**  
 20 = 20 mm

**Series**  
**NAXR** machined outer ring thrust cylindrical roller and radial needle roller bearing without inner ring  
**700** drawn cup design radial needle roller and needle thrust roller bearing without inner ring or thrust washer  
**400** machined ring radial needle roller and thrust needle roller bearing without inner ring or thrust washer  
**500** machined ring radial needle roller and thrust cylindrical roller bearing

## Inner rings for Combined Needle Roller Bearings - Metric Nominal Dimensions

**Prefix**  
**JR** inner ring for use with NAXR series bearings

**JR** **25** x **30** x **18**

**IM** **10** **14** **16** **P**

**Bore diameter**  
 25 = 25 mm

**Width**  
 18 = 18 mm

**Outside diameter**  
 14 = 14 mm

**Prefix**  
**IM** inner ring for use non-NAXR series bearings

**Suffix**  
**P** ISO 492 tolerated inner ring

## Thrust Washers for Combined Needle Roller Bearings - Metric Nominal Dimensions

**Prefix**  
**CP** thrust washer for metric needle roller bearings

**CP** **15** **28** — Thin Washer designation

**CP** **2** **15** **28** — Thick Washer designation

**Thickness**  
 2 = 2 mm

**Outside diameter**  
 28 = 28 mm

**Bore diameter**  
 15 = 15 mm



# ***Combined Needle Roller Bearings***

|                                                                     | <i>Page</i> |
|---------------------------------------------------------------------|-------------|
| Introduction . . . . .                                              | C288        |
| Cylindrical Roller Thrust Series Metric Series.. . . . .            | C290        |
| Needle Roller and Cylindrical Roller Thrust Metric Series . . . . . | C294        |
| Open and Closed Bearings Metric Series.... . . . .                  | C296        |





## NEEDLE ROLLER BEARINGS

### COMBINED BEARINGS – METRIC SERIES

Timken® Torrington® combined bearings consist of a radial bearing (needle roller bearing) and a thrust bearing (roller or needle bearing). The thrust roller bearing is usually a cylindrical roller thrust bearing.

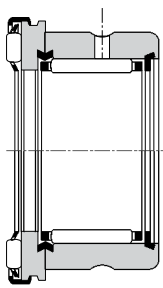
Combined bearings make an effective alternative in place of two separate bearings in terms of cost, handling and packaging. Combined bearings are possible to use with or without matching inner rings and thrust washers, though these are listed opposite the bearing part numbers, where possible, in the following pages of tables, for convenience.

#### REFERENCE STANDARDS ARE:

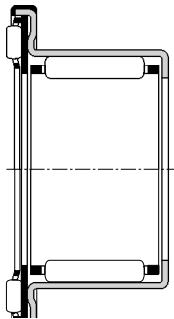
- **DIN 5429, Part 1** – Needle roller – thrust cylindrical roller bearings, series NAXR, NAXR.Z
- **ISO 1206** – Needle roller bearings – light and medium series – dimensions and tolerances

### TYPES OF METRIC SERIES COMBINED BEARINGS

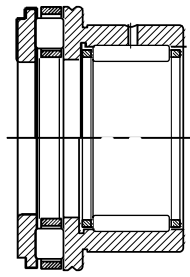
#### Needle roller-cylindrical roller thrust bearings



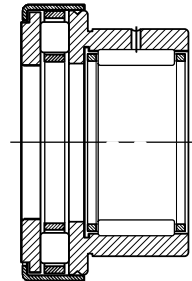
RAX 400



RAX 700



RAX 500



NAXR.Z

#### Suffixes

|             |                                                                        |
|-------------|------------------------------------------------------------------------|
| <b>TN</b>   | molded cage of reinforced engineered polymer                           |
| <b>Z</b>    | retained with a dust cap                                               |
| <b>Z.TN</b> | retained with a dust cap, molded cage of reinforced engineered polymer |
| <b>TB</b>   | radial play under rollers set to lower half of F6 tolerance limits     |
| <b>TC</b>   | radial play under rollers set to upper half of F6 tolerance limits     |

### CONSTRUCTION

Needle roller – cylindrical roller thrust bearings of series NAXR and RAXZ 500 are available with dust caps. They have the highest axial load carrying capability of all combined bearings.

Combined bearings of series RAX 700 use a thin, one-piece outer ring design similar in construction to metric drawn cups. The RAX 700 Series is available with an open or closed (RAXF) design, as are standard drawn cups. These bearings use needle rollers for both their radial and thrust complements.

The RAX 400 Series uses needle rollers for both their radial and thrust complements, as with the RAX 700 Series, but are constructed from two separate machined rings joined with a strong metal insert. The RAX 500 Series, fabricated like the 400 Series, uses heavier cylindrical rollers for their thrust complement. Both series are available with matching thrust washers and inner rings and should be considered for applications requiring higher load capacity and running accuracy.

Each of the previous two bearing types may be best used without inner rings because the radial internal clearances are smaller if the needle roller and cage assemblies operate directly on a hardened and ground shaft. Tolerance class F6 is the normal specification for the needle roller complement bore diameters of the unmounted bearings.

RAX 400 and 500 Series (without inner rings) can be supplied with a smaller radial clearance if desired. Refer to the suffix options TB and TC as listed in the chart above.

Quality requirements for shafts when used as a bearing raceway are given in the engineering section of this catalog. When it becomes impractical to meet the shaft raceway design requirements, standard inner rings may be used with these bearings.

## DIMENSIONAL ACCURACY

### TOLERANCES

Metric series combined bearings (except Series RAX 700) are manufactured to the normal tolerances which apply to the metric series radial bearings and standard thrust bearings as shown in the engineering section. The only exceptions are: the diameter tolerances of the shaft piloted washer and the bearing width tolerances shown in cross-sectional views listed on the tables in the pages provided.

Because of the nature of the RAX 700 Series design, these bearings must be inspected with suitable plug (GO and NO GO) and ring gages corresponding to metric drawn cups of equivalent bore and O.D. sizes.

The matching thrust washer thickness tolerances may be found in the metric unitized thrust bearing section of this catalog.

## BEARING MOUNTING

### MOUNTING DIMENSIONS

Simple, through-bored housings are adequate for combined bearings. The mounting tolerances for the mechanical ring combined bearings are provided in Table 1.

The shaft piloted washers of combined bearings must be supported at least over half their width. Other quality requirements for shafts and housings are given in the engineering section of this catalog. Requirements for fillets, recesses and shoulder heights are the same as for needle roller bearings as shown in "Mounting dimensions" paragraph on pages C102-C103.

When mounting these bearings in their housings with a tight fit, relatively high press-in forces will be required which may brinell the raceways of the thrust bearing arrangements. Particular care should be exercised when installing needle roller - cylindrical roller thrust bearings with dust caps and where the roller assembly of the thrust bearings cannot be removed. In order to avoid brinelling of the thrust bearing raceways the bearings should be installed with uniform, continuous pressure against the installation tool, avoiding sudden impact forces. At times it may even be desirable to heat the housing before bearing mounting.

TABLE 1 – MOUNTING TOLERANCES

| Rotation Conditions                 | ISO tolerance zone for housing | Nominal shaft diameter, d mm |    | ISO tolerance zone for shaft |                    |
|-------------------------------------|--------------------------------|------------------------------|----|------------------------------|--------------------|
|                                     |                                | >                            | ≤  | With Inner Ring              | Without Inner Ring |
| Load Stationary Relative to Housing | K6 (M6) <sup>1</sup>           | 10                           | 40 | k6                           | h6                 |
|                                     |                                | 40                           | 70 | m6                           | h6                 |
| Load Rotates Relative to Housing    | M6 (N6) <sup>1</sup>           | all diameters                |    | g6                           | f6                 |
| RAX 700<br>RAXF 700                 | H6 (H7)                        | all diameters                |    | k5                           | h5 (h6)            |

<sup>1</sup> Tighter fit for more secure arrangement

## LUBRICATION

When the applied axial loads are relatively high and the application allows the use of oil as the desired method of lubrication, bearing types NAXR and NAXK should be given consideration. Combined bearings with a dust cap may use oil lubrication although their design makes them better suited for use with grease lubrication.

Combined bearings are typically shipped protected with a corrosion-preventive compound which is not a lubricant. The bearings may be used in oil or grease lubricated applications without removal of the corrosion preventive compound, although to avoid subsequent recognition problems it may be advisable to remove the corrosion preventive compound before packing the bearings with a suitable grease.

## LOAD RATINGS

Minimum axial load for combined bearings excluding RAX700:

$$F_{\text{amin}} = C_0 / 2200 \quad (\text{kN})$$

$$\text{where } C_0 = \text{static load rating} \quad (\text{kN})$$

## DYNAMIC EQUIVALENT LOAD

Combined bearings can accommodate radial and axial loads.

Radial needle roller complement

$$P = F_r \quad (\text{kN})$$

Cylindrical or needle roller thrust complement

$$P_a = F_a \quad (\text{kN})$$

## STATIC EQUIVALENT LOAD

For all combined bearings series:

Radial needle roller complement

$$P_0 = F_r \quad (\text{kN})$$

Cylindrical or needle roller thrust complement

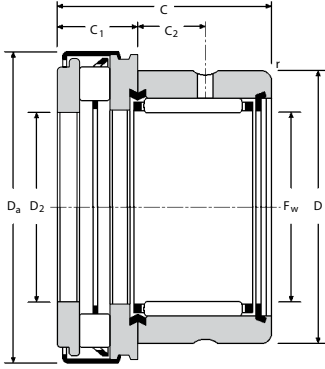
$$P_{0a} = F_a \quad (\text{kN})$$



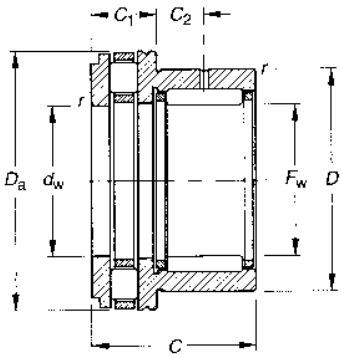
# NEEDLE ROLLER BEARINGS

## CYLINDRICAL ROLLER THRUST SERIES

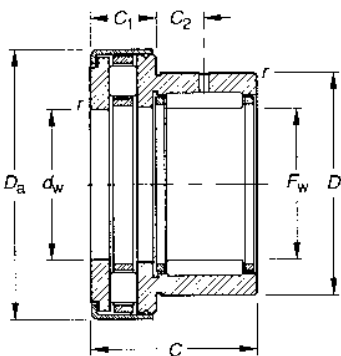
### METRIC SERIES



RAXZ50



NAXR



NAXR.Z

| Outside Dia. | Dimensions mm/in.  |                    |                      |                    |                      |                     |                      |                      |
|--------------|--------------------|--------------------|----------------------|--------------------|----------------------|---------------------|----------------------|----------------------|
|              | $F_w$              | $D$                | $C$                  | $d_w$              | $D_a$                | $C_1$               | $C_2$                | $r_{min}$            |
| <b>10</b>    | <b>10</b><br>0.394 | <b>19</b><br>0.748 | <b>21.5</b><br>0.846 | <b>14</b><br>0.551 | <b>22.4</b><br>0.882 | <b>7.5</b><br>0.295 | <b>6</b><br>0.236    | <b>0.35</b><br>0.014 |
| <b>12</b>    | <b>12</b><br>0.472 | <b>21</b><br>0.827 | <b>22</b><br>0.866   | <b>14</b><br>0.551 | <b>26.4</b><br>1.039 | <b>8</b><br>0.315   | <b>6</b><br>0.236    | <b>0.35</b><br>0.014 |
| <b>15</b>    | <b>15</b><br>0.591 | <b>24</b><br>0.945 | <b>23</b><br>0.906   | <b>15</b><br>0.591 | <b>28</b><br>1.102   | <b>9</b><br>0.354   | <b>6.5</b><br>0.256  | <b>0.3</b><br>0.012  |
|              | <b>15</b><br>0.591 | <b>24</b><br>0.945 | <b>23</b><br>0.906   | <b>15</b><br>0.591 | <b>29</b><br>1.142   | <b>9</b><br>0.354   | <b>6.5</b><br>0.256  | <b>0.3</b><br>0.012  |
|              | <b>15</b><br>0.591 | <b>24</b><br>0.945 | <b>22</b><br>0.866   | <b>14</b><br>0.551 | <b>28.4</b><br>1.118 | <b>8</b><br>0.315   | <b>6</b><br>0.236    | <b>0.35</b><br>0.014 |
| <b>17</b>    | <b>17</b><br>0.669 | <b>26</b><br>1.024 | <b>25</b><br>0.984   | <b>17</b><br>0.669 | <b>30</b><br>1.181   | <b>9</b><br>0.354   | <b>8.0</b><br>0.315  | <b>0.3</b><br>0.012  |
|              | <b>17</b><br>0.669 | <b>26</b><br>1.024 | <b>25</b><br>0.984   | <b>17</b><br>0.669 | <b>31</b><br>1.220   | <b>9</b><br>0.354   | <b>8.0</b><br>0.315  | <b>0.3</b><br>0.012  |
|              | <b>17</b><br>0.669 | <b>26</b><br>1.024 | <b>24</b><br>0.945   | <b>16</b><br>0.630 | <b>30.4</b><br>1.197 | <b>8</b><br>0.315   | <b>8</b><br>0.315    | <b>0.65</b><br>0.026 |
| <b>20</b>    | <b>20</b><br>0.787 | <b>30</b><br>1.181 | <b>30</b><br>1.181   | <b>20</b><br>0.787 | <b>35</b><br>1.378   | <b>10</b><br>0.394  | <b>10.5</b><br>0.413 | <b>0.3</b><br>0.012  |
|              | <b>20</b><br>0.787 | <b>30</b><br>1.181 | <b>30</b><br>1.181   | <b>20</b><br>0.787 | <b>36</b><br>1.417   | <b>10</b><br>0.394  | <b>10.5</b><br>0.413 | <b>0.3</b><br>0.012  |
|              | <b>20</b><br>0.787 | <b>30</b><br>1.181 | <b>29</b><br>1.142   | <b>18</b><br>0.709 | <b>35.4</b><br>1.394 | <b>11</b><br>0.433  | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |
| <b>25</b>    | <b>25</b><br>0.984 | <b>37</b><br>1.457 | <b>30</b><br>1.181   | <b>25</b><br>0.984 | <b>42</b><br>1.654   | <b>11</b><br>0.433  | <b>9.5</b><br>0.374  | <b>0.6</b><br>0.024  |
|              | <b>25</b><br>0.984 | <b>37</b><br>1.457 | <b>30</b><br>1.181   | <b>25</b><br>0.984 | <b>43</b><br>1.693   | <b>11</b><br>0.433  | <b>9.5</b><br>0.374  | <b>0.6</b><br>0.024  |
|              | <b>25</b><br>0.984 | <b>37</b><br>1.457 | <b>29</b><br>1.142   | <b>18</b><br>0.709 | <b>43</b><br>1.693   | <b>11</b><br>0.433  | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |
| <b>30</b>    | <b>30</b><br>1.181 | <b>42</b><br>1.654 | <b>30</b><br>1.181   | <b>30</b><br>1.181 | <b>47</b><br>1.850   | <b>11</b><br>0.433  | <b>9.5</b><br>0.374  | <b>0.6</b><br>0.024  |
|              | <b>30</b><br>1.181 | <b>42</b><br>1.654 | <b>30</b><br>1.181   | <b>30</b><br>1.181 | <b>48</b><br>1.890   | <b>11</b><br>0.433  | <b>9.5</b><br>0.374  | <b>0.6</b><br>0.024  |
|              | <b>30</b><br>1.181 | <b>42</b><br>1.654 | <b>29</b><br>1.142   | <b>18</b><br>0.709 | <b>48</b><br>1.890   | <b>11</b><br>0.433  | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |
| <b>35</b>    | <b>35</b><br>1.378 | <b>47</b><br>1.850 | <b>30</b><br>1.181   | <b>35</b><br>1.378 | <b>52</b><br>2.047   | <b>12</b><br>0.472  | <b>9.0</b><br>0.354  | <b>0.6</b><br>0.024  |
|              | <b>35</b><br>1.378 | <b>47</b><br>1.850 | <b>30</b><br>1.181   | <b>35</b><br>1.378 | <b>53</b><br>2.087   | <b>12</b><br>0.472  | <b>9.0</b><br>0.354  | <b>0.6</b><br>0.024  |
|              | <b>35</b><br>1.378 | <b>47</b><br>1.850 | <b>30</b><br>1.181   | <b>18</b><br>0.709 | <b>54</b><br>2.126   | <b>12</b><br>0.472  | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |
| <b>40</b>    | <b>40</b><br>1.575 | <b>52</b><br>2.047 | <b>32</b><br>1.260   | <b>40</b><br>1.575 | <b>60</b><br>2.362   | <b>13</b><br>0.512  | <b>10.0</b><br>0.394 | <b>0.6</b><br>0.024  |
|              | <b>40</b><br>1.575 | <b>52</b><br>2.047 | <b>32</b><br>1.260   | <b>40</b><br>1.575 | <b>61</b><br>2.402   | <b>13</b><br>0.512  | <b>10.0</b><br>0.394 | <b>0.6</b><br>0.024  |
|              | <b>40</b><br>1.575 | <b>52</b><br>2.047 | <b>31</b><br>1.220   | <b>18</b><br>0.709 | <b>61</b><br>2.402   | <b>13</b><br>0.512  | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |

## Combined Needle Roller Bearings

| Bearing Designation |          |            | Limiting Speed Oil | Load Ratings kN/lbs. |                       |               |                       | Wt. kg/lbs.    | Matching Inner Ring Designation | Shaft Dia. mm |
|---------------------|----------|------------|--------------------|----------------------|-----------------------|---------------|-----------------------|----------------|---------------------------------|---------------|
| RAXZ                | NAXR     | NAXR.Z     |                    | Radial               |                       | Thrust        |                       |                |                                 |               |
|                     |          |            | RPM                | Dynamic C            | Static C <sub>0</sub> | Dynamic C     | Static C <sub>0</sub> |                |                                 |               |
| RAXZ 510            |          |            | 15500              | 5.9<br>1330          | 7.2<br>1610           | 8.2<br>1840   | 17.9<br>4020          | 0.026<br>0.057 | IM 7 10 16 P                    | 10            |
| RAXZ 512            |          |            | 13000              | 6.8<br>1520          | 9.0<br>2030           | 12.7<br>2860  | 29.5<br>6630          | 0.033<br>0.073 | IM 9 12 16 P                    | 12            |
|                     | NAXR15   |            | 12000              | 9.7<br>2180          | 12.6<br>2830          | 12.1<br>2720  | 26.3<br>5910          | 0.032<br>0.071 | JR12x15x16                      | 15            |
|                     |          | NAXR15.Z   | 12000              | 9.7<br>2180          | 12.6<br>2830          | 12.1<br>2720  | 26.3<br>5910          | 0.035<br>0.077 | JR12x15x16                      |               |
| RAXZ 515            |          |            | 11500              | 9.7<br>2170          | 12.6<br>2830          | 14.0<br>3150  | 34.0<br>7640          | 0.036<br>0.079 | IM 12 15 16 P                   |               |
|                     | NAXR17   |            | 11000              | 11.4<br>2560         | 16.1<br>3620          | 12.6<br>2830  | 28.6<br>6430          | 0.050<br>0.110 | JR14x17x17                      | 17            |
|                     |          | NAXR17.Z   | 11000              | 11.4<br>2560         | 16.1<br>3620          | 12.6<br>2830  | 28.6<br>6430          | 0.053<br>0.117 | JR14x17x17                      |               |
| RAXZ 517            |          |            | 10500              | 11.8<br>2650         | 16.3<br>3660          | 15.0<br>3370  | 39.0<br>8770          | 0.044<br>0.097 | IM 14 17 17 P                   |               |
|                     | NAXR20TN |            | 9500               | 14.8<br>3330         | 23.7<br>5330          | 23.6<br>5310  | 56.8<br>12800         | 0.090<br>0.198 | JR17x20x20                      | 20            |
|                     |          | NAXR20Z.TN | 9500               | 14.8<br>3330         | 23.7<br>5330          | 23.6<br>5310  | 56.8<br>12800         | 0.095<br>0.209 | JR17x20x20                      |               |
| RAXZ 520            |          |            | 9000               | 14.8<br>3330         | 23.7<br>5330          | 22.0<br>4950  | 54.0<br>12100         | 0.070<br>0.154 | IM 15 20 20 P                   |               |
|                     | NAXR25TN |            | 8000               | 18.8<br>4230         | 29.8<br>6700          | 31.2<br>7010  | 81.0<br>18200         | 0.146<br>0.322 | JR20x25x20                      | 25            |
|                     |          | NAXR25Z.TN | 8000               | 18.8<br>4230         | 29.8<br>6700          | 31.2<br>7010  | 81.0<br>18200         | 0.152<br>0.335 | JR20x25x20                      |               |
| RAXZ 525            |          |            | 7500               | 15.1<br>3390         | 26.2<br>5890          | 25.5<br>5730  | 70.0<br>15700         | 0.105<br>0.231 | IM 20 25 20 P                   |               |
|                     | NAXR30TN |            | 6700               | 20.2<br>4540         | 34.6<br>7780          | 33.0<br>7420  | 91.1<br>20500         | 0.162<br>0.357 | JR25x30x20                      | 30            |
|                     |          | NAXR30Z.TN | 6700               | 20.2<br>4540         | 34.6<br>7780          | 33.0<br>7420  | 91.1<br>20500         | 0.169<br>0.373 | JR25x30x20                      |               |
| RAXZ 530            |          |            | 6500               | 20.2<br>4540         | 34.6<br>7780          | 26.5<br>5960  | 77.0<br>17300         | 0.118<br>0.260 | IM 25 30 20 P                   |               |
|                     | NAXR35   |            | 6000               | 22.1<br>4970         | 40.8<br>9170          | 30.9<br>6950  | 86.0<br>19300         | 0.186<br>0.410 | JR30x35x20                      | 35            |
|                     |          | NAXR35.Z   | 6000               | 22.1<br>4970         | 40.8<br>9170          | 30.9<br>6950  | 86.0<br>19300         | 0.195<br>0.430 | JR30x35x20                      |               |
| RAXZ 535            |          |            | 5500               | 22.1<br>4970         | 40.8<br>9170          | 33.8<br>7600  | 94.0<br>21100         | 0.146<br>0.322 | IM 30 35 20 P                   |               |
|                     | NAXR40   |            | 5300               | 23.8<br>5350         | 47.0<br>10600         | 44.5<br>10000 | 126.0<br>28300        | 0.288<br>0.635 | JR35x40x20                      | 40            |
|                     |          | NAXR40.Z   | 5300               | 23.8<br>5350         | 47.0<br>10600         | 44.5<br>10000 | 126.0<br>28300        | 0.299<br>0.659 | JR35x40x20                      |               |
| RAXZ 540            |          |            | 5000               | 23.8<br>5350         | 47.0<br>10600         | 46.0<br>10300 | 129.0<br>29000        | 0.174<br>0.384 | IM 35 40 20 P                   |               |

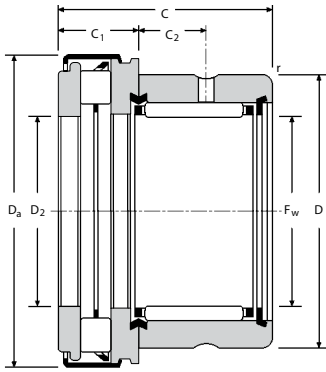
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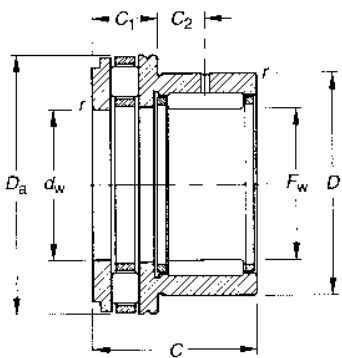


# NEEDLE ROLLER BEARINGS

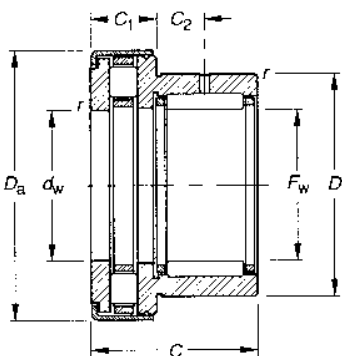
## CYLINDRICAL ROLLER THRUST SERIES — *continued*



**RAXZ500**



**NAXR**



**NAXR.Z**

| Outside Dia. | Dimensions mm/in.  |                    |                    |                    |                    |                    |                      |                      |
|--------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|----------------------|
|              | $F_w$              | $D$                | $C$                | $d_w$              | $D_a$              | $C_1$              | $C_2$                | $r_{smin}$           |
| <b>45</b>    | <b>45</b><br>1.772 | <b>58</b><br>2.283 | <b>32</b><br>1.260 | <b>45</b><br>1.772 | <b>65</b><br>2.559 | <b>14</b><br>0.551 | <b>9.0</b><br>0.354  | <b>0.6</b><br>0.024  |
|              | <b>45</b><br>1.772 | <b>58</b><br>2.283 | <b>32</b><br>1.260 | <b>45</b><br>1.772 | <b>66</b><br>2.598 | <b>14</b><br>0.551 | <b>9.0</b><br>0.354  | <b>0.6</b><br>0.024  |
|              | <b>45</b><br>1.772 | <b>58</b><br>2.283 | <b>31</b><br>1.220 | <b>18</b><br>0.709 | <b>66</b><br>2.598 | <b>13</b><br>0.512 | <b>9</b><br>0.354    | <b>0.85</b><br>0.033 |
| <b>50</b>    | <b>50</b><br>1.969 | <b>62</b><br>2.441 | <b>35</b><br>1.378 | <b>50</b><br>1.969 | <b>70</b><br>2.756 | <b>14</b><br>0.551 | <b>10.0</b><br>0.394 | <b>0.6</b><br>0.024  |
|              | <b>50</b><br>1.969 | <b>62</b><br>2.441 | <b>35</b><br>1.378 | <b>50</b><br>1.969 | <b>71</b><br>2.795 | <b>14</b><br>0.551 | <b>10.0</b><br>0.394 | <b>0.6</b><br>0.024  |
|              | <b>50</b><br>1.969 | <b>62</b><br>2.441 | <b>34</b><br>1.339 | <b>21</b><br>0.827 | <b>71</b><br>2.795 | <b>13</b><br>0.512 | <b>11</b><br>0.433   | <b>1.3</b><br>0.051  |
| <b>60</b>    | <b>60</b><br>2.362 | <b>72</b><br>2.835 | <b>36</b><br>1.417 | <b>21</b><br>0.827 | <b>86</b><br>3.386 | <b>15</b><br>0.591 | <b>11</b><br>0.433   | <b>1.3</b><br>0.051  |
| <b>70</b>    | <b>70</b><br>2.756 | <b>85</b><br>3.346 | <b>36</b><br>1.417 | <b>21</b><br>0.827 | <b>96</b><br>3.780 | <b>15</b><br>0.591 | <b>11</b><br>0.433   | <b>1.3</b><br>0.051  |

C

## Combined Needle Roller Bearings

| Bearing Designation |      |        | Limiting Speed Oil | Load Ratings kN/lbs. |                       |               |                       | Wt. kg/lbs.    | Matching Inner Ring Designation | Shaft Dia. mm |
|---------------------|------|--------|--------------------|----------------------|-----------------------|---------------|-----------------------|----------------|---------------------------------|---------------|
| RAXZ                | NAXR | NAXR.Z |                    | Radial               |                       | Thrust        |                       |                |                                 |               |
|                     |      |        | RPM                | Dynamic C            | Static C <sub>0</sub> | Dynamic C     | Static C <sub>0</sub> |                |                                 |               |
| NAXR45TN            |      |        | 4800               | 24.9<br>5600         | 51.8<br>11600         | 47.0<br>10600 | 140.0<br>31500        | 0.360<br>0.794 | JR40x45x20                      | 45            |
| NAXR45Z.TN          |      |        | 4800               | 24.9<br>5600         | 51.8<br>11600         | 47.0<br>10600 | 140.0<br>31500        | 0.370<br>0.816 | JR40x45x20                      |               |
| RAXZ 545            |      |        | 4500               | 24.9<br>5600         | 51.8<br>11600         | 49.0<br>11000 | 143.0<br>32100        | 0.206<br>0.454 | IM 40 45 20 P                   |               |
| NAXR50              |      |        | 4300               | 30.2<br>6790         | 68.5<br>15400         | 49.7<br>11200 | 155.0<br>34800        | 0.432<br>0.952 | JR45x50x25                      | 50            |
| NAXR50.Z            |      |        | 4300               | 30.2<br>6790         | 68.5<br>15400         | 49.7<br>11200 | 155.0<br>34800        | 0.452<br>0.996 | JR45x50x25                      |               |
| RAXZ 550            |      |        | 4000               | 30.2<br>6790         | 68.5<br>15400         | 51.0<br>11500 | 157.0<br>35300        | 0.232<br>0.511 | IM 45 50 25 P                   |               |
| RAXZ 560            |      |        | 3500               | 31.9<br>7170         | 78.1<br>17600         | 71.0<br>16000 | 255.0<br>57300        | 0.327<br>0.721 | IM 55 60 25 P                   | 60            |
| RAXZ 570            |      |        | 3000               | 36.1<br>8120         | 84.7<br>19000         | 77.0<br>17300 | 295.0<br>66300        | 0.435<br>0.959 | IM 60 70 25 P                   | 70            |

C



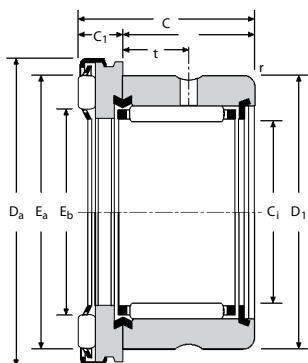




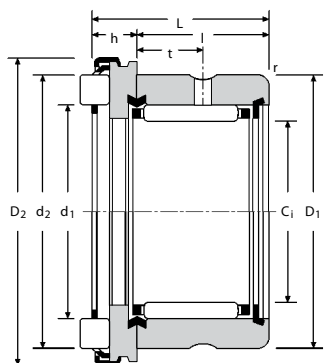
# NEEDLE ROLLER BEARINGS

## NEEDLE ROLLER AND CYLINDRICAL ROLLER THRUST SERIES

### METRIC SERIES



RAX 400



RAX 500

| Outside Dia. | Dimensions mm/in.      |       |        |                |                |                |                                |                |
|--------------|------------------------|-------|--------|----------------|----------------|----------------|--------------------------------|----------------|
|              | -1 -0.004<br>-2 -0.008 |       | E7     |                |                |                | +0.05 +0.0019<br>-0.06 -0.0024 |                |
| mm           | F <sub>w</sub>         | C     | D      | d <sub>a</sub> | E <sub>b</sub> | E <sub>a</sub> | C <sub>1</sub>                 | C <sub>2</sub> |
| 10           | 10                     | 19    | 19     | 22             | 12             | 18.6           | 5                              | 6              |
|              | 0.3937                 | 0.748 | 0.7480 | 0.8661         | 0.47           | 0.73           | 0.197                          | 0.236          |
| 12           | 10                     | 19.5  | 19     | 22             | 12.2           | 18.5           | 5.5                            | 6              |
|              | 0.3937                 | 0.768 | 0.7480 | 0.8661         | 0.48           | 0.73           | 0.217                          | 0.236          |
| 15           | 12                     | 19    | 21     | 26             | 15             | 22.6           | 5                              | 6              |
|              | 0.4724                 | 0.748 | 0.8268 | 1.0236         | 0.59           | 0.89           | 0.197                          | 0.236          |
| 17           | 15                     | 19    | 24     | 28             | 17             | 24.6           | 5                              | 6              |
|              | 0.5906                 | 0.748 | 0.9449 | 1.1024         | 0.67           | 0.97           | 0.197                          | 0.236          |
| 20           | 15                     | 20    | 24     | 28             | 16.8           | 24.9           | 6                              | 6              |
|              | 0.5906                 | 0.787 | 0.9449 | 1.1024         | 0.66           | 0.98           | 0.236                          | 0.236          |
| 25           | 17                     | 21    | 26     | 30             | 19             | 26.6           | 5                              | 8              |
|              | 0.6693                 | 0.827 | 1.0236 | 1.1811         | 0.75           | 1.05           | 0.197                          | 0.315          |
| 30           | 17                     | 22    | 26     | 30             | 18.8           | 26.9           | 6                              | 8              |
|              | 0.6693                 | 0.866 | 1.0236 | 1.1811         | 0.74           | 1.06           | 0.236                          | 0.315          |
| 35           | 20                     | 24    | 30     | 35             | 22             | 31.6           | 6                              | 9              |
|              | 0.7874                 | 0.945 | 1.1811 | 1.3780         | 0.87           | 1.24           | 0.236                          | 0.354          |
| 40           | 20                     | 26    | 30     | 35             | 22             | 31.6           | 8                              | 9              |
|              | 0.7874                 | 1.024 | 1.1811 | 1.3780         | 0.87           | 1.24           | 0.315                          | 0.354          |
| 45           | 25                     | 24    | 37     | 42             | 27.7           | 37.4           | 6                              | 9              |
|              | 0.9843                 | 0.945 | 1.4567 | 1.6535         | 1.09           | 1.47           | 0.236                          | 0.354          |
| 50           | 25                     | 26    | 37     | 42             | 27.7           | 37.4           | 8                              | 9              |
|              | 0.9843                 | 1.024 | 1.4567 | 1.6535         | 1.09           | 1.47           | 0.315                          | 0.354          |
| 55           | 30                     | 24    | 42     | 47             | 32.7           | 42.4           | 6                              | 9              |
|              | 1.1811                 | 0.945 | 1.6535 | 1.8504         | 1.29           | 1.67           | 0.236                          | 0.354          |
| 60           | 30                     | 26    | 42     | 47             | 32.7           | 42.3           | 8                              | 9              |
|              | 1.1811                 | 1.024 | 1.6535 | 1.8504         | 1.29           | 1.67           | 0.315                          | 0.354          |
| 65           | 35                     | 24    | 47     | 53             | 37.2           | 49             | 6                              | 9              |
|              | 1.3780                 | 0.945 | 1.8504 | 2.0866         | 1.46           | 1.93           | 0.236                          | 0.354          |
| 70           | 35                     | 27    | 47     | 53.4           | 37.8           | 47.8           | 9                              | 9              |
|              | 1.3780                 | 1.063 | 1.8504 | 2.1024         | 1.49           | 1.88           | 0.354                          | 0.354          |
| 75           | 40                     | 24    | 52     | 60             | 43             | 54.9           | 6                              | 9              |
|              | 1.5748                 | 0.945 | 2.0472 | 2.3622         | 1.69           | 2.16           | 0.236                          | 0.354          |
| 80           | 45                     | 24    | 58     | 65             | 48             | 59.9           | 6                              | 9              |
|              | 1.7717                 | 0.945 | 2.2835 | 2.5591         | 1.89           | 2.36           | 0.236                          | 0.354          |
| 85           | 45                     | 28    | 58     | 65.4           | 47.8           | 59.8           | 10                             | 9              |
|              | 1.7717                 | 1.102 | 2.2835 | 2.5748         | 1.88           | 2.35           | 0.394                          | 0.354          |
| 90           | 50                     | 27    | 62     | 70             | 53.3           | 65.7           | 6                              | 11             |
|              | 1.9685                 | 1.063 | 2.4409 | 2.7559         | 2.10           | 2.59           | 0.236                          | 0.433          |
| 95           | 50                     | 31    | 62     | 70.4           | 52.8           | 64.8           | 10                             | 11             |
|              | 1.9685                 | 1.220 | 2.4409 | 2.7717         | 2.08           | 2.55           | 0.394                          | 0.433          |
| 100          | 60                     | 28    | 72     | 85             | 63.5           | 79.2           | 7                              | 11             |
|              | 2.3622                 | 1.102 | 2.8346 | 3.3465         | 2.50           | 3.12           | 0.276                          | 0.433          |
| 105          | 60                     | 32    | 72     | 85.4           | 63.5           | 79.5           | 11                             | 11             |
|              | 2.3622                 | 1.260 | 2.8346 | 3.3622         | 2.50           | 3.13           | 0.433                          | 0.433          |
| 110          | 70                     | 28    | 85     | 95             | 73.5           | 89.2           | 7                              | 11             |
|              | 2.7559                 | 1.102 | 3.3465 | 3.7402         | 2.89           | 3.51           | 0.276                          | 0.433          |
| 115          | 70                     | 32    | 85     | 95.4           | 73.5           | 89.5           | 11                             | 11             |
|              | 2.7559                 | 1.260 | 3.3465 | 3.7559         | 2.89           | 3.52           | 0.433                          | 0.433          |

## Combined Needle Roller Bearings

| Bearing Designation |            | Limiting Speed Oil | Load Ratings kN/lbs. |                |               |                | Wt. kg/lbs.    | Matching Inner Ring | Thin Plate   | Thick Plate | Shaft Dia. mm |
|---------------------|------------|--------------------|----------------------|----------------|---------------|----------------|----------------|---------------------|--------------|-------------|---------------|
| 400 Series          | 500 Series |                    | Radial               |                | Thrust        |                |                |                     |              |             |               |
|                     |            | RPM                | Dynamic              | Static         | Dynamic       | Static         |                |                     |              |             |               |
|                     |            |                    | C                    | C <sub>0</sub> | C             | C <sub>0</sub> |                |                     |              |             |               |
| RAX 410             |            | 15500              | 5.90<br>1330         | 7.16<br>1610   | 5.00<br>1120  | 10.9<br>2450   | 0.025<br>0.055 |                     | CP 10 22     | CP 2 10 22  | 10            |
|                     | RAX 510    | 15500              | 5.90<br>1330         | 7.16<br>1610   | 8.20<br>1840  | 17.9<br>4020   | 0.026<br>0.057 |                     | CP 10 22     | CP 2 10 22  |               |
| RAX 412             |            | 13000              | 6.78<br>1520         | 9.03<br>2030   | 7.10<br>1600  | 18.5<br>4160   | 0.032<br>0.071 | IM 9 12 16 P        | CP 12 26     | CP 2 12 26  | 12            |
| RAX 415             |            | 11500              | 9.66<br>2170         | 12.6<br>2830   | 7.60<br>1710  | 20.8<br>4680   | 0.034<br>0.075 | IM 12 15 16 P       | CP 15 28     | CP 2 15 28  | 15            |
|                     | RAX 515    | 11500              | 9.66<br>2170         | 12.6<br>2830   | 14.0<br>3150  | 34.0<br>7640   | 0.036<br>0.079 | IM 12 15 16 P       | CP 15 28     | CP 2 15 28  |               |
| RAX 417             |            | 10500              | 11.8<br>2650         | 16.3<br>3660   | 8.10<br>1820  | 23.0<br>5170   | 0.041<br>0.090 | IM 14 17 17 P       | CP 17 30     | CP 2 17 30  | 17            |
|                     | RAX 517    | 10500              | 11.8<br>2650         | 16.3<br>3660   | 15.0<br>3370  | 39.0<br>8770   | 0.044<br>0.097 | IM 14 17 17 P       | CP 17 30     | CP 2 17 30  |               |
| RAX 420             |            | 9000               | 14.8<br>3330         | 23.7<br>5330   | 11.8<br>2650  | 39.0<br>8770   | 0.066<br>0.146 | IM 15 20 20 P       | CP 20 35     | CP 3 20 35  | 20            |
|                     | RAX 520    | 9000               | 14.8<br>3330         | 23.7<br>5330   | 22.0<br>4950  | 54.0<br>12100  | 0.070<br>0.154 | IM 15 20 20 P       | CP 20 35     | CP 3 20 35  |               |
| RAX 425             |            | 7500               | 15.1<br>3390         | 26.2<br>5890   | 13.3<br>2990  | 49.0<br>11000  | 0.099<br>0.218 | IM 20 25 20 P       | CP 25 42     | CP 3 25 42  | 25            |
|                     | RAX 525    | 7500               | 15.1<br>3390         | 26.2<br>5890   | 25.5<br>5730  | 70.0<br>15700  | 0.105<br>0.231 | IM 20 25 20 P       | CP 25 42     | CP 3 25 42  |               |
| RAX 430             |            | 6500               | 20.2<br>4540         | 34.6<br>7780   | 14.5<br>3260  | 57.0<br>12800  | 0.111<br>0.245 | IM 25 30 20 P       | CP 30 47     | CP 3 30 47  | 30            |
|                     | RAX 530    | 6500               | 20.2<br>4540         | 34.6<br>7780   | 26.5<br>5960  | 77.0<br>17300  | 0.118<br>0.260 | IM 25 30 20 P       | CP 30 47     | CP 3 30 47  |               |
| RAX 435             |            | 5500               | 22.1<br>4970         | 40.8<br>9170   | 18.9<br>4250  | 84.0<br>18900  | 0.130<br>0.287 | IM 30 35 20 P       | CP 35 52     | CP 3 35 52  | 35            |
|                     | RAX 535    | 5500               | 22.1<br>4970         | 40.8<br>9170   | 33.8<br>7600  | 94.0<br>21100  | 0.146<br>0.322 | IM 30 35 20 P       | CP 35 52     | CP 3 35 52  |               |
| RAX 440             |            | 5000               | 23.8<br>5350         | 47.0<br>10600  | 20.4<br>4590  | 96.0<br>21600  | 0.150<br>0.331 | IM 35 40 20 P       | CP 40 60     | CP 3 40 60  | 40            |
| RAX 445             |            | 4500               | 24.9<br>5600         | 51.8<br>11600  | 21.8<br>4900  | 109.0<br>24500 | 0.179<br>0.395 | IM 40 45 20 P       | CP 45 65     | CP 3 45 65  | 45            |
|                     | RAX 545    | 4500               | 24.9<br>5600         | 51.8<br>11600  | 49.0<br>11000 | 143.0<br>32100 | 0.206<br>0.454 | IM 40 45 20 P       | CP 45 65     | CP 3 45 65  |               |
| RAX 450             |            | 4000               | 30.2<br>6790         | 68.5<br>15400  | 22.5<br>5060  | 118.0<br>26500 | 0.205<br>0.452 | IM 45 50 25 P       | CP 50 70     | CP 3 50 70  | 50            |
|                     | RAX 550    | 4000               | 30.2<br>6790         | 68.5<br>15400  | 51.0<br>11500 | 157.0<br>35300 | 0.232<br>0.511 | IM 45 50 25 P       | CP 50 70     | CP 3 50 70  |               |
| RAX 460             |            | 3500               | 31.9<br>7170         | 78.1<br>17600  | 31.5<br>7080  | 193.0<br>43400 | 0.282<br>0.622 | IM 55 60 25 P       | CP 60 85     | CP 4 60 85  | 60            |
|                     | RAX 560    | 3500               | 31.9<br>7170         | 78.1<br>17600  | 71.0<br>16000 | 255.0<br>57300 | 0.327<br>0.721 | IM 55 60 25 P       | CP 60 85     | CP 4 60 85  |               |
| RAX 470             |            | 3000               | 36.1<br>8120         | 84.7<br>19000  | 34.5<br>7760  | 223.0<br>50100 | 0.386<br>0.851 | IM 60 70 25 P       | CP 1,5 70 95 | CP 4 70 95  | 70            |
|                     | RAX 570    | 3000               | 36.1<br>8120         | 84.7<br>19000  | 77.0<br>17300 | 295.0<br>66300 | 0.435<br>0.959 | IM 60 70 25 P       | CP 1,5 70 95 | CP 4 70 95  |               |

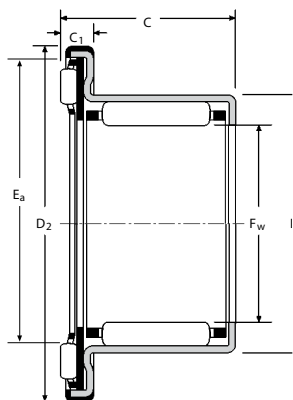




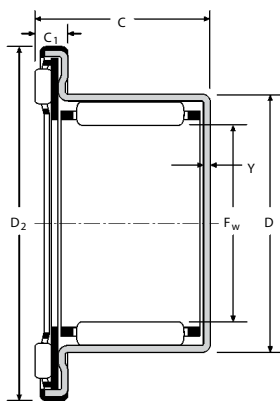
# NEEDLE ROLLER BEARINGS

## OPEN AND CLOSED BEARINGS

### METRIC SERIES



RAX 700



RAXF 700

| Outside Dia. | Dimensions mm/in. |              |               |                |             |              |              | Bearing Designation |            |
|--------------|-------------------|--------------|---------------|----------------|-------------|--------------|--------------|---------------------|------------|
|              | $F_w$             | D            | C             | $D_a$          | $E_{ab}$    | $E_a$        | $C_1$        | Open End            | Closed End |
| 5            | 5<br>0.1969       | 9<br>0.3543  | 11<br>0.433   | 15.5<br>0.6102 | 7.2<br>0.28 | 11.2<br>0.44 | 3.3<br>0.130 | RAX 705             |            |
| 12           | 12<br>0.4724      | 18<br>0.7087 | 14.2<br>0.559 | 27.5<br>1.0827 | 15<br>0.59  | 22.6<br>0.89 | 4.2<br>0.165 | RAX 712             | RAXF 712   |
| 14           | 14<br>0.5512      | 20<br>0.7874 | 14.2<br>0.559 | 29.5<br>1.1614 | 17<br>0.67  | 24.6<br>0.97 | 4.2<br>0.165 | RAX 714             | RAXF 714   |
| 15           | 15<br>0.5906      | 21<br>0.8268 | 14.2<br>0.559 | 31.5<br>1.2402 | 19<br>0.75  | 26.6<br>1.05 | 4.2<br>0.165 | RAX 715             | RAXF 715   |
| 18           | 18<br>0.7087      | 24<br>0.9449 | 18.2<br>0.717 | 33.5<br>1.3189 | 21<br>0.83  | 28.6<br>1.13 | 4.2<br>0.165 | RAX 718             | RAXF 718   |
| 20           | 20<br>0.7874      | 26<br>1.0236 | 18.2<br>0.717 | 36.5<br>1.4370 | 22<br>0.87  | 31.6<br>1.24 | 4.2<br>0.165 | RAX 720             | RAXF 720   |
| 25           | 25<br>0.9843      | 33<br>1.2992 | 22.2<br>0.874 | 45.5<br>1.7913 | 30<br>1.18  | 39.6<br>1.56 | 4.2<br>0.165 | RAX 725             | RAXF 725   |
| 30           | 30<br>1.1811      | 38<br>1.4961 | 22.2<br>0.874 | 50.5<br>1.9882 | 35<br>1.38  | 44.7<br>1.76 | 4.2<br>0.165 | RAX 730             | RAXF 730   |
| 35           | 35<br>1.3780      | 43<br>1.6929 | 22.2<br>0.874 | 56.5<br>2.2244 | 39<br>1.54  | 50.9<br>2.00 | 4.2<br>0.165 | RAX 735             |            |
| 40           | 40<br>1.5748      | 48<br>1.8898 | 22.2<br>0.874 | 61.5<br>2.4213 | 43<br>1.69  | 54.9<br>2.16 | 4.2<br>0.165 | RAX 740             | RAXF 740   |
| 45           | 45<br>1.7717      | 52<br>2.0472 | 22.2<br>0.874 | 66.5<br>2.6181 | 48<br>1.89  | 59.9<br>2.36 | 4.2<br>0.165 | RAX 745             |            |

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## Combined Needle Roller Bearings

| mm/in.        | Limiting Speed Oil | Load Ratings kN/lbs. |                |              |                | Wt. kg/lbs.    | mm/in. Ring Gage | Matching Inner Ring | Thin Plate | Thick Plate | Shaft Dia. mm |
|---------------|--------------------|----------------------|----------------|--------------|----------------|----------------|------------------|---------------------|------------|-------------|---------------|
|               |                    | Radial               |                | Thrust       |                |                |                  |                     |            |             |               |
| Y             | RPM                | C                    | C <sub>0</sub> | C            | C <sub>0</sub> |                |                  |                     |            |             |               |
| –             | 25000              | 2.15<br>480          | 1.95<br>440    | 3.15<br>710  | 6.35<br>1430   | 0.005<br>0.010 | 9.000<br>0.3543  |                     |            |             | 5             |
| 13.2<br>0.520 | 13000              | 6.30<br>1420         | 7.20<br>1620   | 6.90<br>1550 | 17.7<br>3980   | 0.017<br>0.036 | 18.000<br>0.7087 | IM 8 12 12,4        | CP 12 26   | CP 2 12 26  | 12            |
| 13.2<br>0.520 | 11500              | 6.90<br>1550         | 8.50<br>1910   | 7.40<br>1660 | 20.0<br>4500   | 0.018<br>0.040 | 20.000<br>0.7874 | IM 10 14 12,4       | CP 14 26   | CP 2 14 26  | 14            |
| 13.2<br>0.520 | 10500              | 7.40<br>1660         | 9.30<br>2090   | 7.80<br>1750 | 22.0<br>4950   | 0.020<br>0.044 | 21.000<br>0.8268 | IM 12 15 12,4       | CP 15 28   | CP 2 15 28  | 15            |
| 17.2<br>0.677 | 10000              | 11.5<br>2590         | 17.7<br>3980   | 8.00<br>1800 | 23.0<br>5170   | 0.027<br>0.060 | 24.000<br>0.9449 | IM 13 18 16,4       | CP 18 30   | CP 2 18 30  | 18            |
| 17.2<br>0.677 | 9000               | 12.2<br>2740         | 19.5<br>4380   | 11.8<br>2650 | 39.0<br>8770   | 0.031<br>0.068 | 26.000<br>1.0236 | IM 15 20 16,4       | CP 20 35   | CP 3 20 35  | 20            |
| 21.2<br>0.835 | 7200               | 20.5<br>4610         | 32.0<br>7190   | 13.7<br>3080 | 52.0<br>11700  | 0.055<br>0.121 | 33.000<br>1.2992 | IM 20 25 20,4       | CP 25 42   | CP 3 25 42  | 25            |
| 21.2<br>0.835 | 6300               | 22.3<br>5010         | 37.5<br>8430   | 14.9<br>3350 | 60.0<br>13500  | 0.063<br>0.139 | 38.000<br>1.4961 | IM 25 30 20,4       | CP 30 47   | CP 3 30 47  | 30            |
| 21.2<br>0.835 | 5500               | 24.5<br>5510         | 45.0<br>10120  | 19.4<br>4360 | 88.0<br>19800  | 0.075<br>0.165 | 43.000<br>1.6929 | IM 30 35 20,4       | CP 35 52   | CP 3 35 52  | 35            |
| 21.2<br>0.835 | 5000               | 26.2<br>5890         | 51.0<br>11470  | 20.4<br>4590 | 96.0<br>21600  | 0.086<br>0.190 | 48.000<br>1.8898 | IM 35 40 20,4       | CP 40 60   | CP 3 40 60  | 40            |
| 21.2<br>0.835 | 4500               | 24.8<br>5580         | 55.0<br>12360  | 21.8<br>4900 | 109<br>24500   | 0.088<br>0.194 | 52.000<br>2.0472 | IM 40 45 20,4       | CP 45 65   | CP 3 45 65  | 45            |

C





## **NEEDLE ROLLER BEARINGS**

### **NOTES**

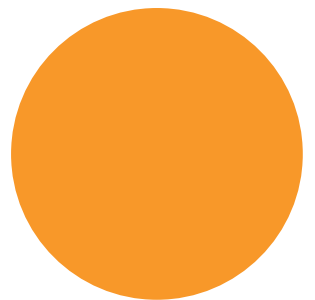
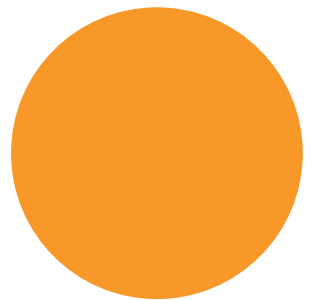
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## DRAWN CUP ROLLER CLUTCHES

**Overview:** Drawn cup needle roller clutches are similar to drawn cup needle bearings in design, but allow free rotation in only one direction while transmitting torque in the opposite direction. These designs use the same small radial section as drawn cup needle roller bearings and are offered as clutch-only units or as clutch and bearing assemblies.

- **Sizes:** 3 mm - 35 mm bore ( $1/8$  in. - 1.4 in.) bore.
- **Markets:** Office equipment, paper-towel dispensers, exercise equipment, appliances and two-speed gearboxes.
- **Features:** Compact, lightweight and operate directly on a hardened shaft.
- **Benefits:** Installation is easily accomplished with a simple press fit.





## Drawn Cup Roller Clutches

### Metric Series

- FCS, FC-K** regular clutch, single roller per stainless steel spring
- FC** regular clutch, multi-roller per stainless steel spring
- FCL-K** light series clutch, single roller per stainless steel spring
- FCB** regular clutch and bearing assembly, multi-roller per stainless steel spring
- FCBL-K, FCBN -K** light series clutch and bearing assembly, single roller per stainless steel spring

**FCL - 10 - K**

Bore, in millimeters

### Inch Series

- RC** regular clutch, single roller per integral spring
- RC-FS** regular clutch, single roller per stainless steel spring
- RCB** regular clutch and bearing assembly, single roller per integral spring
- RCB-FS** regular clutch and bearing assembly, single roller per stainless steel spring

Outside Diameter  
14 =  $1\frac{1}{16}$  =  $\frac{7}{8}$  in.

**RC - 10    14    10 - FS**

Bore  
10 =  $\frac{10}{16}$  =  $\frac{5}{8}$  in.

Width  
10 =  $\frac{10}{16}$  =  $\frac{5}{8}$  in.

# ***Drawn Cup Roller Clutches***

|                                                                           | <i>Page</i> |
|---------------------------------------------------------------------------|-------------|
| Introduction .....                                                        | C302        |
| Drawn Cup Roller Clutches – Metric Series .....                           | C308        |
| Drawn Cup Roller Clutches and Bearing Assemblies –<br>Metric Series ..... | C310        |
| Drawn Cup Roller Clutches – Inch Series .....                             | C312        |
| Drawn Cup Roller Clutch and Bearing Assemblies –<br>Inch Series .....     | C314        |

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## NEEDLE ROLLER BEARINGS

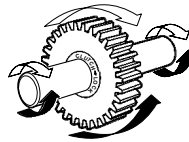
### DRAWN CUP ROLLER CLUTCHES

#### METRIC AND INCH SERIES

The Timken® Torrington® drawn cup roller clutch transmits torque between shaft and housing in one direction and allows free overrun in the opposite direction. When transmitting torque, either the shaft or the housing can be the input member. Applications are generally described as indexing, backstopping or overrunning.

#### LOCK FUNCTION

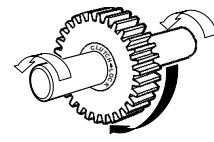
Shaft drives gear clockwise (white arrows)



or gear can drive shaft counter-clockwise (black arrows)

#### OVERRUN FUNCTION

Shaft overruns in gear counter clockwise (white arrows)



or gear overruns on shaft clockwise (black arrow)

C

### IDENTIFICATION

The prefix letters in the designation of the Timken Torrington drawn cup roller clutches and drawn cup roller clutch and bearing assemblies denote whether these are manufactured to metric or inch nominal dimensions. Designation codes for clutches and clutch and bearing assemblies with metric nominal dimensions begin with the letter "F". Designation codes for clutches and clutch and bearing assemblies with inch nominal dimensions begin with the letter "R".

The basic types of clutches and clutch and bearing assemblies are listed below:

#### METRIC SERIES TYPES

- FCS, FC-K** regular clutch, single roller per stainless steel spring
- FC** regular clutch, multi-roller per stainless steel spring
- FCB** regular clutch and bearing assembly, multi-roller per stainless steel spring
- FCL-K** light series clutch, single roller per stainless steel spring
- FCBL-K** light series clutch and bearing assembly, single roller per stainless steel spring.

#### INCH SERIES TYPES

- RC** regular clutch, single roller per integral spring
- RC-FS** regular clutch, single roller per stainless steel spring
- RCB** regular clutch and bearing assembly, single roller per integral spring
- RCB-FS** regular clutch and bearing assembly, single roller per stainless steel spring

### Types Of Clutches And Clutch And Bearing Assemblies



Drawn Cup Roller Clutch Type FC with Steel Springs



Drawn Cup Clutch & Bearing Assembly Type FCB with Steel Springs



Drawn Cup Roller Clutch, Types FCS, FC-K, FCL-K, and RC-FS with Steel Springs



Drawn Cup Clutch & Bearing Assembly Types FCBL-K and RCB-FS with Steel Springs



Drawn Cup Roller Clutch, Type RC with Integral Springs



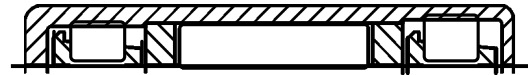
Drawn Cup Clutch & Bearing Assembly Type RCB with Integral Springs

## CONSTRUCTION

In many respects, construction is similar to that of drawn cup bearings. Design and manufacture of drawn cup clutches, just as with drawn cup bearings, was pioneered and developed by Timken. The well established design utilizes the same low profile radial section as drawn cup bearings. The precisely formed interior ramps provide surfaces against which the needle rollers wedge to positively lock the clutch with the shaft when rotated in the proper direction. These ramps, formed during the operation of drawing the cup, are case hardened to assure long wear life. The incorporation of ramp forming into the cup drawing operation is a manufacturing innovation that contributes much to the low cost of the unit.

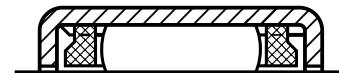
Two designs of precision molded clutch cages are employed. Clutch and clutch and bearing assembly types FC, FC-K, FCS, FCL-K, RC-FS, FCB, FCBL-K and RCB-FS use a glass fiber reinforced nylon cage equipped with inserted stainless steel leaf springs. The stainless steel springs permit higher rates of clutch engagement and achieve greater spring life. The nylon cage permits operation at higher temperatures. Clutch types RC and RCB utilize a one-piece cage of acetyl resin plastic with integral leaf style springs used for lower temperatures than permitted for the units with nylon cages.

Types FCB, FCBL-K, RCB and RCB-FS clutch and bearing assemblies have cages for retention and guidance of the needle rollers in the bearings located on both sides of the clutch unit.



Clutch And Bearing Assembly

Types FC, FC-K, FCS, FCL-K, RC and RC-FS are of clutch-only configurations for use with external radial support (usually two drawn cup needle roller bearings). Separate bearings position the shaft and housing concentrically and carry the radial load during overrun.



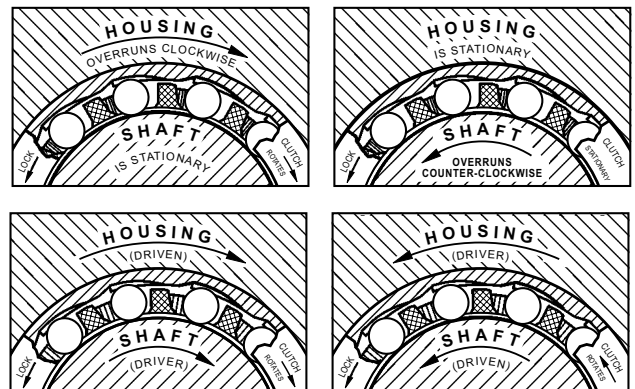
Clutch Only

## OPERATION

Operation is in two modes; the overrun mode and the lock mode. Operational mode is controlled by the direction of the clutch or shaft rotation with respect to the locking ramps.

In the overrun mode shown in the drawings below, the relative rotation between the housed clutch and the shaft causes the rollers to move away from their locking position against the locking ramps in the drawn cup. The housing and the clutch are then free to overrun in one direction, or the shaft is free to overrun in the other direction.

In the lock mode shown in the drawings below, the relative rotation between the housed clutch and the shaft is opposite to that in the overrun mode. The rollers, assisted by the leaf type springs, become wedged between the locking ramps and the shaft to transmit torque between the two members. Either the member housing the clutch drives the shaft in one direction, or the shaft can drive the clutch and its housing member in the other direction.



Clearance between the rollers and cup ramps is exaggerated in these drawings.



# NEEDLE ROLLER BEARINGS

## APPLICATION

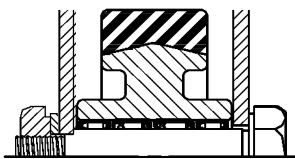
Timken® Torrington® clutches and clutch and bearing assemblies are successfully applied in a wide range of commercial products where indexing, backstopping and overrunning operations must be performed reliably. The sketches on these pages illustrate some of the many possible uses.

When applying the clutch-only unit, separate bearings on each side of the clutch are required to position the shaft concentrically with the housing and to carry the radial loads during overrun. Drawn cup needle roller bearings with the same radial section as the clutch should be used in the through bored housings for simplicity and economy. Two clutches can be used side by side for greater torque capacity.

Where the radial loads are light, the clutch and bearing assembly can be used without additional support bearings. This reduces the overall assembly width, the number of stocked and ordered parts, and assembly costs as well.

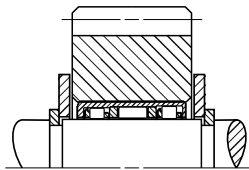
Timken Torrington drawn cup roller clutches are manufactured to commercial hardware standards and are used extensively in appliances, business machines, industrial and recreation equipment and a wide range of other applications.

Clutch & Bearing Arrangement



for Heavy Loads

Clutch & Bearing Assembly



for Light Loads

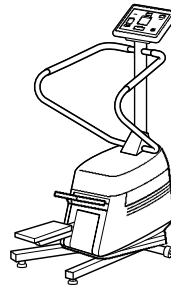
In any application where our clutch may be considered, it will be part of a system in which the operating conditions and the clutch mounting will affect its function. Before any clutch selection is made, it is important that the following catalog section be carefully studied to understand the effects of these factors. Consideration should be given to operating conditions such as:

- Magnitude of externally applied torque as well as inertial torque.
- Magnitude of applied radial loads during overrunning.
- Potential for vibration or axial shaft movement within the clutch during engagement.
- Engagement rate, as it pertains to the selection of stainless steel or plastic leaf springs.
- Oil lubricant supply during high overrunning speeds.
- External and internal environmental temperatures that can affect clutch performance.
- Lubricant selection effect on clutch engagement.
- Indexing inaccuracies resulting from backlash [lost motion].

Consideration should be given to the shaft and housing design requirements such as:

- Shaft hardness and strength particularly when approaching torque rating limits.
- Shaft roundness, taper and surface finish necessary to ensure sufficient fatigue life and torque carrying ability.
- Housing strength [hardness and cross section] to support the applied torque loads.
- Housing roundness, taper and surface finish necessary to ensure uniform torque and load distribution.

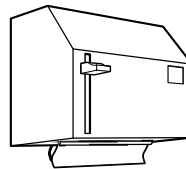
A test program under all expected operating conditions should be carried out before putting a new application into production. Timken customer engineers are constantly working with and testing new applications, and, their experience can be of great help to the designer considering the use of a drawn cup roller clutch.



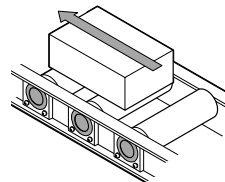
Stair Steppers, and other Athletic Equipment



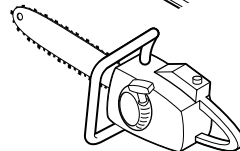
Lawnmower Differential



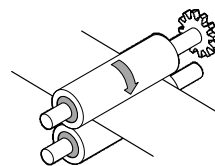
Tape Dispensers and Similar Web Roll Feed Mechanisms



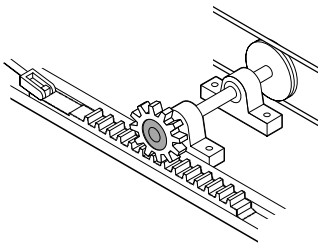
Conveyor Rollers



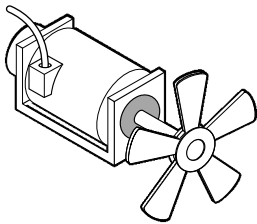
Chainsaw Starters



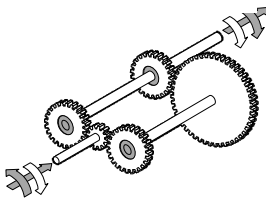
Paper Feed Rolls in Business Machines



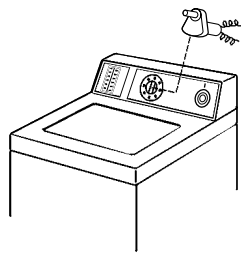
**Rack Indexing Drive**



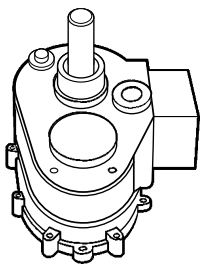
**Motor Backstops**



**2 Speed Gearbox with Reversing Input**



**Timing Motor Freewheels**



**Washing Machine Transmission**

### HOUSING DESIGN

Drawn cup clutches and clutch and bearing assemblies are mounted with a simple press fit in their housings. Through-bored and chamfered housings are preferred. A 30° angle is suggested and care should be taken to round the edge where the chamfer meets the housing bore. A sharp edge at this location can greatly increase installation forces. Provisions for axial location, such as shoulders or snap rings, are not required. The case hardened cups have a long fatigue life, but must be properly supported to

realize this benefit. Steel housings are preferred and must be used for applications involving high torque loads to prevent radial expansion of the clutch cups. The suggested minimum housing outside diameters in the tables of dimensions are for steel.

The housing bore should be round within one-half of the diameter tolerance.

The taper within the length of the outer ring should not exceed 0.013 mm (.0005 inch).

The surface finish of the housing bore should not exceed 1.6 mm  $R_a$  (63 microinches  $R_a$ ).

The torque ratings given in the clutch tables are based on a steel housing of a large section. When other housing material must be used (such as aluminum, powdered metal and plastics) the torque rating of the clutch will be reduced. Such housings may be satisfactory for lightly torqued applications but your Timken representative should be consulted for appropriate housing and shaft suggestions. Otherwise, an insufficient press fit and use of a lower strength housing material can result in more internal clearance and reduced performance of the clutch.

When using non-steel housings, thorough testing of the design is suggested.

Adhesive compounds can be used to prevent creeping rotation of the clutch in plastic housings with low friction properties. Adhesives will not provide proper support in oversized metal housings. When using adhesives, care must be taken to keep the adhesive out of the clutches and bearings.

### SHAFT DESIGN

The clutch or clutch and bearing assembly operates directly on the shaft whose specifications of dimension, hardness and surface finish are well within standard manufacturing limits.

Either case hardening or through-hardening grades of good bearing quality steel are satisfactory for raceways. Steels modified for free machining, such as those high in sulfur content and particularly those containing lead, are seldom satisfactory for raceways.

For long fatigue life, the shaft raceway, must have a hardness equivalent to 58 HRC, and ground to the suggested diameter shown in the tables of dimensions. It may be through hardened, or it may be case hardened, with an effective case depth of 0.4 mm (0.015 inch). (Effective case depth is defined as the distance from the surface inward to the equivalent of 50 HRC hardness level after grinding.)

Taper within the length of the raceway should not exceed 0.008 mm (0.0003 inch), or one-half the diameter tolerance, whichever is smaller. The radial deviation from true circular form of the raceway should not exceed 0.0025 mm (0.0001 inch) for diameters up to and including 25 mm (1.0 inch). For raceways greater than 25 mm (1.0 inch) the allowable radial deviation should not exceed 0.0025 mm (0.0001 inch) multiplied by a factor of the raceway diameter divided by 25 (1.0 inch). Surface finish on the raceway should not exceed 0.4 mm (16 microinches)  $R_a$ . Deviations will reduce the load capacity and fatigue life of the shaft.

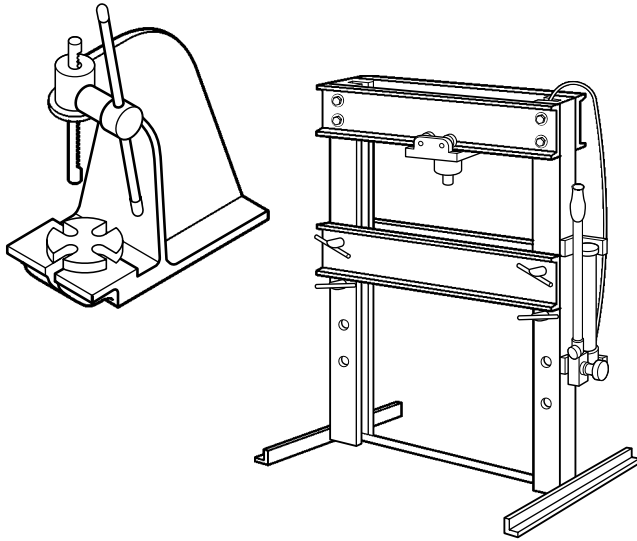


## NEEDLE ROLLER BEARINGS

### INSTALLATION

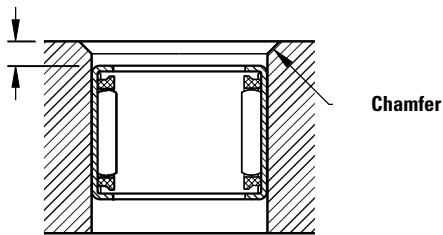
Simplicity of installation promotes additional cost savings. The drawn cup roller clutch, or the clutch and bearing assembly, must be pressed into its housing. Procedures are virtually identical with those for installing drawn cup bearings as detailed on pages C40 and C62. The unit is pressed into the bore of a gear hub or pulley hub, or housing of the proper size, and no shoulders, splines, keys, screws or snap rings are required.

Installation procedures are summarized in the following sketches:



Use an arbor press or hydraulic ram press which will exert steady pressure. Never use a hammer or other tool requiring pounding to drive the clutch into its housing.

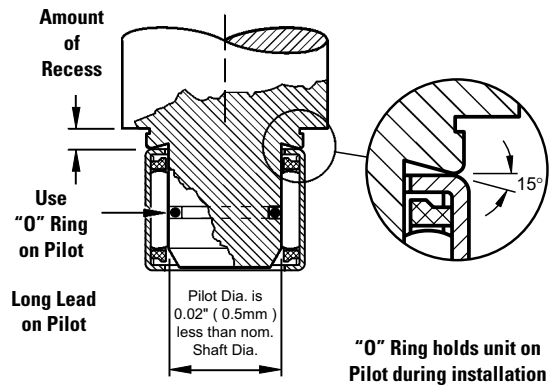
Amount of Recess



Make sure that the housing bore is chamfered to permit easy introduction of the clutch and bearing or the clutch unit. Press unit slightly beyond the chamfer in the housing bore to assure full seating. Through-bored housings are always preferred. If the housing has a shoulder, never seat the clutch against the shoulder. For further details see pages C40 and C62.

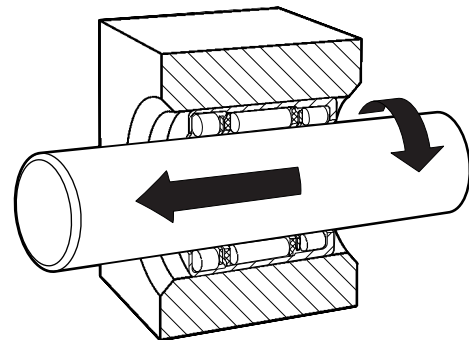


**IMPORTANT:** The mounted clutch or clutch and bearing assembly engages when the housing is rotated relative to the shaft in the direction of the arrow and LOCK marking [LOCK] stamped on the cup. Make sure that the unit is oriented properly before pressing it into its housing.



Use an installation tool as shown in the diagram above. If clutch is straddled by needle roller bearings, press units into position in proper sequence and preferably leave a small clearance between units.

When assembling the shaft, it should be rotated in the overrun direction during insertion. The end of the shaft should have a large chamfer or rounding.





## APPLIED LOADS

The clutch-only unit is designed to transmit purely torque loads. Applied torque should not exceed the catalog ratings which are based on the compressive strength of well-aligned clutch components. Bearings on either side of the clutch are to assure concentricity between the shaft and the housing and to support radial loads during clutch overrun. Integral clutch and bearing assemblies are available for this purpose where the radial loads are light. The total maximum dynamic radial load that may be shared by the two needle roller and cage radial bearing assemblies should not be greater than C/3.

In determining the total torque load on a clutch, it is essential to consider the torque due to inertial forces developed in the mechanism, in addition to the externally applied torque. The larger the clutch and the greater the mass of the mechanism controlled by it, the more important this consideration becomes.

Clutch lockup depends on friction. For this reason applications involving severe vibrations or axial motion of the shaft within the clutch are to be avoided. The applications where there are overhanging or overturning loads should incorporate bearings that will maintain alignment between the shaft and the clutch housing. Consult your Timken representative for suggestions.

## LUBRICATION

Oil is the preferred lubricant, as it minimizes wear and heat generation. For those applications where oil is not practical, clutches are packed with a soft grease containing mineral oil. Thick grease will retard roller engagement and can cause individual rollers to slip, possibly overloading any engaged rollers.

## TEMPERATURE

Temperature extremes can cause clutch malfunctions and failure. The molded plastic cage with integral springs holds its necessary resiliency and strength when the operating temperature within the clutch is kept below 90 degrees Celsius (200 degrees Fahrenheit). The clutch with reinforced nylon cage and separate steel springs operates well at temperatures up to 120 degrees C (250 degrees Fahrenheit) continuously and to 150 degrees Celsius (300 degrees Fahrenheit) intermittently. Excessive thickening of the lubricant at low temperatures may prevent some or all of the rollers from engaging. New applications should be tested under expected operating conditions to determine whether or not temperature problems exist.

## BACKLASH

Backlash, or lost motion, prior to engagement is minimal. The variation in backlash from one cycle to another is extremely low. Grease lubrication or improper fitup [housing bore and shaft diameter] may increase backlash. Angular displacement between the shaft and housing increases as an applied torque load is increased.

## RATE OF ENGAGEMENT

Clutch lockup depends upon static friction. Axial motion between shaft and clutch rollers prevents lockup.

Clutches with integral springs engage satisfactorily at cyclic rates up to 200 engagements per minute. Intermittent operation at higher rates has been successful. The steel spring type clutches have proven dependability at rates up to 6000 or 7000 engagements per minute. Even higher cyclic rates may be practical. Since grease may impair engagement at high cyclic rates, a light oil should be used.

## OVERRUN LIMIT SPEED

Exact limiting speeds are not easily predictable. The value for each clutch given in the tabular data is not absolute but serves as a guide for the designer. Oil lubrication is absolutely necessary for high speed operations. Consult your Timken representative when overrunning speeds are high.

## INSPECTION

Although the outer cup of the clutch is accurately drawn from strip steel, it can go slightly out of round during heat treat. When the assembly is pressed into a ring gage or properly prepared housing of correct size and wall thickness, it becomes round and properly sized. Direct measurement of the outside diameter of a drawn cup assembly is an incorrect procedure. The proper inspection procedure is as follows:

1. Press the assembly into a ring gage of the proper size as given in the tabular data.
2. Gage the bore with the specified plug gages of the proper size, as given in the tables of dimensions.
  - a. The locking plug is rotated to insure lockup when the clutch is operated at low limit shaft and is mounted in a high limit housing strong enough to properly size the clutch.
  - b. The overrun plug is rotated to ensure free over-running when the clutch is operated on a high limit shaft and is mounted in a low limit housing.
  - c. The go plug and no go plug insure proper size of the bearings in the clutch and bearing assemblies.

Gage sizes are listed in the tables of dimensions. Plug gage sizes reflect adjustment for the loose and tight conditions resulting from high or low housings or shafts.

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# NEEDLE ROLLER BEARINGS

## DRAWN CUP ROLLER CLUTCHES

### METRIC SERIES

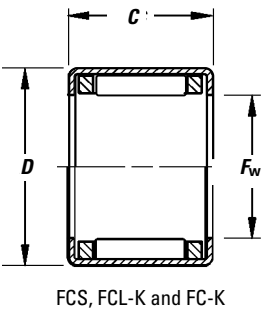
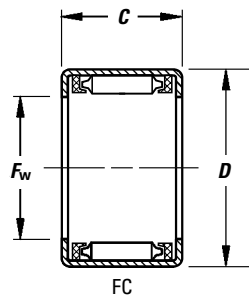
- For proper application, separate bearings suggested (adjacent to clutch) to carry radial loads and assure concentricity between shaft and housing.
- Clutch engages when housing rotated (relative to the shaft) in direction of arrow marking [LOCK] as labeled on cup
- Proper inspection requires use of ring gage and bore plug gage(s) — see the inspection section page C307.
- Full details on installation given on page C306.

- Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed on the opposite page.
- Types FC, FCS, FC-K and FCL-K clutches have stainless steel springs inserted in molded cage to position rollers for lockup.



The mounted clutch and bearing assembly engages when the housing is rotated relative to the shaft in the direction of the arrow marking [← LOCK] stamped on the cup

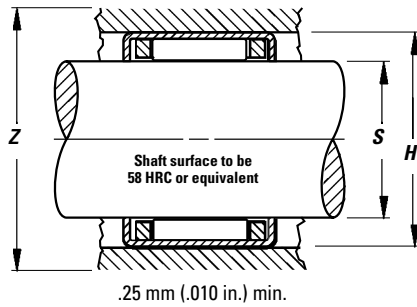
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| Shaft Diameter | Dimensions mm/in. |              |             | Clutch Designation | Torque Rating<br>N•m/in.-lbf. | Minimum O.D. of Steel Housing for Rated Torque<br>mm/in. | Overrun Limiting Speed for Rotating Shaft<br>RPM | Suitable Drawn Cup Bearing <sup>1</sup> |
|----------------|-------------------|--------------|-------------|--------------------|-------------------------------|----------------------------------------------------------|--------------------------------------------------|-----------------------------------------|
|                | F <sub>w</sub>    | D            | C           |                    |                               |                                                          |                                                  |                                         |
| 4              | 4<br>0.1575       | 8<br>0.315   | 6<br>0.236  | FC-4-K             | 0.349<br>3.09                 | 11<br>0.433                                              | 26000                                            | HK0408                                  |
| 6              | 6<br>0.2362       | 10<br>0.3937 | 12<br>0.472 | FCS-6              | 2.15<br>19                    | 14<br>0.551                                              | 22000                                            | HK0608                                  |
| 8              | 8<br>0.315        | 12<br>0.4724 | 12<br>0.472 | FCL-8-K            | 3.39<br>30                    | 17<br>0.669                                              | 21000                                            | HK0808                                  |
|                | 8<br>0.315        | 14<br>0.5512 | 12<br>0.472 | FC-8               | 4.42<br>39.1                  | 20<br>0.787                                              | 21000                                            | —                                       |
| 10             | 10<br>0.3937      | 14<br>0.5512 | 12<br>0.472 | FCL-10-K           | 4.6<br>40.7                   | 20<br>0.787                                              | 19000                                            | HK1010                                  |
|                | 10<br>0.3937      | 16<br>0.6299 | 12<br>0.472 | FC-10              | 5.82<br>51.5                  | 25<br>0.984                                              | 19000                                            | —                                       |
| 12             | 12<br>0.4724      | 18<br>0.7087 | 16<br>0.63  | FC-12              | 14<br>124                     | 27<br>1.063                                              | 19000                                            | HK1212                                  |
| 16             | 16<br>0.6299      | 22<br>0.8661 | 16<br>0.63  | FC-16              | 21.7<br>192                   | 31<br>1.22                                               | 14000                                            | HK1612                                  |
| 20             | 20<br>0.7874      | 26<br>1.0236 | 16<br>0.63  | FC-20              | 32.6<br>289                   | 38<br>1.496                                              | 11000                                            | HK2012                                  |
| 25             | 25<br>0.9843      | 32<br>1.2598 | 20<br>0.787 | FC-25              | 71<br>628                     | 46<br>1.811                                              | 8700                                             | HK2512                                  |
| 30             | 30<br>1.1811      | 37<br>1.4567 | 20<br>0.787 | FC-30              | 99.1<br>877                   | 51<br>2.008                                              | 7300                                             | HK3012                                  |

<sup>1</sup> See pages C42-C49 for suitable bearing types and sizes.

## Drawn Cup Roller Clutches



| Ring Gage               | Gaging mm/in.           |                         | Mounting mm/in.         |                         |                         |                         | Wt. kg/lbs. Approx.   |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|
|                         | Clutch Locking Plug     | Clutch Overrun Plug     | Shaft Raceway Diameter  |                         | Housing Bore            |                         |                       |
|                         |                         |                         | Max.                    | Min.                    | Min.                    | Max.                    |                       |
|                         |                         |                         | <b>S</b>                |                         | <b>H</b>                |                         |                       |
| <b>7.984</b><br>0.3143  | <b>3.980</b><br>0.1567  | <b>4.004</b><br>0.1576  | <b>4.000</b><br>0.1575  | <b>3.995</b><br>0.1573  | <b>7.984</b><br>0.3143  | <b>7.993</b><br>0.3147  | <b>0.001</b><br>0.002 |
| <b>9.984</b><br>0.3931  | <b>5.980</b><br>0.2354  | <b>6.004</b><br>0.2364  | <b>6.000</b><br>0.2362  | <b>5.995</b><br>0.236   | <b>9.984</b><br>0.3931  | <b>9.993</b><br>0.3934  | <b>0.003</b><br>0.007 |
| <b>11.980</b><br>0.4717 | <b>7.976</b><br>0.314   | <b>8.005</b><br>0.3152  | <b>8.000</b><br>0.315   | <b>7.994</b><br>0.3147  | <b>11.980</b><br>0.4717 | <b>11.991</b><br>0.4721 | <b>0.003</b><br>0.007 |
| <b>13.98</b><br>0.5504  | <b>7.976</b><br>0.314   | <b>8.005</b><br>0.3152  | <b>8.000</b><br>0.315   | <b>7.994</b><br>0.3147  | <b>13.980</b><br>0.5504 | <b>13.991</b><br>0.5508 | <b>0.007</b><br>0.015 |
| <b>13.980</b><br>0.5504 | <b>9.976</b><br>0.3928  | <b>10.005</b><br>0.3939 | <b>10.000</b><br>0.3937 | <b>9.994</b><br>0.3935  | <b>13.980</b><br>0.5504 | <b>13.991</b><br>0.5508 | <b>0.004</b><br>0.009 |
| <b>15.980</b><br>0.6291 | <b>9.976</b><br>0.3928  | <b>10.005</b><br>0.3939 | <b>10.000</b><br>0.3937 | <b>9.994</b><br>0.3935  | <b>15.980</b><br>0.6291 | <b>15.991</b><br>0.6296 | <b>0.009</b><br>0.02  |
| <b>17.980</b><br>0.7079 | <b>11.974</b><br>0.4714 | <b>12.006</b><br>0.4727 | <b>12.000</b><br>0.4724 | <b>11.992</b><br>0.4721 | <b>17.980</b><br>0.7079 | <b>17.991</b><br>0.7083 | <b>0.012</b><br>0.026 |
| <b>21.976</b><br>0.8652 | <b>15.972</b><br>0.6288 | <b>16.006</b><br>0.6302 | <b>16.000</b><br>0.6299 | <b>15.992</b><br>0.6296 | <b>21.976</b><br>0.8652 | <b>21.989</b><br>0.8657 | <b>0.018</b><br>0.04  |
| <b>25.976</b><br>1.0227 | <b>19.970</b><br>0.7862 | <b>20.007</b><br>0.7877 | <b>20.000</b><br>0.7874 | <b>19.991</b><br>0.787  | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>0.021</b><br>0.046 |
| <b>31.972</b><br>1.2587 | <b>24.967</b><br>0.983  | <b>25.007</b><br>0.9845 | <b>25.000</b><br>0.9843 | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>0.034</b><br>0.075 |
| <b>36.972</b><br>1.4556 | <b>29.967</b><br>1.1798 | <b>30.007</b><br>1.1814 | <b>30.000</b><br>1.1811 | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>0.042</b><br>0.093 |





# NEEDLE ROLLER BEARINGS

## DRAWN CUP ROLLER CLUTCHES AND BEARING ASSEMBLIES

### METRIC SERIES

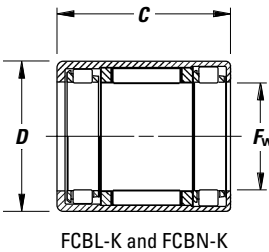
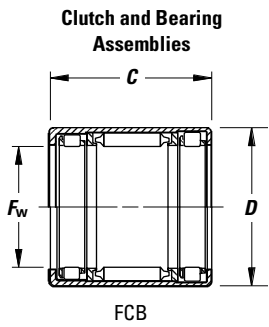
- Clutch and bearing assembly engages when housing rotated (relative to shaft) in direction of arrow marking [LOCK] as labeled on cup.
- Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed on the opposite page.
- Proper inspection requires use of ring gage and bore plug gage(s) — see the inspection section page C307.

- Full details on installation given on page C306.
- Types FCB, FCBL-L and FCBN-K clutch and bearing assemblies have stainless steel springs inserted in molded cage to position rollers for lockup.



The mounted clutch and bearing assembly engages when the housing is rotated relative to the shaft in the direction of the arrow marking [← LOCK] stamped on the cup

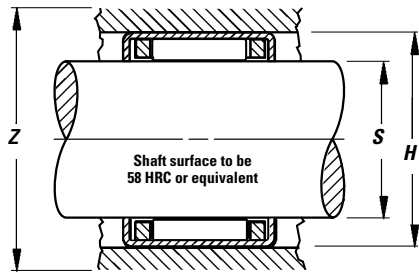
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| Shaft Diameter | Dimensions mm/in. |    |    | Clutch and Bearing Assembly Designation | Torque Rating<br>N•m/in.-lbf. | Minimum O.D. of Steel Housing for Rated Torque | Load Ratings      |                    | Overrun Limiting Speed for Rotating Shaft<br>RPM |
|----------------|-------------------|----|----|-----------------------------------------|-------------------------------|------------------------------------------------|-------------------|--------------------|--------------------------------------------------|
|                | $F_w$             | D  | C  |                                         |                               |                                                | Static<br>kN/lbf. | Dynamic<br>kN/lbf. |                                                  |
| 8              | 8                 | 12 | 22 | FCBL-8-K                                | 3.39<br>30.0                  | 17<br>0.669                                    | 3.28<br>740       | 3.62<br>810        | 21000                                            |
| 8              | 8                 | 14 | 20 | FCB-8                                   | 4.42<br>39.1                  | 20<br>0.787                                    | 3.04<br>680       | 4.22<br>950        | 21000                                            |
| 10             | 10                | 16 | 20 | FCB-10                                  | 5.82<br>51.5                  | 25<br>0.984                                    | 3.80<br>850       | 4.84<br>1 090      | 19000                                            |
| 12             | 12                | 18 | 26 | FCB-12                                  | 14.00<br>124                  | 27<br>1.063                                    | 5.84<br>1 310     | 6.30<br>1 420      | 19000                                            |
| 20             | 20                | 26 | 26 | FCB-20                                  | 32.60<br>289                  | 38<br>1.496                                    | 9.46<br>2 130     | 8.16<br>1 830      | 11000                                            |
| 25             | 25                | 32 | 30 | FCB-25                                  | 71.00<br>628                  | 46<br>1.811                                    | 13.1<br>2 940     | 11.3<br>2 540      | 8700                                             |
| 30             | 30                | 37 | 30 | FCB-30                                  | 99.10<br>877                  | 51<br>2.008                                    | 14.9<br>3 350     | 11.5<br>2 590      | 7300                                             |

Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.

## Drawn Cup Roller Clutches



.25 mm (.010 in.) min.

| Ring Gage               | Gaging mm/in.           |                                    |                         | Mounting mm/in.         |                         |                         |                         | Wt. kg/lbs. Approx.   |
|-------------------------|-------------------------|------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-----------------------|
|                         | Clutch Locking Plug     | Clutch Overrun and Bearing Go Plug | Bearing No Go Plug      | Shaft Raceway Diameter  |                         | Housing Bore            |                         |                       |
|                         |                         |                                    |                         | Max.                    | Min.                    | Min.                    | Max.                    |                       |
|                         |                         |                                    |                         | S                       |                         | H                       |                         |                       |
| <b>11.980</b><br>0.4717 | <b>7.976</b><br>0.3140  | <b>8.005</b><br>0.3152             | <b>8.033</b><br>0.3163  | <b>8.000</b><br>0.3150  | <b>7.994</b><br>0.3147  | <b>11.980</b><br>0.4717 | <b>11.991</b><br>0.4721 | <b>0.005</b><br>0.011 |
| <b>13.980</b><br>0.5504 | <b>7.976</b><br>0.3140  | <b>8.005</b><br>0.3152             | <b>8.033</b><br>0.3163  | <b>8.000</b><br>0.3150  | <b>7.994</b><br>0.3147  | <b>13.980</b><br>0.5504 | <b>13.991</b><br>0.5508 | <b>0.011</b><br>0.024 |
| <b>15.980</b><br>0.6291 | <b>9.976</b><br>0.3928  | <b>10.005</b><br>0.3939            | <b>10.033</b><br>0.3950 | <b>10.000</b><br>0.3937 | <b>9.994</b><br>0.3935  | <b>15.980</b><br>0.6291 | <b>15.991</b><br>0.6296 | <b>0.013</b><br>0.029 |
| <b>17.980</b><br>0.7079 | <b>11.974</b><br>0.4714 | <b>12.006</b><br>0.4727            | <b>12.036</b><br>0.4739 | <b>12.000</b><br>0.4724 | <b>11.992</b><br>0.4721 | <b>17.980</b><br>0.7079 | <b>17.991</b><br>0.7083 | <b>0.018</b><br>0.040 |
| <b>25.976</b><br>1.0227 | <b>19.970</b><br>0.7862 | <b>20.007</b><br>0.7877            | <b>20.043</b><br>0.7891 | <b>20.000</b><br>0.7874 | <b>19.991</b><br>0.7870 | <b>25.976</b><br>1.0227 | <b>25.989</b><br>1.0232 | <b>0.028</b><br>0.062 |
| <b>31.972</b><br>1.2587 | <b>24.967</b><br>0.9830 | <b>25.007</b><br>0.9845            | <b>25.043</b><br>0.9859 | <b>25.000</b><br>0.9843 | <b>24.991</b><br>0.9839 | <b>31.972</b><br>1.2587 | <b>31.988</b><br>1.2594 | <b>0.048</b><br>0.106 |
| <b>36.972</b><br>1.4556 | <b>29.967</b><br>1.1798 | <b>30.007</b><br>1.1814            | <b>30.043</b><br>1.1828 | <b>30.000</b><br>1.1811 | <b>29.991</b><br>1.1807 | <b>36.972</b><br>1.4556 | <b>36.988</b><br>1.4562 | <b>0.054</b><br>0.119 |

C





# NEEDLE ROLLER BEARINGS

## DRAWN CUP ROLLER CLUTCHES

### INCH SERIES

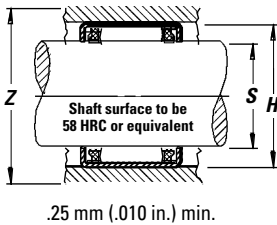
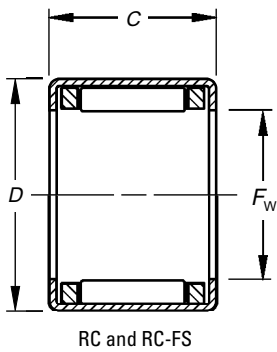
- For proper application, separate bearings suggested (adjacent to clutch) to carry radial loads and assure concentricity between shaft and housing.
- Clutch engages when housing rotated (relative to the shaft) in direction of arrow marking [LOCK] as labeled on cup.
- Proper inspection requires use of ring gage and bore plug gage(s) — see the inspection section page C307.
- Full details on installation given on page C306.

- Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed on the opposite page.
- Type RCFS clutches have stainless steel springs inserted in molded cage to position rollers for lockup.



The mounted clutch engages when the housing is rotated relative to the shaft in the direction of the arrow marking [← LOCK] stamped on the cup.

C



| Shaft Diameter | Dimensions mm/in. |                |                | Clutch Designations          |                       | Torque Rating<br>N•m/in.-lbs. | Minimum O.D. of Steel Housing For Rated Torque | Overrun Limiting Speed for Rotating Shaft |
|----------------|-------------------|----------------|----------------|------------------------------|-----------------------|-------------------------------|------------------------------------------------|-------------------------------------------|
|                | F <sub>w</sub>    | D              | C              | With Stainless Steel Springs | With Integral Springs |                               |                                                |                                           |
| 1/8            | 3.18<br>0.125     | 7.14<br>0.281  | 6.35<br>0.250  | —                            | RC-02                 | 0.323<br>2.86                 | 11.2<br>0.44                                   | 34000                                     |
| 1/4            | 6.35<br>0.250     | 11.13<br>0.438 | 12.70<br>0.500 | —                            | RC-040708             | 2.02<br>17.9                  | 15.7<br>0.62                                   | 20000                                     |
| 3/8            | 9.53<br>0.375     | 15.88<br>0.625 | 12.70<br>0.500 | RC-061008-FS*                | RC-061008             | 5.45<br>48.2                  | 22.4<br>0.88                                   | 18000                                     |
| 1/2            | 12.70<br>0.500    | 19.05<br>0.750 | 12.70<br>0.500 | RC-081208-FS*                | RC-081208             | 8.85<br>78.3                  | 27.9<br>1.10                                   | 17000                                     |
| 5/8            | 15.88<br>0.625    | 22.23<br>0.875 | 15.88<br>0.625 | RC-101410-FS*                | RC-101410             | 16.8<br>149                   | 30.5<br>1.20                                   | 14000                                     |
| 3/4            | 19.05<br>0.750    | 25.40<br>1.000 | 15.88<br>0.625 | RC-121610-FS*                | RC-121610             | 23.3<br>206                   | 35.6<br>1.40                                   | 12000                                     |
| 1              | 25.40<br>1.000    | 33.35<br>1.313 | 15.88<br>0.625 | RC-162110-FS*                | RC-162110             | 49.6<br>439                   | 48.3<br>1.90                                   | 8700                                      |

\* Suffix "-FS" is not always stamped on the clutch cup. Type RC-FS with stainless steel springs is always readily identified by RED clutch cage.

<sup>1</sup> See pages C82-C89 for other suitable bearing types and sizes.

## Drawn Cup Roller Clutches

|         | Gaging mm/in.    |                     |                     | Mounting mm/in.        |                  |                  |                  | Wt. kg/lbs.    |
|---------|------------------|---------------------|---------------------|------------------------|------------------|------------------|------------------|----------------|
|         | Ring Gage        | Clutch Locking Plug | Clutch Overrun Plug | Shaft Raceway Diameter |                  | Housing Bore     |                  |                |
|         |                  |                     |                     | Max.                   | Min.             | Min.             | Max.             |                |
|         |                  |                     |                     | S                      |                  | H                |                  |                |
| —       | 7.155<br>0.2817  | 3.160<br>0.1244     | 3.195<br>0.1258     | 3.175<br>0.1250        | 3.167<br>0.1247  | 7.142<br>0.2812  | 7.155<br>0.2817  | 0.001<br>0.002 |
| J-45    | 11.125<br>0.4380 | 6.337<br>0.2495     | 6.383<br>0.2513     | 6.350<br>0.2500        | 6.337<br>0.2495  | 11.100<br>0.4370 | 11.125<br>0.4380 | 0.004<br>0.008 |
| JH-68   | 15.888<br>0.6255 | 9.512<br>0.3745     | 9.558<br>0.3763     | 9.525<br>0.3750        | 9.512<br>0.3745  | 15.862<br>0.6245 | 15.888<br>0.6255 | 0.008<br>0.017 |
| JH-87   | 19.063<br>0.7505 | 12.687<br>0.4995    | 12.733<br>0.5013    | 12.700<br>0.5000       | 12.687<br>0.4995 | 19.037<br>0.7495 | 19.063<br>0.7505 | 0.009<br>0.020 |
| JH-1010 | 22.238<br>0.8755 | 15.862<br>0.6245    | 15.908<br>0.6263    | 15.875<br>0.6250       | 15.862<br>0.6245 | 22.212<br>0.8745 | 22.238<br>0.8755 | 0.014<br>0.030 |
| J-126   | 25.387<br>0.9995 | 19.012<br>0.7485    | 19.058<br>0.7503    | 19.050<br>0.7500       | 19.037<br>0.7495 | 25.387<br>0.9995 | 25.413<br>1.0005 | 0.015<br>0.034 |
| JH-1612 | 33.325<br>1.3120 | 25.362<br>0.9985    | 25.408<br>1.0003    | 25.400<br>1.0000       | 25.387<br>0.9995 | 33.325<br>1.3120 | 33.350<br>1.3130 | 0.026<br>0.058 |

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## NEEDLE ROLLER BEARINGS

### DRAWN CUP ROLLER CLUTCH AND BEARING ASSEMBLIES

#### INCH SERIES

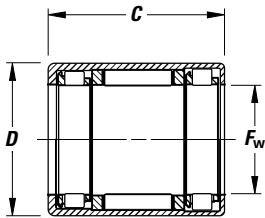
- Clutch and bearing assembly engages when housing rotated (relative to shaft) in direction of arrow marking [LOCK] as labeled on cup.
- Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed.
- Proper inspection requires use of ring gage and bore plug gage(s) — see the inspection section page C307.

- Full details on installation given on page C306.
- Clutch and bearing assemblies have spring integrally molded (type RCB) stainless steel springs inserted (type RCB-FS) in molded cage to position rollers for lockup.

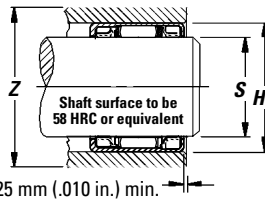


The mounted clutch and bearing assemblies engages when the housing is rotated relative to the shaft in the direction of the arrow marking [← LOCK] stamped on the cup.

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RCB and RCB-FS



.25 mm (.010 in.) min.

| Shaft Diameter | Dimensions mm/in. |                |                | Clutch and Bearing Designations With |                  | Torque Rating<br>N•m/in.-lbf. | Minimum O.D. of Steel Housing For Rated Torque | Load Ratings kN/lbf. |              |
|----------------|-------------------|----------------|----------------|--------------------------------------|------------------|-------------------------------|------------------------------------------------|----------------------|--------------|
|                | F <sub>w</sub>    | D              | C              | Stainless Steel Springs              | Integral Springs |                               |                                                | Z                    | C            |
| $\frac{3}{8}$  | 9.53<br>0.375     | 15.88<br>0.625 | 22.23<br>0.875 | RCB-061014-FS*                       | RCB-061014       | 5.45<br>48.2                  | 22.4<br>0.88                                   | 4.89<br>1100         | 6.01<br>1350 |
| $\frac{1}{2}$  | 12.70<br>0.500    | 19.05<br>0.750 | 22.23<br>0.875 | RCB-081214-FS*                       | RCB-081214       | 8.85<br>78.3                  | 27.9<br>1.1                                    | 6.49<br>1460         | 7.12<br>1600 |
| $\frac{5}{8}$  | 15.88<br>0.625    | 22.23<br>0.875 | 25.40<br>1.000 | RCB-101416-FS*                       | RCB-101416       | 16.8<br>149.0                 | 30.5<br>1.2                                    | 8.14<br>1830         | 8.05<br>1810 |
| $\frac{3}{4}$  | 19.05<br>0.750    | 25.40<br>1.000 | 25.40<br>1.000 | RCB-121616-FS*                       | RCB-121616       | 23.3<br>206.0                 | 35.6<br>1.4                                    | 9.79<br>2200         | 8.90<br>2000 |
| 1              | 25.40<br>1.000    | 33.35<br>1.313 | 27.00<br>1.063 | RCB-162117-FS*                       | RCB-162117       | 49.6<br>439.0                 | 48.3<br>1.9                                    | 17.6<br>3960         | 15.4<br>3460 |

\* Suffix "-FS" is not always stamped on the clutch cup. Type RC-FS with stainless steel springs is always readily identified by RED clutch cage.





## **NEEDLE ROLLER BEARINGS**

### **NOTES**

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## NEEDLE ROLLER BEARING ACCESSORIES

### NEEDLE/CYLINDRICAL ROLLERS

**Overview:** Loose needle and cylindrical rollers are mainly used as bearing rolling elements to reduce friction and torque in rotating and pivoting applications. However, these precision rollers have many other uses such as shafts or locating pins.

- **Sizes:** Diameters from 1.5 mm (0.0591 in.) to 14 mm (0.551 in.). Lengths from 5 mm (0.20 in.) to 57.2 mm (1.25 in.).
- **Markets:** Vehicle and industrial transmissions, universal joints, and two-cycle engines.
- **Features:** Cylindrical and needle sizes are available. Needle rollers are available with flat and rounded ends, metric series needle rollers available in Grade 2, 3 or 5.
- **Benefits:** Provide the maximum load carrying capacity within the smallest envelope at a low cost.

### METRIC INNER RINGS

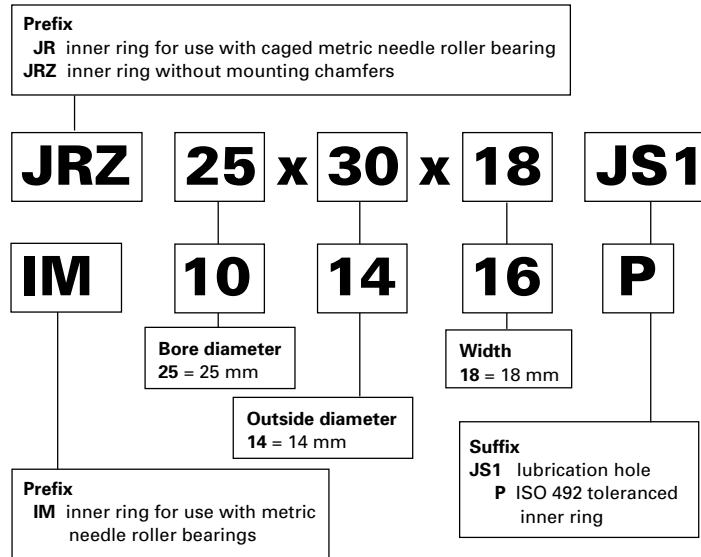
**Overview:** Inner rings are made from bearing quality steel and their O.D. and bore are precision ground. They function as the inner raceway for a needle roller bearing by providing a surface that meets all shaft raceway design requirements (hardness, surface finish, roundness, etc.).

- **Sizes:** 5 mm (0.197 in.) bore to 180 mm (7.087 in.) outside diameter.
- **Markets:** Automotive, truck, power transmissions, and industrial applications.
- **Features:** Available with and without chamfers, some are available with a profiled outside diameter.
- **Benefits:** When it is not practical to manufacture the shaft to raceway quality, an inner ring allows a customer to obtain acceptable bearing performance.

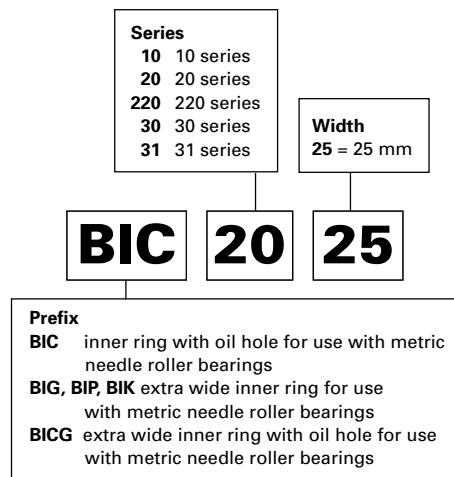




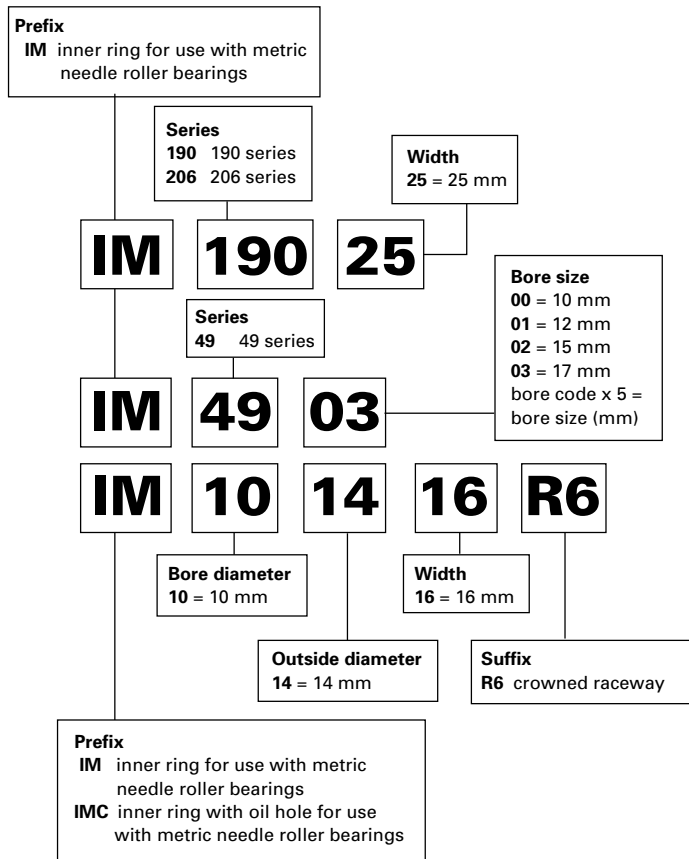
## Standard Inner Rings for Needle Roller Bearings - Metric Nominal Dimensions



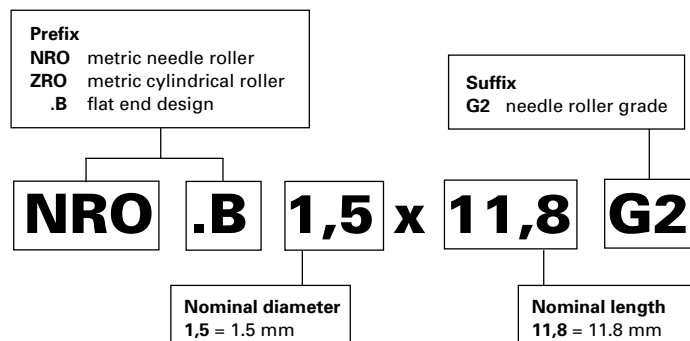
## Extra Wide Inner Rings for Needle Roller Bearings - Metric Nominal Dimensions



## Inner Rings for Full Complement Needle Roller Bearings - Metric Nominal Dimensions



## Loose Rollers - Metric Nominal Dimensions



C



# ***Needle Roller Bearings***

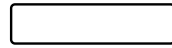
|                                                                                   | <i>Page</i> |
|-----------------------------------------------------------------------------------|-------------|
| Introduction Needle Rollers Metric Series . . . . .                               | C322        |
| Inner and Outer Raceway Dimensions, mm . . . . .                                  | C328        |
| Introduction Needle Rollers Inch Series . . . . .                                 | C331        |
| Inner Rings Metric Series . . . . .                                               | C338        |
| Inner Rings For Full Complement Needle Roller Bearings<br>Metric Series . . . . . | C347        |
| Extra Wide Inner Rings Metric Series . . . . .                                    | C350        |
| End Washers Metric Series . . . . .                                               | C353        |

C

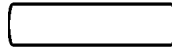




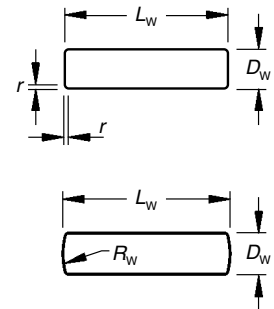
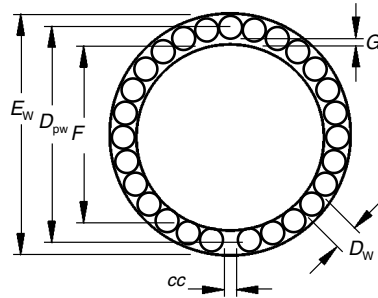
## NEEDLE ROLLER BEARINGS



Flat End



Rounded End



C

### NEEDLE ROLLERS – METRIC SERIES

Needle rollers are made from rolling bearing quality steel hardened to 60-64 HRC or equivalent. Nominal metric needle rollers in various grades are standardized at national and international levels. The grades determine the dimensional and form tolerances of the needle rollers. Metric series needle rollers may differ by their end form: type A has rounded ends and type B has flat ends. Timken prefers to supply needle rollers in the most economical flat end or type B design in G2 grade. Metric series needle rollers of type A may also be made available on request, and in other G3 or G5 grades.

### METRIC SERIES NEEDLE ROLLER DIMENSIONS

Nominally metric needle rollers, conforming to the International Standard ISO 3096, are shown in Table 1. The symbols used in Table 1 as well as in subsequent tables and figures are summarized in Table 5. Needle rollers with flat ends, which are the preferred design are shown in Table 1. Chamfer dimension limits are also shown, the use of which results in the maximum possible effective contact length between roller and raceway. Yet, the relieves at the needle roller ends help to reduce stress concentration resulting in more uniform stress distribution, optimum load ratings, and longer life.

Every needle roller gage is separately packed and the packages are marked accordingly.

### Reference standards are:

- **ISO 3096** – Rolling bearings – Needle rollers – Dimensions and tolerances
- **DIN 5402** – Sheet 3 – Rolling bearing components – Needle rollers.

### EXAMPLE OF METRIC SERIES NEEDLE ROLLER DESIGNATION AND PACKAGE MARKING:

NRO.B1,5x13,8G2  
M2M4

- NRO – Needle roller
- .B – Flat end needle rollers
- 1,5 – Nominal diameter  $D_w = 1,5$  mm
- 13,8 – Nominal length  $L_w = 13,8$  mm
- G2 – Needle roller grade (see table 2)
- M2M4 – deviation of needle roller gage  $-2/-4$  mm

The actual finished diameter is between 1.498 and 1.496 mm.

In the marking of the needle roller gage, P identifies zero (0) or plus (+), M identifies minus (-). If a shipment of needle rollers of the same size comprises several boxes, each box contains needle rollers of the same grade. The gage may vary from box to box. Each individual box, however, contains needle rollers of identical gage.

NEEDLE ROLLERS – METRIC SERIES

| mm/in.         |                | Needle Roller Designation | Wt. kg/lbs.<br>1000 pcs<br>Approx. | Chamfer Dimension  |              |              |
|----------------|----------------|---------------------------|------------------------------------|--------------------|--------------|--------------|
| Dia.           | Length         |                           |                                    | Limits mm/in.      |              |              |
| D <sub>w</sub> | L <sub>w</sub> |                           |                                    | r <sub>s</sub> min | Rad.         | Axial        |
| 1.5<br>0.0591  | 5.8<br>0.228   | NRO.B1.5x5.8G2            | 0.080<br>0.176                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 1.5<br>0.0591  | 6.8<br>0.268   | NRO.B1.5x6.8G2            | 0.094<br>0.207                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 1.5<br>0.0591  | 7.8<br>0.307   | NRO.B1.5x7.8G2            | 0.108<br>0.238                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 1.5<br>0.0591  | 9.8<br>0.386   | NRO.B1.5x9.8G2            | 0.136<br>0.300                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 1.5<br>0.0591  | 11.8<br>0.465  | NRO.B1.5x11.8G2           | 0.164<br>0.362                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 1.5<br>0.0591  | 13.8<br>0.543  | NRO.B1.5x13.8G2           | 0.191<br>0.421                     | 0.1<br>0.004       | 0.4<br>0.016 | 0.6<br>0.024 |
| 2<br>0.0787    | 7.8<br>0.307   | NRO.B2x7.8G2              | 0.190<br>0.419                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 9.8<br>0.386   | NRO.B2x9.8G2              | 0.240<br>0.529                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 11.8<br>0.465  | NRO.B2x11.8G2             | 0.290<br>0.639                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 13.8<br>0.543  | NRO.B2x13.8G2             | 0.340<br>0.750                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 15.8<br>0.622  | NRO.B2x15.8G2             | 0.390<br>0.860                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 17.8<br>0.701  | NRO.B2x17.8G2             | 0.440<br>0.970                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2<br>0.0787    | 19.8<br>0.780  | NRO.B2x19.8G2             | 0.490<br>1.080                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 7.8<br>0.307   | NRO.B2.5x7.8G2            | 0.300<br>0.661                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 9.8<br>0.386   | NRO.B2.5x9.8G2            | 0.380<br>0.838                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 11.8<br>0.465  | NRO.B2.5x11.8G2           | 0.450<br>0.992                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 13.8<br>0.543  | NRO.B2.5x13.8G2           | 0.530<br>1.168                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 15.8<br>0.622  | NRO.B2.5x15.8G2           | 0.610<br>1.345                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 17.8<br>0.701  | NRO.B2.5x17.8G2           | 0.690<br>1.521                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 19.8<br>0.780  | NRO.B2.5x19.8G2           | 0.760<br>1.676                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 21.8<br>0.858  | NRO.B2.5x21.8G2           | 0.840<br>1.852                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 2.5<br>0.0984  | 23.8<br>0.937  | NRO.B2.5x23.8G2           | 0.920<br>2.028                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 9.8<br>0.386   | NRO.B3x9.8G2              | 0.540<br>1.190                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 11.8<br>0.465  | NRO.B3x11.8G2             | 0.650<br>1.433                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 13.8<br>0.543  | NRO.B3x13.8G2             | 0.760<br>1.676                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 15.8<br>0.622  | NRO.B3x15.8G2             | 0.870<br>1.918                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 17.8<br>0.701  | NRO.B3x17.8G2             | 0.990<br>2.183                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 19.8<br>0.780  | NRO.B3x19.8G2             | 1.100<br>2.425                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 21.8<br>0.858  | NRO.B3x21.8G2             | 1.210<br>2.668                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 23.8<br>0.937  | NRO.B3x23.8G2             | 1.320<br>2.910                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 25.8<br>1.016  | NRO.B3x25.8G2             | 1.430<br>3.153                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |
| 3<br>0.1181    | 27.8<br>1.094  | NRO.B3x27.8G2             | 1.540<br>3.395                     | 0.1<br>0.004       | 0.6<br>0.024 | 0.8<br>0.031 |

| mm/in.         |                | Needle Roller Designation | Wt. kg/lbs.<br>1000 pcs<br>Approx. | Chamfer Dimension  |              |              |
|----------------|----------------|---------------------------|------------------------------------|--------------------|--------------|--------------|
| Dia.           | Length         |                           |                                    | Limits mm/in.      |              |              |
| D <sub>w</sub> | L <sub>w</sub> |                           |                                    | r <sub>s</sub> min | Rad.         | Axial        |
| 3.5<br>0.1378  | 11.8<br>0.465  | NRO.B3.5x11.8G2           | 0.910<br>2.006                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 13.8<br>0.543  | NRO.B3.5x13.8G2           | 1.040<br>2.293                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 15.8<br>0.622  | NRO.B3.5x15.8G2           | 1.190<br>2.624                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 17.8<br>0.701  | NRO.B3.5x17.8G2           | 1.340<br>2.954                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 21.8<br>0.858  | NRO.B3.5x21.8G2           | 1.640<br>3.616                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 23.8<br>0.937  | NRO.B3.5x23.8G2           | 1.850<br>4.079                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 25.8<br>1.016  | NRO.B3.5x25.8G2           | 1.950<br>4.299                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 29.8<br>1.173  | NRO.B3.5x29.8G2           | 2.250<br>4.960                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 3.5<br>0.1378  | 34.8<br>1.370  | NRO.B3.5x34.8G2           | 2.650<br>5.842                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 11.8<br>0.465  | NRO.B4x11.8G2             | 1.600<br>3.527                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 13.8<br>0.543  | NRO.B4x13.8G2             | 1.360<br>2.998                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 15.8<br>0.622  | NRO.B4x15.8G2             | 1.550<br>3.417                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 17.8<br>0.701  | NRO.B4x17.8G2             | 1.750<br>3.858                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 19.8<br>0.780  | NRO.B4x19.8G2             | 1.950<br>4.299                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 21.8<br>0.858  | NRO.B4x21.8G2             | 2.150<br>4.740                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 23.8<br>0.937  | NRO.B4x23.8G2             | 2.350<br>5.181                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 25.8<br>1.016  | NRO.B4x25.8G2             | 2.550<br>5.622                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 27.8<br>1.094  | NRO.B4x27.8G2             | 2.740<br>6.041                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 29.8<br>1.173  | NRO.B4x29.8G2             | 2.950<br>6.504                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 34.8<br>1.370  | NRO.B4x34.8G2             | 3.400<br>7.496                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 4<br>0.1575    | 39.8<br>1.567  | NRO.B4x39.8G2             | 3.900<br>8.598                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 15.8<br>0.622  | NRO.B5x15.8G2             | 2.430<br>5.357                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 19.8<br>0.780  | NRO.B5x19.8G2             | 3.050<br>6.724                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 21.8<br>0.858  | NRO.B5x21.8G2             | 3.360<br>7.408                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 23.8<br>0.937  | NRO.B5x23.8G2             | 3.670<br>8.091                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 25.8<br>1.016  | NRO.B5x25.8G2             | 3.980<br>8.774                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 27.8<br>1.094  | NRO.B5x27.8G2             | 4.290<br>9.458                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 29.8<br>1.173  | NRO.B5x29.8G2             | 4.600<br>10.141                    | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 34.8<br>1.370  | NRO.B5x34.8G2             | 5.400<br>11.905                    | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 39.8<br>1.567  | NRO.B5x39.8G2             | 6.150<br>13.558                    | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 5<br>0.1969    | 49.8<br>1.961  | NRO.B5x49.8G2             | 7.500<br>16.535                    | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |
| 6<br>0.2362    | 17.8<br>0.701  | NRO.B6x17.8G2             | 3.950<br>8.708                     | 0.1<br>0.004       | 0.9<br>0.035 | 1.0<br>0.039 |



# NEEDLE ROLLER BEARINGS

## METRIC SERIES NEEDLE ROLLER TOLERANCES

TABLE 2 – VARIATION OF GAGE LOT DIAMETER, PREFERRED GAGES AND CIRCULARITY DEVIATION (VALUES IN MM)

| Grade<br>Gage<br>Lot Diameter | Variation of<br>High/Low Deviation<br>of Mean Diameter<br>Max. | Gages<br>Deviation<br>Max. |    |                  |     |      |     |     |    |     |     | Circularity |
|-------------------------------|----------------------------------------------------------------|----------------------------|----|------------------|-----|------|-----|-----|----|-----|-----|-------------|
|                               |                                                                | VDWL                       |    | D <sub>wmp</sub> |     |      |     |     |    |     |     |             |
| 2                             | 2                                                              | high                       | 0  | -1               | -2  | -3   | -4  | -5  | -6 | -7  | -8  | 1           |
|                               |                                                                | low                        | -2 | -3               | -4  | -5   | -6  | -7  | -8 | -9  | -10 |             |
| 3                             | 3                                                              | high                       | 0  | -1.5             | -3  | -4.5 | -6  | -7  | -9 | -10 | 1.5 |             |
|                               |                                                                | low                        | -3 | -4.5             | -6  | -7.5 | -9  | -10 |    |     |     |             |
| 5                             | 5                                                              | high                       | 0  | -3               | -5  | -8   | -10 | 2.5 |    |     |     |             |
|                               |                                                                | low                        | -5 | -8               | -10 |      |     |     |    |     |     |             |

Note 1 - Tolerance values apply only at the middle of the needle roller length.

Note 2 - Needle rollers of any nominal dimensions and any of the quoted grades will be supplied sub-divided into the gages listed in Table 2 at our option, if nothing to the contrary is agreed upon at the time of ordering.

## END FORM TOLERANCES

Table 3 specifies the applicable end configuration for rounded end and flat end needle rollers of all grades.

TABLE 3 –  
END CONFIGURATION LIMITS FOR METRIC NEEDLE ROLLERS

| Rounded End<br>Needle Rollers<br>End Radius |                | Nominal<br>Diameter<br>of Needle<br>Roller |     | Flat End Needle Rollers<br>Chamfer Dimension Limits<br>(Dimensions in millimeters) |                    |       |
|---------------------------------------------|----------------|--------------------------------------------|-----|------------------------------------------------------------------------------------|--------------------|-------|
| Min.                                        | Max.           | >                                          | ≤   | Radial                                                                             |                    | Axial |
| R <sub>w</sub> *                            |                | D <sub>w</sub>                             |     | r <sub>s</sub> min*                                                                | r <sub>s</sub> max |       |
| —                                           | —              | —                                          | 1   | 0.1                                                                                | 0.3                | 0.5   |
| D <sub>w</sub>                              | L <sub>w</sub> | 1                                          | 1.5 | 0.1                                                                                | 0.4                | 0.6   |
| 2                                           | 2              | 1.5                                        | 3   | 0.1                                                                                | 0.6                | 0.8   |
|                                             |                | 3                                          | 6   | 0.1                                                                                | 0.9                | 1     |

Notes: \*The chamfer of a needle roller shall clear a fillet radius equal to r<sub>s</sub> min which should also be considered for designs using rounded end needle rollers.

## NEEDLE ROLLER LENGTH TOLERANCE

Tolerances on the length L<sub>w</sub> for needle rollers of all grades: h13, see Table 4.

TABLE 4 –  
TOLERANCES FOR NEEDLE ROLLER LENGTH, NOMINAL METRIC  
NEEDLE ROLLERS

| Nominal Length, L <sub>w</sub> mm |    | Tolerance Limits mm<br>(ISO h13) |       |
|-----------------------------------|----|----------------------------------|-------|
| >                                 | ≤  | Max.                             | Min.  |
| 3                                 | 6  | 0                                | -0.18 |
| 6                                 | 10 | 0                                | -0.22 |
| 10                                | 18 | 0                                | -0.27 |
| 18                                | 30 | 0                                | -0.33 |
| 30                                | 50 | 0                                | -0.39 |

## DESIGN CALCULATIONS FOR NEEDLE ROLLER BEARING COMPLEMENTS

In the majority of full complement needle roller applications, needle roller complements of less than 35 needle rollers per row and a ratio of length to diameter between 4:1 and 8:1 is advantageous. Other combinations of quantity and length to diameter ratios of needle rollers have been used successfully. Specific design requirements usually dictate the appropriate selection.

In general, needle roller complements for rotating motion should employ a smaller number of large diameter needle rollers, while needle roller complements subjected to oscillating motion (especially under high loads) should employ a large number of smaller diameter needle rollers.

Oscillating applications with small angular travel encourage the development of fretting corrosion. The best performance under these conditions has been achieved by using the largest practical number of small diameter needle rollers.

## CALCULATION OF RACEWAY DIAMETERS

The calculation of inner and outer raceway diameters may be carried out using either the formula given in Table 5 or more conveniently the raceway calculation form in Table 6. To assist the designer in making these calculations, the values of K required for calculation of needle roller complements of 6 through 60 needle rollers are listed in Table 7. Values of K for other numbers of needle rollers can be calculated using the formulas given in Table 5.

Table 8 lists the suggested values for minimum radial internal clearance (G<sub>r</sub> min) and the minimum circumferential clearance divided by π (cc min/π), to be used for calculating needle roller complements for normal rotating applications where the speeds, loads and shaft deflections are moderate.

Applications with poor lubrication, unusual motion, large misalignment, raceway distortions, load reversals, high speeds, etc. can not be characterized as normal rotating applications. These miscellaneous applications require adjustment of the minimum clearances listed in Table 8. The factors in Table 9 may be used for general guidance in the adjustment of the minimal clearances. For any of the listed miscellaneous applications or any application where abnormal factors such as those listed above exist, and particularly when the inner raceway diameter will exceed 50 mm, consult your Timken representative for design assistance.

TABLE 5 – DESIGN FACTORS FOR NEEDLE ROLLERS

|          |                                                                                                                                                                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Z        | number of needle rollers per bearing path                                                                                                                                                                                                                             |
| K        | chordal factor, $K = 1/\sin(180^\circ/Z)$                                                                                                                                                                                                                             |
| cc       | total circumferential clearance. See Tables 8 and 9 for $cc_{min}/\pi$ values.                                                                                                                                                                                        |
| $G_r$    | radial internal clearance. See Tables 8 and 9 for $G_{r min}$ values                                                                                                                                                                                                  |
| $D_{pw}$ | pitch diameter:<br>$D_{pw} = K \cdot D_{w max} + (cc_{min}/\pi) = E_{min} - D_{w max}$ $= F_{max} + G_{r min} + D_{w max}$                                                                                                                                            |
| E        | outer raceway bore diameter:<br>$E_{min} = D_{pw} + D_{w max} = (K + 1) \cdot D_{w max} + (cc_{min}/\pi)$ $= F_{max} + G_{r min} + 2D_{w max}$                                                                                                                        |
| F        | inner raceway diameter:<br>$F_{max} = D_{pw} - D_{w max} - G_{r min}$ $= (K-1) \cdot D_{w max} + (cc_{min}/\pi) - G_{r min}$ $= E_{min} - 2D_{w max} - G_{r min}$                                                                                                     |
| $D_w$    | nominal needle roller diameter                                                                                                                                                                                                                                        |
| $D_{we}$ | needle roller diameter applicable in the calculation of load ratings:<br>$D_{we} = D_{pw} - F_{max} - G_{r min} = \frac{D_{pw} - cc_{min}/\pi}{K}$ $= \frac{F_{max} + G_{r min} - (cc_{min}/\pi)}{(K-1)}$ $= E_{min} - D_{pw} = \frac{E_{min} - cc_{min}/\pi}{(K+1)}$ |
| $L_w$    | overall needle roller length                                                                                                                                                                                                                                          |
| $R_w$    | end radius, rounded end needle roller                                                                                                                                                                                                                                 |
| $r_s$    | corner rounding, flat end needle roller                                                                                                                                                                                                                               |
| $L_{we}$ | needle roller length applicable in the calculation of load ratings, for rounded end needle rollers:<br>$L_{we} = L_{w max} - (L_{w max} - \sqrt{L_{w max}^2 - D_{we}^2})$<br>for flat end needle rollers:<br>$L_{we} = L_{w max} - (2 \cdot r_s min)$                 |

Note: If length of contact of the needle roller with the raceway is reduced because of undercuts, chamfers, etc.  $L_{we}$  must be reduced correspondingly.

## RACEWAY DIAMETER TOLERANCES

Table 10 lists the recommended tolerances that should be applied to the dimensions for the maximum inner raceway and minimum outer raceway diameter after they have been calculated using the information given in Table 5 or Table 6.

TABLE 6 – RACEWAY CALCULATION FORM

| STEP | SOURCE    | DESIGN FACTOR                  | MILLIMETERS            |
|------|-----------|--------------------------------|------------------------|
| 1    | given     | $D_w$ , needle roller diameter | 3000 max.              |
| 2    | Table 7   | K, for 30 needle rollers       | 9.56677                |
| 3    | (1) X (2) | $KD_w$                         | 28700                  |
| 4    | Table 8   | $cc_{min}/\pi = 0.025$         | 0.025 min.             |
| 5    | (3) + (4) | $D_{pw}$ pitch diameter        | 28725                  |
| 6    | given     | $D_w$ , needle roller diameter | 3000 max.              |
| 7    | (5) - (6) |                                | 25725                  |
| 8    | Table 8   | $G_r$ , radial clearance       | 0.013 min.             |
| 9    | (7) - (8) | F, inner raceway diameter      | 25712 max. 25703 min.* |
| 10   | (5) + (6) | E, outer raceway diameter      | 31725 min. 31741 max.* |

\*From Table 10

## CLEARANCES IN NEEDLE ROLLER COMPLEMENTS

Needle rollers, supplied in bulk, are generally used for full complement assemblies. Successful operation of a full complement of needle rollers not only requires careful selection of radial internal clearance but, more importantly, depends on proper circumferential clearance, or the total clearance between needle rollers.

Needle roller guidance in a full complement assembly depends largely on contact between needle rollers. Too little circumferential clearance causes overheating. Too much circumferential clearance in a heavily loaded full complement of needle rollers causes loss of needle roller guidance and results in needle roller skew and resultant end thrusting.

Control of radial clearance and circumferential clearance is influenced by the needle roller diameter tolerance, as well as the tolerances of the inner and outer raceway diameters.

## END CLEARANCE

The total needle roller end clearance, or end play, normally should be 0.20 mm minimum per path of needle rollers.

TABLE 7

| K VALUES |         |    |         |    |          |
|----------|---------|----|---------|----|----------|
| Z        | K       | Z  | K       | Z  | K        |
| 6        | 2.00000 | 16 | 5.12583 | 26 | 8.29623  |
| 7        | 2.30476 | 17 | 5.44219 | 27 | 8.61379  |
| 8        | 2.61313 | 18 | 5.75877 | 28 | 8.93140  |
| 9        | 2.92380 | 19 | 6.07553 | 29 | 9.24907  |
| 10       | 3.23607 | 20 | 6.39245 | 30 | 9.56677  |
| 11       | 3.54947 | 21 | 6.70951 | 31 | 9.88452  |
| 12       | 3.86370 | 22 | 7.02667 | 32 | 10.20230 |
| 13       | 4.17858 | 23 | 7.34394 | 33 | 10.52011 |
| 14       | 4.49396 | 24 | 7.66130 | 34 | 10.83795 |
| 15       | 4.80973 | 25 | 7.97873 | 35 | 11.15582 |
|          |         |    |         | 36 | 11.47371 |
|          |         |    |         | 37 | 11.79163 |
|          |         |    |         | 38 | 12.10957 |
|          |         |    |         | 39 | 12.42752 |
|          |         |    |         | 40 | 12.74549 |
|          |         |    |         | 41 | 13.06348 |
|          |         |    |         | 42 | 13.38149 |
|          |         |    |         | 43 | 13.69951 |
|          |         |    |         | 44 | 14.01754 |
|          |         |    |         | 45 | 14.33559 |
|          |         |    |         | 46 | 14.65364 |
|          |         |    |         | 47 | 14.97171 |
|          |         |    |         | 48 | 15.28979 |
|          |         |    |         | 49 | 15.60788 |
|          |         |    |         | 50 | 15.92597 |
|          |         |    |         | 51 | 16.24408 |
|          |         |    |         | 52 | 16.56219 |
|          |         |    |         | 53 | 16.88031 |
|          |         |    |         | 54 | 17.19843 |
|          |         |    |         | 55 | 17.51657 |
|          |         |    |         | 56 | 17.86471 |
|          |         |    |         | 57 | 18.15285 |
|          |         |    |         | 58 | 18.47100 |
|          |         |    |         | 59 | 18.78916 |
|          |         |    |         | 60 | 19.10732 |





# NEEDLE ROLLER BEARINGS

**TABLE 8 – MINIMUM CLEARANCES, NORMAL ROTATING APPLICATIONS**

| F<br>Nominal Inner Raceway Diameter<br>mm |     | $c_{c\min}/\pi$ | $G_{r\min}$ |
|-------------------------------------------|-----|-----------------|-------------|
| >                                         | ≤   | mm              | mm          |
| —                                         | 3   | 0.025           | 0.006       |
| 3                                         | 6   | 0.025           | 0.008       |
| 6                                         | 10  | 0.025           | 0.009       |
| 10                                        | 18  | 0.025           | 0.011       |
| 18                                        | 30  | 0.025           | 0.013       |
| 30                                        | 50  | 0.05            | 0.016       |
| 50                                        | 80  | 0.05            | 0.019       |
| 80                                        | 120 | 0.05            | 0.022       |

**TABLE 9 – MINIMUM CLEARANCES, MISCELLANEOUS APPLICATIONS**

| Application                    | $c_{c\min}/\pi$                | $G_{r\min}$               |
|--------------------------------|--------------------------------|---------------------------|
| universal joint                | $1/3 \cdot \text{normal}$      | $1/2 \cdot \text{normal}$ |
| transmission pilot             | normal                         | $3 \cdot \text{normal}$   |
| constant mesh gear             | $0.2 \cdot \text{roller dia.}$ | normal                    |
| transmission planet            | normal                         | normal                    |
| crank pin for two cycle engine | $5 \cdot \text{normal}$        | $7 \cdot \text{normal}$   |

**TABLE 10 – SUGGESTED RACEWAY DIAMETER TOLERANCES**

| F<br>Nominal Inner Raceway Diameter<br>mm |     | Tolerance Limits (ISO h5) |        |
|-------------------------------------------|-----|---------------------------|--------|
| >                                         | ≤   | mm                        |        |
|                                           |     | High                      | Low    |
| 3                                         | 6   | 0                         | -0.005 |
| 6                                         | 10  | 0                         | -0.006 |
| 10                                        | 18  | 0                         | -0.008 |
| 18                                        | 30  | 0                         | -0.009 |
| 30                                        | 50  | 0                         | -0.011 |
| 50                                        | 80  | 0                         | -0.013 |
| 80                                        | 120 | 0                         | -0.015 |

| E<br>Nominal Outer Raceway Diameter<br>mm |     | Tolerance Limits (ISO H6) |        |
|-------------------------------------------|-----|---------------------------|--------|
| >                                         | ≤   | mm                        |        |
|                                           |     | Low                       | High   |
| 3                                         | 6   | 0                         | +0.008 |
| 6                                         | 10  | 0                         | +0.009 |
| 10                                        | 18  | 0                         | +0.011 |
| 18                                        | 30  | 0                         | +0.013 |
| 30                                        | 50  | 0                         | +0.016 |
| 50                                        | 80  | 0                         | +0.019 |
| 80                                        | 120 | 0                         | +0.022 |

## LOAD RATING AND LIFE CALCULATIONS FOR FULL COMPLEMENTS OF NEEDLE ROLLERS

Before selecting the quantity and size of needle rollers to be used in a needle roller complement, it is usually necessary to calculate the load rating required using the applied load, speed and desired life. For a review of bearing size selection, see the engineering section.

Since it is not practical to tabulate the dynamic and static load ratings for the great number of needle roller complements that can be assembled by using different quantities, diameters and lengths of rollers, formulae are provided for the necessary calculations.

For convenience, values of  $f_c$  and values of  $Z^{3/4}$  have been combined into single factors ( $f_c \cdot Z^{3/4}$ ). These factors for a wide range of roller complements are tabulated in Table 11.

### BASIC DYNAMIC LOAD RATINGS

The basic dynamic load rating C, for any roller bearing can be calculated from the formula:

$$C = f_c \cdot (i \cdot L_{we} \cdot \cos \alpha)^{7/9} \cdot Z^{3/4} \cdot D_{we}^{29/27}$$

where:  $f_c$  = a factor which depends on the geometry of the bearing components, the accuracy to which the various components are made, and the material. Maximum values are listed in such standards as ISO 281 and USA ANSI-ABMA Standard 11.

$i$  = number of rows of rollers in any one bearing.

$\alpha$  = nominal angle of contact. Since  $\alpha = 0$  for a radial roller bearing,  $\cos \alpha = 1$ .

Other symbols are explained in Table 5.

For single path radial roller bearings, where  $i = 1$  and  $\cos \alpha = 1$ , the basic dynamic load rating formula can be written as:

$$C = f_c \cdot Z^{3/4} \cdot L_{we}^{7/9} \cdot D_{we}^{29/27}$$

TABLE 11 – VALUES OF  $f_c Z^{3/4}$  FOR METRIC UNITS

| Z  | $f_c Z^{3/4}$ kN - mm units |
|----|-----------------------------|
| 6  | 0.267                       |
| 7  | 0.336                       |
| 8  | 0.400                       |
| 9  | 0.459                       |
| 10 | 0.514                       |
| 11 | 0.565                       |
| 12 | 0.613                       |
| 13 | 0.658                       |
| 14 | 0.701                       |
| 15 | 0.742                       |
| 16 | 0.781                       |
| 17 | 0.818                       |
| 18 | 0.853                       |
| 19 | 0.887                       |
| 20 | 0.919                       |
| 21 | 0.951                       |
| 22 | 0.981                       |
| 23 | 1.011                       |
| 24 | 1.039                       |
| 25 | 1.067                       |
| 26 | 1.094                       |
| 27 | 1.120                       |
| 28 | 1.145                       |
| 29 | 1.170                       |
| 30 | 1.195                       |
| 31 | 1.219                       |
| 32 | 1.242                       |
| 33 | 1.265                       |
| 34 | 1.288                       |
| 35 | 1.310                       |
| 36 | 1.331                       |
| 37 | 1.353                       |
| 38 | 1.374                       |
| 39 | 1.394                       |
| 40 | 1.415                       |
| 41 | 1.435                       |
| 42 | 1.454                       |
| 43 | 1.474                       |
| 44 | 1.493                       |
| 45 | 1.512                       |
| 46 | 1.531                       |
| 47 | 1.549                       |
| 48 | 1.568                       |
| 49 | 1.586                       |
| 50 | 1.604                       |
| 51 | 1.621                       |
| 52 | 1.639                       |
| 53 | 1.656                       |
| 54 | 1.673                       |
| 55 | 1.690                       |
| 56 | 1.707                       |
| 57 | 1.724                       |
| 58 | 1.740                       |
| 59 | 1.757                       |
| 60 | 1.773                       |

**Example:**

Calculate the basic dynamic load rating for a full complement of 28 flat end rollers, 3 mm diameter and 17.8 mm length.

$$C = f_c \cdot Z^{3/4} \cdot L_{we}^{7/9} \cdot D_{we}^{29/27}$$

$$f_c Z^{3/4} \text{ from Table 11} = 1145$$

$$D_{we}^{29/27} = 3^{29/27} = 3,254$$

$$L_{we} = 17.8 - 0.2 = 17.6 \text{ mm}$$

$$L_{we}^{7/9} = 17.6^{7/9} = 9305$$

$$C = 1145 \cdot 9305 \cdot 3254 = 34.7 \text{ kN}$$

When a couple load (overturning moment) is imposed on a single row of needle rollers, the resulting uneven distribution of load can seriously affect bearing life. In such cases, two rows of needle rollers are generally suggested.

**BASIC STATIC LOAD RATING**

The basic static load rating ( $C_0$ ) for any roller bearing, including needle roller bearings, can be calculated from the following formula included in ISO 76, USA ANSI-ABMA Standard 11, and other Standards:

$$C_0 = f_0 \cdot \left(1 - \frac{D_{we} \cdot \cos \alpha}{D_{pw}}\right) \cdot i \cdot Z \cdot L_{we} \cdot D_{we} \cdot \cos \alpha$$

where:  $f_0 = 0,044$  when kilo-newton and millimeter units are used.

$D_{pw}$  = pitch diameter of the needle roller complement (mm).

$i$  = number of rows of rollers in any one bearing.

$\alpha$  = nominal angle of contact. Since  $\alpha = 0$  for radial roller bearing,  $\cos \alpha = 1$ .

The other symbols are described in Table 5.



# NEEDLE ROLLER BEARINGS

## INNER AND OUTER RACEWAY DIMENSIONS, MM

| Z  | D <sub>w</sub> = 1.5 |        |        |        | D <sub>w</sub> = 2.0 |        |        |        | D <sub>w</sub> = 2.5 |        |        |        |
|----|----------------------|--------|--------|--------|----------------------|--------|--------|--------|----------------------|--------|--------|--------|
|    | Max.                 | Min.   | Min.   | Max.   | Max.                 | Min.   | Min.   | Max.   | Max.                 | Min.   | Min.   | Max.   |
|    | F                    |        | E      |        | F                    |        | E      |        | F                    |        | E      |        |
| 14 | 5.258                | 5.253  | 8.266  | 8.275  | 7.004                | 6.998  | 11.013 | 11.024 | 8.751                | 8.745  | 13.760 | 13.771 |
| 15 | 5.732                | 5.727  | 8.740  | 8.749  | 7.635                | 7.629  | 11.644 | 11.655 | 9.540                | 9.534  | 14.549 | 14.560 |
| 16 | 6.205                | 6.199  | 9.214  | 9.223  | 8.268                | 8.262  | 12.277 | 12.288 | 10.329               | 10.321 | 15.340 | 15.351 |
| 17 | 6.679                | 6.673  | 9.688  | 9.697  | 8.900                | 8.894  | 12.909 | 12.920 | 11.119               | 11.111 | 16.130 | 16.141 |
| 18 | 7.154                | 7.148  | 10.163 | 10.174 | 9.534                | 9.528  | 13.543 | 13.554 | 11.911               | 11.903 | 16.922 | 16.933 |
| 19 | 7.629                | 7.623  | 10.638 | 10.649 | 10.165               | 10.157 | 14.176 | 14.187 | 12.703               | 12.695 | 17.714 | 17.725 |
| 20 | 8.105                | 8.099  | 11.114 | 11.125 | 10.799               | 10.791 | 14.810 | 14.821 | 13.495               | 13.487 | 18.506 | 18.519 |
| 21 | 8.580                | 8.574  | 11.589 | 11.600 | 11.433               | 11.425 | 15.444 | 15.455 | 14.288               | 14.280 | 19.299 | 19.312 |
| 22 | 9.056                | 9.050  | 12.065 | 12.076 | 12.067               | 12.059 | 16.078 | 16.089 | 15.081               | 15.073 | 20.092 | 20.105 |
| 23 | 9.532                | 9.526  | 12.541 | 12.552 | 12.702               | 12.694 | 16.713 | 16.724 | 15.874               | 15.865 | 20.885 | 20.898 |
| 24 | 10.008               | 10.000 | 13.017 | 13.028 | 13.337               | 13.329 | 17.348 | 17.359 | 16.667               | 16.659 | 21.678 | 21.691 |
| 25 | 10.482               | 10.474 | 13.493 | 13.504 | 13.971               | 13.963 | 17.982 | 17.993 | 17.461               | 17.453 | 22.472 | 22.485 |
| 26 | 10.958               | 10.950 | 13.969 | 13.980 | 14.606               | 14.598 | 18.617 | 18.630 | 18.253               | 18.244 | 23.266 | 23.279 |
| 27 | 11.435               | 11.427 | 14.446 | 14.457 | 15.242               | 15.234 | 19.253 | 19.266 | 19.046               | 19.037 | 24.059 | 24.072 |
| 28 | 11.911               | 11.903 | 14.922 | 14.933 | 15.877               | 15.869 | 19.888 | 19.901 | 19.841               | 19.832 | 24.854 | 24.867 |
| 29 | 12.388               | 12.380 | 15.399 | 15.410 | 16.512               | 16.504 | 20.523 | 20.536 | 20.635               | 20.626 | 25.648 | 25.661 |
| 30 | 12.864               | 12.856 | 15.875 | 15.886 | 17.148               | 17.140 | 21.159 | 21.172 | 21.429               | 21.420 | 26.442 | 26.455 |
| 31 | 13.341               | 13.333 | 16.352 | 16.363 | 17.783               | 17.775 | 21.794 | 21.807 | 22.223               | 22.214 | 27.236 | 27.249 |
| 32 | 13.817               | 13.809 | 16.828 | 16.839 | 18.417               | 18.408 | 22.430 | 22.443 | 23.018               | 23.009 | 28.031 | 28.044 |
| 33 | 14.294               | 14.286 | 17.305 | 17.316 | 19.052               | 19.043 | 23.065 | 23.078 | 23.812               | 23.803 | 28.825 | 28.838 |
| 34 | 14.771               | 14.763 | 17.782 | 17.793 | 19.688               | 19.679 | 23.701 | 23.714 | 24.607               | 24.598 | 29.620 | 29.633 |
| 35 | 15.248               | 15.240 | 18.259 | 18.272 | 20.324               | 20.315 | 24.337 | 24.350 | 25.402               | 25.393 | 30.415 | 30.431 |
| 36 | 15.725               | 15.717 | 18.736 | 18.749 | 20.959               | 20.950 | 24.972 | 24.985 | 26.196               | 26.187 | 31.209 | 31.225 |
| 37 | 16.201               | 16.193 | 19.212 | 19.225 | 21.595               | 21.586 | 25.608 | 25.621 | 26.991               | 26.982 | 32.004 | 32.020 |
| 38 | 16.678               | 16.670 | 19.689 | 19.702 | 22.231               | 22.222 | 26.244 | 26.257 | 27.786               | 27.777 | 32.799 | 32.815 |
| 39 | 17.155               | 17.147 | 20.166 | 20.179 | 22.867               | 22.858 | 26.880 | 26.893 | 28.581               | 28.572 | 33.594 | 33.610 |
| 40 | 17.632               | 17.624 | 20.643 | 20.656 | 23.503               | 23.494 | 27.516 | 27.529 | 29.376               | 29.367 | 34.389 | 34.405 |
| 41 | 18.107               | 18.098 | 21.120 | 21.133 | 24.139               | 24.130 | 28.152 | 28.165 | 30.193               | 30.182 | 35.209 | 35.225 |
| 42 | 18.584               | 18.575 | 21.597 | 21.610 | 24.775               | 24.766 | 28.788 | 28.801 | 30.988               | 30.977 | 36.004 | 36.020 |
| 43 | 19.061               | 19.052 | 22.074 | 22.087 | 25.411               | 25.402 | 29.424 | 29.437 | 31.783               | 31.772 | 36.799 | 36.815 |
| 44 | 19.538               | 19.529 | 22.551 | 22.564 | 26.047               | 26.038 | 30.060 | 30.076 | 32.578               | 32.567 | 37.594 | 37.610 |
| 45 | 20.015               | 20.006 | 23.028 | 23.041 | 26.683               | 26.674 | 30.696 | 30.712 | 33.373               | 33.362 | 38.389 | 38.405 |
| 46 | 20.492               | 20.483 | 23.505 | 23.518 | 27.319               | 27.310 | 31.332 | 31.348 | 34.168               | 34.157 | 39.184 | 39.200 |
| 47 | 20.970               | 20.961 | 23.983 | 23.996 | 27.955               | 27.946 | 31.968 | 31.984 | 34.963               | 34.952 | 39.979 | 39.995 |
| 48 | 21.447               | 21.438 | 24.460 | 24.473 | 28.592               | 28.583 | 32.605 | 32.621 | 35.758               | 35.747 | 40.774 | 40.790 |
| 49 | 21.924               | 21.915 | 24.937 | 24.950 | 29.228               | 29.219 | 33.241 | 33.257 | 36.554               | 36.543 | 41.570 | 41.586 |
| 50 | 22.401               | 22.392 | 25.414 | 25.427 | 29.864               | 29.855 | 33.877 | 33.893 | 37.349               | 37.338 | 42.365 | 42.381 |
| 51 | 22.878               | 22.869 | 25.891 | 25.904 | 30.522               | 30.511 | 34.538 | 34.554 | 38.144               | 38.133 | 43.160 | 43.176 |
| 52 | 23.355               | 23.346 | 26.368 | 26.381 | 31.158               | 31.147 | 35.174 | 35.190 | 38.939               | 38.928 | 43.955 | 43.971 |
| 53 | 23.832               | 23.823 | 26.845 | 26.858 | 31.795               | 31.784 | 35.811 | 35.827 | 39.735               | 39.724 | 44.751 | 44.767 |
| 54 | 24.310               | 24.301 | 27.323 | 27.336 | 32.431               | 32.420 | 36.447 | 36.463 | 40.530               | 40.519 | 45.546 | 45.562 |
| 55 | 24.787               | 24.778 | 27.800 | 27.813 | 33.067               | 33.056 | 37.083 | 37.099 | 41.325               | 41.314 | 46.341 | 46.357 |
| 56 | 25.264               | 25.255 | 28.277 | 28.290 | 33.703               | 33.692 | 37.719 | 37.735 | 42.121               | 42.110 | 47.137 | 47.153 |
| 57 | 25.741               | 25.732 | 28.754 | 28.767 | 34.340               | 34.329 | 38.356 | 38.372 | 42.916               | 42.905 | 47.932 | 47.948 |
| 58 | 26.219               | 26.210 | 29.232 | 29.245 | 34.976               | 34.965 | 38.992 | 39.008 | 43.712               | 43.701 | 48.728 | 48.744 |
| 59 | 26.696               | 26.687 | 29.709 | 29.722 | 35.612               | 35.601 | 39.628 | 39.644 | 44.507               | 44.496 | 49.523 | 49.539 |
| 60 | 27.173               | 27.164 | 30.186 | 30.202 | 36.249               | 36.238 | 40.265 | 40.281 | 45.302               | 45.291 | 50.318 | 50.337 |

## Timken® Torrington® Metric Series Needle Roller Designation and Load Rating Multiplier (D<sub>w</sub><sup>29/27</sup> L<sub>w</sub><sup>7/9</sup>)

| Needle Roller Designation | D <sub>w</sub> = 1.5                                                  | Needle Roller Designation | D <sub>w</sub> = 2.0                                                  | Needle Roller Designation | D <sub>w</sub> = 2.5                                                  |
|---------------------------|-----------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------|
|                           | D <sub>w</sub> e <sup>(29/27)</sup> L <sub>w</sub> e <sup>(7/9)</sup> |                           | D <sub>w</sub> e <sup>(29/27)</sup> L <sub>w</sub> e <sup>(7/9)</sup> |                           | D <sub>w</sub> e <sup>(29/27)</sup> L <sub>w</sub> e <sup>(7/9)</sup> |
| NRO.B1.5x5.8G2            | 5.903                                                                 | NRO.B2x7.8G2              | 10.195                                                                | NRO.B2.5x7.8G2            | 12.957                                                                |
| NRO.B1.5x6.8G2            | 6.707                                                                 | NRO.B2x9.8G2              | 12.227                                                                | NRO.B2.5x9.8G2            | 15.538                                                                |
| NRO.B1.5x7.8G2            | 7.485                                                                 | NRO.B2x11.8G2             | 14.166                                                                | NRO.B2.5x11.8G2           | 18.002                                                                |
| NRO.B1.5x9.8G2            | 8.977                                                                 | NRO.B2x13.8G2             | 16.031                                                                | NRO.B2.5x13.8G2           | 20.373                                                                |
| NRO.B1.5x11.8G2           | 10.400                                                                | NRO.B2x15.8G2             | 17.837                                                                | NRO.B2.5x15.8G2           | 22.667                                                                |
| NRO.B1.5x13.8G2           | 11.770                                                                | NRO.B2x17.8G2             | 19.591                                                                | NRO.B2.5x17.8G2           | 24.897                                                                |
|                           |                                                                       | NRO.B2x19.8G2             | 21.302                                                                | NRO.B2.5x19.8G2           | 27.071                                                                |
|                           |                                                                       | NRO.B2x21.8G2             | 22.974                                                                | NRO.B2.5x21.8G2           | 29.196                                                                |
|                           |                                                                       |                           |                                                                       | NRO.B2.5x23.8G2           | 31.278                                                                |

INNER AND OUTER RACEWAY DIMENSIONS, MM

| Z  | D <sub>w</sub> = 3.0 |        |        |        | D <sub>w</sub> = 3.5 |        |        |        | D <sub>w</sub> = 4.0 |        |        |        |
|----|----------------------|--------|--------|--------|----------------------|--------|--------|--------|----------------------|--------|--------|--------|
|    | Max.                 | Min.   | Min.   | Max.   | Max.                 | Min.   | Min.   | Max.   | Max.                 | Min.   | Min.   | Max.   |
|    | F                    |        | E      |        | F                    |        | E      |        | F                    |        | E      |        |
| 14 | 10.496               | 10.488 | 16.507 | 16.518 | 12.243               | 12.235 | 19.254 | 19.267 | 13.990               | 13.982 | 22.001 | 22.014 |
| 15 | 11.443               | 11.435 | 17.454 | 17.465 | 13.348               | 13.340 | 20.359 | 20.372 | 15.253               | 15.245 | 23.264 | 23.277 |
| 16 | 12.391               | 12.383 | 18.402 | 18.415 | 14.454               | 14.446 | 21.465 | 21.478 | 16.517               | 16.509 | 24.528 | 24.541 |
| 17 | 13.341               | 13.333 | 19.352 | 19.365 | 15.562               | 15.554 | 22.573 | 22.586 | 17.783               | 17.775 | 25.794 | 25.807 |
| 18 | 14.290               | 14.282 | 20.301 | 20.314 | 16.670               | 16.662 | 23.681 | 23.694 | 19.047               | 19.038 | 27.060 | 27.073 |
| 19 | 15.241               | 15.233 | 21.252 | 21.265 | 17.778               | 17.770 | 24.789 | 24.802 | 20.314               | 20.305 | 28.327 | 28.340 |
| 20 | 16.191               | 16.183 | 22.202 | 22.215 | 18.886               | 18.877 | 25.899 | 25.912 | 21.582               | 21.573 | 29.595 | 29.608 |
| 21 | 17.143               | 17.135 | 23.154 | 23.167 | 19.995               | 19.986 | 27.008 | 27.021 | 22.850               | 22.841 | 30.863 | 30.879 |
| 22 | 18.092               | 18.083 | 24.105 | 24.118 | 21.105               | 21.096 | 28.118 | 28.131 | 24.119               | 24.110 | 32.132 | 32.148 |
| 23 | 19.044               | 19.035 | 25.057 | 25.070 | 22.216               | 22.207 | 29.229 | 29.242 | 25.388               | 25.379 | 33.401 | 33.417 |
| 24 | 19.996               | 19.987 | 26.009 | 26.022 | 23.327               | 23.318 | 30.340 | 30.356 | 26.657               | 26.648 | 34.670 | 34.686 |
| 25 | 20.948               | 20.939 | 26.961 | 26.974 | 24.438               | 24.429 | 31.451 | 31.467 | 27.927               | 27.918 | 35.940 | 35.956 |
| 26 | 21.901               | 21.892 | 27.914 | 27.927 | 25.549               | 25.540 | 32.562 | 32.578 | 29.197               | 29.188 | 37.210 | 37.226 |
| 27 | 22.853               | 22.844 | 28.866 | 28.879 | 26.660               | 26.651 | 33.673 | 33.689 | 30.489               | 30.478 | 38.505 | 38.521 |
| 28 | 23.806               | 23.797 | 29.819 | 29.832 | 27.772               | 27.763 | 34.785 | 34.801 | 31.760               | 31.749 | 39.776 | 39.792 |
| 29 | 24.759               | 24.750 | 30.772 | 30.788 | 28.884               | 28.875 | 35.897 | 35.913 | 33.030               | 33.019 | 41.046 | 41.062 |
| 30 | 25.712               | 25.703 | 31.725 | 31.741 | 29.996               | 29.987 | 37.009 | 37.025 | 34.301               | 34.290 | 42.317 | 42.333 |
| 31 | 26.666               | 26.657 | 32.679 | 32.695 | 31.130               | 31.119 | 38.146 | 38.162 | 35.572               | 35.561 | 43.588 | 43.604 |
| 32 | 27.619               | 27.610 | 33.632 | 33.648 | 32.242               | 32.231 | 39.258 | 39.274 | 36.843               | 36.832 | 44.859 | 44.875 |
| 33 | 28.572               | 28.563 | 34.585 | 34.601 | 33.354               | 33.343 | 40.370 | 40.386 | 38.114               | 38.103 | 46.130 | 46.146 |
| 34 | 29.526               | 29.517 | 35.539 | 35.555 | 34.467               | 34.456 | 41.483 | 41.499 | 39.386               | 39.375 | 47.402 | 47.418 |
| 35 | 30.501               | 30.490 | 36.517 | 36.533 | 35.579               | 35.568 | 42.595 | 42.611 | 40.657               | 40.646 | 48.673 | 48.689 |
| 36 | 31.455               | 31.444 | 37.471 | 37.487 | 36.692               | 36.681 | 43.708 | 43.724 | 41.929               | 41.918 | 49.945 | 49.961 |
| 37 | 32.409               | 32.398 | 38.425 | 38.441 | 37.805               | 37.794 | 44.821 | 44.837 | 43.201               | 43.190 | 51.217 | 51.236 |
| 38 | 33.363               | 33.352 | 39.379 | 39.395 | 38.917               | 38.906 | 45.933 | 45.949 | 44.472               | 44.461 | 52.488 | 52.507 |
| 39 | 34.317               | 34.306 | 40.333 | 40.349 | 40.030               | 40.019 | 47.046 | 47.062 | 45.744               | 45.733 | 53.760 | 53.779 |
| 40 | 35.270               | 35.259 | 41.286 | 41.302 | 41.143               | 41.132 | 48.159 | 48.175 | 47.016               | 47.005 | 55.032 | 55.051 |
| 41 | 36.224               | 36.213 | 42.240 | 42.256 | 42.256               | 42.245 | 49.272 | 49.288 | 48.288               | 48.277 | 56.304 | 56.323 |
| 42 | 37.178               | 37.167 | 43.194 | 43.210 | 43.369               | 43.358 | 50.385 | 50.404 | 49.560               | 49.549 | 57.576 | 57.595 |
| 43 | 38.133               | 38.122 | 44.149 | 44.165 | 44.482               | 44.471 | 51.498 | 51.517 | 50.829               | 50.816 | 58.848 | 58.867 |
| 44 | 39.087               | 39.076 | 45.103 | 45.119 | 45.595               | 45.584 | 52.611 | 52.630 | 52.101               | 52.088 | 60.120 | 60.139 |
| 45 | 40.041               | 40.030 | 46.057 | 46.073 | 46.709               | 46.698 | 53.725 | 53.744 | 53.373               | 53.360 | 61.392 | 61.411 |
| 46 | 40.995               | 40.984 | 47.011 | 47.027 | 47.822               | 47.811 | 54.838 | 54.857 | 54.646               | 54.633 | 62.665 | 62.684 |
| 47 | 41.949               | 41.938 | 47.965 | 47.981 | 48.935               | 48.924 | 55.951 | 55.970 | 55.918               | 55.905 | 63.937 | 63.956 |
| 48 | 42.903               | 42.892 | 48.919 | 48.935 | 50.045               | 50.032 | 57.064 | 57.083 | 57.190               | 57.177 | 65.209 | 65.228 |
| 49 | 43.858               | 43.847 | 49.874 | 49.890 | 51.159               | 51.146 | 58.178 | 58.197 | 58.463               | 58.450 | 66.482 | 66.501 |
| 50 | 44.812               | 44.801 | 50.828 | 50.847 | 52.272               | 52.259 | 59.291 | 59.310 | 59.735               | 59.722 | 67.754 | 67.773 |
| 51 | 45.766               | 45.755 | 51.782 | 51.801 | 53.385               | 53.372 | 60.404 | 60.423 | 61.007               | 60.994 | 69.026 | 69.045 |
| 52 | 46.721               | 46.710 | 52.737 | 52.756 | 54.499               | 54.486 | 61.518 | 61.537 | 62.280               | 62.267 | 70.299 | 70.318 |
| 53 | 47.675               | 47.664 | 53.691 | 53.710 | 55.612               | 55.599 | 62.631 | 62.650 | 63.552               | 63.539 | 71.571 | 71.590 |
| 54 | 48.629               | 48.618 | 54.645 | 54.664 | 56.726               | 56.713 | 63.745 | 63.764 | 64.825               | 64.812 | 72.844 | 72.863 |
| 55 | 49.584               | 49.573 | 55.600 | 55.619 | 57.839               | 57.826 | 64.858 | 64.877 | 66.097               | 66.084 | 74.116 | 74.135 |
| 56 | 50.535               | 50.522 | 56.554 | 56.573 | 58.952               | 58.939 | 65.971 | 65.990 | 67.370               | 67.357 | 75.389 | 75.408 |
| 57 | 51.490               | 51.477 | 57.509 | 57.528 | 60.066               | 60.053 | 67.085 | 67.104 | 68.642               | 68.629 | 76.661 | 76.680 |
| 58 | 52.444               | 52.431 | 58.463 | 58.482 | 61.180               | 61.167 | 68.199 | 68.218 | 69.915               | 69.902 | 77.934 | 77.953 |
| 59 | 53.398               | 53.385 | 59.417 | 59.436 | 62.293               | 62.280 | 69.312 | 69.331 | 71.188               | 71.175 | 79.207 | 79.226 |
| 60 | 54.353               | 54.340 | 60.372 | 60.391 | 63.407               | 63.394 | 70.426 | 70.445 | 72.460               | 72.447 | 80.479 | 80.501 |

Timken® Torrington® Metric Series Needle Roller Designation and Load Rating Multiplier (D<sub>w</sub><sup>29/27</sup> L<sub>w</sub><sup>7/9</sup>)

| Needle Roller Designation | D <sub>w</sub> = 3.0                                              | Needle Roller Designation | D <sub>w</sub> = 3.5                                              | Needle Roller Designation | D <sub>w</sub> = 4.0                                              |
|---------------------------|-------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------|
|                           | D <sub>w</sub> <sup>(29/27)</sup> L <sub>w</sub> <sup>(7/9)</sup> |                           | D <sub>w</sub> <sup>(29/27)</sup> L <sub>w</sub> <sup>(7/9)</sup> |                           | D <sub>w</sub> <sup>(29/27)</sup> L <sub>w</sub> <sup>(7/9)</sup> |
| NRO.B3x9.8G2              | 18.900                                                            | NRO.B3.5x11.8G2           | 25.839                                                            | NRO.B4x11.8G2             | 29.824                                                            |
| NRO.B3x11.8G2             | 21.897                                                            | NRO.B3.5x13.8G2           | 29.242                                                            | NRO.B4x13.8G2             | 33.752                                                            |
| NRO.B3x13.8G2             | 24.780                                                            | NRO.B3.5x15.8G2           | 32.535                                                            | NRO.B4x15.8G2             | 37.553                                                            |
| NRO.B3x15.8G2             | 27.571                                                            | NRO.B3.5x17.8G2           | 35.736                                                            | NRO.B4x17.8G2             | 41.247                                                            |
| NRO.B3x17.8G2             | 30.283                                                            | NRO.B3.5x19.8G2           | 38.856                                                            | NRO.B4x19.8G2             | 44.848                                                            |
| NRO.B3x19.8G2             | 32.927                                                            | NRO.B3.5x21.8G2           | 41.906                                                            | NRO.B4x21.8G2             | 48.369                                                            |
| NRO.B3x21.8G2             | 35.512                                                            | NRO.B3.5x23.8G2           | 44.894                                                            | NRO.B4x23.8G2             | 51.818                                                            |
| NRO.B3x23.8G2             | 38.044                                                            | NRO.B3.5x25.8G2           | 47.826                                                            | NRO.B4x25.8G2             | 55.202                                                            |
| NRO.B3x25.8G2             | 40.529                                                            | NRO.B3.5x29.8G2           | 53.544                                                            | NRO.B4x29.8G2             | 58.528                                                            |
| NRO.B3x27.8G2             | 42.971                                                            | NRO.B3.5x34.8G2           | 60.454                                                            | NRO.B4x34.8G2             | 61.801                                                            |



# NEEDLE ROLLER BEARINGS

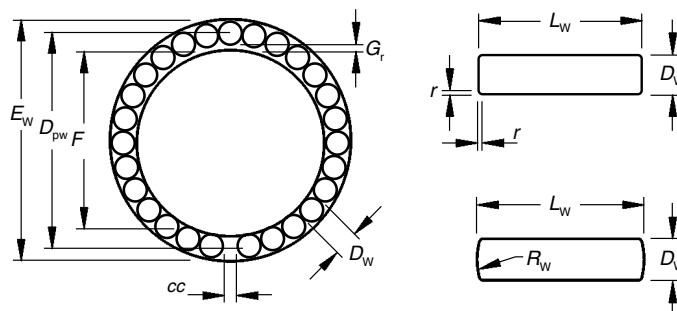
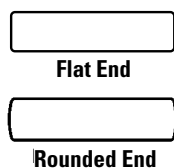
## INNER AND OUTER RACEWAY DIMENSIONS, MM

| Z  | D <sub>w</sub> = 5.0 |        |         |         | D <sub>w</sub> = 6.0 |         |         |         |
|----|----------------------|--------|---------|---------|----------------------|---------|---------|---------|
|    | Max.                 | min.   | Min.    | Max.    | Max.                 | Min.    | Min.    | Max.    |
|    | F                    |        | E       |         | F                    |         | E       |         |
| 14 | 17.484               | 17.476 | 27.495  | 27.508  | 20.976               | 20.967  | 32.989  | 33.005  |
| 15 | 19.061               | 19.052 | 29.074  | 29.087  | 22.870               | 22.861  | 34.883  | 34.899  |
| 16 | 20.641               | 20.632 | 30.654  | 30.670  | 24.767               | 24.758  | 36.780  | 36.796  |
| 17 | 22.223               | 22.214 | 32.236  | 32.252  | 26.665               | 26.656  | 38.678  | 38.694  |
| 18 | 23.806               | 23.797 | 33.819  | 33.835  | 28.565               | 28.556  | 40.578  | 40.594  |
| 19 | 25.390               | 25.381 | 35.403  | 35.419  | 30.487               | 30.476  | 42.503  | 42.519  |
| 20 | 26.974               | 26.965 | 36.987  | 37.003  | 32.389               | 32.378  | 44.405  | 44.421  |
| 21 | 28.560               | 28.551 | 38.573  | 38.589  | 34.291               | 34.280  | 46.307  | 46.323  |
| 22 | 30.167               | 30.156 | 40.183  | 40.199  | 36.194               | 36.183  | 48.210  | 48.226  |
| 23 | 31.754               | 31.743 | 41.770  | 41.786  | 38.098               | 38.087  | 50.114  | 50.133  |
| 24 | 33.340               | 33.329 | 43.356  | 43.372  | 40.002               | 39.991  | 52.018  | 52.037  |
| 25 | 34.928               | 34.917 | 44.944  | 44.960  | 41.906               | 41.895  | 53.922  | 53.941  |
| 26 | 36.515               | 36.504 | 46.531  | 46.547  | 43.811               | 43.800  | 55.827  | 55.846  |
| 27 | 38.103               | 38.092 | 48.119  | 48.135  | 45.717               | 45.706  | 57.733  | 57.752  |
| 28 | 39.691               | 39.680 | 49.707  | 49.723  | 47.622               | 47.611  | 59.638  | 59.657  |
| 29 | 41.279               | 41.268 | 51.295  | 51.314  | 49.528               | 49.517  | 61.544  | 61.563  |
| 30 | 42.868               | 42.857 | 52.884  | 52.903  | 51.432               | 51.419  | 63.451  | 63.470  |
| 31 | 44.457               | 44.446 | 54.473  | 54.492  | 53.338               | 53.325  | 65.357  | 65.376  |
| 32 | 46.045               | 46.034 | 56.061  | 56.080  | 55.245               | 55.232  | 67.264  | 67.283  |
| 33 | 47.635               | 47.624 | 57.651  | 57.670  | 57.152               | 57.139  | 69.171  | 69.190  |
| 34 | 49.224               | 49.213 | 59.240  | 59.259  | 59.059               | 59.046  | 71.078  | 71.097  |
| 35 | 50.810               | 50.797 | 60.829  | 60.848  | 60.966               | 60.953  | 72.985  | 73.004  |
| 36 | 52.400               | 52.387 | 62.419  | 62.438  | 62.873               | 62.860  | 74.892  | 74.911  |
| 37 | 53.989               | 53.976 | 64.008  | 64.027  | 64.781               | 64.768  | 76.800  | 76.819  |
| 38 | 55.579               | 55.566 | 65.598  | 65.617  | 66.688               | 66.675  | 78.707  | 78.726  |
| 39 | 57.169               | 57.156 | 67.188  | 67.207  | 68.596               | 68.583  | 80.615  | 80.637  |
| 40 | 58.758               | 58.745 | 68.777  | 68.796  | 70.504               | 70.491  | 82.523  | 82.545  |
| 41 | 60.348               | 60.335 | 70.367  | 70.386  | 72.412               | 72.399  | 84.431  | 84.453  |
| 42 | 61.938               | 61.925 | 71.957  | 71.976  | 74.320               | 74.307  | 86.339  | 86.361  |
| 43 | 63.529               | 63.516 | 73.548  | 73.567  | 76.228               | 76.215  | 88.247  | 88.269  |
| 44 | 65.119               | 65.106 | 75.138  | 75.157  | 78.136               | 78.123  | 90.155  | 90.177  |
| 45 | 66.709               | 66.696 | 76.728  | 76.747  | 80.042               | 80.027  | 92.064  | 92.086  |
| 46 | 68.299               | 68.286 | 78.318  | 78.337  | 81.950               | 81.935  | 93.972  | 93.994  |
| 47 | 69.890               | 69.877 | 79.909  | 79.928  | 83.858               | 83.843  | 95.880  | 95.902  |
| 48 | 71.480               | 71.467 | 81.499  | 81.521  | 85.767               | 85.752  | 97.789  | 97.811  |
| 49 | 73.070               | 73.057 | 83.089  | 83.111  | 87.675               | 87.660  | 99.697  | 99.719  |
| 50 | 74.661               | 74.648 | 84.680  | 84.702  | 89.584               | 89.569  | 101.606 | 101.628 |
| 51 | 76.251               | 76.238 | 86.270  | 86.292  | 91.492               | 91.477  | 103.514 | 103.536 |
| 52 | 77.842               | 77.829 | 87.861  | 87.883  | 93.401               | 93.386  | 105.423 | 105.445 |
| 53 | 79.433               | 79.420 | 89.452  | 89.474  | 95.310               | 95.295  | 107.332 | 107.354 |
| 54 | 81.020               | 81.005 | 91.042  | 91.064  | 97.219               | 97.204  | 109.241 | 109.263 |
| 55 | 82.611               | 82.596 | 92.633  | 92.655  | 99.127               | 99.112  | 111.149 | 111.171 |
| 56 | 84.202               | 84.187 | 94.224  | 94.246  | 101.036              | 101.021 | 113.058 | 113.080 |
| 57 | 85.792               | 85.777 | 95.814  | 95.836  | 102.945              | 102.930 | 114.967 | 114.989 |
| 58 | 87.383               | 87.368 | 97.405  | 97.427  | 104.854              | 104.839 | 116.876 | 116.898 |
| 59 | 88.974               | 88.959 | 98.996  | 99.018  | 106.763              | 106.748 | 118.785 | 118.807 |
| 60 | 90.565               | 90.550 | 100.587 | 100.609 | 108.672              | 108.657 | 120.694 | 120.719 |

## Timken® Torrington® Metric Series Needle Roller Designation and Load Rating Multiplier (D<sub>w</sub><sup>29/27</sup> L<sub>we</sub><sup>7/9</sup>)

|  | D <sub>w</sub> = 5.0      |                                                                    | D <sub>w</sub> = 6.0      |                                                                    |
|--|---------------------------|--------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------|
|  | Needle Roller Designation | D <sub>w</sub> <sup>(29/27)</sup> L <sub>we</sub> <sup>(7/9)</sup> | Needle Roller Designation | D <sub>w</sub> <sup>(29/27)</sup> L <sub>we</sub> <sup>(7/9)</sup> |
|  | NRO.B5x15.8G2             | 47.723                                                             | NRO.B6X17.8G2             | 63.756                                                             |
|  | NRO.B5x19.8G2             | 56.995                                                             |                           |                                                                    |
|  | NRO.B5x21.8G2             | 61.469                                                             |                           |                                                                    |
|  | NRO.B5x23.8G2             | 65.852                                                             |                           |                                                                    |
|  | NRO.B5X25.8G2             | 70.153                                                             |                           |                                                                    |
|  | NRO.B5X27.8G2             | 74.379                                                             |                           |                                                                    |
|  | NRO.B5X29.8G2             | 78.539                                                             |                           |                                                                    |
|  | NRO.B5X34.5G2             | 88.676                                                             |                           |                                                                    |
|  | NRO.B5X39.8G2             | 98.491                                                             |                           |                                                                    |
|  | NRO.B5X49.8G2             | 117.342                                                            |                           |                                                                    |

## NEEDLE ROLLERS – INCH SERIES



## INTRODUCTION

Before selecting a specific needle roller complement, the engineering section of this catalog should be reviewed for detailed information concerning:

- bearing type selection
- bearing life and reliability
- definition of load ratings
- life and load relationships
- effect of raceway hardness
- example of life calculation
- lubrication
- shaft design
- housing design

In addition to these general considerations, material which follows should also be reviewed when selecting a needle roller complement.

Standard inch series needle rollers are furnished in two styles – elliptical end or the most economical design: flat end. Materials, dimensions and tolerances for standard needle rollers are specified in this section.

When required, needle rollers having spherical ends, conical ends, trunnion ends or crank pin ends, as well as other end designs, can be furnished. Your Timken representative should be consulted before final needle roller selection is made.

## INCH SERIES – NEEDLE ROLLER DIMENSIONS

Needle rollers are made from rolling bearing quality steel hardened to 60-64 HRC or equivalent. Nominally inch needle rollers are given in Table 1. Your Timken representative should be consulted for availability. The symbols used in Tables 1 as well as in subsequent tables and figures are summarized in Table 2.

Needle rollers with elliptical ends permit the use of a more generous fillet between the raceway and the locating shoulder than possible with flat end rollers. Also, due to the length of the elliptical end, the possibility of the roller's cylindrical surface operating over the edge of the raceway is less, thus reducing the chance of occurrence of harmful stress concentrations. On the other hand, where design considerations permit their use, flat end rollers achieve the maximum possible effective contact length between roller and raceway along with maximum load ratings and longer life.

## CLEARANCES IN NEEDLE ROLLER COMPLEMENTS

Needle rollers, supplied in bulk, are generally used to assemble full complement bearings. Successful operation of a full complement of rollers not only requires careful selection of radial clearance but, more importantly, depends on proper circumferential clearance, or the total clearance between rollers.

Circumferential guidance in a full complement of needle rollers depends largely on roller-to-roller contact. Too little circumferential clearance causes overheating. Too much circumferential clearance in a heavily loaded full complement of needle rollers causes loss of roller guidance and results in roller skew and heavy end thrust.

Control of radial clearance and circumferential clearance is influenced by the roller diameter tolerance, as well as the tolerances of the inner and outer raceway diameters.

## END CLEARANCE

The total needle roller end clearance, or end play, normally should be 0.008 inch minimum per path of needle rollers.

## NOMINAL INCH NEEDLE ROLLERS TOLERANCES

Unless otherwise specified, inch needle rollers are normally manufactured with a tolerance of +0.0000 in. -0.0002 in. This tolerance has proven acceptable and ensures satisfactory control of circumferential clearance. The needle roller length tolerance may vary with the end configuration. The normal roller length tolerance for rounded end rollers is +0.000 in. -0.020 in.

Timken also manufactures needle rollers with 0.0001 in. diameter tolerance. These offer enhanced load carrying capability and improved control of circumferential clearance. For needle rollers of greater precision, please consult with your Timken representative.

Nominal dimensions for typical inch series needle rollers are shown in Table 1. Timken supplies rollers with smaller and larger length-to-diameter ratios for special applications. Rollers with dimensions other than those shown in Table 1 can be obtained provided the quantities permit economical production. For example, although the largest needle rollers shown in Table 1 are 0.2500 in. (the usual limits for needle rollers), Timken produces quantities of rollers as large as 0.6250 in. diameter.

Your Timken representative should be contacted with the following information about the required needle rollers:

- nominal metric or inch
- diameter and tolerance (e.g., .1250 in., + 0 in. -.0002 in.)
- length and tolerance (e.g., .560 in., + 0 in. -.020 in.)
- end form (e.g., elliptical end or flat end)
- material (e.g., high carbon chrome steel)
- special features required (e.g., Controlled Stress)
- quantity required



# NEEDLE ROLLER BEARINGS

TABLE 1 – NOMINAL DIMENSIONS FOR TYPICAL INCH NEEDLE ROLLERS

| Nominal Diameter | Nominal Length |      |      |      |      |      |      |      |      |     |      |      |      |      |   |      |      |      |     |      |   |      |     |
|------------------|----------------|------|------|------|------|------|------|------|------|-----|------|------|------|------|---|------|------|------|-----|------|---|------|-----|
|                  | L <sub>w</sub> |      |      |      |      |      |      |      |      |     |      |      |      |      |   |      |      |      |     |      |   |      |     |
| D <sub>w</sub>   | 0.12           | 0.16 | 0.19 | 0.22 | 0.25 | 0.28 | 0.31 | 0.38 | 0.44 | 0.5 | 0.56 | 0.62 | 0.75 | 0.88 | 1 | 1.12 | 1.25 | 1.38 | 1.5 | 1.75 | 2 | 2.25 | 2.5 |
| Inch             |                |      |      |      |      |      |      |      |      |     |      |      |      |      |   |      |      |      |     |      |   |      |     |
| 0.0625           |                |      |      |      | *    | *    | *    | *    | *    | *   | *    | *    | *    | *    |   |      |      |      |     |      |   |      |     |
| 0.0781           |                |      |      |      |      |      | *    | *    | *    | *   | *    | *    | *    | *    |   |      |      |      |     |      |   |      |     |
| 0.0938           |                |      |      |      |      |      |      | *    | *    | *   | *    | *    | *    | *    | * |      |      |      |     |      |   |      |     |
| 0.125            |                |      |      |      |      |      |      |      | *    | *   | *    | *    | *    | *    | * |      |      |      |     |      |   |      |     |
| 0.1562           |                |      |      |      |      |      |      |      |      |     | *    | *    | *    | *    | * | *    | *    | *    | *   |      |   |      |     |
| 0.1875           |                |      |      |      |      |      |      |      |      |     |      | *    | *    | *    | * | *    | *    | *    | *   | *    | * |      |     |
| 0.2188           |                |      |      |      |      |      |      |      |      |     |      |      | *    | *    | * | *    | *    | *    | *   | *    | * | *    | *   |
| 0.25             |                |      |      |      |      |      |      |      |      |     |      |      | *    | *    | * | *    | *    | *    | *   | *    | * | *    | *   |

\* Indicates preferred needle roller sizes. Consult with your Timken representative.

## DESIGN CALCULATIONS FOR NEEDLE ROLLER BEARING COMPLEMENTS

In the majority of full complement needle roller applications, roller complements of less than 35 needle rollers per row and a ratio of roller length to roller diameter between 4:1 and 8:1 is advantageous. Other combinations of quantity and length-to-diameter ratios of needle rollers have been used successfully. Specific design requirements usually dictate the appropriate selection.

In general, roller complements for rotating motion should employ a smaller number of larger diameter needle rollers, while roller complements subjected to oscillating motion (especially under high loads) should employ a larger number of smaller diameter needle rollers.

Oscillating applications with small angular travel encourage the development of fretting corrosion. The best performance under these conditions has been achieved by using the largest practical number of small diameter needle rollers.

## CALCULATION OF RACEWAY DIAMETERS

It may be convenient to use the Bearing Calculation Form in Table 3 to calculate the maximum inner raceway and the minimum outer raceway diameters of a bearing. The formula given in Table 2 can also be used. To assist the designer in making these calculations, the values of K required for calculation of needle roller complements of 6 through 60 needle rollers are listed in Table 4. Values of K for other numbers of needle rollers will be furnished on request, or can be calculated from the formula given in Table 2.

Table 5 lists the suggested values for minimum radial clearance and (G<sub>r min</sub>) minimum circumferential clearance divided by π (cc<sub>min</sub>/π), to be used for calculating needle roller complements for normal rotating applications where the speeds, loads and shaft deflections are moderate.

Applications with poor lubrication, unusual motion, large misalignment, raceway distortions, load reversals, high speeds, etc., can not be characterized as normal rotating applications. These miscellaneous applications require adjustment of the minimum clearances listed in Table 5. The factors in Table 6 may be used for general guidance in the adjustment of the minimal clearances. For any of the listed miscellaneous applications or any application where abnormal factors such as those listed above exist, and particularly when the inner raceway diameter will exceed 2 inches, your Timken representative should be consulted for design assistance.

TABLE 2 – DESIGN FACTORS FOR NEEDLE ROLLERS

|                 |                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Z               | number of needle rollers per bearing path                                                                                                                                                                                                                                            |
| K               | chordal factor, $K = 1/\sin(180^\circ/Z)$                                                                                                                                                                                                                                            |
| cc              | total circumferential clearance. See Tables 8 and 9 for cc <sub>min</sub> /π values.                                                                                                                                                                                                 |
| G <sub>r</sub>  | radial internal clearance. See Tables 8 and 9 for G <sub>r min</sub> values                                                                                                                                                                                                          |
| D <sub>pw</sub> | pitch diameter:<br>$D_{pw} = K \cdot D_{w \max} + (cc_{\min}/\pi) = E_{\min} - D_{w \max}$<br>$= F_{\max} + G_{r \min} + D_{w \max}$                                                                                                                                                 |
| E               | outer raceway bore diameter:<br>$E_{\min} = D_{pw} + D_{w \max} = (K + 1) \cdot D_{w \max} + (cc_{\min}/\pi)$<br>$= F_{\max} + G_{r \min} + 2D_{w \max}$                                                                                                                             |
| F               | inner raceway diameter:<br>$F_{\max} = D_{pw} - D_{w \max} - G_{r \min}$<br>$= (K-1) \cdot D_{w \max} + (cc_{\min}/\pi) - G_{r \min}$<br>$= E_{\min} - 2D_{w \max} - G_{r \min}$                                                                                                     |
| D <sub>w</sub>  | nominal needle roller diameter                                                                                                                                                                                                                                                       |
| D <sub>we</sub> | needle roller diameter applicable in the calculation of load ratings:<br>$D_{we} = D_{pw} - F_{\max} - G_{r \min} = \frac{D_{pw} - cc_{\min}/\pi}{K}$<br>$= \frac{F_{\max} + G_{r \min} - (cc_{\min}/\pi)}{(K-1)}$<br>$= E_{\min} - D_{pw} = \frac{E_{\min} - cc_{\min}/\pi}{(K+1)}$ |
| L <sub>w</sub>  | overall needle roller length                                                                                                                                                                                                                                                         |
| R <sub>w</sub>  | end radius, rounded end needle roller                                                                                                                                                                                                                                                |
| r <sub>s</sub>  | corner rounding, flat end needle roller                                                                                                                                                                                                                                              |
| L <sub>we</sub> | needle roller length applicable in the calculation of load ratings, for elliptical end needle rollers:<br>$L_{we} = L_{w \max} - (0.4 \cdot D_{we})$<br>for flat end needle rollers:<br>$L_{we} = L_{w \max} - (2 \cdot r_{s \min})$                                                 |

Note: If length of contact of the needle roller with the raceway is reduced because of undercuts, chamfers, etc. L<sub>we</sub> must be reduced correspondingly.



### RACEWAY DIAMETER TOLERANCE LIMITS

Table 7 lists the suggested tolerances that should be applied to the dimensions for the maximum inner raceway and the minimum outer raceway diameter after they have been calculated using the Bearing Calculation Form, Table 3.

TABLE 3 – BEARING CALCULATION FORM

| Step | Source    | Design Factor             | Inch               |                     |
|------|-----------|---------------------------|--------------------|---------------------|
| 1    | given     | $D_{w,roller}$ diameter   | <b>0.1250</b> max. | min.                |
| 2    | Table 4   | K, for 30 rollers         | <b>9.56677</b>     |                     |
| 3    | (1) x (2) | $KD_w$                    | <b>1.1958</b>      |                     |
| 4    | Table 5   | $cc_{min}/\pi = 0.001^*$  | <b>0.0010</b> min. | max.                |
| 5    | (3) + (4) | $D_{pw}$ pitch diameter   | <b>1.1968</b>      |                     |
| 6    | given     | $D_{w,roller}$ diameter   | <b>0.1250</b> max. | min.                |
| 7    | (5) – (6) |                           | <b>1.0718</b>      |                     |
| 8    | Table 5   | $G_r$ , radial clearance  | <b>0.0005</b> min. | max.                |
| 9    | (7)– (8)  | F, inner raceway diameter | <b>1.0713</b> max. | <b>1.0709</b> min.* |
| 10   | (5) + (6) | E, outer raceway diameter | <b>1.3218</b> min. | <b>1.3224</b> max.* |

\*From Table 7.

TABLE 5 – MINIMUM CLEARANCES, NORMAL ROTATING APPLICATIONS

| F<br>Nominal Inner Raceway Diameter<br>inch |        | $cc_{min}/\pi$ | $G_{r min}$ |
|---------------------------------------------|--------|----------------|-------------|
| >                                           | ≤      | inch           | inch        |
| –                                           | 0.1181 | 0.001          | 0.0002      |
| 0.1181                                      | 0.2362 | 0.001          | 0.0003      |
| 0.2362                                      | 0.3937 | 0.001          | 0.0004      |
| 0.3937                                      | 0.7087 | 0.001          | 0.0004      |
| 0.7087                                      | 1.1811 | 0.001          | 0.0005      |
| 1.1811                                      | 1.9685 | 0.002          | 0.0006      |
| 1.9685                                      | 3.1496 | 0.002          | 0.0007      |
| 3.1496                                      | 4.7244 | 0.002          | 0.0009      |

TABLE 6 – MINIMUM CLEARANCES, MISCELLANEOUS APPLICATIONS

| Application         | $cc_{min}/\pi$         | $G_{r min}$            |
|---------------------|------------------------|------------------------|
| universal joint     | $\frac{1}{3}$ • normal | $\frac{1}{2}$ • normal |
| transmission pilot  | normal                 | 3 • normal             |
| constant mesh gear  | 0.2 • roller dia.      | normal                 |
| transmission planet | normal                 | normal                 |
| crank pin for two   | 5 • normal             | 7 • normal             |

TABLE 4 –

| K Values |          |
|----------|----------|
| Z        | K        |
| 6        | 2.00000  |
| 7        | 2.30476  |
| 8        | 2.61313  |
| 9        | 2.92380  |
| 10       | 3.23607  |
| 11       | 3.54947  |
| 12       | 3.86370  |
| 13       | 4.17858  |
| 14       | 4.49396  |
| 15       | 4.80973  |
| 16       | 5.12583  |
| 17       | 5.44219  |
| 18       | 5.75877  |
| 19       | 6.07553  |
| 20       | 6.39245  |
| 21       | 6.70951  |
| 22       | 7.02667  |
| 23       | 7.34394  |
| 24       | 7.66130  |
| 25       | 7.97873  |
| 26       | 8.29623  |
| 27       | 8.61379  |
| 28       | 8.93140  |
| 29       | 9.24907  |
| 30       | 9.56677  |
| 31       | 9.88452  |
| 32       | 10.20230 |
| 33       | 10.52011 |
| 34       | 10.83795 |
| 35       | 11.15582 |
| 36       | 11.47371 |
| 37       | 11.79163 |
| 38       | 12.10957 |
| 39       | 12.42752 |
| 40       | 12.74549 |
| 41       | 13.06348 |
| 42       | 13.38149 |
| 43       | 13.69951 |
| 44       | 14.01754 |
| 45       | 14.33559 |
| 46       | 14.65364 |
| 47       | 14.97171 |
| 48       | 15.28979 |
| 49       | 15.60788 |
| 50       | 15.92597 |
| 51       | 16.24408 |
| 52       | 16.56219 |
| 53       | 16.88031 |
| 54       | 17.19843 |
| 55       | 17.51657 |
| 56       | 17.83471 |
| 57       | 18.15285 |
| 58       | 18.47100 |
| 59       | 18.78916 |
| 60       | 19.10732 |





## NEEDLE ROLLER BEARINGS

**TABLE 7 – SUGGESTED RACEWAY DIAMETER TOLERANCES**

| F<br>Nominal Inner Raceway Diameter<br>inch |        | Tolerance Limits (ISO h5)<br>inch |         |
|---------------------------------------------|--------|-----------------------------------|---------|
| >                                           | ≤      | High                              | Low     |
| 0.1181                                      | 0.2362 | 0                                 | -0.0002 |
| 0.2362                                      | 0.3937 | 0                                 | -0.0002 |
| 0.3937                                      | 0.7087 | 0                                 | -0.0003 |
| 0.7087                                      | 1.1811 | 0                                 | -0.0004 |
| 1.1811                                      | 1.9685 | 0                                 | -0.0004 |
| 1.9685                                      | 3.1496 | 0                                 | -0.0005 |
| 3.1496                                      | 4.7244 | 0                                 | -0.0006 |

| E<br>Nominal Outer Raceway Diameter<br>inch |        | Tolerance Limits (ISO H6)<br>inch |         |
|---------------------------------------------|--------|-----------------------------------|---------|
| >                                           | ≤      | Low                               | High    |
| 0.1181                                      | 0.2362 | 0                                 | +0.0003 |
| 0.2362                                      | 0.3937 | 0                                 | +0.0004 |
| 0.3937                                      | 0.7087 | 0                                 | +0.0004 |
| 0.7087                                      | 1.1811 | 0                                 | +0.0005 |
| 1.1811                                      | 1.9685 | 0                                 | +0.0006 |
| 1.9685                                      | 3.1496 | 0                                 | +0.0007 |
| 3.1496                                      | 4.7244 | 0                                 | +0.0009 |

### KEYSTONED ROLLER ASSEMBLIES

Retention of the rollers in the outer raceway by key-stoning can be helpful in assembly operations. The following formula may be used to check the bearing design to be sure that a given number of rollers, Z, will keystone.

$$Y \cdot D_{w \min} > E_{\max} = \text{keystone condition}$$

That is, the product of the keystone constant Y, given below, and the minimum roller diameter  $D_{w \min}$ , must be greater than the maximum outer race bore,  $E_{\max}$ .

Roller complements with 14 or more rollers usually will not keystone unless steps are taken to reduce the circumferential clearance. It is suggested that your Timken representative be consulted when designing a keystone roller complement with 14 or more rollers.

**TABLE 8 – KEYSTONE CONSTANT**

| Z  | Y       | Z  | Y       | Z  | Y       |
|----|---------|----|---------|----|---------|
| 8  | 3.67633 | 12 | 4.88797 | 16 | 6.13885 |
| 9  | 3.97094 | 13 | 5.19892 | 17 | 6.45365 |
| 10 | 4.27277 | 14 | 5.51128 | 18 | 6.76893 |
| 11 | 4.57895 | 15 | 5.82467 | 19 | 7.08461 |

### LOAD RATING AND LIFE CALCULATIONS FOR FULL COMPLEMENTS OF NEEDLE ROLLERS

Before selecting the quantity and size of needle rollers to be used in a needle roller complement, it is usually necessary to calculate the load rating required using the applied load, speed and desired life. For a review of bearing size selection, see the engineering section.

Since it is not practical to tabulate the dynamic and static load ratings for the great number of needle roller complements that can be assembled by using different quantities, diameters and lengths of rollers, formulae are provided for the necessary calculations.

For convenience, values of  $f_c$  and values of  $Z^{3/4}$  have been combined into single factors ( $f_c \cdot Z^{3/4}$ ). These factors for a wide range of needle roller complements are contained in Table 9.

### BASIC DYNAMIC LOAD RATINGS

The basic dynamic load rating C, for any roller bearing can be calculated from the formula:

$$C = f_c (i L_w \cos \alpha)^{7/9} Z^{3/4} D_w^{29/27}$$

where:  $f_c$  = a factor which depends on the geometry of the bearing components, the accuracy to which the various components are made, and the material. Maximum values are listed in such standards as ISO 281 and USA ANSI-ABMA Standard 11.

$i$  = number of rows of needle rollers in any one bearing.

$\alpha$  = nominal angle of contact. Since  $\alpha = 0$  for a radial needle roller bearing,  $\cos \alpha = 1$ .

Other symbols are explained in Table 2.

For single path radial needle roller bearings, where  $i = 1$  and  $\cos \alpha = 1$ , the basic dynamic load rating formula can be written as:

$$C_r = f_c Z^{3/4} L_{we}^{7/9} D_w^{29/27}$$

TABLE 9 – VALUES OF  $F_C Z^{3/4}$  FOR INCH UNITS

| Z  | $f_c Z^{3/4}$ lbf - inch units |
|----|--------------------------------|
| 6  | 24000                          |
| 7  | 30200                          |
| 8  | 35900                          |
| 9  | 41200                          |
| 10 | 46100                          |
| 11 | 50700                          |
| 12 | 55100                          |
| 13 | 59100                          |
| 14 | 63000                          |
| 15 | 66600                          |
| 16 | 70100                          |
| 17 | 73400                          |
| 18 | 76600                          |
| 19 | 79700                          |
| 20 | 82600                          |
| 21 | 85400                          |
| 22 | 88100                          |
| 23 | 90800                          |
| 24 | 93300                          |
| 25 | 95800                          |
| 26 | 98200                          |
| 27 | 100600                         |
| 28 | 102900                         |
| 29 | 105100                         |
| 30 | 107300                         |
| 31 | 109500                         |
| 32 | 111600                         |
| 33 | 113600                         |
| 34 | 115600                         |
| 35 | 117600                         |
| 36 | 119600                         |
| 37 | 121500                         |
| 38 | 123400                         |
| 39 | 125200                         |
| 40 | 127100                         |
| 41 | 128900                         |
| 42 | 130600                         |
| 43 | 132400                         |
| 44 | 134100                         |
| 45 | 135800                         |
| 46 | 137500                         |
| 47 | 139200                         |
| 48 | 140800                         |
| 49 | 142400                         |
| 50 | 144000                         |
| 51 | 145600                         |
| 52 | 147200                         |
| 53 | 148800                         |
| 54 | 150300                         |
| 55 | 151800                         |
| 56 | 153300                         |
| 57 | 154800                         |
| 58 | 156300                         |
| 59 | 157800                         |
| 60 | 159200                         |

**Example:**

Calculate the basic dynamic load rating in lbf for a full complement of 28 elliptical end rollers, 0.1250 in. diameter and 0.750 in. length.

$$C = f_c \cdot Z^{3/4} \cdot L_{we}^{7/9} \cdot D_{we}^{29/27}$$

$$f_c Z^{3/4} \text{ from Table 9} = 102900$$

$$D_{we}^{29/27} = 0.1250^{29/27} = 0.1072$$

$$L_{we} = 0.750 - (0.4 \cdot 0.1250) = 0.700 \text{ (see Table 2)}$$

$$L_{we}^{7/9} = 0.700^{7/9} = 0.758$$

$$C = 102900 \cdot 0.1072 \cdot 0.758 = 8360 \text{ lbf}$$

When a couple load (overturning moment) is imposed on a single row of needle rollers, the resulting uneven distribution of load can seriously affect bearing life. In such cases, two rows of needle rollers are generally suggested.

Your Timken representative should be consulted before a final selection of a needle roller complement is made.

**BASIC STATIC LOAD RATING**

The basic static load rating ( $C_0$ ) for any roller bearing, including needle roller bearings, can be calculated from the following formula included in ISO 76, USA ANSI-ABMA Standard 11 and other Standards:

$$C_0 = f_0 \cdot \left(1 - \frac{D_{we} \cdot \cos \alpha}{D_{pw}}\right) i Z L_{we} D_{we} \cos \alpha$$

where:  $f_0 = 6430$  when pound-force and inch units are used

$D_{pw}$  = pitch diameter of the needle roller complement (inch).

$i$  = number of rows of rollers in any one bearing.

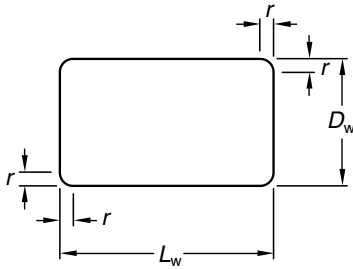
$\alpha$  = nominal angle of contact. Since  $\alpha = 0$  for radial roller bearing,  $\cos \alpha = 1$ .

The other symbols are described in Table 2.



# NEEDLE ROLLER BEARINGS

## CYLINDRICAL ROLLERS – METRIC SERIES



Timken® Torrington® cylindrical rollers are made from bearing quality steel and hardened to 58-65 HRC or equivalent. Nominal metric cylindrical rollers are sorted into gages based on the mean deviation from nominal diameter and nominal length. The relieved ends of the cylindrical rollers, when used in bearing complements, help to reduce stress concentration at the ends of rollers, both under misalignment or ideal alignment. This results in a more uniform stress distribution along the roller-raceway contact length and optimum bearing performance.

### METRIC SERIES CYLINDRICAL ROLLER DIMENSIONS

Nominally metric cylindrical rollers conforming to **DIN 5402** sheet 1 are shown in Table 1. Chamfer dimension limits of these cylindrical rollers with flat ends are also shown in Table 1. The use of these chamfer limits results in the maximum possible effective contact length between roller and raceway, along with the already mentioned relieved ends, producing the maximum possible load ratings and longer life.

Each cylindrical roller gage is packed separately and the mean deviations of diameter and length gages are shown on the package (below the roller designation).

### EXAMPLE OF METRIC SERIES CYLINDRICAL ROLLER DESIGNATION AND PACKAGE MARKING:

ZRO.6 x 8  
P0/M6

Nominal diameter:  $D_w = 6$  mm

Nominal length:  $L_w = 8$  mm

Mean deviation of the diameter  $\pm 0$   $\mu$ m (see Table 2)

Mean deviation of the length  $-6$   $\mu$ m. (see Table 3)

The actual finished diameter is between 5,999 and 6,001 mm.

The actual finished length is between 7,991 and 7,997 mm.

In the marking of the cylindrical roller gage, P identifies zero (0) or plus (+), M identifies minus (-). If a shipment of cylindrical rollers of the same size comprises several boxes, each box contains cylindrical rollers of the identical gage, although the gage may vary from box to box.

TABLE 1 – DIMENSIONS OF METRIC SERIES CYLINDRICAL ROLLERS

| Nominal Diameter<br>mm | Nominal Length |           |           | Cylindrical Roller Designation | Wt. kg 100 pieces (approx.) |
|------------------------|----------------|-----------|-----------|--------------------------------|-----------------------------|
| $D_w$                  | $L_w$          | $r_s$ min | $r_s$ max |                                |                             |
| 3                      | 5              | 0.2       | 0.4       | ZRO.3x5                        | 0.027                       |
| 3.5                    | 5              | 0.2       | 0.4       | ZRO.3.5x5                      | 0.037                       |
| 4                      | 4              | 0.2       | 0.4       | ZRO.4x4                        | 0.039                       |
| 4                      | 6              | 0.2       | 0.4       | ZRO.4x6                        | 0.058                       |
| 4                      | 8              | 0.2       | 0.4       | ZRO.4x8                        | 0.078                       |
| 5                      | 5              | 0.2       | 0.6       | ZRO.5x5                        | 0.075                       |
| 5                      | 8              | 0.2       | 0.6       | ZRO.5x8                        | 0.121                       |
| 5.5                    | 8              | 0.2       | 0.6       | ZRO.5.5x8                      | 0.146                       |
| 6                      | 6              | 0.2       | 0.6       | ZRO.6x6                        | 0.13                        |
| 6                      | 12             | 0.2       | 0.6       | ZRO.6x12                       | 0.261                       |
| 6.5                    | 9              | 0.2       | 0.6       | ZRO.6.5x9                      | 0.23                        |
| 7                      | 7              | 0.2       | 0.6       | ZRO.7x7                        | 0.206                       |
| 7                      | 10             | 0.2       | 0.6       | ZRO.7x10                       | 0.296                       |
| 7                      | 14             | 0.2       | 0.6       | ZRO.7x14                       | 0.417                       |
| 7.5                    | 7.5            | 0.2       | 0.6       | ZRO.7.5x7.5                    | 0.254                       |
| 7.5                    | 9              | 0.2       | 0.6       | ZRO.7.5x9                      | 0.312                       |
| 7.5                    | 11             | 0.2       | 0.6       | ZRO.7.5x11                     | 0.374                       |
| 8                      | 8              | 0.2       | 0.6       | ZRO.8x8                        | 0.308                       |
| 8                      | 12             | 0.2       | 0.6       | ZRO.8x12                       | 0.465                       |
| 9                      | 10             | 0.3       | 0.7       | ZRO.9x10                       | 0.5                         |
| 9                      | 14             | 0.3       | 0.7       | ZRO.9x14                       | 0.68                        |
| 10                     | 10             | 0.3       | 0.7       | ZRO.10x10                      | 0.6                         |
| 10                     | 11             | 0.3       | 0.7       | ZRO.10x11                      | 0.68                        |
| 10                     | 14             | 0.3       | 0.7       | ZRO.10x14                      | 0.85                        |
| 11                     | 15             | 0.3       | 0.7       | ZRO.11x15                      | 1.1                         |
| 12                     | 14             | 0.3       | 0.7       | ZRO.12x14                      | 1.23                        |
| 13                     | 20             | 0.4       | 0.8       | ZRO.13x20                      | 2.04                        |
| 14                     | 14             | 0.4       | 0.8       | ZRO.14x14                      | 1.66                        |
| 14                     | 20             | 0.4       | 0.8       | ZRO.14x20                      | 2.38                        |

Mass in accordance with DIN 5402.

TABLE 2 – DIAMETER AND FORM ACCURACY OF METRIC SERIES CYLINDRICAL ROLLERS

| Nominal Diameter $D_w$ |      | Total Diameter Deviation |                   | Variation of Gage | Mean Deviation of Gage<br>DIN/ISO 1101 |    |    |    |    |    |   |    |    |    |    |    |    |    |    | Circularity Deviation |
|------------------------|------|--------------------------|-------------------|-------------------|----------------------------------------|----|----|----|----|----|---|----|----|----|----|----|----|----|----|-----------------------|
| > mm                   | ≤ mm | high $\mu\text{m}$       | low $\mu\text{m}$ | $\mu\text{m}$     | $\mu\text{m}$                          |    |    |    |    |    |   |    |    |    |    |    |    |    |    | max. $\mu\text{m}$    |
| —                      | 20   | +7                       | -9                | 2                 | +6                                     | +5 | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | 0.8                   |

TABLE 3 – LENGTH GAGES OF METRIC SERIES CYLINDRICAL ROLLERS

| Nominal Length $L_w$ |      | Total Length Deviation |                    | Variation of gage | Mean Deviation of Gage |   |    | Axial Runout<br>DIN/ISO 1101 |   |
|----------------------|------|------------------------|--------------------|-------------------|------------------------|---|----|------------------------------|---|
| > mm                 | ≤ mm | high $\mu\text{m}$     | high $\mu\text{m}$ | $\mu\text{m}$     | $\mu\text{m}$          |   |    | $\mu\text{m}$                |   |
| —                    | 48   | +9                     | -15                | 6                 | +6                     | 0 | -6 | -12                          | 6 |

### INNER RINGS – METRIC SERIES

When it is impractical to meet the shaft raceway design requirements (hardness, surface finish, case depth, etc.) outlined in the engineering section of this catalog, standard inner rings may be used.

Inner rings are made of rolling bearing steel and after hardening, their bores, raceways and end surfaces are ground. Metric series inner rings may be used to provide inner raceway surfaces for metric series needle roller and cage radial assemblies, metric series needle roller bearings and metric series drawn cup needle roller bearings. The extended inner rings are suitable for use with bearings containing lip contact seals and for applications in which axial movement may be present.

#### CONSTRUCTION

Metric series inner rings are available in four basic designs and differ only by the chamfers at the ends of the raceway surfaces, the lubricant access holes and the raceway profile. Inner rings of series JR have chamfers to assist in bearing installation but are without lubricating holes. Inner rings of series JR and IM have bearing installation chamfers and lubricating holes (bore diameters 5 to 50 mm). Inner rings of series JRZ.JS1 are without installation chamfers, allowing for maximum possible raceway contact. IM...RG6 inner rings have a profiled outer diameter for use in applications having a greater degree of misalignment.

The BIC and BICG Series inner rings have chamfers and oil holes and are designed to be used with the full complement, metric, needle roller bearings of Series RNA1000, RNA2000 and RNA3000. These inner rings are intended for RNA bearings of the same number; for example a BIC2020 would be used with a RNA2020.

#### DIMENSIONAL ACCURACY

The tolerances of size, form, and runout for metric series inner rings meet the requirements of ISO normal tolerance class for radial bearings (see the engineering section). Most metric series inner rings are produced with outside diameter raceway tolerance in accordance with h5 which, in most cases, is suitable for combining the metric series needle roller bearings to give the

normal clearance class, and for use with drawn cup bearings. Other raceway tolerances may also be found on inner rings for combining with needle roller bearings to give one of the clearance classes, or other specially requested radial internal clearance requirement.

#### MOUNTING OF INNER RINGS

Inner rings may be mounted on the shaft with either a loose transition fit or an interference fit. These fits used in conjunction with the proper fit of the bearing outer ring, will provide the correct operating clearances for most applications.

Regardless of the fit of the inner ring on the shaft, the inner ring should be axially located by shaft shoulders or other positive means. The shaft shoulder diameter adjacent to the inner ring must not exceed the inner ring outside diameter (per suggestions on page C103 of the metric series needle roller bearing section).

When metric series inner rings are to be used with the metric series needle roller bearings, appropriate shaft tolerances should be selected from Table 3 in the metric series needle roller bearing section. When metric series inner rings are to be used with drawn cup bearings the suggested shaft tolerances are given in the "Inner ring" discussion on page C39 of the "metric series drawn cup needle roller bearings" section of this catalog.

#### INCH SERIES INNER RINGS

Inch series inner rings for use with inch series drawn cup bearings are tabulated on page C92 of this catalog. See catalog page C150 for inch series inner rings for use with inch series needle roller bearings.

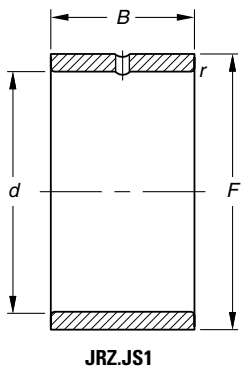
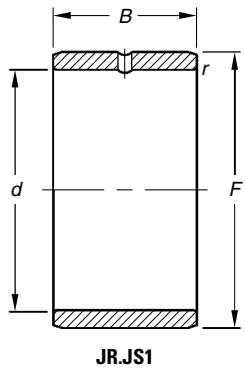
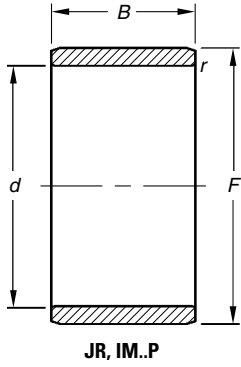
#### END WASHERS – METRIC SERIES

When the metric series needle roller and cage radial assembly used in series NAO and RNAO needle roller bearings without flanges cannot be axially located by suitable shoulders or side faces, end washers of series SNSH may be used. These end washers, which are made of spring steel, are designed to be guided in the housing bore. They are tabulated on page C353.



# NEEDLE ROLLER BEARINGS

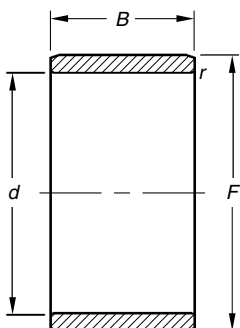
## INNER RINGS METRIC SERIES



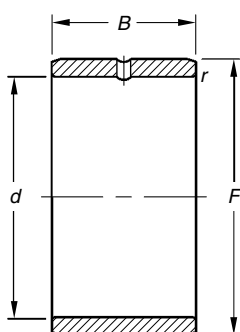
| Shaft Diameter | Dimensions mm/in. |        |        |        | Inner Ring Designation | Wt. kg/lbs.    |                    |
|----------------|-------------------|--------|--------|--------|------------------------|----------------|--------------------|
|                | mm                | d      | F      | B      |                        |                | r <sub>s min</sub> |
| 5              |                   | 5      | 8      | 8      | 0.3                    | JR5x8x8JS1     | 0.002              |
|                |                   | 0.1969 | 0.3150 | 0.315  | 0.01                   |                | 0.004              |
|                |                   | 5      | 8      | 12     | 0.3                    | JR5x8x12       | 0.003              |
| 6              |                   | 0.1969 | 0.3150 | 0.4724 | 0.01                   |                | 0.007              |
|                |                   | 5      | 8      | 16     | 0.3                    | JR5x8x16       | 0.004              |
|                |                   | 0.1969 | 0.3150 | 0.630  | 0.01                   |                | 0.009              |
| 6              |                   | 6      | 9      | 8      | 0.3                    | JR6x9x8JS1     | 0.002              |
|                |                   | 0.2362 | 0.3543 | 0.315  | 0.01                   |                | 0.004              |
|                |                   | 6      | 9      | 12     | 0.3                    | JR6x9x12       | 0.003              |
| 6              |                   | 0.2362 | 0.3543 | 0.472  | 0.01                   |                | 0.007              |
|                |                   | 6      | 9      | 16     | 0.3                    | JR6x9x16       | 0.004              |
|                |                   | 0.2362 | 0.3543 | 0.630  | 0.01                   |                | 0.009              |
| 6              |                   | 6      | 10     | 10     | 0.3                    | JR6x10x10      | 0.004              |
|                |                   | 0.2362 | 0.3937 | 0.394  | 0.01                   |                | 0.009              |
|                |                   | 6      | 10     | 10     | 0.3                    | JR6x10x10JS1   | 0.004              |
| 6              |                   | 0.2362 | 0.3937 | 0.394  | 0.01                   |                | 0.009              |
|                |                   | 6      | 10     | 12     | 0.3                    | JRZ6x10x12JS1  | 0.005              |
|                |                   | 0.2362 | 0.3937 | 0.472  | 0.01                   |                | 0.011              |
| 7              |                   | 7      | 10     | 10.5   | 0.3                    | JR7x10x10.5    | 0.003              |
|                |                   | 0.2756 | 0.3937 | 0.413  | 0.01                   |                | 0.007              |
|                |                   | 7      | 10     | 12     | 0.3                    | JR7x10x12      | 0.004              |
| 7              |                   | 0.2756 | 0.3937 | 0.472  | 0.01                   |                | 0.009              |
|                |                   | 7      | 10     | 16     | 0.3                    | JR7x10x16      | 0.005              |
|                |                   | 0.2756 | 0.3937 | 0.630  | 0.01                   |                | 0.011              |
| 8              |                   | 8      | 12     | 10     | 0.3                    | JR8x12x10      | 0.005              |
|                |                   | 0.3150 | 0.4724 | 0.394  | 0.01                   |                | 0.011              |
|                |                   | 8      | 12     | 10     | 0.3                    | JR8x12x10JS1   | 0.005              |
| 8              |                   | 0.3150 | 0.4724 | 0.394  | 0.01                   |                | 0.011              |
|                |                   | 8      | 12     | 10.5   | 0.3                    | JR8x12x10.5    | 0.005              |
|                |                   | 0.3150 | 0.4724 | 0.413  | 0.01                   |                | 0.011              |
| 8              |                   | 8      | 12     | 12     | 0.3                    | JRZ8x12x12JS1  | 0.006              |
|                |                   | 0.3150 | 0.4724 | 0.472  | 0.01                   |                | 0.013              |
|                |                   | 8      | 12     | 12.5   | 0.3                    | JR8x12x12.5    | 0.006              |
| 8              |                   | 0.3150 | 0.4724 | 0.492  | 0.01                   |                | 0.013              |
|                |                   | 8      | 12     | 16     | 0.3                    | IM 8 12 16 P   | 0.007              |
|                |                   | 0.3150 | 0.4724 | 0.630  | 0.01                   |                | 0.016              |
| 9              |                   | 9      | 12     | 12     | 0.3                    | JR9x12x12      | 0.005              |
|                |                   | 0.3543 | 0.4724 | 0.472  | 0.01                   |                | 0.011              |
|                |                   | 9      | 12     | 16     | 0.3                    | JR9x12x16      | 0.006              |
| 9              |                   | 0.3543 | 0.4724 | 0.630  | 0.01                   |                | 0.013              |
|                |                   | 10     | 13     | 12.5   | 0.3                    | JR10x13x12.5   | 0.005              |
|                |                   | 0.3937 | 0.5118 | 0.492  | 0.01                   |                | 0.011              |
| 10             |                   | 10     | 14     | 11     | 0.3                    | JR10x14x11JS1  | 0.007              |
|                |                   | 0.3937 | 0.5512 | 0.433  | 0.01                   |                | 0.015              |
|                |                   | 10     | 14     | 12     | 0.3                    | JR10x14x12     | 0.007              |
| 10             |                   | 0.3937 | 0.5512 | 0.472  | 0.01                   |                | 0.015              |
|                |                   | 10     | 14     | 12     | 0.3                    | JR10x14x12JS1  | 0.007              |
|                |                   | 0.3937 | 0.5512 | 0.472  | 0.01                   |                | 0.015              |
| 10             |                   | 10     | 14     | 13     | 0.3                    | JR10x14x13     | 0.007              |
|                |                   | 0.3937 | 0.5512 | 0.512  | 0.01                   |                | 0.015              |
|                |                   | 10     | 14     | 14     | 0.3                    | JRZ10x14x14JS1 | 0.008              |
| 10             |                   | 0.3937 | 0.5512 | 0.551  | 0.01                   |                | 0.018              |
|                |                   | 10     | 14     | 16     | 0.3                    | JR10x14x16     | 0.009              |
|                |                   | 0.3937 | 0.5512 | 0.630  | 0.01                   |                | 0.020              |

INNER RINGS – continued

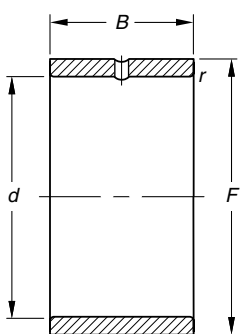
METRIC SERIES



JR, IM..P



JR.JS1



JRZ.JS1

| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|-------|------------------------|----------------|
|                | mm                | d      | F     | B     |                        |                |
| 10             | 10                | 14     | 20    | 0.3   | JR10x14x20             | 0.012<br>0.026 |
|                | 0.3937            | 0.5512 | 0.787 | 0.01  |                        |                |
| 12             | 12                | 15     | 12.5  | 0.3   | JR12x15x12.5           | 0.006<br>0.013 |
|                | 0.4724            | 0.5906 | 0.492 | 0.01  |                        |                |
|                | 12                | 15     | 16    | 0.3   | JR12x15x16             | 0.008<br>0.018 |
|                | 0.4724            | 0.5906 | 0.630 | 0.01  |                        |                |
|                | 12                | 15     | 16.5  | 0.3   | JR12x15x16.5           | 0.008<br>0.018 |
|                | 0.4724            | 0.5906 | 0.650 | 0.01  |                        |                |
|                | 12                | 15     | 18.5  | 0.3   | JR12x15x18.5           | 0.009<br>0.020 |
|                | 0.4724            | 0.5906 | 0.728 | 0.01  |                        |                |
|                | 12                | 15     | 22.4  | 0.2   | IM 12 15 22,4 P        | 0.011<br>0.024 |
|                | 0.4724            | 0.5906 | 0.882 | 0.01  |                        |                |
|                | 12                | 15     | 22.5  | 0.3   | JR12x15x22.5           | 0.011<br>0.024 |
|                | 0.4724            | 0.5906 | 0.886 | 0.01  |                        |                |
|                | 12                | 16     | 12    | 0.3   | JR12x16x12             | 0.008<br>0.018 |
|                | 0.4724            | 0.6299 | 0.472 | 0.01  |                        |                |
|                | 12                | 16     | 12    | 0.3   | JR12x16x12JS1          | 0.008<br>0.018 |
|                | 0.4724            | 0.6299 | 0.472 | 0.01  |                        |                |
|                | 12                | 16     | 13    | 0.3   | JR12x16x13             | 0.008<br>0.018 |
|                | 0.4724            | 0.6299 | 0.512 | 0.01  |                        |                |
|                | 12                | 16     | 14    | 0.3   | JR12x16x14JS1          | 0.010<br>0.022 |
|                | 0.4724            | 0.6299 | 0.551 | 0.01  |                        |                |
|                | 12                | 16     | 16    | 0.3   | JR12x16x16             | 0.011<br>0.024 |
|                | 0.4724            | 0.6299 | 0.630 | 0.01  |                        |                |
|                | 12                | 16     | 20    | 0.3   | JR12x16x20             | 0.014<br>0.031 |
|                | 0.4724            | 0.6299 | 0.787 | 0.01  |                        |                |
|                | 12                | 16     | 22    | 0.3   | JR12x16x22             | 0.015<br>0.033 |
|                | 0.4724            | 0.6299 | 0.866 | 0.01  |                        |                |
| 13             | 13                | 18     | 16    | 0.35  | IM 13 18 16 P          | 0.015<br>0.032 |
|                | 0.5118            | 0.7087 | 0.630 | 0.014 |                        |                |
| 14             | 14                | 17     | 17    | 0.3   | JR14x17x17             | 0.009<br>0.020 |
|                | 0.5512            | 0.6693 | 0.669 | 0.01  |                        |                |
| 15             | 15                | 18     | 16.5  | 0.3   | JR15x18x16.5           | 0.010<br>0.022 |
|                | 0.5906            | 0.7087 | 0.650 | 0.01  |                        |                |
|                | 15                | 19     | 16    | 0.3   | JR15x19x16             | 0.013<br>0.029 |
|                | 0.5906            | 0.7480 | 0.630 | 0.01  |                        |                |
|                | 15                | 19     | 20    | 0.3   | JR15x19x20             | 0.017<br>0.037 |
|                | 0.5906            | 0.7480 | 0.787 | 0.01  |                        |                |
|                | 15                | 20     | 12    | 0.3   | JR15x20x12             | 0.012<br>0.026 |
|                | 0.5906            | 0.7874 | 0.472 | 0.01  |                        |                |
|                | 15                | 20     | 12    | 0.3   | JR15x20x12JS1          | 0.012<br>0.026 |
|                | 0.5906            | 0.7874 | 0.472 | 0.01  |                        |                |
|                | 15                | 20     | 13    | 0.3   | JR15x20x13             | 0.014<br>0.031 |
|                | 0.5906            | 0.7874 | 0.512 | 0.01  |                        |                |
|                | 15                | 20     | 14    | 0.3   | JR15x20x14JS1          | 0.015<br>0.033 |
|                | 0.5906            | 0.7874 | 0.551 | 0.01  |                        |                |
|                | 15                | 20     | 16    | 0.3   | JR15x20x16             | 0.017<br>0.037 |
|                | 0.5906            | 0.7874 | 0.630 | 0.01  |                        |                |
|                | 15                | 20     | 20    | 0.35  | IM 15 20 20 P          | 0.021<br>0.045 |
|                | 0.5906            | 0.7874 | 0.787 | 0.014 |                        |                |
|                | 15                | 20     | 23    | 0.3   | JR15x20x23             | 0.025<br>0.055 |
|                | 0.5906            | 0.7874 | 0.906 | 0.01  |                        |                |
|                | 15                | 20     | 26    | 0.3   | JR15x20x26             | 0.028<br>0.062 |
|                | 0.5906            | 0.7874 | 1.024 | 0.01  |                        |                |

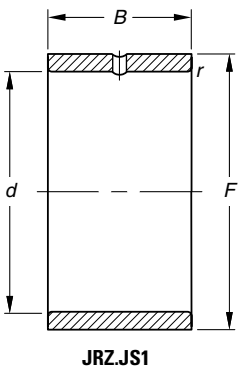
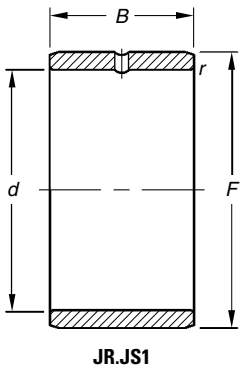
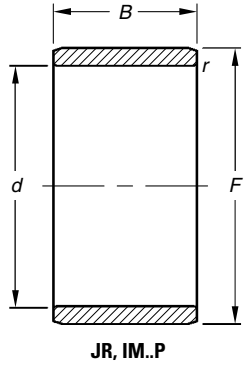
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# NEEDLE ROLLER BEARINGS

## INNER RINGS — *continued*

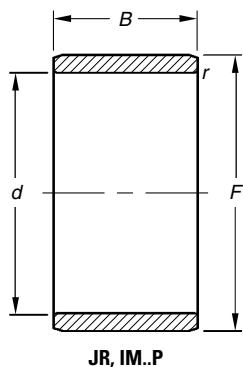
### METRIC SERIES



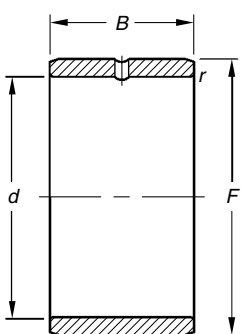
| Shaft Diameter | Dimensions mm/in. |        |        |       | Inner Ring Designation | Wt. kg/lbs.   |                    |
|----------------|-------------------|--------|--------|-------|------------------------|---------------|--------------------|
|                | mm                | d      | F      | B     |                        |               | r <sub>s min</sub> |
| 17             | 17                | 20     | 16.5   | 0.3   | JR17x20x16.5           | 0.011         |                    |
|                | 0.6693            | 0.7874 | 0.650  | 0.01  |                        | 0.024         |                    |
|                | 17                | 20     | 20     | 0.3   | JR17x20x20             | 0.014         |                    |
|                | 0.6693            | 0.7874 | 0.787  | 0.01  |                        | 0.031         |                    |
|                | 17                | 20     | 20.5   | 0.3   | JR17x20x20.5           | 0.014         |                    |
|                | 0.6693            | 0.7874 | 0.807  | 0.01  |                        | 0.031         |                    |
|                | 17                | 20     | 30.5   | 0.3   | JR17x20x30.5           | 0.021         |                    |
|                | 0.6693            | 0.7874 | 1.201  | 0.01  |                        | 0.046         |                    |
|                | 17                | 21     | 16     | 0.3   | JR17x21x16             | 0.015         |                    |
|                | 0.6693            | 0.8268 | 0.630  | 0.01  |                        | 0.033         |                    |
|                | 17                | 21     | 20     | 0.3   | JR17x21x20             | 0.019         |                    |
|                | 0.6693            | 0.8268 | 0.787  | 0.01  |                        | 0.042         |                    |
| 17             | 17                | 22     | 13     | 0.3   | JR17x22x13             | 0.015         |                    |
|                | 0.6693            | 0.8661 | 0.512  | 0.01  |                        | 0.033         |                    |
|                | 17                | 22     | 16     | 0.3   | JR17x22x16             | 0.019         |                    |
|                | 0.6693            | 0.8661 | 0.630  | 0.01  |                        | 0.042         |                    |
|                | 17                | 22     | 16     | 0.3   | JR17x22x16JS1          | 0.019         |                    |
|                | 0.6693            | 0.8661 | 0.630  | 0.01  |                        | 0.042         |                    |
|                | 17                | 22     | 16     | 0.3   | JRZ17x22x16JS1         | 0.019         |                    |
|                | 0.6693            | 0.8661 | 0.630  | 0.01  |                        | 0.042         |                    |
|                | 17                | 22     | 20     | 0.35  | IM 17 22 20 P          | 0.023         |                    |
|                | 0.6693            | 0.8661 | 0.787  | 0.014 |                        | 0.051         |                    |
|                | 17                | 22     | 23     | 0.3   | JR17x22x23             | 0.028         |                    |
|                | 0.6693            | 0.8661 | 0.906  | 0.01  |                        | 0.062         |                    |
| 17             | 17                | 22     | 26     | 0.3   | JR17x22x26             | 0.031         |                    |
|                | 0.6693            | 0.8661 | 1.024  | 0.01  |                        | 0.068         |                    |
|                | 17                | 22     | 32     | 0.3   | JR17x22x32             | 0.038         |                    |
|                | 0.6693            | 0.8661 | 1.260  | 0.01  |                        | 0.084         |                    |
|                | 20                | 20     | 24     | 16    | 0.3                    | JR20x24x16    | 0.018              |
|                |                   | 0.7874 | 0.9449 | 0.630 | 0.01                   |               | 0.040              |
|                |                   | 20     | 24     | 20    | 0.3                    | JR20x24x20    | 0.022              |
|                |                   | 0.7874 | 0.9449 | 0.787 | 0.01                   |               | 0.049              |
|                |                   | 20     | 25     | 16    | 0.3                    | JR20x25x16    | 0.022              |
|                |                   | 0.7874 | 0.9843 | 0.630 | 0.01                   |               | 0.049              |
|                |                   | 20     | 25     | 16    | 0.3                    | JR20x25x16JS1 | 0.022              |
|                |                   | 0.7874 | 0.9843 | 0.630 | 0.01                   |               | 0.049              |
| 20             |                   | 25     | 17     | 0.3   | JR20x25x17             | 0.023         |                    |
| 0.7874         |                   | 0.9843 | 0.669  | 0.01  |                        | 0.051         |                    |
| 20             |                   | 25     | 18     | 0.3   | JRZ20x25x18JS1         | 0.025         |                    |
| 0.7874         |                   | 0.9843 | 0.709  | 0.01  |                        | 0.055         |                    |
| 20             | 20                | 25     | 20     | 0.3   | JR20x25x20             | 0.028         |                    |
|                | 0.7874            | 0.9843 | 0.787  | 0.01  |                        | 0.062         |                    |
|                | 20                | 25     | 20.5   | 0.3   | JR20x25x20.5           | 0.029         |                    |
|                | 0.7874            | 0.9843 | 0.807  | 0.01  |                        | 0.064         |                    |
|                | 20                | 25     | 26     | 0.3   | JR20x25x26             | 0.036         |                    |
|                | 0.7874            | 0.9843 | 1.024  | 0.01  |                        | 0.079         |                    |
|                | 20                | 25     | 26.5   | 0.3   | JR20x25x26.5           | 0.037         |                    |
|                | 0.7874            | 0.9843 | 1.043  | 0.01  |                        | 0.082         |                    |
|                | 20                | 25     | 30     | 0.3   | JR20x25x30             | 0.042         |                    |
|                | 0.7874            | 0.9843 | 1.181  | 0.01  |                        | 0.093         |                    |
|                | 20                | 25     | 32     | 0.3   | JR20x25x32             | 0.044         |                    |
|                | 0.7874            | 0.9843 | 1.260  | 0.01  |                        | 0.097         |                    |
| 20             | 20                | 25     | 38.5   | 0.3   | JR20x25x38.5           | 0.054         |                    |
|                | 0.7874            | 0.9843 | 1.516  | 0.01  |                        | 0.119         |                    |

INNER RINGS — continued

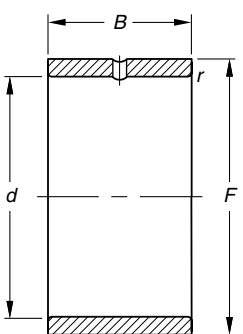
METRIC SERIES



JR, IM..P



JR.JS1



JRZ.JS1

| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Wt. kg/lbs. |
|----------------|-------------------|--------|-------|-------|------------------------|-------------|
|                | mm                | d      | F     | B     |                        |             |
| 22             | 22                | 26     | 16    | 0.3   | JR22x26x16             | 0.019       |
|                | 0.8661            | 1.0236 | 0.630 | 0.01  |                        | 0.042       |
| 22             | 22                | 26     | 20    | 0.3   | JR22x26x20             | 0.023       |
|                | 0.8661            | 1.0236 | 0.787 | 0.01  |                        | 0.051       |
| 22             | 22                | 28     | 17    | 0.3   | JR22x28x17             | 0.030       |
|                | 0.8661            | 1.1024 | 0.669 | 0.01  |                        | 0.066       |
| 22             | 22                | 28     | 20.5  | 0.3   | JR22x28x20.5           | 0.038       |
|                | 0.8661            | 1.1024 | 0.807 | 0.01  |                        | 0.084       |
| 22             | 22                | 28     | 30    | 0.3   | JR22x28x30             | 0.056       |
|                | 0.8661            | 1.1024 | 1.181 | 0.01  |                        | 0.123       |
| 23             | 23                | 28     | 20    | 0.35  | IM 23 28 20 P          | 0.030       |
|                | 0.9055            | 1.1024 | 0.787 | 0.014 |                        | 0.066       |
| 25             | 25                | 29     | 20    | 0.3   | JR25x29x20             | 0.027       |
|                | 0.9843            | 1.1417 | 0.787 | 0.01  |                        | 0.060       |
| 25             | 25                | 29     | 30    | 0.3   | JR25x29x30             | 0.040       |
|                | 0.9843            | 1.1417 | 1.181 | 0.01  |                        | 0.088       |
| 25             | 25                | 30     | 16    | 0.3   | JR25x30x16             | 0.027       |
|                | 0.9843            | 1.1811 | 0.630 | 0.01  |                        | 0.060       |
| 25             | 25                | 30     | 16    | 0.3   | JR25x30x16JS1          | 0.027       |
|                | 0.9843            | 1.1811 | 0.630 | 0.01  |                        | 0.060       |
| 25             | 25                | 30     | 17    | 0.3   | JR25x30x17             | 0.028       |
|                | 0.9843            | 1.1811 | 0.669 | 0.01  |                        | 0.062       |
| 25             | 25                | 30     | 18    | 0.3   | JR25x30x18JS1          | 0.031       |
|                | 0.9843            | 1.1811 | 0.709 | 0.01  |                        | 0.068       |
| 25             | 25                | 30     | 20    | 0.3   | JR25x30x20             | 0.034       |
|                | 0.9843            | 1.1811 | 0.787 | 0.01  |                        | 0.075       |
| 25             | 25                | 30     | 20.5  | 0.3   | JR25x30x20.5           | 0.035       |
|                | 0.9843            | 1.1811 | 0.807 | 0.01  |                        | 0.077       |
| 25             | 25                | 30     | 26    | 0.3   | JR25x30x26             | 0.044       |
|                | 0.9843            | 1.1811 | 1.024 | 0.01  |                        | 0.097       |
| 25             | 25                | 30     | 26.5  | 0.3   | JR25x30x26.5           | 0.045       |
|                | 0.9843            | 1.1811 | 1.043 | 0.01  |                        | 0.099       |
| 25             | 25                | 30     | 30    | 0.3   | JR25x30x30             | 0.051       |
|                | 0.9843            | 1.1811 | 1.181 | 0.01  |                        | 0.112       |
| 25             | 25                | 30     | 32    | 0.3   | JR25x30x32             | 0.054       |
|                | 0.9843            | 1.1811 | 1.260 | 0.01  |                        | 0.119       |
| 25             | 25                | 30     | 38.5  | 0.3   | JR25x30x38.5           | 0.066       |
|                | 0.9843            | 1.1811 | 1.516 | 0.01  |                        | 0.146       |
| 28             | 28                | 32     | 17    | 0.3   | JR28x32x17             | 0.028       |
|                | 1.1024            | 1.2598 | 0.669 | 0.01  |                        | 0.062       |
| 28             | 28                | 32     | 20    | 0.3   | JR28x32x20             | 0.030       |
|                | 1.1024            | 1.2598 | 0.787 | 0.01  |                        | 0.066       |
| 28             | 28                | 32     | 30    | 0.3   | JR28x32x30             | 0.044       |
|                | 1.1024            | 1.2598 | 1.181 | 0.01  |                        | 0.097       |
| 30             | 30                | 35     | 16    | 0.3   | JR30x35x16             | 0.031       |
|                | 1.1811            | 1.3780 | 0.630 | 0.01  |                        | 0.068       |
| 30             | 30                | 35     | 17    | 0.3   | JR30x35x17             | 0.033       |
|                | 1.1811            | 1.3780 | 0.669 | 0.01  |                        | 0.073       |
| 30             | 30                | 35     | 18    | 0.3   | JR30x35x18JS1          | 0.036       |
|                | 1.1811            | 1.3780 | 0.709 | 0.01  |                        | 0.079       |
| 30             | 30                | 35     | 20    | 0.3   | JR30x35x20             | 0.039       |
|                | 1.1811            | 1.3780 | 0.787 | 0.01  |                        | 0.086       |
| 30             | 30                | 35     | 20    | 0.3   | JR30x35x20JS1          | 0.039       |
|                | 1.1811            | 1.3780 | 0.787 | 0.01  |                        | 0.086       |

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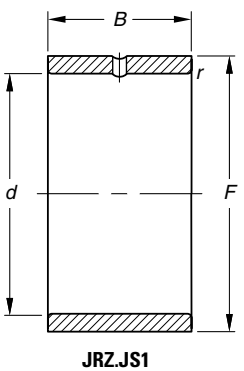
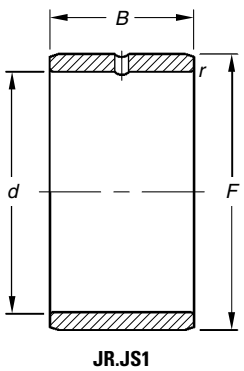
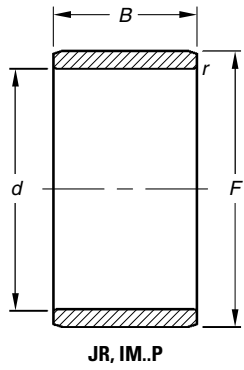




# NEEDLE ROLLER BEARINGS

## INNER RINGS — continued

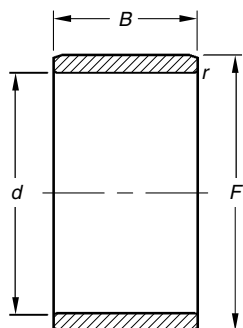
### METRIC SERIES



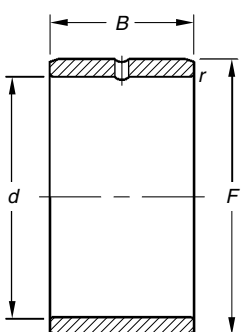
| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|-------|------------------------|----------------|
|                | mm                | d      | F     | B     |                        |                |
| 30             | 30                | 35     | 20.5  | 0.3   | JR30x35x20.5           | 0.040<br>0.088 |
|                | 1.1811            | 1.3780 | 0.807 | 0.01  |                        |                |
|                | 30                | 35     | 26    | 0.3   | JR30x35x26             | 0.054<br>0.119 |
| 30             | 1.1811            | 1.3780 | 1.024 | 0.01  |                        |                |
|                | 30                | 35     | 30    | 0.3   | JR30x35x30             | 0.057<br>0.126 |
|                | 1.1811            | 1.3780 | 1.181 | 0.01  |                        |                |
| 30             | 30                | 35     | 32    | 0.3   | JR30x35x32             | 0.062<br>0.137 |
|                | 1.1811            | 1.3780 | 1.260 | 0.01  |                        |                |
|                | 30                | 38     | 20    | 0.6   | JR30x38x20.JS1         | 0.067<br>0.148 |
| 32             | 1.1811            | 1.4961 | 0.787 | 0.02  |                        |                |
|                | 32                | 37     | 20    | 0.3   | JR32x37x20             | 0.043<br>0.095 |
|                | 1.2598            | 1.4567 | 0.787 | 0.01  |                        |                |
| 32             | 32                | 37     | 30    | 0.3   | JR32x37x30             | 0.064<br>0.141 |
|                | 1.2598            | 1.4567 | 1.181 | 0.01  |                        |                |
|                | 32                | 40     | 20    | 0.6   | JR32x40x20             | 0.069<br>0.152 |
| 32             | 1.2598            | 1.5748 | 0.787 | 0.02  |                        |                |
|                | 32                | 40     | 36    | 0.6   | JR32x40x36             | 0.128<br>0.282 |
|                | 1.2598            | 1.5748 | 1.417 | 0.02  |                        |                |
| 35             | 35                | 40     | 17    | 0.3   | JR35x40x17             | 0.040<br>0.088 |
|                | 1.3780            | 1.5748 | 0.669 | 0.01  |                        |                |
|                | 35                | 40     | 20    | 0.3   | JR35x40x20             | 0.046<br>0.101 |
| 35             | 1.3780            | 1.5748 | 0.787 | 0.01  |                        |                |
|                | 35                | 40     | 20.5  | 0.3   | JR35x40x20.5           | 0.049<br>0.108 |
|                | 1.3780            | 1.5748 | 0.807 | 0.01  |                        |                |
| 35             | 35                | 40     | 22    | 0.3   | JR35x40x22             | 0.052<br>0.115 |
|                | 1.3780            | 1.5748 | 0.866 | 0.01  |                        |                |
|                | 35                | 40     | 30    | 0.3   | JR35x40x30             | 0.071<br>0.157 |
| 35             | 1.3780            | 1.5748 | 1.181 | 0.01  |                        |                |
|                | 35                | 40     | 34    | 0.3   | JR35x40x34             | 0.080<br>0.176 |
|                | 1.3780            | 1.5748 | 1.339 | 0.01  |                        |                |
| 35             | 35                | 40     | 40    | 0.3   | JR35x40x40             | 0.094<br>0.207 |
|                | 1.3780            | 1.5748 | 1.575 | 0.01  |                        |                |
|                | 35                | 42     | 20    | 0.6   | JR35x42x20             | 0.065<br>0.143 |
| 35             | 1.3780            | 1.6535 | 0.787 | 0.02  |                        |                |
|                | 35                | 42     | 20    | 0.6   | JR35x42x20.JS1         | 0.065<br>0.143 |
|                | 1.3780            | 1.6535 | 0.787 | 0.02  |                        |                |
| 35             | 35                | 42     | 23    | 0.6   | JR35x42x23.JS1         | 0.074<br>0.163 |
|                | 1.3780            | 1.6535 | 0.906 | 0.02  |                        |                |
|                | 35                | 42     | 36    | 0.6   | JR35x42x36             | 0.122<br>0.269 |
| 35             | 1.3780            | 1.6535 | 1.417 | 0.02  |                        |                |
|                | 35                | 44     | 22    | 0.6   | JR35x44x22             | 0.097<br>0.214 |
|                | 1.3780            | 1.7323 | 0.866 | 0.02  |                        |                |
| 37             | 37                | 42     | 20    | 0.35  | IM 37 42 20 P          | 0.046<br>0.101 |
|                | 1.4567            | 1.6535 | 0.787 | 0.014 |                        |                |
| 38             | 38                | 43     | 20    | 0.3   | JR38x43x20             | 0.050<br>0.110 |
|                | 1.4961            | 1.6929 | 0.787 | 0.01  |                        |                |
|                | 38                | 43     | 30    | 0.3   | JR38x43x30             | 0.075<br>0.165 |
| 40             | 1.4961            | 1.6929 | 1.181 | 0.01  |                        |                |
|                | 40                | 45     | 17    | 0.3   | JR40x45x17             | 0.044<br>0.097 |
|                | 1.5748            | 1.7717 | 0.669 | 0.01  |                        |                |
| 40             | 40                | 45     | 20    | 0.3   | JR40x45x20             | 0.052<br>0.115 |
|                | 1.5748            | 1.7717 | 0.787 | 0.01  |                        |                |
|                | 40                | 45     | 20.5  | 0.3   | JR40x45x20.5           | 0.054<br>0.119 |
| 40             | 1.5748            | 1.7717 | 0.807 | 0.01  |                        |                |

INNER RINGS — continued

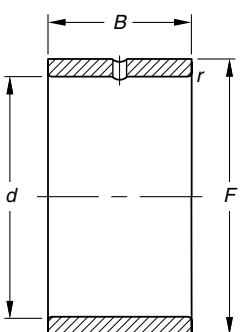
METRIC SERIES



JR, IM..P



JR.JS1



JRZ.JS1

| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Wt. kg/lbs. |
|----------------|-------------------|--------|-------|-------|------------------------|-------------|
|                | mm                | d      | F     | B     |                        |             |
| 40             | 40                | 45     | 25    | 0.35  | IM 40 45 25 P          | 0.062       |
|                | 1.5748            | 1.7717 | 0.984 | 0.014 |                        | 0.137       |
| 40             | 40                | 45     | 30    | 0.3   | JR40x45x30             | 0.078       |
|                | 1.5748            | 1.7717 | 1.181 | 0.01  |                        | 0.172       |
| 40             | 40                | 45     | 34    | 0.3   | JR40x45x34             | 0.089       |
|                | 1.5748            | 1.7717 | 1.339 | 0.01  |                        | 0.196       |
| 40             | 40                | 45     | 40    | 0.3   | JR40x45x40             | 0.115       |
|                | 1.5748            | 1.7717 | 1.575 | 0.01  |                        | 0.254       |
| 40             | 40                | 48     | 22    | 0.6   | JR40x48x22             | 0.094       |
|                | 1.5748            | 1.8898 | 0.866 | 0.02  |                        | 0.207       |
| 40             | 40                | 48     | 23    | 0.6   | JRZ40x48x23JS1         | 0.100       |
|                | 1.5748            | 1.8898 | 0.906 | 0.02  |                        | 0.220       |
| 40             | 40                | 48     | 40    | 0.6   | JR40x48x40             | 0.173       |
|                | 1.5748            | 1.8898 | 1.575 | 0.02  |                        | 0.381       |
| 40             | 40                | 50     | 20    | 1     | JR40x50x20             | 0.110       |
|                | 1.5748            | 1.9685 | 0.787 | 0.04  |                        | 0.243       |
| 42             | 42                | 47     | 20    | 0.3   | JR42x47x20             | 0.055       |
|                | 1.6535            | 1.8504 | 0.787 | 0.01  |                        | 0.121       |
| 42             | 42                | 47     | 30    | 0.3   | JR42x47x30             | 0.083       |
|                | 1.6535            | 1.8504 | 1.181 | 0.01  |                        | 0.183       |
| 45             | 45                | 50     | 20    | 0.3   | JR45x50x20             | 0.058       |
|                | 1.7717            | 1.9685 | 0.787 | 0.01  |                        | 0.128       |
| 45             | 45                | 50     | 25    | 0.6   | JR45x50x25             | 0.073       |
|                | 1.7717            | 1.9685 | 0.984 | 0.02  |                        | 0.161       |
| 45             | 45                | 50     | 25.5  | 0.3   | JR45x50x25.5           | 0.075       |
|                | 1.7717            | 1.9685 | 1.004 | 0.01  |                        | 0.165       |
| 45             | 45                | 50     | 35    | 0.6   | JR45x50x35             | 0.103       |
|                | 1.7717            | 1.9685 | 1.378 | 0.02  |                        | 0.227       |
| 45             | 45                | 50     | 40    | 0.3   | JR45x50x40             | 0.117       |
|                | 1.7717            | 1.9685 | 1.575 | 0.01  |                        | 0.258       |
| 45             | 45                | 52     | 22    | 0.6   | JR45x52x22             | 0.090       |
|                | 1.7717            | 2.0472 | 0.866 | 0.02  |                        | 0.198       |
| 45             | 45                | 52     | 23    | 0.6   | JR45x52x23             | 0.096       |
|                | 1.7717            | 2.0472 | 0.906 | 0.02  |                        | 0.212       |
| 45             | 45                | 52     | 23    | 0.6   | JRZ45x52x23JS1         | 0.096       |
|                | 1.7717            | 2.0472 | 0.906 | 0.02  |                        | 0.212       |
| 45             | 45                | 52     | 40    | 0.6   | JR45x52x40             | 0.167       |
|                | 1.7717            | 2.0472 | 1.575 | 0.02  |                        | 0.368       |
| 45             | 45                | 55     | 20    | 1     | JR45x55x20             | 0.133       |
|                | 1.7717            | 2.1654 | 0.787 | 0.04  |                        | 0.293       |
| 45             | 45                | 55     | 20    | 1     | JR45x55x20JS1          | 0.133       |
|                | 1.7717            | 2.1654 | 0.787 | 0.04  |                        | 0.293       |
| 45             | 45                | 55     | 22    | 1     | JR45x55x22             | 0.135       |
|                | 1.7717            | 2.1654 | 0.866 | 0.04  |                        | 0.298       |
| 45             | 45                | 55     | 40    | 1     | JR45x55x40             | 0.247       |
|                | 1.7717            | 2.1654 | 1.575 | 0.04  |                        | 0.545       |
| 50             | 50                | 55     | 20    | 0.3   | JR50x55x20             | 0.065       |
|                | 1.9685            | 2.1654 | 0.787 | 0.01  |                        | 0.143       |
| 50             | 50                | 55     | 25    | 0.6   | JR50x55x25             | 0.081       |
|                | 1.9685            | 2.1654 | 0.984 | 0.02  |                        | 0.179       |
| 50             | 50                | 55     | 35    | 0.65  | IM 50 55 35 P          | 0.107       |
|                | 1.9685            | 2.1654 | 1.378 | 0.026 |                        | 0.236       |
| 50             | 50                | 55     | 35    | 0.6   | JR50x55x35             | 0.113       |
|                | 1.9685            | 2.1654 | 1.378 | 0.02  |                        | 0.249       |

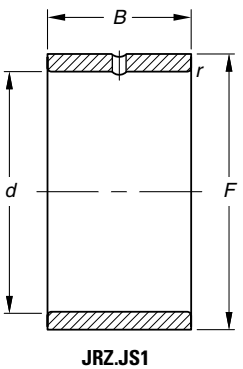
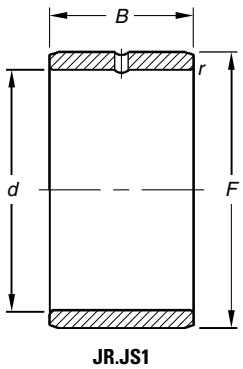
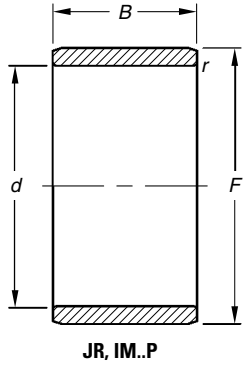
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# NEEDLE ROLLER BEARINGS

## INNER RINGS — continued

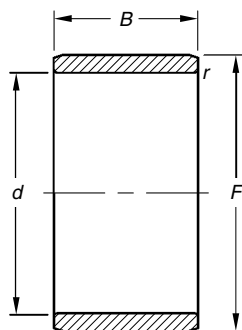
### METRIC SERIES



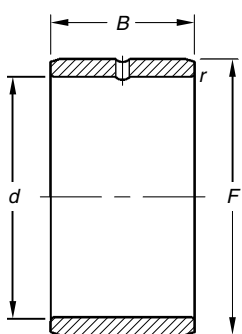
| Shaft Diameter | Dimensions mm/in. |        |       |       | Inner Ring Designation | Wt. kg/lbs. |                    |
|----------------|-------------------|--------|-------|-------|------------------------|-------------|--------------------|
|                | mm                | d      | F     | B     |                        |             | r <sub>s min</sub> |
| 50             | 50                | 55     | 40    | 0.3   | JR50x55x40             | 0.130       |                    |
|                | 1.9685            | 2.1654 | 1.575 | 0.01  |                        | 0.287       |                    |
|                | 50                | 58     | 22    | 0.6   | JR50x58x22             | 0.117       |                    |
|                | 1.9685            | 2.2835 | 0.866 | 0.02  |                        | 0.258       |                    |
|                | 50                | 58     | 23    | 0.6   | JRZ50x58x23JS1         | 0.122       |                    |
|                | 1.9685            | 2.2835 | 0.906 | 0.02  |                        | 0.269       |                    |
| 50             | 50                | 58     | 40    | 0.6   | JR50x58x40             | 0.213       |                    |
|                | 1.9685            | 2.2835 | 1.575 | 0.02  |                        | 0.470       |                    |
|                | 50                | 60     | 20    | 1     | JR50x60x20             | 0.155       |                    |
|                | 1.9685            | 2.3622 | 0.787 | 0.04  |                        | 0.342       |                    |
|                | 50                | 60     | 20    | 1     | JR50x60x20JS1          | 0.155       |                    |
|                | 1.9685            | 2.3622 | 0.787 | 0.04  |                        | 0.342       |                    |
| 50             | 50                | 60     | 25    | 1     | JR50x60x25             | 0.170       |                    |
|                | 1.9685            | 2.3622 | 0.984 | 0.04  |                        | 0.375       |                    |
|                | 50                | 60     | 40    | 1     | JR50x60x40             | 0.310       |                    |
|                | 1.9685            | 2.3622 | 1.575 | 0.04  |                        | 0.683       |                    |
|                | 55                | 55     | 60    | 25    | 0.6                    | JR55x60x25  | 0.088              |
|                | 2.1654            | 2.3622 | 0.984 | 0.02  |                        | 0.194       |                    |
| 55             | 55                | 60     | 35    | 0.65  | IM 55 60 35 P          | 0.118       |                    |
|                | 2.1654            | 2.3622 | 1.378 | 0.026 |                        | 0.260       |                    |
|                | 55                | 60     | 35    | 0.6   | JR55x60x35             | 0.124       |                    |
|                | 2.1654            | 2.3622 | 1.378 | 0.02  |                        | 0.273       |                    |
|                | 55                | 63     | 25    | 1     | JR55x63x25             | 0.141       |                    |
|                | 2.1654            | 2.4803 | 0.984 | 0.04  |                        | 0.311       |                    |
| 55             | 55                | 63     | 45    | 1     | JR55x63x45             | 0.286       |                    |
|                | 2.1654            | 2.4803 | 1.772 | 0.04  |                        | 0.631       |                    |
|                | 55                | 65     | 30    | 1     | JR55x65x30             | 0.222       |                    |
|                | 2.1654            | 2.5591 | 1.181 | 0.04  |                        | 0.489       |                    |
|                | 55                | 65     | 60    | 1     | JR55x65x60             | 0.444       |                    |
|                | 2.1654            | 2.5591 | 2.362 | 0.04  |                        | 0.979       |                    |
| 58             | 58                | 65     | 25    | 0.85  | IM 58 65 25 P          | 0.125       |                    |
| 2.2835         | 2.5591            | 0.984  | 0.033 |       | 0.276                  |             |                    |
| 60             | 60                | 68     | 25    | 0.6   | JR60x68x25             | 0.153       |                    |
|                | 2.3622            | 2.6772 | 0.984 | 0.02  |                        | 0.337       |                    |
|                | 60                | 68     | 35    | 0.6   | JR60x68x35             | 0.220       |                    |
|                | 2.3622            | 2.6772 | 1.378 | 0.02  |                        | 0.485       |                    |
|                | 60                | 68     | 45    | 1     | JR60x68x45             | 0.284       |                    |
|                | 2.3622            | 2.6772 | 1.772 | 0.04  |                        | 0.626       |                    |
| 60             | 60                | 70     | 25    | 1     | JR60x70x25             | 0.200       |                    |
|                | 2.3622            | 2.7559 | 0.984 | 0.04  |                        | 0.441       |                    |
|                | 60                | 70     | 30    | 1     | JR60x70x30             | 0.240       |                    |
|                | 2.3622            | 2.7559 | 1.181 | 0.04  |                        | 0.529       |                    |
|                | 60                | 70     | 35    | 0.85  | IM 60 70 35 P          | 0.280       |                    |
|                | 2.3622            | 2.7559 | 1.378 | 0.033 |                        | 0.616       |                    |
| 60             | 60                | 70     | 60    | 1     | JR60x70x60             | 0.480       |                    |
|                | 2.3622            | 2.7559 | 2.362 | 0.04  |                        | 1.058       |                    |
|                | 65                | 65     | 72    | 25    | JR65x72x25             | 0.143       |                    |
|                | 2.5591            | 2.8346 | 0.984 | 0.04  |                        | 0.315       |                    |
|                | 65                | 72     | 45    | 1     | JR65x72x45             | 0.266       |                    |
|                | 2.5591            | 2.8346 | 1.772 | 0.04  |                        | 0.586       |                    |
| 65             | 65                | 73     | 25    | 0.6   | JR65x73x25             | 0.170       |                    |
|                | 2.5591            | 2.8740 | 0.984 | 0.02  |                        | 0.375       |                    |
|                | 65                | 73     | 35    | 0.6   | JR65x73x35             | 0.240       |                    |
|                | 2.5591            | 2.8740 | 1.378 | 0.02  |                        | 0.529       |                    |
|                | 65                | 75     | 28    | 1     | JR65x75x28             | 0.240       |                    |
|                | 2.5591            | 2.9528 | 1.102 | 0.04  |                        | 0.529       |                    |

INNER RINGS — *continued*

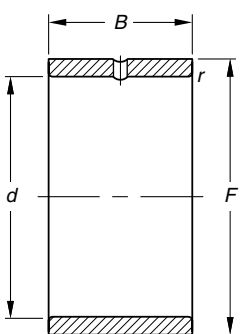
METRIC SERIES



JR, IM..P



JR.JS1



JRZ.JS1

| Shaft Diameter | Dimensions mm/in. |        |       |      | Inner Ring Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|------|------------------------|----------------|
|                | mm                | d      | F     | B    |                        |                |
| 65             | 65                | 75     | 30    | 1    | JR65x75x30             | 0.260<br>0.573 |
|                | 2.5591            | 2.9528 | 1.181 | 0.04 |                        |                |
| 65             | 65                | 75     | 60    | 1    | JR65x75x60             | 0.520<br>1.146 |
|                | 2.5591            | 2.9528 | 2.362 | 0.04 |                        |                |
| 70             | 70                | 80     | 25    | 1    | JR70x80x25             | 0.230<br>0.507 |
|                | 2.7559            | 3.1496 | 0.984 | 0.04 |                        |                |
| 70             | 70                | 80     | 30    | 1    | JR70x80x30             | 0.270<br>0.595 |
|                | 2.7559            | 3.1496 | 1.181 | 0.04 |                        |                |
| 70             | 70                | 80     | 35    | 1    | JR70x80x35             | 0.320<br>0.705 |
|                | 2.7559            | 3.1496 | 1.378 | 0.04 |                        |                |
| 70             | 70                | 80     | 54    | 1    | JR70x80x54             | 0.500<br>1.102 |
|                | 2.7559            | 3.1496 | 2.126 | 0.04 |                        |                |
| 70             | 70                | 80     | 60    | 1    | JR70x80x60             | 0.556<br>1.226 |
|                | 2.7559            | 3.1496 | 2.362 | 0.04 |                        |                |
| 75             | 75                | 85     | 25    | 1    | JR75x85x25             | 0.240<br>0.529 |
|                | 2.9528            | 3.3465 | 0.984 | 0.04 |                        |                |
| 75             | 75                | 85     | 30    | 1    | JR75x85x30             | 0.289<br>0.637 |
|                | 2.9528            | 3.3465 | 1.181 | 0.04 |                        |                |
| 75             | 75                | 85     | 35    | 1    | JR75x85x35             | 0.338<br>0.745 |
|                | 2.9528            | 3.3465 | 1.378 | 0.04 |                        |                |
| 75             | 75                | 85     | 54    | 1    | JR75x85x54             | 0.530<br>1.168 |
|                | 2.9528            | 3.3465 | 2.126 | 0.04 |                        |                |
| 80             | 80                | 90     | 25    | 1    | JR80x90x25             | 0.260<br>0.573 |
|                | 3.1496            | 3.5433 | 0.984 | 0.04 |                        |                |
| 80             | 80                | 90     | 30    | 1    | JR80x90x30             | 0.306<br>0.675 |
|                | 3.1496            | 3.5433 | 1.181 | 0.04 |                        |                |
| 80             | 80                | 90     | 35    | 1    | JR80x90x35             | 0.355<br>0.783 |
|                | 3.1496            | 3.5433 | 1.378 | 0.04 |                        |                |
| 80             | 80                | 90     | 54    | 1    | JR80x90x54             | 0.565<br>1.246 |
|                | 3.1496            | 3.5433 | 2.126 | 0.04 |                        |                |
| 85             | 85                | 95     | 26    | 1    | JR85x95x26             | 0.290<br>0.639 |
|                | 3.3465            | 3.7402 | 1.024 | 0.04 |                        |                |
| 85             | 85                | 95     | 30    | 1    | JR85x95x30             | 0.334<br>0.736 |
|                | 3.3465            | 3.7402 | 1.181 | 0.04 |                        |                |
| 85             | 85                | 95     | 36    | 1    | JR85x95x36             | 0.397<br>0.875 |
|                | 3.3465            | 3.7402 | 1.417 | 0.04 |                        |                |
| 85             | 85                | 100    | 35    | 1.1  | JR85x100x35            | 0.595<br>1.312 |
|                | 3.3465            | 3.9370 | 1.378 | 0.04 |                        |                |
| 85             | 85                | 100    | 63    | 1.1  | JR85x100x63            | 1.080<br>2.381 |
|                | 3.3465            | 3.9370 | 2.480 | 0.04 |                        |                |
| 90             | 90                | 100    | 26    | 1    | JR90x100x26            | 0.300<br>0.661 |
|                | 3.5433            | 3.9370 | 1.024 | 0.04 |                        |                |
| 90             | 90                | 100    | 30    | 1    | JR90x100x30            | 0.350<br>0.772 |
|                | 3.5433            | 3.9370 | 1.181 | 0.04 |                        |                |
| 90             | 90                | 100    | 36    | 1    | JR90x100x36            | 0.422<br>0.930 |
|                | 3.5433            | 3.9370 | 1.417 | 0.04 |                        |                |
| 90             | 90                | 105    | 32    | 1.1  | JR90x105x32            | 0.580<br>1.279 |
|                | 3.5433            | 4.1339 | 1.260 | 0.04 |                        |                |
| 90             | 90                | 105    | 35    | 1.1  | JR90x105x35            | 0.624<br>1.376 |
|                | 3.5433            | 4.1339 | 1.378 | 0.04 |                        |                |
| 90             | 90                | 105    | 63    | 1.1  | JR90x105x63            | 1.140<br>2.513 |
|                | 3.5433            | 4.1339 | 2.480 | 0.04 |                        |                |
| 95             | 95                | 105    | 26    | 1    | JR95x105x26            | 0.310<br>0.683 |
|                | 3.7402            | 4.1339 | 1.024 | 0.04 |                        |                |

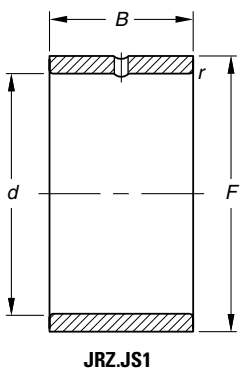
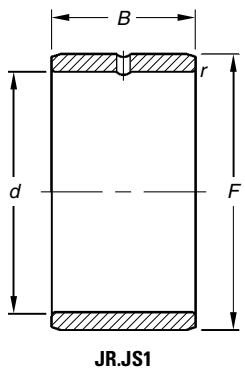
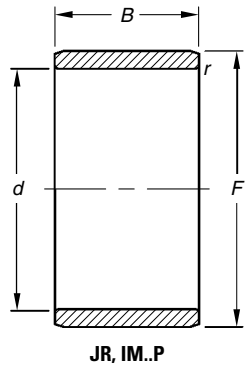
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# NEEDLE ROLLER BEARINGS

## INNER RINGS — *continued*

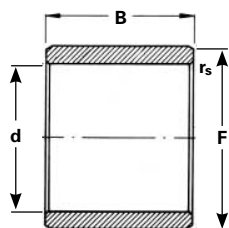
### METRIC SERIES



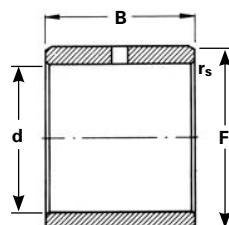
| Shaft Diameter | Dimensions mm/in. |        |       |      | Inner Ring Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|------|------------------------|----------------|
|                | mm                | d      | F     | B    |                        |                |
| 95             | 95                | 105    | 36    | 1    | JR95x105x36            | 0.430<br>0.948 |
|                | 3.7402            | 4.1339 | 1.417 | 0.04 |                        |                |
|                | 95                | 110    | 35    | 1.1  |                        |                |
| 95             | 3.7402            | 4.3307 | 1.378 | 0.04 | JR95x110x63            | 1.200<br>2.646 |
|                | 95                | 110    | 63    | 1.1  |                        |                |
|                | 3.7402            | 4.3307 | 2.480 | 0.04 |                        |                |
| 100            | 100               | 110    | 30    | 1.1  | JR100x110x30           | 0.384<br>0.847 |
|                | 3.9370            | 4.3307 | 1.181 | 0.04 |                        |                |
|                | 100               | 110    | 40    | 1.1  |                        |                |
| 100            | 3.9370            | 4.3307 | 1.575 | 0.04 | JR100x115x40           | 0.790<br>1.742 |
|                | 100               | 115    | 40    | 1.1  |                        |                |
|                | 3.9370            | 4.5276 | 1.575 | 0.04 |                        |                |
| 110            | 110               | 120    | 30    | 1    | JR110x120x30           | 0.425<br>0.937 |
|                | 4.3307            | 4.7244 | 1.181 | 0.04 |                        |                |
|                | 110               | 125    | 40    | 1.1  |                        |                |
| 110            | 4.3307            | 4.9213 | 1.575 | 0.04 | JR120x130x30           | 0.460<br>1.014 |
|                | 120               | 130    | 30    | 1    |                        |                |
|                | 4.7244            | 5.1181 | 1.181 | 0.04 |                        |                |
| 120            | 120               | 135    | 45    | 1.1  | JR120x135x45           | 1.060<br>2.337 |
|                | 4.7244            | 5.3150 | 1.772 | 0.04 |                        |                |
|                | 130               | 145    | 35    | 1.1  |                        |                |
| 130            | 5.1181            | 5.7087 | 1.378 | 0.04 | JR130x150x50           | 1.730<br>3.814 |
|                | 130               | 150    | 50    | 1.5  |                        |                |
|                | 5.1181            | 5.9055 | 1.969 | 0.06 |                        |                |
| 140            | 140               | 155    | 35    | 1.1  | JR140x155x35           | 0.955<br>2.105 |
|                | 5.5118            | 6.1024 | 1.378 | 0.04 |                        |                |
|                | 140               | 160    | 50    | 1.5  |                        |                |
| 140            | 5.5118            | 6.2992 | 1.969 | 0.06 | JR150x165x40           | 1.170<br>2.579 |
|                | 150               | 165    | 40    | 1.1  |                        |                |
|                | 5.9055            | 6.4961 | 1.575 | 0.04 |                        |                |
| 160            | 160               | 175    | 40    | 1.1  | JR160x175x40           | 1.240<br>2.734 |
| 170            | 6.2992            | 6.8898 | 1.575 | 0.04 | JR170x185x45           | 1.480<br>3.263 |
|                | 170               | 185    | 45    | 1.1  |                        |                |
|                | 6.6929            | 7.2835 | 1.772 | 0.04 |                        |                |
| 180            | 180               | 195    | 45    | 1.1  | JR180x195x45           | 1.560<br>3.439 |
|                | 7.0866            | 7.6772 | 1.772 | 0.04 |                        |                |

## INNER RINGS FOR FULL COMPLEMENT NEEDLE ROLLER BEARINGS

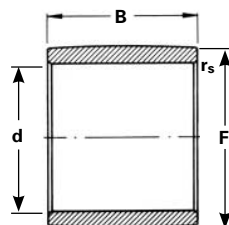
### METRIC SERIES



IM



IMC



IM...R6

| Shaft Diameter | Dimensions mm/in. |        |       | Hole mm/in. <sup>(1)</sup><br>Location | r <sub>s</sub> min | Bearing Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|----------------------------------------|--------------------|---------------------|----------------|
|                | mm                | g5     |       |                                        |                    |                     |                |
| 8              | 8                 | 12     | 12.4  |                                        | 0.3<br>0.01        | IM 8 12 12.4        | 0.006<br>0.013 |
|                | 0.3150            | 0.4724 | 0.488 |                                        |                    |                     |                |
| 9              | 9                 | 13     | 12.4  |                                        | 0.3<br>0.01        | IM 9 13 12.4        | 0.006<br>0.014 |
|                | 0.3543            | 0.5118 | 0.488 |                                        |                    |                     |                |
|                | 9                 | 13     | 12.4  |                                        | 0.3<br>0.01        | IM 9 13 12.4 R6     | 0.006<br>0.014 |
|                | 0.3543            | 0.5118 | 0.488 |                                        |                    |                     |                |
| 10             | 10                | 14     | 12.4  |                                        | 0.3<br>0.01        | IM 10 14 12.4       | 0.007<br>0.015 |
|                | 0.3937            | 0.5512 | 0.488 |                                        |                    |                     |                |
|                | 10                | 14     | 16.4  |                                        | 0.3<br>0.01        | IM 10 14 16.4       | 0.009<br>0.020 |
|                | 0.3937            | 0.5512 | 0.646 |                                        |                    |                     |                |
| 11             | 11                | 15     | 12.4  |                                        | 0.3<br>0.01        | IM 11 15 12.4       | 0.008<br>0.018 |
|                | 0.4331            | 0.5906 | 0.488 |                                        |                    |                     |                |
| 12             | 12                | 15     | 12.4  |                                        | 0.2<br>0.01        | IM 12 15 12.4       | 0.006<br>0.013 |
|                | 0.4724            | 0.5906 | 0.488 |                                        |                    |                     |                |
|                | 12                | 16     | 12.4  |                                        | 0.2<br>0.01        | IM 12 16 12.4       | 0.008<br>0.018 |
|                | 0.4724            | 0.6299 | 0.488 |                                        |                    |                     |                |
|                | 12                | 16     | 12.4  |                                        | 0.3<br>0.01        | IM 12 16 12.4 R6    | 0.008<br>0.018 |
|                | 0.4724            | 0.6299 | 0.488 |                                        |                    |                     |                |
|                | 12                | 16     | 12.4  | 6.2<br>0.24                            | 0.3<br>0.01        | IMC 12 16 12.4      | 0.008<br>0.018 |
|                | 0.4724            | 0.6297 | 0.488 |                                        |                    |                     |                |
| 13             | 13                | 17     | 12.4  |                                        | 0.3<br>0.01        | IM 13 17 12.4       | 0.009<br>0.019 |
|                | 0.5118            | 0.6693 | 0.488 |                                        |                    |                     |                |
|                | 13                | 18     | 12.4  |                                        | 0.35<br>0.014      | IM 13 18 12.4       | 0.011<br>0.025 |
|                | 0.5118            | 0.7087 | 0.488 |                                        |                    |                     |                |
|                | 13                | 18     | 12.4  |                                        | 0.35<br>0.014      | IM 13 18 12.4 R6    | 0.011<br>0.025 |
|                | 0.5118            | 0.7087 | 0.488 |                                        |                    |                     |                |
|                | 13                | 18     | 16.4  |                                        | 0.35<br>0.014      | IM 13 18 16.4       | 0.015<br>0.033 |
|                | 0.5118            | 0.7087 | 0.646 |                                        |                    |                     |                |
| 15             | 15                | 20     | 12.4  |                                        | 0.35<br>0.014      | IM 15 20 12.4       | 0.013<br>0.028 |
|                | 0.5906            | 0.7874 | 0.488 |                                        |                    |                     |                |
|                | 15                | 20     | 16.4  |                                        | 0.35<br>0.014      | IM 15 20 16.4       | 0.017<br>0.037 |
|                | 0.5906            | 0.7874 | 0.646 |                                        |                    |                     |                |
|                | 17                | 22     | 16.4  |                                        | 0.35<br>0.014      | IM 17 22 16.4       | 0.019<br>0.041 |
|                | 0.6693            | 0.8661 | 0.646 |                                        |                    |                     |                |
|                | 17                | 22     | 16.4  |                                        | 0.35<br>0.014      | IM 17 22 16.4 R6    | 0.019<br>0.041 |
|                | 0.6693            | 0.8661 | 0.646 |                                        |                    |                     |                |
| 17             | 17                | 22     | 16.4  | 8.2<br>0.32                            | 0.35<br>0.014      | IMC 17 22 16.4      | 0.019<br>0.041 |
|                | 0.6693            | 0.8659 | 0.646 |                                        |                    |                     |                |
| 20             | 20                | 25     | 16.4  |                                        | 0.35<br>0.014      | IM 20 25 16.4       | 0.022<br>0.047 |
|                | 0.7874            | 0.9843 | 0.646 |                                        |                    |                     |                |
|                | 20                | 25     | 16.4  |                                        | 0.35<br>0.014      | IM 20 25 16.4 R6    | 0.022<br>0.047 |
|                | 0.7874            | 0.9843 | 0.646 |                                        |                    |                     |                |
|                | 20                | 25     | 16.4  | 8.2<br>0.32                            | 0.35<br>0.014      | IMC 20 25 16.4      | 0.022<br>0.047 |
|                | 0.7874            | 0.9840 | 0.646 |                                        |                    |                     |                |
|                | 20                | 25     | 20.4  |                                        | 0.35<br>0.014      | IM 20 25 20.4       | 0.027<br>0.060 |
|                | 0.7874            | 0.9843 | 0.803 |                                        |                    |                     |                |
|                | 20                | 25     | 20.4  | 10.2<br>0.40                           | 0.35<br>0.014      | IMC 20 25 20.4      | 0.027<br>0.060 |
|                | 0.7874            | 0.9840 | 0.803 |                                        |                    |                     |                |
|                | 20                | 25     | 25.0  |                                        | 0.35<br>0.014      | IM 20 25 25         | 0.033<br>0.073 |
|                | 0.7874            | 0.9843 | 0.984 |                                        |                    |                     |                |
| 23             | 23                | 28     | 20.4  |                                        | 0.35<br>0.014      | IM 23 28 20.4       | 0.031<br>0.067 |
|                | 0.9055            | 1.1024 | 0.803 |                                        |                    |                     |                |
| 25             | 25                | 30     | 16.4  |                                        | 0.35<br>0.014      | IM 25 30 16.4       | 0.027<br>0.058 |
|                | 0.9843            | 1.1811 | 0.646 |                                        |                    |                     |                |
|                | 25                | 30     | 16.4  |                                        | 0.35<br>0.014      | IM 25 30 16.4 R6    | 0.027<br>0.058 |
|                | 0.9843            | 1.1811 | 0.646 |                                        |                    |                     |                |

<sup>(1)</sup> single 2 mm dia. thru hole

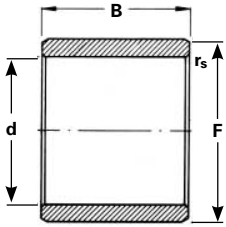
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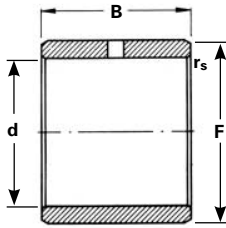
# NEEDLE ROLLER BEARINGS

## INNER RINGS FOR FULL COMPLEMENT NEEDLE ROLLER BEARINGS — *continued*

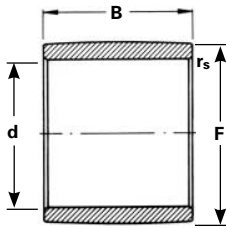
### METRIC SERIES



IM



IMC



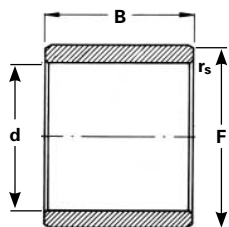
IM...R6

| Shaft Diameter | Dimensions mm/in. |        |       | Hole mm/in. <sup>(1)</sup><br>Location | r <sub>s</sub> min | Bearing Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|----------------------------------------|--------------------|---------------------|----------------|
|                | mm                | g5     |       |                                        |                    |                     |                |
| 25             | 25                | 30     | 16.4  | 8.2<br>0.32                            | 0.35<br>0.014      | IMC 25 30 16.4      | 0.027<br>0.058 |
|                | 0.9843            | 1.1808 | 0.646 |                                        |                    |                     |                |
|                | 25                | 30     | 20.4  |                                        | 0.35<br>0.014      | IM 25 30 20.4       | 0.033<br>0.073 |
| 25             | 25                | 30     | 20.4  | 10.2<br>0.40                           | 0.35<br>0.014      | IMC 25 30 20.4      | 0.033<br>0.073 |
|                | 0.9843            | 1.1808 | 0.803 |                                        |                    |                     |                |
|                | 25                | 30     | 25    |                                        | 0.35<br>0.014      | IM 25 30 25         | 0.040<br>0.088 |
| 30             | 30                | 35     | 16.4  |                                        | 0.35<br>0.014      | IM 30 35 16.4       | 0.031<br>0.068 |
|                | 1.1811            | 1.3780 | 0.646 |                                        |                    |                     |                |
|                | 30                | 35     | 16.4  | 8.2<br>0.32                            | 0.35<br>0.014      | IMC 30 35 16.4      | 0.031<br>0.068 |
| 1.1811         | 1.3780            | 0.646  |       |                                        |                    |                     |                |
| 30             | 30                | 35     | 20.4  |                                        | 0.35<br>0.014      | IM 30 35 20.4       | 0.039<br>0.086 |
|                | 1.1811            | 1.3780 | 0.803 |                                        |                    |                     |                |
|                | 30                | 35     | 20.4  | 10.2<br>0.40                           | 0.35<br>0.014      | IMC 30 35 20.4      | 0.039<br>0.086 |
| 1.1811         | 1.3776            | 0.803  |       |                                        |                    |                     |                |
| 30             | 30                | 35     | 25.0  |                                        | 0.35<br>0.014      | IM 30 35 25         | 0.048<br>0.106 |
|                | 1.1811            | 1.3780 | 0.984 |                                        |                    |                     |                |
|                | 35                | 35     | 40    | 16.4                                   |                    | 0.35<br>0.014       | IM 35 40 16.4  |
| 1.3780         |                   | 1.5748 | 0.646 |                                        |                    |                     |                |
| 35             |                   | 40     | 16.4  |                                        | 0.35<br>0.014      | IM 35 40 16.4 R6    | 0.036<br>0.079 |
| 1.3780         | 1.5748            | 0.646  |       |                                        |                    |                     |                |
| 35             | 35                | 40     | 20.4  |                                        | 0.35<br>0.014      | IM 35 40 20.4       | 0.045<br>0.099 |
|                | 1.3780            | 1.5748 | 0.803 |                                        |                    |                     |                |
|                | 35                | 40     | 20.4  | 10.2<br>0.40                           | 0.35<br>0.014      | IMC 35 40 20.4      | 0.045<br>0.099 |
| 1.3780         | 1.5748            | 0.803  |       |                                        |                    |                     |                |
| 35             | 35                | 40     | 25    |                                        | 0.35<br>0.014      | IM 35 40 25         | 0.055<br>0.121 |
|                | 1.3780            | 1.5748 | 0.984 |                                        |                    |                     |                |
|                | 40                | 40     | 44    | 16.4                                   |                    | 0.3<br>0.01         | IM 40 44 16.4  |
| 1.5748         |                   | 1.7323 | 0.646 |                                        |                    |                     |                |
| 40             |                   | 44     | 16.4  | 8.2<br>0.32                            | 0.3<br>0.01        | IMC 40 44 16.4      | 0.032<br>0.071 |
| 1.5748         | 1.7323            | 0.646  |       |                                        |                    |                     |                |
| 40             | 40                | 44     | 16.4  |                                        | 0.35<br>0.014      | IM 40 44 16.4       | 0.032<br>0.071 |
|                | 1.5748            | 1.7319 | 0.646 |                                        |                    |                     |                |
|                | 40                | 45     | 20.4  | 10.2<br>0.40                           | 0.35<br>0.014      | IMC 40 45 20.4      | 0.05<br>0.112  |
| 1.5748         | 1.7717            | 0.803  |       |                                        |                    |                     |                |
| 45             | 45                | 50     | 20.4  |                                        | 0.65<br>0.026      | IM 45 50 20.4       | 0.056<br>0.123 |
|                | 1.7717            | 1.9685 | 0.803 |                                        |                    |                     |                |
|                | 45                | 50     | 20.4  |                                        | 0.65<br>0.026      | IM 45 50 20.4 R6    | 0.056<br>0.123 |
| 1.7717         | 1.9685            | 0.803  |       |                                        |                    |                     |                |
| 45             | 45                | 50     | 25    |                                        | 0.65<br>0.026      | IM 45 50 25         | 0.069<br>0.152 |
|                | 1.7717            | 1.9685 | 0.984 |                                        |                    |                     |                |
|                | 45                | 60     | 25    | 10.2<br>0.40                           | 0.65<br>0.026      | IMC 45 50 25 R6     | 0.069<br>0.152 |
| 1.7717         | 2.3622            | 0.984  |       |                                        |                    |                     |                |
| 50             | 50                | 55     | 20.4  |                                        | 0.65<br>0.026      | IM 50 55 20.4 R6    | 0.062<br>0.137 |
|                | 1.9685            | 2.1654 | 0.803 |                                        |                    |                     |                |
|                | 50                | 55     | 20.4  |                                        | 0.65<br>0.026      | IM 50 55 20.4       | 0.062<br>0.137 |
| 1.9685         | 2.1654            | 0.803  |       |                                        |                    |                     |                |

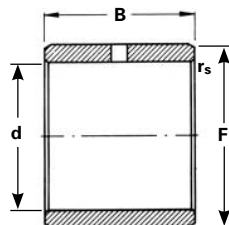
<sup>(1)</sup> single 2 mm dia. thru hole

## INNER RINGS FOR FULL COMPLEMENT NEEDLE ROLLER BEARINGS

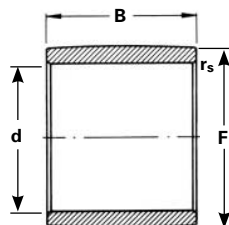
### METRIC SERIES



IM



IMC



IM...R6

| Shaft Diameter | Dimensions mm/in. |        |        |       | Bearing Designation    | Wt. kg/lbs.            |        |
|----------------|-------------------|--------|--------|-------|------------------------|------------------------|--------|
|                | mm                | d      | F      | B     |                        |                        | rs min |
| 17             | 17                | 17     | 20     | 27.5  | 0.2                    | IM 19017               | 0.019  |
|                |                   | 0.6693 | 0.7874 | 1.083 | 0.01                   |                        | 0.042  |
|                |                   | 17     | 20     | 32    | 0.2                    | IM 20617               | 0.021  |
|                |                   | 0.6693 | 0.7874 | 1.240 | 0.01                   |                        | 0.046  |
|                | 17                | 22     | 13     | 0.35  | IM 4903 <sup>(1)</sup> | 0.015                  |        |
|                |                   | 0.6693 | 0.8665 | 0.512 | 0.014                  |                        | 0.033  |
| 20             | 20                | 20     | 25     | 27.5  | 0.35                   | IM 19020               | 0.038  |
|                |                   | 0.7874 | 0.9843 | 1.083 | 0.014                  |                        | 0.084  |
|                |                   | 20     | 25     | 32    | 0.35                   | IM 20620               | 0.044  |
|                |                   | 0.7874 | 0.9843 | 1.240 | 0.014                  |                        | 0.097  |
| 25             | 25                | 25     | 30     | 27.5  | 0.35                   | IM 19025               | 0.042  |
|                |                   | 0.9843 | 1.1811 | 1.083 | 0.014                  |                        | 0.093  |
|                |                   | 25     | 30     | 32    | 0.35                   | IM 20625               | 0.052  |
|                |                   | 0.9843 | 1.1811 | 1.240 | 0.014                  |                        | 0.115  |
| 30             | 30                | 30     | 35     | 17    | 0.35                   | IM 4906 <sup>(1)</sup> | 0.033  |
|                |                   | 1.1811 | 1.3785 | 0.669 | 0.014                  |                        | 0.072  |
|                |                   | 30     | 35     | 27.5  | 0.35                   | IM 19030               | 0.053  |
|                |                   | 1.1811 | 1.3780 | 1.083 | 0.014                  |                        | 0.117  |
|                | 30                | 35     | 32     | 0.35  | IM 20630               | 0.061                  |        |
|                |                   | 1.1811 | 1.3780 | 1.240 | 0.014                  |                        | 0.134  |
| 35             | 35                | 35     | 40     | 27.5  | 0.35                   | IM 19035               | 0.063  |
|                |                   | 1.3780 | 1.5748 | 1.083 | 0.014                  |                        | 0.139  |
|                |                   | 35     | 40     | 32    | 0.35                   | IM 20635               | 0.072  |
|                |                   | 1.3780 | 1.5748 | 1.240 | 0.014                  |                        | 0.159  |
| 40             | 40                | 40     | 45     | 27.5  | 0.35                   | IM 19040               | 0.069  |
|                |                   | 1.5748 | 1.7717 | 1.083 | 0.014                  |                        | 0.152  |
|                |                   | 40     | 45     | 32    | 0.35                   | IM 20640               | 0.080  |
|                |                   | 1.5748 | 1.7717 | 1.240 | 0.014                  |                        | 0.176  |
| 45             | 45                | 45     | 50     | 30.5  | 0.65                   | IM 19045               | 0.085  |
|                |                   | 1.7717 | 1.9685 | 1.201 | 0.026                  |                        | 0.187  |
|                |                   | 45     | 50     | 35    | 0.65                   | IM 20645               | 0.096  |
|                |                   | 1.7717 | 1.9685 | 1.358 | 0.026                  |                        | 0.212  |
|                | 45                | 52     | 22     | 0.85  | IM 4909 <sup>(1)</sup> | 0.087                  |        |
|                |                   | 1.7717 | 2.0476 | 0.866 | 0.033                  |                        | 0.192  |

<sup>(1)</sup> Call for O.D. tolerance

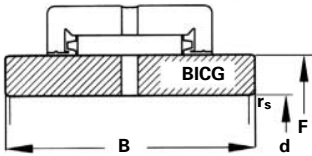
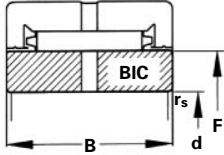




# NEEDLE ROLLER BEARINGS

## EXTRA WIDE INNER RINGS

### METRIC SERIES

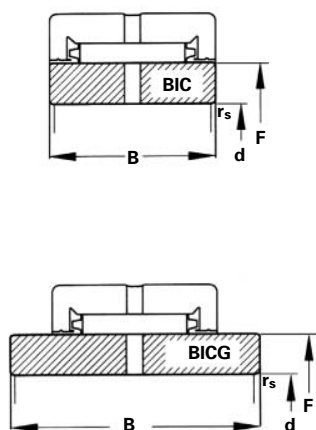


| Shaft Diameter | Dimensions mm/in. |        |        |       | Bearing Designation | Wt. kg/lbs. |                |
|----------------|-------------------|--------|--------|-------|---------------------|-------------|----------------|
|                | mm                | d      | F      | B     |                     |             | rs min         |
| 12             | 12                | 12     | 17.6   | 15    | 1                   | BIC 1012    | 0.016<br>0.035 |
|                |                   | 0.4724 | 0.6929 | 0.591 | 0.04                |             |                |
| 12             | 12                | 12     | 17.6   | 20    | 1                   | BIP 1012    | 0.020<br>0.044 |
|                |                   | 0.4724 | 0.6929 | 0.787 | 0.04                |             |                |
| 15             | 15                | 15     | 20.8   | 15    | 1                   | BIC 1015    | 0.018<br>0.040 |
|                |                   | 0.5906 | 0.8189 | 0.591 | 0.04                |             |                |
| 15             | 15                | 15     | 22.1   | 22    | 1                   | BIC 2015    | 0.035<br>0.077 |
|                |                   | 0.5906 | 0.8701 | 0.866 | 0.04                |             |                |
| 17             | 17                | 17     | 23.9   | 15    | 1                   | BIC 1017    | 0.026<br>0.057 |
|                |                   | 0.6693 | 0.9409 | 0.591 | 0.04                |             |                |
| 20             | 20                | 20     | 28.7   | 18    | 1                   | BIC 1020    | 0.046<br>0.101 |
|                |                   | 0.7874 | 1.1299 | 0.709 | 0.04                |             |                |
| 20             | 20                | 20     | 28.7   | 22    | 1                   | BIC 2020    | 0.056<br>0.123 |
|                |                   | 0.7874 | 1.1299 | 0.866 | 0.04                |             |                |
| 20             | 20                | 20     | 28.7   | 22    | 1                   | BIP 1020    | 0.056<br>0.123 |
|                |                   | 0.7874 | 1.1299 | 0.866 | 0.04                |             |                |
| 25             | 25                | 25     | 33.5   | 18    | 1                   | BIC 1025    | 0.054<br>0.119 |
|                |                   | 0.9843 | 1.3189 | 0.709 | 0.04                |             |                |
| 25             | 25                | 25     | 33.5   | 22    | 1                   | BIC 2025    | 0.065<br>0.143 |
|                |                   | 0.9843 | 1.3189 | 0.866 | 0.04                |             |                |
| 25             | 25                | 25     | 33.5   | 30    | 1                   | BIC 22025   | 0.500<br>1.102 |
|                |                   | 0.9843 | 1.3189 | 1.181 | 0.04                |             |                |
| 25             | 25                | 25     | 33.5   | 32    | 1                   | BiG 2025    | 0.095<br>0.209 |
|                |                   | 0.9843 | 1.3189 | 1.260 | 0.04                |             |                |
| 25             | 25                | 25     | 33.5   | 42    | 1                   | BIK 2025    | 0.125<br>0.276 |
|                |                   | 0.9843 | 1.3189 | 1.654 | 0.04                |             |                |
| 30             | 30                | 30     | 38.2   | 18    | 1                   | BIC 1030    | 0.060<br>0.132 |
|                |                   | 1.1811 | 1.5039 | 0.709 | 0.04                |             |                |
| 30             | 30                | 30     | 38.2   | 22    | 1                   | BIC 2030    | 0.074<br>0.163 |
|                |                   | 1.1811 | 1.5039 | 0.866 | 0.04                |             |                |
| 30             | 30                | 30     | 44.0   | 30    | 1                   | BIC 3030    | 0.188<br>0.414 |
|                |                   | 1.1811 | 1.7323 | 1.181 | 0.04                |             |                |
| 30             | 30                | 30     | 38.2   | 32    | 1                   | BiG 2030    | 0.108<br>0.238 |
|                |                   | 1.1811 | 1.5039 | 1.260 | 0.04                |             |                |
| 30             | 30                | 30     | 44.0   | 40    | 1                   | BiG 3030    | 0.247<br>0.545 |
|                |                   | 1.1811 | 1.7323 | 1.575 | 0.04                |             |                |
| 35             | 35                | 35     | 44.0   | 18    | 1                   | BIC 1035    | 0.077<br>0.170 |
|                |                   | 1.3780 | 1.7323 | 0.709 | 0.04                |             |                |
| 35             | 35                | 35     | 44.0   | 22    | 1                   | BIC 2035    | 0.093<br>0.205 |
|                |                   | 1.3780 | 1.7323 | 0.866 | 0.04                |             |                |
| 35             | 35                | 35     | 44.0   | 32    | 1                   | BiG 2035    | 0.135<br>0.298 |
|                |                   | 1.3780 | 1.7323 | 1.260 | 0.04                |             |                |
| 40             | 40                | 40     | 49.7   | 18    | 1.5                 | BIC 1040    | 0.094<br>0.207 |
|                |                   | 1.5748 | 1.9567 | 0.709 | 0.06                |             |                |
| 40             | 40                | 40     | 49.7   | 22    | 1.5                 | BIC 2040    | 0.115<br>0.254 |
|                |                   | 1.5748 | 1.9567 | 0.866 | 0.06                |             |                |
| 40             | 40                | 40     | 55.4   | 36    | 1.5                 | BIC 3040    | 0.321<br>0.708 |
|                |                   | 1.5748 | 2.1811 | 1.417 | 0.06                |             |                |
| 40             | 40                | 40     | 49.7   | 32    | 1.5                 | BiG 2040    | 0.170<br>0.375 |
|                |                   | 1.5748 | 1.9567 | 1.260 | 0.06                |             |                |
| 40             | 40                | 40     | 49.7   | 22    | 1.5                 | BIP 1040    | 0.115<br>0.254 |
|                |                   | 1.5748 | 1.9567 | 0.866 | 0.06                |             |                |
| 45             | 45                | 45     | 55.4   | 18    | 1.5                 | BIC 1045    | 0.113<br>0.249 |
|                |                   | 1.7717 | 2.1811 | 0.709 | 0.06                |             |                |

Continued on next page.

EXTRA WIDE INNER RINGS — *continued*

METRIC SERIES



| Shaft Diameter | Dimensions mm/in. |        |       |      | Bearing Designation | Wt. kg/lbs.    |
|----------------|-------------------|--------|-------|------|---------------------|----------------|
|                | mm                | d      | F     | B    |                     |                |
| 45             | 45                | 55.4   | 22    | 1.5  | BIC 2045            | 0.139<br>0.306 |
|                | 1.7717            | 2.1811 | 0.866 | 0.06 |                     |                |
|                | 45                | 62.1   | 38    | 1.5  |                     |                |
| 1.7717         | 2.4449            | 1.496  | 0.06  |      |                     |                |
| 45             | 45                | 55.4   | 32    | 1.5  | BIG 2045            | 0.210<br>0.463 |
|                | 1.7717            | 2.1811 | 1.260 | 0.06 |                     |                |
|                | 50                | 50     | 62.1  | 20   |                     |                |
| 1.9685         |                   | 2.4449 | 0.787 | 0.08 |                     |                |
| 50             |                   | 62.1   | 24    | 2    | BIC 11050           | 0.196<br>0.432 |
| 1.9685         | 2.4449            | 0.945  | 0.08  |      |                     |                |
| 50             | 50                | 62.1   | 28    | 2    | BIC 2050            | 0.228<br>0.503 |
|                | 1.9685            | 2.4449 | 1.102 | 0.08 |                     |                |
|                | 50                | 68.8   | 38    | 2    |                     |                |
| 1.9685         | 2.7087            | 1.496  | 0.08  |      |                     |                |
| 50             | 50                | 62.1   | 38    | 2    | BIG 2050            | 0.312<br>0.688 |
|                | 1.9685            | 2.4449 | 1.496 | 0.08 |                     |                |
|                | 50                | 62.1   | 28    | 2    |                     |                |
| 1.9685         | 2.4449            | 1.102  | 0.08  |      |                     |                |
| 55             | 55                | 68.8   | 20    | 2    | BIC 1055            | 0.205<br>0.452 |
|                | 2.1654            | 2.7087 | 0.787 | 0.08 |                     |                |
|                | 55                | 72.6   | 38    | 2    |                     |                |
| 2.1654         | 2.8583            | 1.496  | 0.08  |      |                     |                |
| 55             | 55                | 72.6   | 48    | 2    | BICG 3055           | 0.660<br>1.455 |
|                | 2.1654            | 2.8583 | 1.890 | 0.08 |                     |                |
|                | 55                | 68.8   | 38    | 2    |                     |                |
| 2.1654         | 2.7087            | 1.496  | 0.08  |      |                     |                |
| 55             | 55                | 68.8   | 28    | 2    | BIP 1055            | 0.288<br>0.635 |
|                | 2.1654            | 2.7087 | 1.102 | 0.08 |                     |                |
|                | 60                | 60     | 72.6  | 28   |                     |                |
| 2.3622         |                   | 2.8583 | 1.102 | 0.08 |                     |                |
| 60             |                   | 78.3   | 38    | 2    | BIC 3060            | 0.583<br>1.285 |
| 2.3622         | 3.0827            | 1.496  | 0.08  |      |                     |                |
| 60             | 60                | 72.6   | 38    | 2    | BICG 2060           | 0.385<br>0.849 |
|                | 2.3622            | 2.8583 | 1.496 | 0.08 |                     |                |
|                | 60                | 72.6   | 38    | 2    |                     |                |
| 2.3622         | 2.8583            | 1.496  | 0.08  |      |                     |                |
| 65             | 65                | 83.1   | 38    | 2    | BIC 3065            | 0.623<br>1.373 |
|                | 2.5591            | 3.2717 | 1.496 | 0.08 |                     |                |
|                | 65                | 78.3   | 38    | 2    |                     |                |
| 2.5591         | 3.0827            | 1.496  | 0.08  |      |                     |                |
| 70             | 70                | 88.0   | 38    | 2    | BIC 3070            | 0.662<br>1.459 |
|                | 2.7559            | 3.4646 | 1.496 | 0.08 |                     |                |
|                | 70                | 88.0   | 48    | 2    |                     |                |
| 2.7559         | 3.4646            | 1.890  | 0.08  |      |                     |                |
| 70             | 70                | 88.0   | 58    | 2    | BIK 3070            | 1.010<br>2.227 |
|                | 2.7559            | 3.4646 | 2.283 | 0.08 |                     |                |
|                | 75                | 75     | 88.0  | 32   |                     |                |
| 2.9528         |                   | 3.4646 | 1.260 | 0.08 |                     |                |
| 75             |                   | 88.0   | 42    | 2    | BIG 2075            | 0.538<br>1.186 |
| 2.9528         | 3.4646            | 1.654  | 0.08  |      |                     |                |
| 75             | 75                | 96.0   | 58    | 2    | BIK 3075            | 1.260<br>2.778 |
|                | 2.9528            | 3.7795 | 2.283 | 0.08 |                     |                |
|                | 80                | 80     | 96.0  | 24   |                     |                |
| 3.1496         |                   | 3.7795 | 0.945 | 0.08 |                     |                |

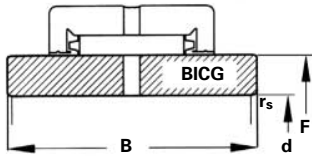
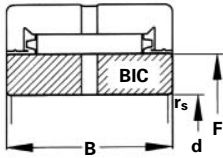
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# NEEDLE ROLLER BEARINGS

## EXTRA WIDE INNER RINGS — *continued*

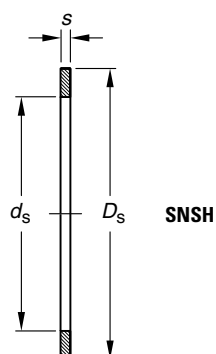
### METRIC SERIES



| Shaft Diameter | Dimensions mm/in. |        |        |       | Bearing Designation | Wt. kg/lbs. |                     |
|----------------|-------------------|--------|--------|-------|---------------------|-------------|---------------------|
|                | mm                | d      | F      | B     |                     |             | $r_{s \text{ min}}$ |
| 80             | 80                | 96.0   | 32     | 2     | BIC 2080            | 0.545       |                     |
|                | 3.1496            | 3.7795 | 1.260  | 0.08  |                     | 1.202       |                     |
|                | 80                | 99.5   | 38     | 2     | BIC 3080            | 0.805       |                     |
| 80             | 3.1496            | 3.9173 | 1.496  | 0.08  |                     | 1.775       |                     |
|                | 80                | 96.0   | 42     | 2     | BIG 2080            | 0.714       |                     |
|                | 3.1496            | 3.7795 | 1.654  | 0.08  |                     | 1.574       |                     |
| 90             | 90                | 104.7  | 32     | 2     | BIC 2090            | 0.531       |                     |
|                | 3.5433            | 4.1220 | 1.260  | 0.08  |                     | 1.171       |                     |
|                | 90                | 109.1  | 43     | 2     | BIC 3090            | 0.990       |                     |
| 90             | 3.5433            | 4.2953 | 1.693  | 0.08  |                     | 2.183       |                     |
|                | 90                | 109.1  | 53     | 2     | BIG 3090            | 1.220       |                     |
|                | 3.5433            | 4.2953 | 2.087  | 0.08  |                     | 2.690       |                     |
| 90             | 90                | 109.1  | 63     | 2     | BIK 3090            | 1.480       |                     |
|                | 3.5433            | 4.2953 | 2.480  | 0.08  |                     | 3.263       |                     |
|                | 95                | 95     | 109.1  | 32    | 2                   | BIC 2095    | 0.548               |
| 3.7402         |                   | 4.2953 | 1.260  | 0.08  |                     | 1.208       |                     |
| 95             |                   | 114.7  | 43     | 2     | BIC 3095            | 1.075       |                     |
| 95             | 3.7402            | 4.5157 | 1.693  | 0.08  |                     | 2.370       |                     |
|                | 95                | 114.7  | 63     | 2     | BIK 3095            | 1.585       |                     |
|                | 3.7402            | 4.5157 | 2.480  | 0.08  |                     | 3.494       |                     |
| 100            | 100               | 119.2  | 43     | 2     | BIC 3100            | 1.090       |                     |
|                | 3.9370            | 4.6929 | 1.693  | 0.08  |                     | 2.403       |                     |
|                | 100               | 114.7  | 42     | 2     | BIG 2100            | 0.800       |                     |
| 100            | 3.9370            | 4.5157 | 1.654  | 0.08  |                     | 1.764       |                     |
|                | 105               | 119.2  | 32     | 2     | BIC 2105            | 0.615       |                     |
|                | 4.1339            | 4.6929 | 1.260  | 0.08  |                     | 1.356       |                     |
| 105            | 105               | 124.7  | 55     | 2     | BIG 3105            | 1.505       |                     |
|                | 4.1339            | 4.9094 | 2.165  | 0.08  |                     | 3.318       |                     |
|                | 110               | 110    | 124.7  | 34    | 2                   | BIC 2110    | 0.705               |
| 4.3307         |                   | 4.9094 | 1.339  | 0.08  |                     | 1.554       |                     |
| 110            |                   | 124.7  | 44     | 2     | BIG 2110            | 0.920       |                     |
| 110            | 4.3307            | 4.9094 | 1.732  | 0.08  |                     | 2.028       |                     |
|                | 125               | 125    | 142.5  | 44    | 2                   | BICG 2125   | 1.340               |
|                |                   | 4.9213 | 5.6102 | 1.732 | 0.08                |             | 2.954               |
| 125            |                   | 142.5  | 44     | 2     | BIG 2125            | 1.325       |                     |
| 125            | 4.9213            | 5.6102 | 1.732  | 0.08  |                     | 2.921       |                     |
|                | 130               | 130    | 158.0  | 52    | 2                   | BIC 3130    | 2.530               |
|                |                   | 5.1181 | 6.2205 | 2.047 | 0.08                |             | 5.578               |

C

**END WASHERS**  
**METRIC SERIES**



| Dimensions mm/in.    |                    |                     | End Washer Designation | Wt. kg/lbs.           |
|----------------------|--------------------|---------------------|------------------------|-----------------------|
| d <sub>s</sub>       | D <sub>s</sub>     | S                   |                        |                       |
| <b>8.0</b><br>0.315  | <b>18</b><br>0.709 | <b>2.0</b><br>0.079 | <b>SNSH8X18X2</b>      | <b>0.001</b><br>0.002 |
| <b>8.5</b><br>0.335  | <b>15</b><br>0.591 | <b>0.5</b><br>0.020 | <b>SNSH8.5X15X0.5</b>  | <b>0.001</b><br>0.002 |
| <b>10.5</b><br>0.413 | <b>17</b><br>0.669 | <b>0.5</b><br>0.020 | <b>SNSH10.5X17X0.5</b> | <b>0.001</b><br>0.001 |
| <b>10.5</b><br>0.413 | <b>20</b><br>0.787 | <b>0.5</b><br>0.020 | <b>SNSH10.5X20X0.5</b> | <b>0.001</b><br>0.002 |
| <b>12.5</b><br>0.492 | <b>19</b><br>0.748 | <b>0.5</b><br>0.020 | <b>SNSH12.5X19X0.5</b> | <b>0.001</b><br>0.001 |
| <b>12.5</b><br>0.492 | <b>22</b><br>0.866 | <b>0.5</b><br>0.020 | <b>SNSH12.5X22X0.5</b> | <b>0.001</b><br>0.002 |
| <b>14.5</b><br>0.571 | <b>22</b><br>0.866 | <b>0.5</b><br>0.020 | <b>SNSH14.5X22X0.5</b> | <b>0.001</b><br>0.002 |
| <b>14.5</b><br>0.571 | <b>26</b><br>1.024 | <b>0.5</b><br>0.020 | <b>SNSH14.5X26X0.5</b> | <b>0.001</b><br>0.003 |
| <b>15.5</b><br>0.610 | <b>23</b><br>0.906 | <b>0.5</b><br>0.020 | <b>SNSH15.5X23X0.5</b> | <b>0.001</b><br>0.002 |
| <b>16.5</b><br>0.650 | <b>24</b><br>0.945 | <b>0.5</b><br>0.020 | <b>SNSH16.5X24X0.5</b> | <b>0.001</b><br>0.002 |
| <b>16.5</b><br>0.650 | <b>28</b><br>1.102 | <b>0.5</b><br>0.020 | <b>SNSH16.5X28X0.5</b> | <b>0.002</b><br>0.004 |
| <b>17.5</b><br>0.689 | <b>25</b><br>0.984 | <b>0.5</b><br>0.020 | <b>SNSH17.5X25X0.5</b> | <b>0.001</b><br>0.002 |
| <b>18.5</b><br>0.728 | <b>26</b><br>1.024 | <b>0.5</b><br>0.020 | <b>SNSH18.5X26X0.5</b> | <b>0.001</b><br>0.002 |
| <b>18.5</b><br>0.728 | <b>30</b><br>1.181 | <b>0.5</b><br>0.020 | <b>SNSH18.5X30X0.5</b> | <b>0.002</b><br>0.004 |
| <b>20.5</b><br>0.807 | <b>28</b><br>1.102 | <b>0.5</b><br>0.020 | <b>SNSH20.5X28X0.5</b> | <b>0.001</b><br>0.002 |
| <b>20.5</b><br>0.807 | <b>32</b><br>1.260 | <b>0.5</b><br>0.020 | <b>SNSH20.5X32X0.5</b> | <b>0.002</b><br>0.004 |

| Dimensions mm/in.    |                    |                     | End Washer Designation | Wt. kg/lbs.           |
|----------------------|--------------------|---------------------|------------------------|-----------------------|
| d <sub>s</sub>       | D <sub>s</sub>     | S                   |                        |                       |
| <b>22.5</b><br>0.886 | <b>30</b><br>1.181 | <b>0.5</b><br>0.020 | <b>SNSH22.5X30X0.5</b> | <b>0.001</b><br>0.003 |
| <b>22.5</b><br>0.886 | <b>35</b><br>1.378 | <b>0.5</b><br>0.020 | <b>SNSH22.5X35X0.5</b> | <b>0.002</b><br>0.005 |
| <b>25.5</b><br>1.004 | <b>35</b><br>1.378 | <b>0.5</b><br>0.020 | <b>SNSH25.5X35X0.5</b> | <b>0.002</b><br>0.004 |
| <b>25.5</b><br>1.004 | <b>37</b><br>1.457 | <b>0.5</b><br>0.020 | <b>SNSH25.5X37X0.5</b> | <b>0.002</b><br>0.005 |
| <b>28.5</b><br>1.122 | <b>40</b><br>1.575 | <b>0.5</b><br>0.020 | <b>SNSH28.5X40X0.5</b> | <b>0.002</b><br>0.005 |
| <b>30.5</b><br>1.201 | <b>40</b><br>1.575 | <b>0.5</b><br>0.020 | <b>SNSH30.5X40X0.5</b> | <b>0.002</b><br>0.005 |
| <b>35.5</b><br>1.398 | <b>47</b><br>1.850 | <b>0.5</b><br>0.020 | <b>SNSH35.5X47X0.5</b> | <b>0.003</b><br>0.006 |
| <b>40.5</b><br>1.594 | <b>50</b><br>1.969 | <b>0.5</b><br>0.020 | <b>SNSH40.5X50X0.5</b> | <b>0.003</b><br>0.006 |
| <b>41.0</b><br>1.614 | <b>55</b><br>2.165 | <b>1.0</b><br>0.039 | <b>SNSH41X55X1</b>     | <b>0.008</b><br>0.018 |
| <b>45.5</b><br>1.791 | <b>55</b><br>2.165 | <b>0.5</b><br>0.020 | <b>SNSH45.5X55X0.5</b> | <b>0.003</b><br>0.007 |
| <b>46.0</b><br>1.811 | <b>62</b><br>2.441 | <b>1.0</b><br>0.039 | <b>SNSH46X62X1</b>     | <b>0.011</b><br>0.024 |
| <b>51.0</b><br>2.008 | <b>65</b><br>2.559 | <b>1.0</b><br>0.039 | <b>SNSH51X65X1</b>     | <b>0.010</b><br>0.022 |
| <b>56.0</b><br>2.205 | <b>72</b><br>2.835 | <b>1.0</b><br>0.039 | <b>SNSH56X72X1</b>     | <b>0.013</b><br>0.029 |
| <b>61.0</b><br>2.402 | <b>78</b><br>3.071 | <b>1.0</b><br>0.039 | <b>SNSH61X78X1</b>     | <b>0.015</b><br>0.033 |
| <b>66.0</b><br>2.598 | <b>85</b><br>3.346 | <b>1.0</b><br>0.039 | <b>SNSH66X85X1</b>     | <b>0.018</b><br>0.040 |



## **NEEDLE ROLLER BEARINGS**



### **NOTES**

C



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**TIMKEN**

# D

## BALL BEARINGS

D

### **D** BALL BEARINGS

|                                         |      |
|-----------------------------------------|------|
| <i>Radial and Angular Contact</i> ..... | D1   |
| <i>Wide Inner Ring</i> .....            | D47  |
| <i>Housed Units</i> .....               | D75  |
| <i>Super Precision</i> .....            | D143 |

## RADIAL AND ANGULAR CONTACT BEARINGS

**Overview:** Timken is a premier manufacturer of ball bearings. We produce a broad range of precision ball bearings, wide inner ring ball bearings and housed units for standard industrial applications and specialized uses. From standard single-row deep groove radial ball bearings to advanced integral designs, Timken has your solution.

- **Sizes:** 3 mm - 600 mm bore.
- **Markets:** Aircraft, construction, agriculture, machine tool and general industry.
- **Features:** Special coatings for corrosion resistance, special seal designs.
- **Benefits:** Radial: Better life in contaminated environments.

Angular: Single-row angular contact ball bearing - suited to work in lower operating temperature and high speed with a heavy thrust load. Can be mounted in a duplex arrangement. The refined bore tolerance give a higher life.

Double-row angular contact ball bearing - excellent axial and radial rigidity in confined space.



D





## Radial and Angular Contact Ball Bearings

### Prefixes:

- A** stainless steel
- F** flanged outer ring
- H** snug fit
- J** extra loose internal fit
- JJ** extra extra loose internal fit
- L** internal self-aligning
- M** precision ABEC 3
- P** loose fit
- R** normal fit
- S** extra small inch-dimension type
- T** tight fit
- V** precision ABEC 5
- W** wide-type single-row  
(same width inner and outer)
- WIR** single-row, wide inner only

**Bore Size:** (04 and up: multiply last two numbers by five to get bore in millimeters)

- 00** 10 mm
- 01** 12 mm
- 02** 15 mm
- 03** 17 mm
- 04** 20 mm
- 05** 25 mm
- 12** 60 mm
- 20** 100 mm

### Suffixes:

- C1, C2, C3, etc.** (manufacturing code - Timken® use only)
- FT** full ball complement
- K** Conrad, non-filling slot type
- W** maximum capacity, filling slot type
- WI** angular contact, low-shoulder outer
- WO** angular contact, low-shoulder inner
- WN** angular contact, low-shoulder, inner and outer

**W**

**3**

**05**

**K**

**LL**

### Numbers: Basic Type Series:

- S1** 3, 5, 7, etc., single-row inch, extra small
- 30** single-row metric, extra small
- 100** single-row, extra large
- 200** single-row, light
- 300** single-row, medium
- 5200** double-row, light
- 5300** double-row, medium
- 7200** single-row, angular contact, light
- 7300** single-row, angular contact, medium
- 7400** single-row, angular contact, heavy
- 9100** single-row, extra-light
- 9300** single-row, ultra-light
- XLS** inch-dimension, Conrad type

### Additional Features:

- B** spherical outside diameter
- BR** cast bronze retainer
- D** one shield
- DD** two shields
- G** Wireloc (snap ring)
- L** one Mechani-Seal
- LL** two Mechani-Seals
- MBR** machined bronze retainer
- P** one seal
- PP** two seals
- PP2, 3, 4, etc.** Tri-Ply Seals if prefix letter is W (example: W208PPB5)
- R** one land-riding rubber seal
- RR** two land-riding rubber seals
- S** external self-aligning
- SMBR** iron silicon bronze retainer
- T** one felt seal
- TT** two felt seals





## BALL BEARINGS

### INTRODUCTION

#### EXTRA SMALL SERIES

Extra small bearings are available in the 30 Metric Series, the 33 and S Inch Series and the F Flanged Series. These bearings can sustain radial, thrust and combined loads proportionate to the capacities of the small shafts for which they are designed. They are appropriate for use in fractional horsepower motors, precision instruments, domestic appliances, film projectors and similar devices.

The F flanged series has external shoulders with the bearing for mounting in through-bored housings. This series is used where compactness is essential or where it is not feasible to machine housing shoulders.

All series in the extra small family include shielded versions. The 30 Metric Series is also available with felt seals, Mechani-Seals and rubber seals, while the 33 and S Inch Series is available with rubber seals.

Some sizes in the Extra Small Series are manufactured from stainless steel.

#### EXTRA SMALL 33 AND S SERIES BUSINESS MACHINE BEARINGS

Standard and special extra small bearings are available and often used in business machine applications. They include clamp-type collar bearings for slip-fit mounting on shafts, bearings with Wireloc in the outer ring, and rubber cushioned "O" series with special housed units.

#### EXTRA LIGHT 9300 AND 9100 SERIES

Bearings in the Extra Light 9300 and 9100 Series are ideally suited for applications where housing diameters are restricted and it is desirable to maintain relatively large shaft diameters. Both series are made in the Conrad or non-filling slot construction with the 9300 Series having a somewhat thinner section.

The 9100 Series is generally available with shields, rubber seals and snap ring combinations. The 9300 Series is selectively available with two rubber seals. Machine tools, textile machinery and jet engine gear boxes are some of the end products in which these series have found wide use.

#### LIGHT 200 SERIES

Bearings in the 200 Series have a greater section height than the Extra Light 9300 and 9100 Series bearings and feature a close dimensional balance between bore, outside diameter and width. These characteristics make them well-suited for a broad range of applications involving light to medium loads combined with relatively high speeds.

Their versatility has made them a popular design choice of designers and has resulted in many variations in the series. They are available in either the Conrad or maximum capacity type and with shields, rubber seals, Mechani-Seals, felt seals or a combination of shield and seal. Snap ring combinations are also included.

Wide-type 200 Series rubber seal (W200PP) and Mechani-Seal (W200KLL) bearings are made with standard bores and outside diameters, but in widths equal to the corresponding sizes of double-row bearings. This series offers a larger support area for shaft and housing contact and extra space for lubricant.

#### MEDIUM 300 SERIES

The 300 Series radial ball bearings are similar in construction to the 200 Series, but have considerably heavier cross sections throughout. They provide greater radial and thrust capacity and are able to withstand heavier shock loads.

Because of their rugged construction, these bearings are particularly suited for heavy-duty applications like those found in large electric motors, woodworking machinery and gear boxes. This series includes both Conrad and maximum capacity designs as well as shielded, sealed and snap ring variations.

In the 300 Series wide-type, rubber seal (W300PP) and Mechani-Seal (W300KLL) bearings are made with standard bores and outside diameters, but in width equal to the corresponding sizes of double-row bearings.



Extra Small Series



Extra Light 9300 and 9100 Series



Light 200 Series



Medium 300 Series

D

### XLS AND EXTRA LARGE 100 SERIES

Bearings in the inch-dimension XLS Series and metric-dimension Extra Large 100 Series have extra large diameters and a compact cross section. XLS bearings are made in the Conrad and maximum capacity filling slot designs. The Extra Large 100 Series offers the maximum capacity, filling slot and counterbore types.



XLS and Extra Large 100 Series

### TRI-PLY SEAL DISK HARROW BEARINGS

Bearings with Tri-Ply Seals are designed for service involving severe contamination, such as disk harrows, disk tillers and other seed preparation equipment and certain conveyor applications. Tri-Ply sealed units come in two designs – one consisting of three Timken rubber seals separated by steel spacers and retained by steel caps in the outer ring and the other, a highly effective one-piece, molded seal design. Both designs have an exterior shroud cap to protect the seals and reinforce the exceptional sealing action of the complete unit. A patented notched seal groove design, provided on selected sizes, is one of the most positive seal retention methods ever developed.



Tri-Ply Seal Disk Harrow Bearings

### HEX BORE BEARINGS

These bearings are designed for either outer or inner ring rotation in low speed, moderately loaded applications such as farm machinery and conveyors. Their chief advantage is ease of mounting. Except for axial positioning by adjacent parts, no collars, setscrews or other external parts are required to lock the inner ring to the hex shaft.



Hex Bore Bearings

### R-SEAL DISK HARROW BEARINGS

R-Seal bearings are designed for a wide variety of farm machinery applications where single-lip positive contact seals are required. Each sealing element has a Timken Fafnir rubber seal that effectively seals the bearing with a heavy flare on the cylindrically ground O.D. (inner ring). A steel back-up plate supports the seal rubber and prevents the seal lip from inverting. An outside metal shroud cap gives maximum abrasion protection to the rubber element and completes the assembly that is rolled into the outer ring seal groove for positive retention.

R-Seal radial ball bearings are used in positions in planting, cultivating and harvesting machinery. They are available in various configurations including round bores in metric and inch dimensions and cylindrical and spherical outside diameters.



R-Seal Agricultural Bearings

### ANGULAR CONTACT – SINGLE-ROW 7000 PRODUCT FAMILY

Timken offers a 7200WN Light, 7300WN Medium and 7400WN Heavy Series single-row, angular contact bearings, which are designed for combination loading with high-thrust capacity in one direction.

The 7000WN bearings are manufactured with better than ABEC 1 inner ring bore tolerances and ABEC 3 running accuracy. These bearings, when mounted in a duplex arrangement, provide axial and/or radial rigidity in applications where control of shaft displacement is essential.

These bearings are available with various cage designs as defined in the dimension tables. The external dimensions of all 7000WN bearings interchange with corresponding sizes in the 200, 300 and 400 single-row radial series.



Single-Row Angular Contact Bearings 7000 Product Family

### ANGULAR CONTACT – DOUBLE-ROW

Double-row Angular Contact Bearings are available in the Light 5200 and Medium 5300 Series. These bearings have the same bores and outside diameters as the corresponding sizes in the 200 and 300 Series, single-row, radial type.

Chief advantages of the double-row type are rigidity, compactness and high capacity. The two rows of balls provide for bearings large radial capacity combined with moderate thrust capacity in either direction.

Double-row bearings are available in both the Conrad (K) construction with uninterrupted race shoulders and the maximum capacity type. The latter has a filling slot in the shoulder of both rings and a maximum ball complement.

Sizes with the W suffix have the filling slot on one side only. In these cases, thrust should be applied on the side opposite the filling slot.



Double-Row Angular Contact

D

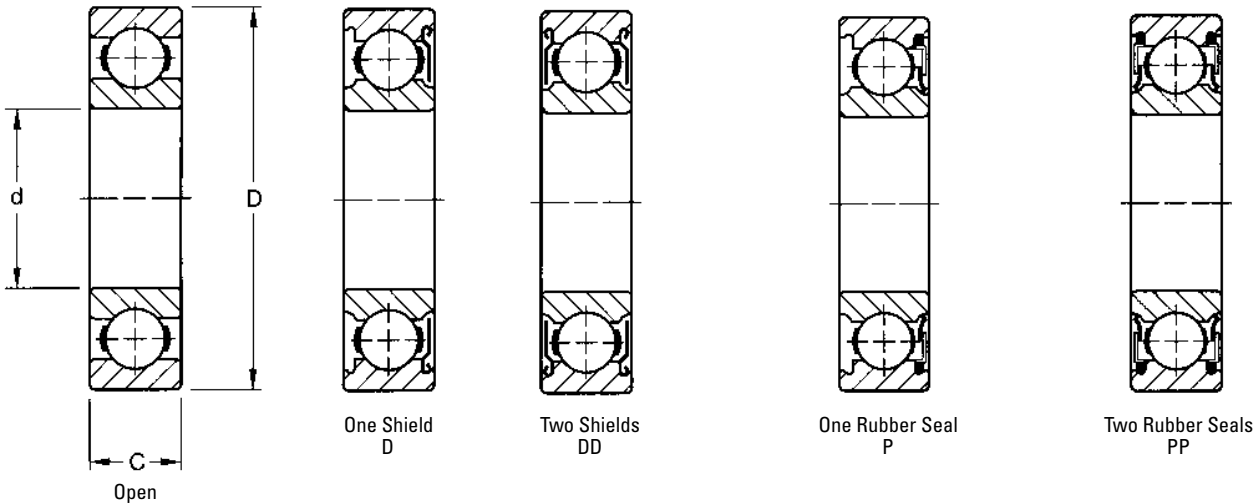




# BALL BEARINGS

## EXTRA SMALL 30 METRIC SERIES

- Designed for small shafts.
- Can sustain radial, thrust and combined load proportionate to capacities of small shafts.
- Suitable for use in fractional horsepower motors, domestic appliances, precision instruments and similar devices.
- Offer various combinations of shields and seals, as listed below.
- Electric motor quality for applications where quietness is required.
- Stainless steel series, denoted by a prefix A before the bearing number. (Example: A38K)



### OPEN AND SHIELDED TYPES DIMENSIONS – TOLERANCES

| Bearing Number |              |               | Bore d                                     |        | Outside Diameter D                          |        |       | Width C                                |    | Fillet Radius <sup>(1)</sup> |     | Wt.   |       | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |      |      |
|----------------|--------------|---------------|--------------------------------------------|--------|---------------------------------------------|--------|-------|----------------------------------------|----|------------------------------|-----|-------|-------|-----------------------------------|------|------------------------------------------------------------|------|------|
| open           | one shield D | two shield DD | +0.000 mm, -0.008 mm<br>+0.0000", -0.0003" |        | tolerance<br>+0.000 mm<br>+0.0000" to minus |        |       | +0.00 mm, -0.12 mm<br>+0.000", -0.005" |    |                              |     |       |       |                                   |      |                                                            |      |      |
|                |              |               | mm                                         | in.    | mm                                          | in.    | mm    | in.                                    | mm | in.                          | mm  | in.   | kg    | lbs.                              | N    | lbs.                                                       | N    | lbs. |
| 34K            | 34KD         | 34KDD         | 4                                          | 0.1575 | 16                                          | 0.6299 | 0.008 | 0.0003                                 | 5  | 0.197                        | 0.3 | 0.012 | 0.005 | 0.01                              | 560  | 125                                                        | 1630 | 365  |
| 35K            | 35KD         | 35KDD         | 5                                          | 0.1969 | 19                                          | 0.7480 | 0.009 | 0.00035                                | 6  | 0.236                        | 0.3 | 0.012 | 0.009 | 0.02                              | 865  | 195                                                        | 2450 | 560  |
| 36K            | 36KD         | 36KDD         | 6                                          | 0.2362 | 19                                          | 0.7480 | 0.009 | 0.00035                                | 6  | 0.236                        | 0.3 | 0.012 | 0.009 | 0.02                              | 865  | 195                                                        | 2450 | 560  |
| 37K            | 37KD         | 37KDD         | 7                                          | 0.2756 | 22                                          | 0.8661 | 0.009 | 0.00035                                | 7  | 0.276                        | 0.3 | 0.012 | 0.009 | 0.02                              | 1400 | 312                                                        | 3650 | 830  |
| 38K            | 38KD         | 38KDD         | 8                                          | 0.3150 | 22                                          | 0.8661 | 0.009 | 0.00035                                | 7  | 0.276                        | 0.3 | 0.012 | 0.009 | 0.02                              | 1400 | 312                                                        | 3650 | 830  |
| 38KV           | —            | —             | 8                                          | 0.3150 | 24                                          | 0.9449 | 0.009 | 0.00035                                | 7  | 0.276                        | 0.3 | 0.012 | 0.018 | 0.04                              | 1370 | 305                                                        | 3650 | 830  |
| 39K            | 39KD         | 39KDD         | 9                                          | 0.3543 | 26                                          | 1.0236 | 0.009 | 0.00035                                | 8  | 0.315                        | 0.3 | 0.012 | 0.018 | 0.04                              | 1960 | 440                                                        | 5000 | 1120 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### SEALED TYPES DIMENSIONS – TOLERANCES

| Bearing Number |              | Bore d                                     |        | Outside Diameter D                          |        | Width C                                |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |      | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |      |
|----------------|--------------|--------------------------------------------|--------|---------------------------------------------|--------|----------------------------------------|-------|------------------------------|-------|-------|------|-----------------------------------|------|------------------------------------------------------------|------|
| one seal P     | two seals PP | +0.000 mm, -0.008 mm<br>+0.0000", -0.0003" |        | +0.000 mm, -0.009 mm<br>+0.0000", -0.00035" |        | +0.00 mm, -0.12 mm<br>+0.000", -0.005" |       |                              |       |       |      |                                   |      |                                                            |      |
|                |              | mm                                         | in.    | mm                                          | in.    | mm                                     | in.   | mm                           | in.   | kg    | lbs. | N                                 | lbs. | N                                                          | lbs. |
| 36P            | 36PP         | 6                                          | 0.2362 | 19                                          | 0.7480 | 10                                     | 0.394 | 0.3                          | 0.012 | 0.014 | 0.03 | 865                               | 195  | 2450                                                       | 560  |
| 36P2           | 36PP2        | 6                                          | 0.2362 | 19                                          | 0.7480 | 6                                      | 0.236 | 0.3                          | 0.012 | 0.014 | 0.03 | 865                               | 195  | 2450                                                       | 560  |
| 37P            | 37PP         | 7                                          | 0.2756 | 22                                          | 0.8661 | 10                                     | 0.394 | 0.3                          | 0.012 | 0.018 | 0.04 | 1370                              | 305  | 3650                                                       | 830  |
| 37P2           | 37PP2        | 7                                          | 0.2756 | 22                                          | 0.8661 | 7                                      | 0.276 | 0.3                          | 0.012 | 0.018 | 0.04 | 1400                              | 312  | 3650                                                       | 830  |
| 38P            | 38PP         | 8                                          | 0.3150 | 22                                          | 0.8661 | 10                                     | 0.394 | 0.3                          | 0.012 | 0.018 | 0.04 | 1370                              | 305  | 3650                                                       | 830  |
| 38P2           | 38PP2        | 8                                          | 0.3150 | 22                                          | 0.8661 | 7                                      | 0.276 | 0.3                          | 0.012 | 0.018 | 0.04 | 1400                              | 312  | 3650                                                       | 830  |
| 39P            | 39PP         | 9                                          | 0.3543 | 26                                          | 1.0236 | 8                                      | 0.315 | 0.6                          | 0.024 | 0.023 | 0.05 | 1960                              | 440  | 5000                                                       | 1120 |

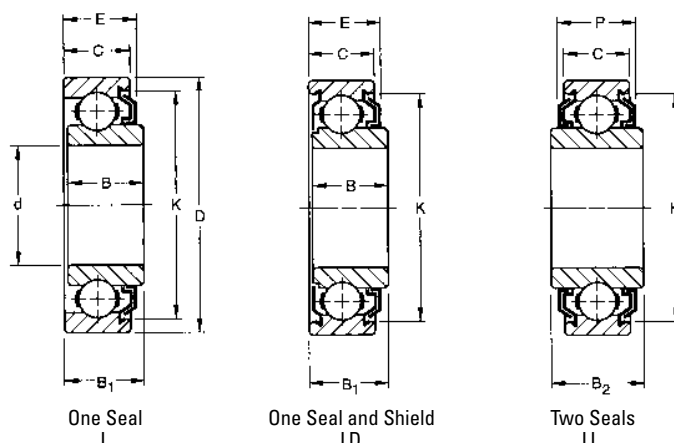
<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

EXTRA SMALL 30 METRIC SERIES

MECHANI-SEALS

- Developed by The Timken® Company.
- Adapted to the 30 metric series for effective grease retention and exclusion of foreign matter.
- Can be operated at speeds comparable to open-type bearings.
- Available with:
  - One Mechani-Seal (suffix L).
  - One Mechani-Seal and one shield (suffix LD).
  - Two Mechani-Seals (suffix LL).



DIMENSIONS – TOLERANCES

| Bearing Number   |                                    |                    | Bore<br>d                                      | Outside<br>Diameter<br>D                        | Width          | Ring Width<br>+0.00 mm, -.12 mm<br>+0.000" -.005" |                               |            | Fillet<br>Radius <sup>(1)</sup> | Seal Protection |             |                                    | Inner<br>Ring<br>Offset <sup>(2)</sup> | Wt.        | Static<br>Load<br>Rating<br>C <sub>0</sub> | Extended<br>Dynamic<br>Load<br>Rating<br>C <sub>e</sub> <sup>(4)</sup> |
|------------------|------------------------------------|--------------------|------------------------------------------------|-------------------------------------------------|----------------|---------------------------------------------------|-------------------------------|------------|---------------------------------|-----------------|-------------|------------------------------------|----------------------------------------|------------|--------------------------------------------|------------------------------------------------------------------------|
| one<br>seal<br>L | one<br>seal<br>and<br>shield<br>LD | two<br>seals<br>LL |                                                |                                                 |                | inner<br>B                                        | outer<br>C                    | width      |                                 | O.D.<br>K       | width<br>E  | P                                  |                                        |            |                                            |                                                                        |
|                  |                                    |                    | +0.000 mm<br>-0.008 mm<br>+0.0000"<br>-0.0003" | +0.000 mm<br>-0.009 mm<br>+0.0000"<br>-0.00035" | B <sub>1</sub> | B                                                 | B <sub>2</sub> <sup>(3)</sup> |            |                                 |                 |             |                                    |                                        |            |                                            |                                                                        |
|                  |                                    |                    | mm in.                                         | mm in.                                          | mm in.         | mm in.                                            | mm in.                        | mm in.     | mm in.                          | mm in.          | mm in.      | mm in.                             | mm in.                                 | kg lbs.    | N lbs.                                     | N lbs.                                                                 |
| 36KL             | 36KLD                              | 36KLL              | 6 0.2362                                       | 19 0.7480                                       | 10.31 0.406    | 9.80 0.386                                        | 14.27 0.562                   | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | 10.87 0.428 | 16.7 <sup>21</sup> / <sub>32</sub> | 0.50 0.020                             | 0.014 0.03 | 865 195                                    | 2450 560                                                               |
| 36KVL            | —                                  | —                  | 6 0.2362                                       | 24 0.9449                                       | 10.31 0.406    | 9.80 0.386                                        | — —                           | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | — —         | 19.0 <sup>3</sup> / <sub>4</sub>   | 0.50 0.020                             | 0.022 0.05 | 865 195                                    | 2450 560                                                               |
| 37KL             | 37KLD                              | 37KLL              | 7 0.2756                                       | 22 0.8661                                       | 10.31 0.406    | 9.80 0.386                                        | 14.27 0.562                   | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | 11.18 0.440 | 18.7 <sup>47</sup> / <sub>64</sub> | 0.50 0.020                             | 0.018 0.04 | 1400 312                                   | 3650 830                                                               |
| 37KVL            | 37KVDL                             | —                  | 7 0.2756                                       | 24 0.9449                                       | 10.31 0.406    | 9.80 0.386                                        | — —                           | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | — —         | 19.0 <sup>3</sup> / <sub>4</sub>   | 0.50 0.020                             | 0.022 0.05 | 1400 312                                   | 3650 830                                                               |
| 38KL             | 38KLD                              | 38KLL              | 8 0.3150                                       | 22 0.8661                                       | 10.31 0.406    | 9.80 0.386                                        | 14.27 0.562                   | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | 11.18 0.440 | 18.7 <sup>47</sup> / <sub>64</sub> | 0.50 0.020                             | 0.018 0.04 | 1400 312                                   | 3650 830                                                               |
| 38KVL            | 38KVDL                             | 38KVLL             | 8 0.3150                                       | 24 0.9449                                       | 10.31 0.406    | 9.80 0.386                                        | 14.27 0.562                   | 8.00 0.315 | 0.3 0.012                       | 9.60 0.378      | 11.13 0.438 | 19.0 <sup>3</sup> / <sub>4</sub>   | 0.50 0.020                             | 0.022 0.05 | 1370 305                                   | 3650 830                                                               |
| —                | —                                  | 38KLL2             | 8 0.3150                                       | 22 0.8661                                       | — —            | — —                                               | 12.62 0.497                   | 8.00 0.315 | 0.3 0.012                       | — —             | 11.18 0.440 | 18.7 <sup>47</sup> / <sub>64</sub> | — —                                    | 0.022 0.05 | 1370 305                                   | 3650 830                                                               |
| —                | —                                  | 38KVLL2            | 8 0.3150                                       | 24 0.9449                                       | — —            | — —                                               | 12.62 0.497                   | 8.00 0.315 | 0.3 0.012                       | — —             | 11.13 0.438 | 19.0 <sup>3</sup> / <sub>4</sub>   | — —                                    | 0.022 0.05 | 1370 305                                   | 3650 830                                                               |
| 39KL2            | 39KLD2                             | —                  | 9 0.3543                                       | 26 1.0236                                       | 10.31 0.406    | 9.80 0.386                                        | — —                           | 8.00 0.315 | 0.6 0.024                       | 9.60 0.378      | — —         | 21.4 <sup>27</sup> / <sub>32</sub> | 0.50 0.020                             | 0.022 0.05 | 1960 440                                   | 5000 1120                                                              |
| —                | 39KVDL                             | 39KVLL2            | 9 0.3543                                       | 30 1.1811                                       | — —            | — —                                               | 16.41 0.646                   | 9.00 0.354 | 0.6 0.024                       | — —             | 15.98 0.629 | 25.4 1                             | 0.50 0.020                             | 0.041 0.09 | 2650 595                                   | 6550 1500                                                              |

(1) Maximum shaft or housing fillet radius that bearing corners will clear.

(2) Does not apply to bearings with two seals.

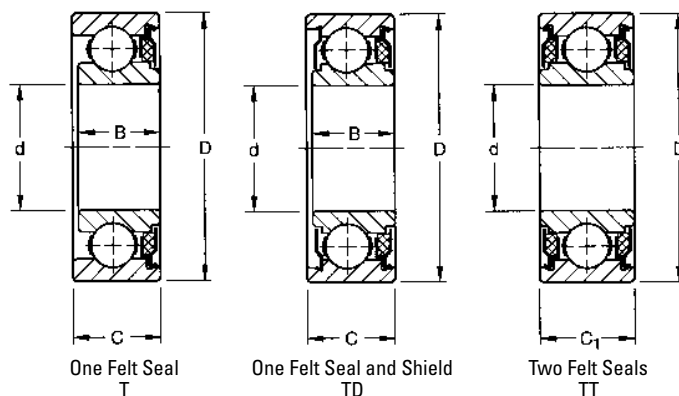
Note: Inner ring offset is .51 mm (.020 inches) for the L, LD, and VLD versions.

(3) Two seals (suffix LL) type only.

(4) Based on 10<sup>6</sup> revolutions of calculated fatigue life.

FELT-SEALS

- Provide effective barrier against the entrance of foreign matter and the escape of lubricant.
- Contact seal with the felt riding on the ground surface of inner ring O.D.
- Can be operated at moderate speeds without excessive heating because the felt washer absorbs some lubricant.
- Electric motor quality where quietness is required.
- Available with:
  - One felt seal (suffix T).
  - One felt seal and one shield (suffix TD).
  - Two felt seals (suffix TT).



DIMENSIONS – TOLERANCES

| Bearing Number   |                              |                    | Bore<br>d                                      | Outside<br>Diameter<br>D                        | Ring Width<br>+0.00 mm, -.12 mm<br>+0.000" -.005" |             |                | Inner<br>Ring<br>Offset <sup>(2)</sup> | Fillet<br>Radius <sup>(1)</sup> | Wt.        | Static<br>Load<br>Rating<br>C <sub>0</sub> | Extended<br>Dynamic<br>Load<br>Rating<br>C <sub>e</sub> <sup>(3)</sup> |
|------------------|------------------------------|--------------------|------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------|----------------|----------------------------------------|---------------------------------|------------|--------------------------------------------|------------------------------------------------------------------------|
| one<br>seal<br>T | one seal<br>and shield<br>TD | two<br>seals<br>TT |                                                |                                                 | inner<br>B                                        | outer<br>C  | C <sub>1</sub> |                                        |                                 |            |                                            |                                                                        |
|                  |                              |                    | +0.000 mm<br>-0.008 mm<br>+0.0000"<br>-0.0003" | +0.000 mm<br>-0.009 mm<br>+0.0000"<br>-0.00035" | mm in.                                            | mm in.      | mm in.         | mm in.                                 | mm in.                          | kg lbs.    | N lbs.                                     | N lbs.                                                                 |
|                  |                              |                    | mm in.                                         | mm in.                                          | mm in.                                            | mm in.      | mm in.         | mm in.                                 | mm in.                          | kg lbs.    | N lbs.                                     | N lbs.                                                                 |
| 36KT             | 36KTD                        | 36KTT              | 6 0.2362                                       | 19 0.7480                                       | 9.80 0.386                                        | 10.31 0.406 | 14.27 0.562    | 0.50 0.020                             | 0.3 0.012                       | 0.014 0.03 | 865 195                                    | 2450 560                                                               |
| 36KVT            | 36KVTD                       | —                  | 6 0.2362                                       | 24 0.9449                                       | 9.80 0.386                                        | 10.31 0.406 | — —            | 0.50 0.020                             | 0.3 0.012                       | 0.027 0.06 | 1370 305                                   | 3650 830                                                               |
| 37KT             | 37KTD                        | —                  | 7 0.2756                                       | 22 0.8661                                       | 9.80 0.386                                        | 10.31 0.406 | — —            | 0.50 0.020                             | 0.3 0.012                       | 0.018 0.04 | 1370 305                                   | 3650 830                                                               |
| 37KVT            | 37KVTD                       | —                  | 7 0.2756                                       | 24 0.9449                                       | 9.80 0.386                                        | 10.31 0.406 | — —            | 0.50 0.020                             | 0.3 0.012                       | 0.022 0.05 | 1370 305                                   | 3650 830                                                               |
| 38KT             | 38KTD                        | 38KTT              | 8 0.3150                                       | 22 0.8661                                       | 9.80 0.386                                        | 10.31 0.406 | 14.27 0.562    | 0.50 0.020                             | 0.3 0.012                       | 0.018 0.04 | 1370 305                                   | 3650 830                                                               |
| 38KVT            | 38KVTD                       | 38KVTT             | 8 0.3150                                       | 24 0.9449                                       | 9.80 0.386                                        | 10.31 0.406 | 14.27 0.562    | 0.50 0.020                             | 0.3 0.012                       | 0.022 0.05 | 1370 305                                   | 3650 830                                                               |
| 39KT             | 39KTD                        | 39KTT              | 9 0.3543                                       | 26 1.0236                                       | 11.10 0.437                                       | 11.51 0.453 | 14.27 0.562    | 0.40 0.016                             | 0.6 0.024                       | 0.027 0.06 | 1960 440                                   | 5000 1120                                                              |
| 39KVT            | 39KVTD                       | —                  | 9 0.3543                                       | 30 1.1811                                       | 12.19 0.480                                       | 12.70 0.500 | — —            | 0.50 0.020                             | 0.6 0.024                       | 0.041 0.09 | 2650 595                                   | 6550 1500                                                              |

(1) Maximum shaft or housing fillet radius that bearing corners will clear.

(2) Does not apply to bearings with two seals.

(3) Based on 10<sup>6</sup> revolutions of calculated fatigue life.

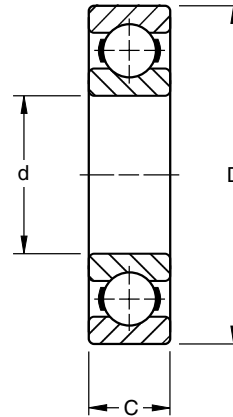




# BALL BEARINGS

## EXTRA SMALL 33 AND S INCH SERIES

- Designed for small shafts.
- Can sustain radial, thrust and combined loads, proportionate to capacities of small shafts.
- Suitable for use in fractional horsepower motors, domestic appliances, precision instruments and similar devices.
- Include combinations of shields and seals, as listed below.
- Electric motor quality for applications where quietness is required.
- Several sizes are manufactured both in standard bearing-quality steel and stainless steel, as indicated in the tables.

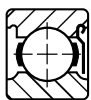


### DIMENSIONS – TOLERANCES

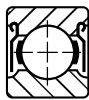
| Bearing Number |           | Bore d |        |       |        | Outside Diameter D |        |       |        | Width C |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |      | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |      |
|----------------|-----------|--------|--------|-------|--------|--------------------|--------|-------|--------|---------|-------|------------------------------|-------|-------|------|-----------------------------------|------|------------------------------------------------------------|------|
| standard       | stainless | mm     | in.    | mm    | in.    | mm                 | in.    | mm    | in.    | mm      | in.   | mm                           | in.   | kg    | lbs. | N                                 | lbs. | N                                                          | lbs. |
| 33K3           | A33K3     | 3.175  | 0.1250 | 0.008 | 0.0003 | 9.525              | 0.3750 | 0.010 | 0.0004 | 3.96    | 0.156 | 0.3                          | 0.012 | 0.005 | 0.01 | 212                               | 48   | 710                                                        | 160  |
| 33K4           | A33K4     | 3.175  | 0.1250 | 0.008 | 0.0003 | 12.700             | 0.5000 | 0.010 | 0.0004 | 4.37    | 0.172 | 0.3                          | 0.012 | 0.005 | 0.01 | 490                               | 110  | 1430                                                       | 325  |
| 33K5           | A33K5     | 4.762  | 0.1875 | 0.008 | 0.0003 | 12.700             | 0.5000 | 0.010 | 0.0004 | 3.96    | 0.156 | 0.3                          | 0.012 | 0.005 | 0.01 | 490                               | 110  | 1430                                                       | 325  |
| S1K7           | AS1K7     | 6.350  | 0.2500 | 0.008 | 0.0003 | 15.875             | 0.6250 | 0.010 | 0.0004 | 4.98    | 0.196 | 0.3                          | 0.012 | 0.005 | 0.01 | 560                               | 125  | 1630                                                       | 365  |
| S1K            | AS1K      | 6.350  | 0.2500 | 0.008 | 0.0003 | 19.050             | 0.7500 | 0.010 | 0.0004 | 5.56    | 0.219 | 0.4                          | 0.016 | 0.009 | 0.02 | 1160                              | 260  | 3100                                                       | 695  |
| S3K            | AS3K      | 9.525  | 0.3750 | 0.008 | 0.0003 | 22.225             | 0.8750 | 0.010 | 0.0004 | 5.56    | 0.219 | 0.4                          | 0.016 | 0.009 | 0.02 | 1400                              | 312  | 3650                                                       | 830  |
| S5K            | AS5K      | 12.700 | 0.5000 | 0.008 | 0.0003 | 28.575             | 1.1250 | 0.010 | 0.0004 | 6.35    | 0.250 | 0.4                          | 0.016 | 0.018 | 0.04 | 2240                              | 500  | 5600                                                       | 1270 |
| S7K            | AS7K      | 15.875 | 0.6250 | 0.008 | 0.0003 | 34.925             | 1.3750 | 0.013 | 0.0005 | 7.14    | 0.281 | 0.8                          | 0.031 | 0.032 | 0.07 | 3050                              | 682  | 7500                                                       | 1700 |
| S8K            | —         | 19.050 | 0.7500 | 0.010 | 0.0004 | 41.275             | 1.6250 | 0.013 | 0.0005 | 7.92    | 0.312 | 0.8                          | 0.031 | 0.050 | 0.11 | 4400                              | 1000 | 10400                                                      | 2320 |
| S9K            | —         | 22.225 | 0.8750 | 0.010 | 0.0004 | 47.625             | 1.8750 | 0.013 | 0.0005 | 9.52    | 0.375 | 0.8                          | 0.031 | 0.064 | 0.14 | 4900                              | 1120 | 11000                                                      | 2500 |
| S10K           | —         | 25.400 | 1.0000 | 0.010 | 0.0004 | 50.800             | 2.0000 | 0.013 | 0.0005 | 9.52    | 0.375 | 0.8                          | 0.031 | 0.082 | 0.18 | 4900                              | 1120 | 11000                                                      | 2500 |
| S11K           | —         | 28.575 | 1.1250 | 0.010 | 0.0004 | 53.975             | 2.1250 | 0.013 | 0.0005 | 9.52    | 0.375 | 0.8                          | 0.031 | 0.091 | 0.20 | 5400                              | 1220 | 11800                                                      | 2650 |
| S12K           | —         | 31.750 | 1.2500 | 0.013 | 0.0005 | 57.150             | 2.2500 | 0.013 | 0.0005 | 9.52    | 0.375 | 0.8                          | 0.031 | 0.100 | 0.22 | 6000                              | 1340 | 12200                                                      | 2750 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.  
<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

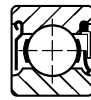
### SHIELD AND SEAL COMBINATIONS



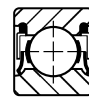
One Shield  
D



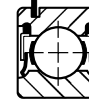
Two Shields  
DD



One Shield  
And Seal  
PD



Two Seals  
PP



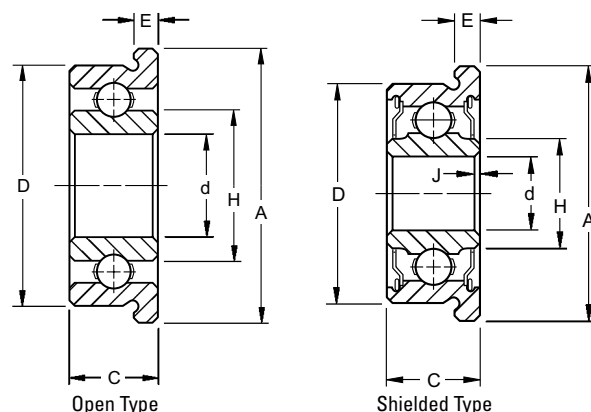
Two Seals  
Wireloc  
PPG

| Standard     |                | Stainless    |                | Width              |       |                  |     | One Shield And Seal PD |        | Two Seals PP |   | Two Seals (Wireloc) PPG |       | Width              |     |                  |     |
|--------------|----------------|--------------|----------------|--------------------|-------|------------------|-----|------------------------|--------|--------------|---|-------------------------|-------|--------------------|-----|------------------|-----|
| One Shield D | Two Shields DD | One Shield D | Two Shields DD | +0.00 mm, -0.12 mm |       | +0.000", -0.005" |     |                        |        |              |   |                         |       | +0.00 mm, -0.12 mm |     | +0.000", -0.005" |     |
|              |                |              |                | mm                 | in.   | mm               | in. |                        |        |              |   | mm                      | in.   | mm                 | in. | mm               | in. |
| 33KD3        | 33KDD3         | A33KD3       | A33KDD3        | 3.96               | 0.156 | 5/32             |     | —                      | 33PP3  | —            | — | 3.96                    | 0.156 | 5/32               |     |                  |     |
| 33KD4        | 33KDD4         | —            | —              | 4.37               | 0.172 | 11/64            |     | —                      | —      | —            | — | —                       | —     | —                  | —   | —                | —   |
| 33KD5        | 33KDD5         | A33KD5       | A33KDD5        | 4.98               | 0.196 | —                |     | —                      | 33PP5  | 33PPG5       | — | 4.98                    | 0.196 | —                  | —   | —                | —   |
| S1KD7        | S1KDD7         | AS1KD7       | AS1KDD7        | 4.98               | 0.196 | —                |     | —                      | S1PP7  | S1PPG7       | — | 4.98                    | 0.196 | —                  | —   | —                | —   |
| S1KD         | S1KDD          | AS1KD        | AS1KDD         | 7.14               | 0.281 | 9/32             |     | —                      | S1PP   | S1PPG        | — | 7.14                    | 0.281 | 9/32               |     |                  |     |
| S3KD         | S3KDD          | AS3KD        | AS3KDD         | 7.14               | 0.281 | 9/32             |     | —                      | S3PP   | S3PPG        | — | 7.14                    | 0.281 | 9/32               |     |                  |     |
| S5KD         | S5KDD          | AS5KD        | AS5KDD         | 7.92               | 0.312 | 5/16             |     | S5PD                   | S5PP   | S5PPG        | — | 7.92                    | 0.312 | 5/16               |     |                  |     |
| S7KD         | S7KDD          | —            | —              | 8.74               | 0.344 | 11/32            |     | —                      | S7PP   | —            | — | 8.74                    | 0.344 | 11/32              |     |                  |     |
| S8KD         | S8KDD          | —            | AS8KDD         | 11.13              | 0.438 | 7/16             |     | S8PD                   | S8PP   | —            | — | 11.13                   | 0.438 | 7/16               |     |                  |     |
| S9KD         | S9KDD          | —            | —              | 12.70              | 0.500 | 1/2              |     | —                      | —      | —            | — | —                       | —     | —                  | —   | —                | —   |
| S10KD        | S10KDD         | —            | —              | 12.70              | 0.500 | 1/2              |     | —                      | S10PP2 | —            | — | 12.70                   | 0.500 | 1/2                |     |                  |     |
| —            | —              | —            | —              | —                  | —     | —                |     | —                      | S12NPP | —            | — | 12.70                   | 0.500 | —                  | —   | —                | —   |

## FLANGED SERIES

### CYLINDRICAL O.D.

- Four sizes offered in flanged construction.
- Integral shoulders for mounting in through-bored housings.
- Straight outside diameters.
- Interchangeable with corresponding unflanged sizes.
- Available with double shields.
- Electric motor quality for applications where quietness is required.



### DIMENSIONS – TOLERANCES

| Bearing Number |                        | Bore d                             |                      | chamfer J x 45°                 |                     | Outside Diameter D                 |                                 | Width C                         |                                 | Inner Ring Shoulder |                                      | Flange                   |                                 | Shielded Type Overall Width |           | Wt.  |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |      |      |     |      |     |
|----------------|------------------------|------------------------------------|----------------------|---------------------------------|---------------------|------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------|--------------------------------------|--------------------------|---------------------------------|-----------------------------|-----------|------|-------|-----------------------------------|-------|------------------------------------------------------------|------|------|-----|------|-----|
| open           | shielded*              | +0.008 mm<br>-0.008 mm<br>+0.0000" | -0.008 mm<br>+0.010" | +0.25 mm<br>-0.00 mm<br>+0.010" | -0.00 mm<br>+0.010" | +0.000 mm<br>-0.010 mm<br>-0.0004" | +0.00 mm<br>-0.13 mm<br>+0.000" | +0.00 mm<br>-0.13 mm<br>-0.005" | +0.00 mm<br>-0.13 mm<br>-0.005" | H<br>Min.           | A<br>+0.13 mm<br>-0.05 mm<br>+0.005" | E<br>±0.05 mm<br>±0.002" | +0.00 mm<br>-0.13 mm<br>+0.000" | -0.13 mm<br>-0.005"         | H<br>Min. | kg   | lbs.  | N                                 | lbs.  | N                                                          | lbs. |      |     |      |     |
| F3K3           | F33KDD3                | 3.175                              | 0.1250               | 0.30                            | 0.012               | 9.525                              | 0.3750                          | 3.96                            | 0.156                           | 5.13                | 0.202                                | 11.18                    | 0.440                           | 0.76                        | 0.030     | 3.96 | 0.156 | 4.65                              | 0.183 | 0.005                                                      | 0.01 | 212  | 48  | 710  | 160 |
| F3K5           | F33KDD5                | 4.762                              | 0.1875               | 0.30                            | 0.012               | 12.700                             | 0.5000                          | 3.96                            | 0.156                           | 6.86                | 0.270                                | 14.35                    | 0.565                           | 1.07                        | 0.042     | 4.98 | 0.196 | 6.30                              | 0.248 | 0.005                                                      | 0.01 | 490  | 110 | 1430 | 325 |
| FS1K7          | FS1KDD7 <sup>(1)</sup> | 6.350                              | 0.2500               | 0.30                            | 0.012               | 15.875                             | 0.6250                          | 4.98                            | 0.196                           | 8.86                | 0.349                                | 17.53                    | 0.690                           | 1.07                        | 0.042     | 4.98 | 0.196 | 8.43                              | 0.332 | 0.005                                                      | 0.01 | 560  | 125 | 1630 | 365 |
| FS3K           | FS3KDD <sup>(1)</sup>  | 9.525                              | 0.3750               | 0.41                            | 0.016               | 22.225                             | 0.8750                          | 5.56                            | 0.219                           | 13.13               | 0.517                                | 24.61                    | 0.969                           | 1.57                        | 0.062     | 7.14 | 0.281 | 12.06                             | 0.475 | 0.009                                                      | 0.02 | 1400 | 310 | 3650 | 830 |

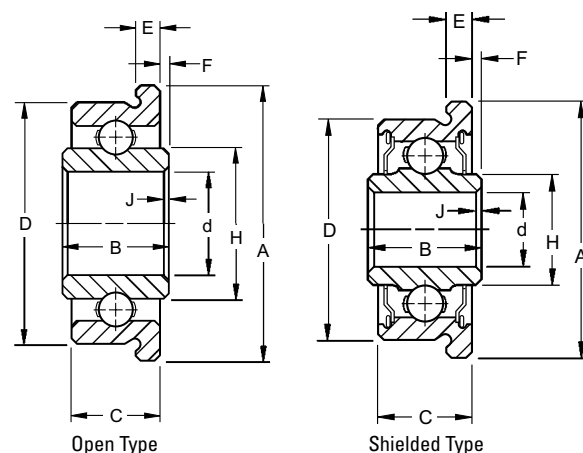
<sup>(1)</sup> Also available in stainless steel. To specify, add prefix "A" before bearing number.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

\* Also available with two contact seals. To specify, replace "KDD" in part number with "PP".

### TAPERED O.D.

- F Flanged series has shoulders integral with the bearings for mounting in through-bored housings.
- Used where compactness is essential or where it is not desirable to machine housing shoulders.
- All sizes in series have tapered outside diameters and are available with double shields.
- Suitable applications include precision instruments, packaging machinery and motion picture projectors.
- Several sizes in the series are manufactured in both standard bearing-quality, chromium-alloy, high-carbon steel and stainless steel (stainless steel specified by suffix "A").
- Electric motor quality where quietness is required.



### DIMENSIONS – TOLERANCES

| Bearing Number    |                     | Bore d                            |                                   | chamfer J x 45°                  |                     | Outside Diameter D               |                     | Inner Ring Widths                |                          | Outer Ring Width                     |                | Flange                               |                          | Wt.  |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(4)</sup> |       |      |       |       |      |     |     |      |     |
|-------------------|---------------------|-----------------------------------|-----------------------------------|----------------------------------|---------------------|----------------------------------|---------------------|----------------------------------|--------------------------|--------------------------------------|----------------|--------------------------------------|--------------------------|------|-------|-----------------------------------|-------|------------------------------------------------------------|-------|------|-------|-------|------|-----|-----|------|-----|
| open              | shielded            | +0.008 mm<br>-0.00 mm<br>+0.0003" | -0.0025 mm<br>-0.00 mm<br>+0.010" | +0.025 mm<br>-0.00 mm<br>+0.010" | -0.00 mm<br>+0.010" | +0.000 mm<br>-0.10 mm<br>+0.000" | -0.10 mm<br>+0.000" | Project F<br>±0.13 mm<br>-0.005" | H <sup>(3)</sup><br>Min. | C<br>+0.00 mm<br>-0.10 mm<br>+0.000" | Taper Per Foot | A<br>+0.13 mm<br>-0.05 mm<br>+0.005" | E<br>±0.05 mm<br>±0.002" | kg   | lbs.  | N                                 | lbs.  | N                                                          | lbs.  |      |       |       |      |     |     |      |     |
| F2 <sup>(1)</sup> | —                   | 4.762                             | 0.1875                            | 0.25                             | 0.010               | 11.130                           | 0.4382              | 4.80                             | 0.189                    | 0.41                                 | 0.016          | 6.93                                 | 0.273                    | 4.14 | 0.163 | 2.03                              | 0.080 | 12.70                                                      | 0.500 | 1.07 | 0.042 | 0.005 | 0.01 | 465 | 106 | 1160 | 260 |
| —                 | F2DD-2              | 3.175                             | 0.1250                            | 0.25                             | 0.010               | 9.534                            | 0.3757              | 4.77                             | 0.188                    | 0.38                                 | 0.015          | 4.60                                 | 0.181                    | 4.14 | 0.163 | 1.90                              | 0.075 | 11.13                                                      | 0.438 | 0.94 | 0.037 | 0.005 | 0.01 | 212 | 48  | 710  | 160 |
| F3                | —                   | 4.762                             | 0.1875                            | 0.25                             | 0.010               | 14.305                           | 0.5632              | 5.54                             | 0.218                    | 0.38                                 | 0.015          | 6.93                                 | 0.273                    | 4.95 | 0.195 | 2.03                              | 0.080 | 15.88                                                      | 0.625 | 1.07 | 0.042 | 0.005 | 0.01 | 490 | 110 | 1430 | 325 |
| —                 | F3DD                | 4.762                             | 0.1875                            | 0.25                             | 0.010               | 14.305                           | 0.5632              | 6.35                             | 0.250                    | 0.38                                 | 0.015          | 6.22                                 | 0.245                    | 5.74 | 0.226 | 1.73                              | 0.068 | 15.88                                                      | 0.625 | 1.07 | 0.042 | 0.005 | 0.01 | 490 | 110 | 1430 | 325 |
| F4                | F4DD                | 6.350                             | 0.2500                            | 0.25                             | 0.010               | 15.893                           | 0.6257              | 6.35                             | 0.250                    | 0.38                                 | 0.015          | 8.41                                 | 0.331                    | 5.74 | 0.226 | 1.73                              | 0.068 | 17.45                                                      | 0.687 | 1.07 | 0.042 | 0.005 | 0.01 | 560 | 125 | 1630 | 365 |
| F5                | F5DD <sup>(2)</sup> | 7.938                             | 0.3125                            | 0.25                             | 0.010               | 17.480                           | 0.6882              | 6.35                             | 0.250                    | 0.38                                 | 0.015          | 10.41                                | 0.410 <sup>(2)</sup>     | 5.74 | 0.226 | 1.73                              | 0.068 | 19.05                                                      | 0.750 | 1.07 | 0.042 | 0.005 | 0.01 | 865 | 196 | 2400 | 540 |

<sup>(1)</sup> Full type, no retainer. Not suggested for speeds over 500 RPM.

<sup>(2)</sup> H dimension is 9.68 mm (.381") for F5DD.

<sup>(3)</sup> Land dimension of the inner ring.

<sup>(4)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

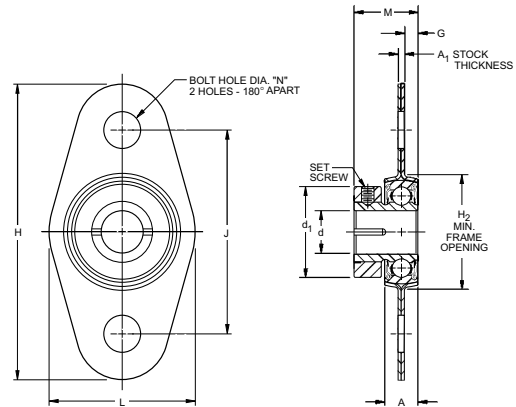




# BALL BEARINGS

## ST FLANGETTE UNIT

- Pressed steel housed units designed for light-duty applications.
- Available in shaft sizes from 6.35 mm - 12.7 mm (1/4 to 1/2 inch).
- Designed to simplify mounting on side plate or frame-type housings.
- Two identical steel stampings house a clamp-type bearing with a spherical O.D. outer ring.
- Spherical inside surface of each stamping mates with the spherical O.D. of the bearing, providing initial self-alignment at mounting.
- Offers features of basic clamp-type bearing.
- Available with sealed or shielded construction.
- Radial load capacity is 25 percent of basic bearing's dynamic load rating at 33.3 RPM.
- Inspected to ABEC-1 tolerances, except bore.
- Suggested shaft tolerance: Nominal bore size to -.0005 in. resulting in .000 in. to .001 in. loose-shaft fit.



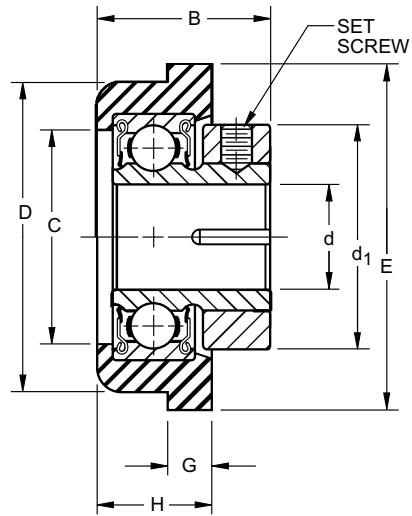
| Unit Number | Bore**<br>d |        | A     |      | d <sub>1</sub> |       | H <sub>2</sub> |        | M      |       | G     |       | A <sub>1</sub> |        | H      |         | L      |         | J      |         | N     |      | Set-screw Thread* | Max. Radial Unit Load |      |
|-------------|-------------|--------|-------|------|----------------|-------|----------------|--------|--------|-------|-------|-------|----------------|--------|--------|---------|--------|---------|--------|---------|-------|------|-------------------|-----------------------|------|
|             | mm          | in.    | mm    | in.  | mm             | in.   | mm             | in.    | mm     | in.   | mm    | in.   | mm             | in.    | mm     | in.     | mm     | in.     | mm     | in.     | mm    | in.  |                   | N                     | lbs. |
| S1PPB7-3 ST | 6.350       | 0.2500 | 5.566 | 7/32 | 14.287         | 9/16  | 19.844         | 25/32  | 10.922 | 0.430 | 2.007 | 0.079 | 0.683          | 0.0269 | 45.244 | 1 25/32 | 22.225 | 7/8     | 30.956 | 1 7/32  | 0.219 | 7/32 | 4-40              | 312                   | 70   |
| S3PPB15 ST  | 7.937       | 0.3125 | 7.144 | 9/32 | 19.844         | 25/32 | 27.781         | 1 3/32 | 14.275 | 0.562 | 2.718 | 0.107 | 0.836          | 0.0329 | 53.181 | 2 3/32  | 30.163 | 1 13/16 | 38.894 | 1 17/32 | 0.219 | 7/32 | 8-36              | 668                   | 150  |
| S3PPB5 ST   | 9.525       | 0.3750 | 7.144 | 9/32 | 19.844         | 25/32 | 27.781         | 1 3/32 | 14.275 | 0.562 | 2.718 | 0.107 | 0.836          | 0.0329 | 53.181 | 2 3/32  | 30.163 | 1 13/16 | 38.894 | 1 17/32 | 0.219 | 7/32 | 8-36              | 668                   | 150  |
| S5PPB2 ST   | 12.700      | 0.5000 | 7.937 | 5/16 | 23.019         | 29/32 | 32.544         | 1 9/32 | 15.875 | 0.625 | 3.048 | 0.120 | 0.912          | 0.0359 | 59.531 | 2 11/32 | 36.512 | 1 17/16 | 45.244 | 1 25/32 | 0.219 | 7/32 | 8-36              | 980                   | 220  |

\* All setscrews are hex socket oval point, six fluted socket setscrews available upon request. Setscrews with fused plastic patch available at added cost.

\*\*Bore tolerance applies prior to collar assembly.

## RTF-RUBBER TIRE FLANGE HOUSED UNIT

- Synthetic, conductive elastomer of Durometer hardness 80-85 facilitates mounting of standard cylindrical O.D. bearings in side plate of frame-type housings.
- Generous taper on entrance corner of rubber cartridge simplifies insertion of unit into side panel, assuring reasonable squareness of bearings when fully mounted.
- Bearing is positioned by integral flange of the rubber cartridge.
- Resiliency of elastomer accommodates wider than the standard suggested housing bore tolerance.
- Greater flexibility in adjusting to minor shaft and/or housing alignment.
- Helps reduce airborne noise and structural vibration.
- Additional advantages are similar to features of basic clamp-type bearing design.
- Due to deflection characteristics of the elastomer, radial and thrust ratings for the RTF Series are 10 percent of the basic bearing's dynamic load rating at 33.3 RPM.



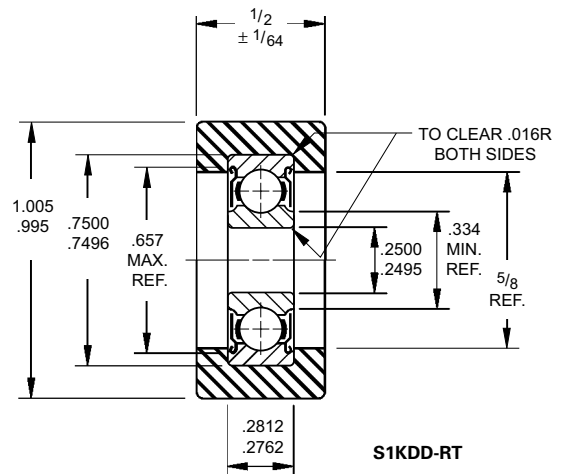
| Unit Number | Bore**<br>d |        | D<br>RTF O.D. |       | HSG Bore |       | C      | d <sub>1</sub> | E      | B     | G      | H       | Set-screw Thread* | Max. Radial Unit Load |       |      |        |       |      |     |    |
|-------------|-------------|--------|---------------|-------|----------|-------|--------|----------------|--------|-------|--------|---------|-------------------|-----------------------|-------|------|--------|-------|------|-----|----|
|             | mm          | in.    | mm            | in.   | mm       | in.   |        |                |        |       |        |         |                   | N                     | lbs.  |      |        |       |      |     |    |
| S1PP73RTF   | 6.350       | 0.2500 | 19.355        | 0.762 | 19.050   | 0.750 | 13.494 | 17/32          | 14.287 | 9/16  | 22.225 | 7/8     | 11.906            | 15/32                 | 1.984 | 5/64 | 7.541  | 19/64 | 4-40 | 116 | 26 |
| S3PP16RTF   | 7.937       | 0.3125 | 27.280        | 1.074 | 26.975   | 1.062 | 19.050 | 3/4            | 19.844 | 25/32 | 30.956 | 1 7/32  | 15.875            | 5/8                   | 3.969 | 5/32 | 10.319 | 13/32 | 8-36 | 258 | 58 |
| S3PP4RTF    | 9.525       | 0.3750 | 27.280        | 1.074 | 26.975   | 1.062 | 19.050 | 3/4            | 19.844 | 25/32 | 30.956 | 1 7/32  | 15.875            | 5/8                   | 3.969 | 5/32 | 10.319 | 13/32 | 8-36 | 258 | 58 |
| S5PP2RTF    | 12.700      | 0.5000 | 35.255        | 1.388 | 34.925   | 1.375 | 25.400 | 1              | 23.019 | 29/32 | 38.894 | 1 17/32 | 17.859            | 45/64                 | 3.969 | 5/32 | 11.906 | 15/32 | 8-36 | 392 | 88 |

\* All setscrews are hex socket oval point, six fluted socket setscrews available upon request. Setscrews with fused plastic patch available at added cost.

\*\*Bore tolerance applies prior to collar assembly.

## SPECIAL BEARINGS

- Pulley, guide roller and pinch roll bearings:
  - Available in several bore sizes.
  - Lightweight, low inertia, low torque and accurate running characteristics with minimum runout and wobble.
  - Many units feature outer ring assemblies with integral molded tires.
  - Most common tire materials are aluminum, steel and a variety of engineered plastics such as nylon, polycarbonate, acetal resin or polyurethane.
  - Tire material and configuration are determined by application requirements.
  - Standard materials and shapes can be made in many sizes.
  - Timken engineering may assist in testing materials you feel are suitable for your applications.
  
- Timken universal ring design:
  - Sealed or shielded versions readily available in the most basic bearing sizes.
  - Varying degrees of seal drag, to suit the sealing torque requirements dictated by the environmental conditions of the application.
  
- Integral assembly design concept:
  - Complete package of bearings, housings, shafts, etc.
  - Assembled and ready to mount.
  - Custom designed to solve customer assembly problems and minimize inventory of multiple components.
  - Overall cost savings.
  - Bearing units shown have been developed especially for business machine applications.



D

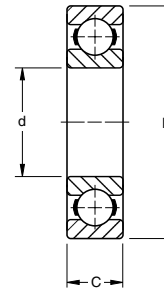




# BALL BEARINGS

## ULTRA LIGHT 9300K SERIES

- Designed for applications where housing diameters are restricted and it is desirable to maintain relatively large shaft diameters.
- Resembles the 9100K Series, except corresponding sizes of the 9300K Series have a somewhat thinner section.
- Used extensively in machine tools, textile machinery and jet engine gearbox applications.



### DIMENSIONS – TOLERANCES

| Bearing Number          | Bore d |        |       |         | Outside Diameter D |        |       |         | Width C |        |      |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |      | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load Rating C <sub>E</sub> <sup>(4)</sup> |      |
|-------------------------|--------|--------|-------|---------|--------------------|--------|-------|---------|---------|--------|------|-------|------------------------------|-------|-------|------|-----------------------------------|------|------------------------------------------------------------|------|
|                         | mm     | in.    | mm    | in.     | mm                 | in.    | mm    | in.     | mm      | in.    | mm   | in.   | mm                           | in.   | kg    | lbs. | N                                 | lbs. | N                                                          | lbs. |
| 9301K                   | 12     | 0.4724 | 0.008 | 0.0003  | 24                 | 0.9449 | 0.009 | 0.00035 | 6       | 0.236  | 0.12 | 0.005 | 0.3                          | 0.012 | 0.014 | 0.03 | 1600                              | 360  | 3650                                                       | 830  |
| 9302K                   | 15     | 0.5906 | 0.008 | 0.0003  | 28                 | 1.1024 | 0.009 | 0.00035 | 7       | 0.276  | 0.12 | 0.005 | 0.3                          | 0.012 | 0.018 | 0.04 | 2270                              | 510  | 4890                                                       | 1100 |
| 9303K <sup>(2)</sup>    | 17     | 0.6693 | 0.008 | 0.0003  | 30                 | 1.1811 | 0.009 | 0.00035 | 7       | 0.276  | 0.12 | 0.005 | 0.3                          | 0.012 | 0.027 | 0.06 | 2540                              | 570  | 5250                                                       | 1180 |
| 9305K <sup>(2)</sup>    | 25     | 0.9843 | 0.010 | 0.0004  | 42                 | 1.6535 | 0.011 | 0.00045 | 9       | 0.354  | 0.12 | 0.005 | 0.3                          | 0.012 | 0.045 | 0.10 | 4540                              | 1020 | 8010                                                       | 1800 |
| 9306K <sup>(2)(3)</sup> | 30     | 1.1811 | 0.010 | 0.0004  | 47                 | 1.8504 | 0.011 | 0.00045 | 9       | 0.354  | 0.12 | 0.005 | 0.3                          | 0.012 | 0.075 | 0.16 | 4980                              | 1120 | 8270                                                       | 1860 |
| 9307K                   | 35     | 1.3780 | 0.012 | 0.00045 | 55                 | 2.1654 | 0.013 | 0.0005  | 10      | 0.394  | 0.12 | 0.005 | 0.6                          | 0.024 | 0.095 | 0.21 | 8010                              | 1800 | 13300                                                      | 3000 |
| 9308K                   | 40     | 1.5748 | 0.012 | 0.00045 | 62                 | 2.4409 | 0.013 | 0.0005  | 12      | 0.472  | 0.12 | 0.005 | 0.6                          | 0.024 | 0.141 | 0.31 | 8900                              | 2000 | 13800                                                      | 3100 |
| 9310K                   | 50     | 1.9685 | 0.012 | 0.00045 | 72                 | 2.8346 | 0.013 | 0.0005  | 12      | 0.472  | 0.12 | 0.005 | 0.6                          | 0.024 | 0.168 | 0.37 | 11560                             | 2600 | 16700                                                      | 3750 |
| 9311K                   | 55     | 2.1654 | 0.015 | 0.0006  | 80                 | 3.1496 | 0.013 | 0.0005  | 13      | 0.512* | 0.15 | 0.006 | 1.0                          | 0.039 | 0.209 | 0.46 | 14010                             | 3150 | 18900                                                      | 4250 |
| 9313K                   | 65     | 2.5591 | 0.015 | 0.0006  | 90                 | 3.5433 | 0.015 | 0.0006  | 13      | 0.512* | 0.15 | 0.006 | 1.0                          | 0.039 | 0.250 | 0.55 | 16010                             | 3600 | 19600                                                      | 4400 |
| 9316K                   | 80     | 3.1496 | 0.015 | 0.0006  | 110                | 4.3307 | 0.015 | 0.0006  | 16      | 0.630* | 0.15 | 0.006 | 1.0                          | 0.039 | 0.363 | 0.80 | 24020                             | 5400 | 28500                                                      | 6400 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

\* Width tolerance is +.00 mm to -.15 mm (+.000" to -.006").

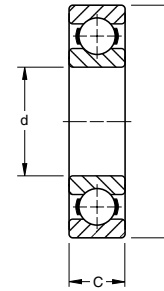
<sup>(2)</sup> Also available with rubber seals, e.g., 9303PP.

<sup>(3)</sup> Also available with two shields, e.g., 9306KDD.

<sup>(4)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## EXTRA LIGHT 9100K SERIES

- For applications where housing diameters are restricted and it is desirable to maintain relatively large shaft diameters.
- Electric motor quality for applications where quietness is a requirement.



### DIMENSIONS – TOLERANCES

| Bearing Number | Bore d |        |       |         | Outside Diameter D |        |       |         | Width C |        |      |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |      | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |       |
|----------------|--------|--------|-------|---------|--------------------|--------|-------|---------|---------|--------|------|-------|------------------------------|-------|-------|------|-----------------------------------|-------|------------------------------------------------------------|-------|
|                | mm     | in.    | mm    | in.     | mm                 | in.    | mm    | in.     | mm      | in.    | mm   | in.   | mm                           | in.   | kg    | lbs. | N                                 | lbs.  | N                                                          | lbs.  |
| 9100K          | 10     | 0.3937 | 0.008 | 0.0003  | 26                 | 1.0236 | 0.009 | 0.00035 | 8       | 0.3150 | 0.12 | 0.005 | 0.3                          | 0.012 | 0.018 | 0.04 | 1960                              | 440   | 5160                                                       | 1160  |
| 9101K          | 12     | 0.4724 | 0.008 | 0.0003  | 28                 | 1.1024 | 0.009 | 0.00035 | 8       | 0.3150 | 0.12 | 0.005 | 0.3                          | 0.012 | 0.018 | 0.04 | 2360                              | 530   | 5870                                                       | 1320  |
| 9102K          | 15     | 0.5906 | 0.008 | 0.0003  | 32                 | 1.2598 | 0.011 | 0.00045 | 9       | 0.3543 | 0.12 | 0.005 | 0.3                          | 0.012 | 0.027 | 0.06 | 2800                              | 630   | 6360                                                       | 1430  |
| 9103K          | 17     | 0.6693 | 0.008 | 0.0003  | 35                 | 1.3780 | 0.011 | 0.00045 | 10      | 0.3937 | 0.12 | 0.005 | 0.3                          | 0.012 | 0.041 | 0.09 | 3200                              | 720   | 6800                                                       | 1530  |
| 9104K          | 20     | 0.7874 | 0.010 | 0.0004  | 42                 | 1.6535 | 0.011 | 0.00045 | 12      | 0.4724 | 0.12 | 0.005 | 0.6                          | 0.024 | 0.073 | 0.16 | 5000                              | 1120  | 10700                                                      | 2400  |
| 9105K          | 25     | 0.9843 | 0.010 | 0.0004  | 47                 | 1.8504 | 0.011 | 0.00045 | 12      | 0.4724 | 0.12 | 0.005 | 0.6                          | 0.024 | 0.077 | 0.17 | 5740                              | 1290  | 11300                                                      | 2550  |
| 9106K          | 30     | 1.1811 | 0.010 | 0.0004  | 55                 | 2.1654 | 0.013 | 0.0005  | 13      | 0.5118 | 0.12 | 0.005 | 1.0                          | 0.039 | 0.118 | 0.26 | 8010                              | 1800  | 14600                                                      | 3350  |
| 9107K          | 35     | 1.3780 | 0.012 | 0.00045 | 62                 | 2.4409 | 0.013 | 0.0005  | 14      | 0.5512 | 0.12 | 0.005 | 1.0                          | 0.039 | 0.145 | 0.32 | 9960                              | 2240  | 18000                                                      | 4050  |
| 9108K          | 40     | 1.5748 | 0.012 | 0.00045 | 68                 | 2.6772 | 0.013 | 0.0005  | 15      | 0.5906 | 0.12 | 0.005 | 1.0                          | 0.039 | 0.195 | 0.43 | 12200                             | 2750  | 20000                                                      | 4500  |
| 9109K          | 45     | 1.7717 | 0.012 | 0.00045 | 75                 | 2.9528 | 0.013 | 0.0005  | 16      | 0.6299 | 0.12 | 0.005 | 1.0                          | 0.039 | 0.249 | 0.55 | 14900                             | 3350  | 24000                                                      | 5400  |
| 9110K          | 50     | 1.9685 | 0.012 | 0.00045 | 80                 | 3.1496 | 0.013 | 0.0005  | 16      | 0.6299 | 0.12 | 0.005 | 1.0                          | 0.039 | 0.272 | 0.60 | 16000                             | 3600  | 24900                                                      | 5600  |
| 9111K          | 55     | 2.1654 | 0.015 | 0.0006  | 90                 | 3.5433 | 0.015 | 0.0006  | 18      | 0.7087 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.390 | 0.86 | 20700                             | 4650  | 32000                                                      | 7200  |
| 9112K          | 60     | 2.3622 | 0.015 | 0.0006  | 95                 | 3.7402 | 0.015 | 0.0006  | 18      | 0.7087 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.417 | 0.92 | 22600                             | 5100  | 33400                                                      | 7500  |
| 9113K          | 65     | 2.5591 | 0.015 | 0.0006  | 100                | 3.9370 | 0.015 | 0.0006  | 18      | 0.7087 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.445 | 0.98 | 24500                             | 5500  | 34700                                                      | 7800  |
| 9114K          | 70     | 2.7559 | 0.015 | 0.0006  | 110                | 4.3307 | 0.015 | 0.0006  | 20      | 0.7874 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.630 | 1.39 | 29800                             | 6700  | 43200                                                      | 9720  |
| 9115K          | 75     | 2.9528 | 0.015 | 0.0006  | 115                | 4.5276 | 0.015 | 0.0006  | 20      | 0.7874 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.680 | 1.50 | 32700                             | 7350  | 44500                                                      | 10000 |
| 9116K          | 80     | 3.1496 | 0.015 | 0.0006  | 125                | 4.9213 | 0.018 | 0.0007  | 22      | 0.8661 | 0.15 | 0.006 | 1.0                          | 0.039 | 0.885 | 1.95 | 35600                             | 8000  | 54300                                                      | 12200 |
| 9117K          | 85     | 3.3465 | 0.020 | 0.0008  | 130                | 5.1181 | 0.018 | 0.0007  | 22      | 0.8661 | 0.20 | 0.008 | 1.0                          | 0.039 | 0.966 | 2.13 | 35600                             | 8000  | 56500                                                      | 12700 |
| 9118K          | 90     | 3.5433 | 0.020 | 0.0008  | 140                | 5.5118 | 0.018 | 0.0007  | 24      | 0.9449 | 0.20 | 0.008 | 1.5                          | 0.059 | 1.157 | 2.55 | 48000                             | 10800 | 66700                                                      | 15000 |
| 9119K          | 95     | 3.7402 | 0.020 | 0.0008  | 145                | 5.7087 | 0.018 | 0.0007  | 24      | 0.9449 | 0.20 | 0.008 | 1.5                          | 0.059 | 1.188 | 2.62 | 52500                             | 11800 | 68100                                                      | 15300 |
| 9120K          | 100    | 3.9370 | 0.020 | 0.0008  | 150                | 5.9055 | 0.018 | 0.0007  | 24      | 0.9449 | 0.20 | 0.008 | 1.5                          | 0.059 | 1.315 | 2.90 | 52500                             | 11800 | 68100                                                      | 15300 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

Continued on the next page.

## EXTRA LIGHT 9100K SERIES (continued)

### DIMENSIONS – TOLERANCES

| Bearing Number | Bore d |         |                              |                             | Outside Diameter D |         |                              |                             | Width C |        |      |       | Fillet Radius <sup>(1)</sup> |       | Wt.  |       | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |        |
|----------------|--------|---------|------------------------------|-----------------------------|--------------------|---------|------------------------------|-----------------------------|---------|--------|------|-------|------------------------------|-------|------|-------|-----------------------------------|--------|------------------------------------------------------------|--------|
|                | mm     | in.     | tolerance +0.000 mm to minus | tolerance +0.0000" to minus | mm                 | in.     | tolerance +0.000 mm to minus | tolerance +0.0000" to minus | mm      | in.    | mm   | in.   | mm                           | in.   | kg   | lbs.  | N                                 | lbs.   | N                                                          | lbs.   |
| 9121K          | 105    | 4.1339  | 0.020                        | 0.0008                      | 160                | 6.2992  | 0.025                        | 0.0010                      | 26      | 1.0236 | 0.20 | 0.008 | 2.0                          | 0.079 | 1.6  | 3.6   | 59600                             | 13400  | 76900                                                      | 17600  |
| 9122K          | 110    | 4.3307  | 0.020                        | 0.0008                      | 170                | 6.6929  | 0.025                        | 0.0010                      | 28      | 1.1024 | 0.20 | 0.008 | 2.0                          | 0.080 | —    | —     | 71100                             | 16000  | 92500                                                      | 20800  |
| 9124K          | 120    | 4.7244  | 0.020                        | 0.0008                      | 180                | 7.0866  | 0.025                        | 0.0010                      | 28      | 1.1024 | 0.20 | 0.008 | 2.0                          | 0.079 | 2.2  | 4.9   | 71100                             | 16000  | 88900                                                      | 20000  |
| 9126K          | 130    | 5.1181  | 0.025                        | 0.0010                      | 200                | 7.8740  | 0.030                        | 0.0012                      | 33      | 1.2992 | 0.25 | 0.010 | 2.0                          | 0.079 | 3.4  | 7.4   | 90700                             | 20400  | 115600                                                     | 26000  |
| 9128K          | 140    | 5.5118  | 0.025                        | 0.0010                      | 210                | 8.2677  | 0.030                        | 0.0012                      | 33      | 1.2992 | 0.25 | 0.010 | 2.0                          | 0.080 | 3.6  | 8.0   | 105000                            | 23600  | 124500                                                     | 28000  |
| 9130K          | 150    | 5.9055  | 0.025                        | 0.0010                      | 225                | 8.8583  | 0.030                        | 0.0012                      | 35      | 1.3780 | 0.25 | 0.010 | 2.0                          | 0.080 | 5.5  | 12.0  | 92500                             | 20800  | 113400                                                     | 25500  |
| 9132K          | 160    | 6.2992  | 0.025                        | 0.0010                      | 240                | 9.4488  | 0.030                        | 0.0012                      | 38      | 1.4961 | 0.25 | 0.010 | 2.0                          | 0.080 | 6.7  | 14.8  | 138000                            | 31000  | 166800                                                     | 37500  |
| 9134K          | 170    | 6.6929  | 0.025                        | 0.0010                      | 260                | 10.2362 | 0.035                        | 0.0014                      | 42      | 1.6535 | 0.25 | 0.010 | 2.0                          | 0.080 | 9.0  | 19.8  | 160000                            | 36000  | 189000                                                     | 42500  |
| 9136K          | 180    | 7.0866  | 0.025                        | 0.0010                      | 280                | 11.0236 | 0.035                        | 0.0014                      | 44      | 1.8110 | 0.25 | 0.010 | 2.0                          | 0.080 | 11.0 | 24.3  | 195700                            | 44000  | 222000                                                     | 50000  |
| 9138K          | 190    | 7.4803  | 0.030                        | 0.0012                      | 290                | 11.4173 | 0.035                        | 0.0014                      | 46      | 1.8110 | 0.30 | 0.012 | 2.0                          | 0.080 | 12.0 | 26.5  | 204000                            | 45500  | 216000                                                     | 48000  |
| 9140K          | 200    | 7.8740  | 0.030                        | 0.0012                      | 310                | 12.2047 | 0.035                        | 0.0014                      | 51      | 2.0079 | 0.30 | 0.012 | 2.0                          | 0.080 | 15.4 | 34.0  | 245000                            | 55000  | 245000                                                     | 55000  |
| 9144K          | 220    | 8.6614  | 0.030                        | 0.0012                      | 340                | 13.3858 | 0.040                        | 0.0016                      | 56      | 2.2047 | 0.30 | 0.012 | 2.5                          | 0.100 | 20.0 | 44.2  | 290000                            | 65500  | 280000                                                     | 63000  |
| 9146K          | 240    | 9.4488  | 0.030                        | 0.0012                      | 360                | 14.1732 | 0.040                        | 0.0016                      | 56      | 2.2047 | 0.30 | 0.012 | 2.5                          | 0.100 | 21.5 | 47.3  | 320000                            | 72000  | 290000                                                     | 65500  |
| 9152K          | 260    | 10.2362 | 0.035                        | 0.0014                      | 400                | 15.7480 | 0.040                        | 0.0016                      | 65      | 2.5591 | 0.35 | 0.014 | 3.0                          | 0.120 | 31.6 | 69.6  | 400000                            | 90000  | 345000                                                     | 78000  |
| 9156K          | 280    | 11.0236 | 0.035                        | 0.0014                      | 420                | 16.5354 | 0.045                        | 0.0018                      | 65      | 2.5591 | 0.35 | 0.014 | 3.0                          | 0.120 | 33.5 | 73.8  | 355000                            | 80000  | 360000                                                     | 80000  |
| 9160K          | 300    | 11.8110 | 0.035                        | 0.0014                      | 460                | 18.1102 | 0.045                        | 0.0018                      | 74      | 2.9134 | 0.35 | 0.014 | 3.0                          | 0.120 | 46.6 | 102.9 | 520000                            | 118000 | 415000                                                     | 93000  |
| 9164K          | 320    | 12.5984 | 0.040                        | 0.0016                      | 480                | 18.8976 | 0.045                        | 0.0018                      | 74      | 2.9134 | 0.40 | 0.016 | 3.0                          | 0.120 | 49.1 | 108.3 | 570000                            | 127000 | 430000                                                     | 98000  |
| 9180K          | 400    | 15.7480 | 0.040                        | 0.0016                      | 600                | 23.6220 | 0.050                        | 0.0020                      | 90      | 3.5433 | 0.40 | 0.016 | 4.0                          | 0.160 | —    | —     | 815000                            | 180000 | 550000                                                     | 122000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### SHIELDS, SEALS AND SNAP RING COMBINATIONS

| Shields and Seals |                |            |              |                        | Snap Ring (Wireloc) <sup>(1)</sup> |                 |               | Dimensions |         |           |       |        |       |
|-------------------|----------------|------------|--------------|------------------------|------------------------------------|-----------------|---------------|------------|---------|-----------|-------|--------|-------|
| One Shield D      | Two Shields DD | One Seal P | Two Seals PP | One Shield And Seal PD | Open Type G                        | Two Shields DDG | Two Seals PPG | O.D.       |         | Thickness |       | Offset |       |
|                   |                |            |              |                        |                                    |                 |               | mm         | in.     | mm        | in.   | mm     | in.   |
| 9100KD            | 9100KDD        | 9100P      | 9100PP       | 9100PD                 | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| 9101KD            | 9101KDD        | 9101P      | 9101PP       | 9101PD                 | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| 9102KD            | 9102KDD        | 9102P      | 9102PP       | —                      | 9102KG                             | 9102KDDG        | 9102PPG       | 36.5       | 1 7/16  | 1.07      | 0.042 | 3.05   | 0.120 |
| 9103KD            | 9103KDD        | 9103P      | 9103PP       | 9103PD <sup>(2)</sup>  | 9103KG                             | 9103KDDG        | 9103PPG       | 39.3       | 1 35/64 | 1.07      | 0.042 | 3.05   | 0.120 |
| 9104KD            | 9104KDD        | 9104P      | 9104PP       | —                      | 9104KG                             | 9104KDDG        | 9104PPG       | 46.0       | 1 13/16 | 1.07      | 0.042 | 3.05   | 0.120 |
| 9105KD            | 9105KDD        | 9105P      | 9105PP       | —                      | —                                  | —               | —             | 52.4       | 2 1/16  | 1.07      | 0.042 | 3.05   | 0.120 |
| 9106KD            | 9106KDD        | 9106P      | 9106PP       | 9106PD                 | 9106KG                             | 9106KDDG        | 9106PPG       | 60.3       | 2 3/8   | 1.07      | 0.042 | 3.05   | 0.120 |
| 9107KD            | 9107KDD        | 9107P      | 9107PP       | —                      | 9107KG                             | 9107KDDG        | 9107PPG       | 67.5       | 2 21/32 | 1.65      | 0.065 | 3.63   | 0.143 |
| 9108KD            | 9108KDD        | 9108P      | 9108PP       | —                      | 9108KG                             | 9108KDDG        | 9108PPG       | 74.2       | 2 59/64 | 1.65      | 0.065 | 4.04   | 0.159 |
| 9109KD            | 9109KDD        | 9109P      | 9109PP       | 9109PD                 | 9109KG                             | 9109KDDG        | 9109PPG       | 81.4       | 3 13/64 | 1.65      | 0.065 | 4.04   | 0.159 |
| 9110KD            | 9110KDD        | 9110P      | 9110PP       | —                      | 9110KG                             | —               | —             | 86.5       | 3 13/32 | 1.65      | 0.065 | 4.04   | 0.159 |
| 9111KD            | 9111KDD        | 9111P      | 9111PP       | —                      | 9111KG                             | —               | 9111PPG       | 96.4       | 3 51/64 | 2.41      | 0.095 | 5.18   | 0.204 |
| 9112KD            | 9112KDD        | 9112P      | 9112PP       | —                      | 9112KG                             | —               | —             | 101.2      | 3 63/64 | 2.41      | 0.095 | 5.18   | 0.204 |
| 9113KD            | 9113KDD        | 9113P      | 9113PP       | 9113PD                 | 9113KG                             | —               | 9113PPG       | 106.4      | 4 3/16  | 2.41      | 0.095 | 5.18   | 0.204 |
| 9114KD            | 9114KDD        | 9114P      | 9114PP       | —                      | 9114KG                             | —               | —             | 116.3      | 4 37/64 | 2.41      | 0.095 | 5.18   | 0.204 |
| 9115KD            | 9115KDD        | 9115P      | 9115PP       | —                      | —                                  | —               | —             | 121.4      | 4 25/32 | 2.41      | 0.095 | 5.18   | 0.204 |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| 9117KD            | —              | —          | —            | —                      | 9117KG                             | 9117KDDG        | —             | 139.7      | 5 1/2   | 2.77      | 0.109 | 5.54   | 0.218 |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| 9120KD            | —              | —          | 9120NPP      | —                      | —                                  | —               | —             | 159.5      | 6 9/32  | 2.77      | 0.109 | 6.35   | 0.250 |
| 9121KD            | —              | —          | —            | —                      | —                                  | —               | —             | 169.5      | 6 43/64 | 2.77      | 0.109 | 6.35   | 0.250 |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| 9124KD            | —              | 9124P      | 9124PP       | —                      | 9124KG                             | —               | —             | 192.9      | 7 19/32 | 3.05      | 0.120 | 6.63   | 0.261 |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |
| —                 | —              | —          | —            | —                      | —                                  | —               | —             | —          | —       | —         | —     | —      | —     |

<sup>(1)</sup> The snap ring is normally packaged separately in the box with bearing.

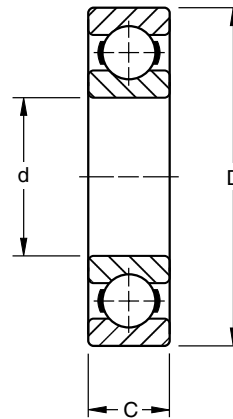
<sup>(2)</sup> Width of bearing is 12.700 mm (.5000").



# BALL BEARINGS

## LIGHT 200K SERIES

- Conrad-type bearing is well-balanced, with deep races and uninterrupted race shoulders. Excellent, general-purpose bearing.
- Capacity to carry radial and thrust in either direction or combined loads.
- Electric motor quality for applications where quietness is a requirement.



### DIMENSIONS – TOLERANCES

| Bearing Number | Bore d |         |                              |                             | Outside Diameter D |         |                              |                             | Width C |        |                              |                             | Fillet Radius <sup>(1)</sup> |       | Wt.    |       | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |        |
|----------------|--------|---------|------------------------------|-----------------------------|--------------------|---------|------------------------------|-----------------------------|---------|--------|------------------------------|-----------------------------|------------------------------|-------|--------|-------|-----------------------------------|--------|------------------------------------------------------------|--------|
|                | mm     | in.     | tolerance +0.000 mm to minus | tolerance +0.0000" to minus | mm                 | in.     | tolerance +0.000 mm to minus | tolerance +0.0000" to minus | mm      | in.    | tolerance +0.000 mm to minus | tolerance +0.0000" to minus | mm                           | in.   | kg     | lbs.  | N                                 | lbs.   | N                                                          | lbs.   |
| 200K           | 10     | 0.3937  | 0.008                        | 0.0003                      | 30                 | 1.1811  | 0.009                        | 0.00035                     | 9       | 0.3543 | 0.12                         | 0.005                       | 0.6                          | 0.024 | 0.027  | 0.06  | 2600                              | 585    | 6800                                                       | 1530   |
| 201K           | 12     | 0.4724  | 0.008                        | 0.0003                      | 32                 | 1.2598  | 0.011                        | 0.00043                     | 10      | 0.3937 | 0.12                         | 0.005                       | 0.6                          | 0.024 | 0.036  | 0.08  | 3000                              | 680    | 7600                                                       | 1730   |
| 202K           | 15     | 0.5906  | 0.008                        | 0.0003                      | 35                 | 1.3780  | 0.011                        | 0.00043                     | 11      | 0.4331 | 0.12                         | 0.005                       | 0.6                          | 0.024 | 0.041  | 0.09  | 3470                              | 830    | 8650                                                       | 1930   |
| 203K           | 17     | 0.6693  | 0.008                        | 0.0003                      | 40                 | 1.5748  | 0.011                        | 0.00043                     | 12      | 0.4724 | 0.12                         | 0.005                       | 0.6                          | 0.024 | 0.064  | 0.14  | 4700                              | 1060   | 10900                                                      | 2450   |
| 204K           | 20     | 0.7874  | 0.010                        | 0.0004                      | 47                 | 1.8504  | 0.011                        | 0.00043                     | 14      | 0.5512 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.104  | 0.23  | 6500                              | 1460   | 14400                                                      | 3250   |
| 205K           | 25     | 0.9843  | 0.010                        | 0.0004                      | 52                 | 2.0472  | 0.013                        | 0.0005                      | 15      | 0.5906 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.127  | 0.28  | 7800                              | 1760   | 16000                                                      | 3600   |
| 206K           | 30     | 1.1811  | 0.010                        | 0.0004                      | 62                 | 2.4409  | 0.013                        | 0.0005                      | 16      | 0.6299 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.195  | 0.43  | 11300                             | 2550   | 22200                                                      | 5000   |
| 207K           | 35     | 1.3780  | 0.012                        | 0.00047                     | 72                 | 2.8346  | 0.013                        | 0.0005                      | 17      | 0.6693 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.290  | 0.64  | 15300                             | 3450   | 29100                                                      | 6550   |
| 208K           | 40     | 1.5748  | 0.012                        | 0.00047                     | 80                 | 3.1496  | 0.013                        | 0.0005                      | 18      | 0.7087 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.376  | 0.83  | 19800                             | 4460   | 36200                                                      | 8130   |
| 209K           | 45     | 1.7717  | 0.012                        | 0.00047                     | 85                 | 3.3465  | 0.015                        | 0.0006                      | 19      | 0.7480 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.426  | 0.94  | 20500                             | 4600   | 36300                                                      | 8160   |
| 210K           | 50     | 1.9685  | 0.012                        | 0.00047                     | 90                 | 3.5433  | 0.015                        | 0.0006                      | 20      | 0.7874 | 0.12                         | 0.005                       | 1.0                          | 0.039 | 0.476  | 1.05  | 23100                             | 5200   | 40000                                                      | 9000   |
| 211K           | 55     | 2.1654  | 0.015                        | 0.0006                      | 100                | 3.9370  | 0.015                        | 0.0006                      | 21      | 0.8268 | 0.15                         | 0.006                       | 1.5                          | 0.059 | 0.635  | 1.40  | 29100                             | 6550   | 49000                                                      | 11000  |
| 212K           | 60     | 2.3622  | 0.015                        | 0.0006                      | 110                | 4.3307  | 0.015                        | 0.0006                      | 22      | 0.8661 | 0.15                         | 0.006                       | 1.5                          | 0.059 | 0.807  | 1.78  | 35500                             | 8000   | 62100                                                      | 13400  |
| 213K           | 65     | 2.5591  | 0.015                        | 0.0006                      | 120                | 4.7244  | 0.015                        | 0.0006                      | 23      | 0.9055 | 0.15                         | 0.006                       | 1.5                          | 0.059 | 1.016  | 2.24  | 39900                             | 9000   | 62100                                                      | 14600  |
| 214K           | 70     | 2.7559  | 0.015                        | 0.0006                      | 125                | 4.9213  | 0.018                        | 0.0007                      | 24      | 0.9449 | 0.15                         | 0.006                       | 1.5                          | 0.059 | 1.107  | 2.44  | 44000                             | 9890   | 69000                                                      | 15500  |
| 215K           | 75     | 2.9528  | 0.015                        | 0.0006                      | 130                | 5.1181  | 0.018                        | 0.0007                      | 25      | 0.9843 | 0.15                         | 0.006                       | 1.5                          | 0.059 | 1.198  | 2.64  | 44800                             | 10100  | 68900                                                      | 15500  |
| 216K           | 80     | 3.1496  | 0.015                        | 0.0006                      | 140                | 5.5118  | 0.018                        | 0.0007                      | 26      | 1.0236 | 0.15                         | 0.006                       | 2.0                          | 0.079 | 1.483  | 3.27  | 54200                             | 12200  | 81300                                                      | 18300  |
| 217K           | 85     | 3.3465  | 0.020                        | 0.0008                      | 150                | 5.9055  | 0.018                        | 0.0007                      | 28      | 1.1024 | 0.20                         | 0.008                       | 2.0                          | 0.079 | 1.860  | 4.10  | 62200                             | 14000  | 95900                                                      | 21600  |
| 218K           | 90     | 3.5433  | 0.020                        | 0.0008                      | 160                | 6.2992  | 0.025                        | 0.0010                      | 30      | 1.1811 | 0.20                         | 0.008                       | 2.0                          | 0.079 | 2.209  | 4.87  | 71100                             | 16000  | 109000                                                     | 24500  |
| 220K           | 100    | 3.9370  | 0.020                        | 0.0008                      | 180                | 7.0866  | 0.025                        | 0.0010                      | 34      | 1.3386 | 0.20                         | 0.008                       | 2.0                          | 0.080 | 4.077  | 8.98  | 93000                             | 20800  | 134000                                                     | 30500  |
| 221K           | 105    | 4.1339  | 0.020                        | 0.0008                      | 190                | 7.4803  | 0.030                        | 0.0012                      | 36      | 1.4173 | 0.20                         | 0.008                       | 2.0                          | 0.080 | 3.777  | 8.32  | 93000                             | 20800  | 127000                                                     | 28500  |
| 222K           | 110    | 4.3307  | 0.020                        | 0.0008                      | 200                | 7.8740  | 0.030                        | 0.0012                      | 38      | 1.4961 | 0.20                         | 0.008                       | 2.0                          | 0.080 | 4.300  | 9.47  | 104900                            | 23600  | 153000                                                     | 34500  |
| 224K           | 120    | 4.7244  | 0.020                        | 0.0008                      | 215                | 8.4646  | 0.030                        | 0.0012                      | 40      | 1.5748 | 0.20                         | 0.008                       | 2.0                          | 0.080 | 7.064  | 15.56 | 133000                            | 30000  | 173000                                                     | 39000  |
| 226K           | 130    | 5.1181  | 0.020                        | 0.0010                      | 230                | 9.0551  | 0.030                        | 0.0012                      | 40      | 1.5748 | 0.25                         | 0.010                       | 3.0                          | 0.120 | 6.642  | 14.63 | 149000                            | 33500  | 189000                                                     | 42500  |
| 228K           | 140    | 5.5118  | 0.025                        | 0.0010                      | 250                | 9.8425  | 0.030                        | 0.0012                      | 42      | 1.6535 | 0.25                         | 0.010                       | 3.0                          | 0.120 | 11.196 | 24.66 | 162000                            | 36500  | 200000                                                     | 45000  |
| 230K           | 150    | 5.9055  | 0.025                        | 0.0010                      | 270                | 10.6299 | 0.035                        | 0.0014                      | 45      | 1.7717 | 0.25                         | 0.010                       | 3.0                          | 0.120 | 12.17  | 26.8  | 180000                            | 40500  | 218000                                                     | 49000  |
| 232K           | 160    | 6.2992  | 0.025                        | 0.0010                      | 290                | 11.4173 | 0.035                        | 0.0014                      | 48      | 1.8898 | 0.25                         | 0.010                       | 3.0                          | 0.120 | 15.03  | 33.1  | 235000                            | 53000  | 260000                                                     | 58500  |
| 234K           | 170    | 6.6929  | 0.025                        | 0.0010                      | 310                | 12.2047 | 0.035                        | 0.0014                      | 52      | 2.0472 | 0.25                         | 0.010                       | 4.0                          | 0.160 | 18.66  | 41.1  | 276000                            | 62000  | 291000                                                     | 65500  |
| 236K           | 180    | 7.0866  | 0.025                        | 0.0010                      | 320                | 12.5984 | 0.040                        | 0.0016                      | 52      | 2.0472 | 0.25                         | 0.010                       | 4.0                          | 0.160 | 19.39  | 42.7  | 298000                            | 67000  | 309000                                                     | 69500  |
| 238K           | 190    | 7.4803  | 0.030                        | 0.0012                      | 340                | 13.3858 | 0.040                        | 0.0016                      | 55      | 2.1654 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 23.02  | 50.7  | 290000                            | 65000  | 300000                                                     | 67000  |
| 240K           | 200    | 7.8740  | 0.030                        | 0.0012                      | 360                | 14.1732 | 0.040                        | 0.0016                      | 58      | 2.2835 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 26.42  | 58.2  | 375000                            | 83000  | 355000                                                     | 80000  |
| 242K           | 210    | 8.2677  | 0.030                        | 0.0012                      | 380                | 14.9606 | 0.040                        | 0.0016                      | 61      | 2.4016 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 32.42  | 71.4  | 335000                            | 76500  | 325000                                                     | 73500  |
| 244K           | 220    | 8.6614  | 0.030                        | 0.0012                      | 400                | 15.7480 | 0.040                        | 0.0016                      | 65      | 2.5591 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 36.96  | 81.4  | 380000                            | 86500  | 355000                                                     | 80000  |
| 246K           | 230    | 9.0551  | 0.030                        | 0.0012                      | 420                | 16.5354 | 0.045                        | 0.0018                      | 68      | 2.6772 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 42.36  | 93.3  | 425000                            | 95000  | 380000                                                     | 85000  |
| 248K           | 240    | 9.4488  | 0.030                        | 0.0012                      | 440                | 17.3228 | 0.045                        | 0.0018                      | 72      | 2.8346 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 46.81  | 103.1 | 520000                            | 116000 | 455000                                                     | 102000 |
| 250K           | 250    | 9.8425  | 0.035                        | 0.0014                      | 460                | 18.1102 | 0.045                        | 0.0018                      | 76      | 2.9921 | 0.30                         | 0.012                       | 4.0                          | 0.160 | 55.57  | 122.4 | 585000                            | 129000 | 490000                                                     | 110000 |
| 252K           | 260    | 10.2362 | 0.035                        | 0.0014                      | 480                | 18.8976 | 0.045                        | 0.0018                      | 80      | 3.1496 | 0.35                         | 0.014                       | 5.0                          | 0.200 | 63.11  | 139.0 | 640000                            | 143000 | 520000                                                     | 118000 |
| 256K           | 280    | 11.0236 | 0.035                        | 0.0014                      | 500                | 19.6850 | 0.045                        | 0.0018                      | 80      | 3.1496 | 0.35                         | 0.014                       | 5.0                          | 0.200 | 64.20  | 141.4 | 710000                            | 160000 | 560000                                                     | 125000 |
| 260K           | 300    | 11.8110 | 0.035                        | 0.0014                      | 540                | 21.2598 | 0.050                        | 0.0020                      | 85      | 3.3465 | 0.35                         | 0.014                       | 5.0                          | 0.200 | 87.49  | 192.7 | 670000                            | 150000 | 520000                                                     | 116000 |
| 264K           | 320    | 12.5984 | 0.040                        | 0.0016                      | 580                | 22.8346 | 0.050                        | 0.0020                      | 92      | 3.6220 | 0.40                         | 0.016                       | 5.0                          | 0.200 | 94.66  | 208.5 | 980000                            | 220000 | 710000                                                     | 160000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## SHIELDS, SEALS AND SNAP RING COMBINATIONS

| Shields and Seals |                |                |                        |                                 | Snap Ring (Wireloc) <sup>(1)</sup> |               |               |                 |             |               |                         |                | Snap Ring Dimensions |           |       |        |       |
|-------------------|----------------|----------------|------------------------|---------------------------------|------------------------------------|---------------|---------------|-----------------|-------------|---------------|-------------------------|----------------|----------------------|-----------|-------|--------|-------|
| One Shield D      | Two Shields DD | One Seal (N) P | One Seal One Shield PD | Two <sup>(3)</sup> Seals (N) PP | Open Type G                        | One Shield DG | One Shield GD | Two Shields DDG | One Seal PG | Two Seals PPG | One Seal One Shield PDG | O.D. Snap Ring |                      | Thickness |       | Offset |       |
|                   |                |                |                        |                                 |                                    |               |               |                 |             |               |                         | mm             | in.                  | mm        | in.   | mm     | in.   |
| 200KD             | 200KDD         | 200P           | 200PD <sup>(2)</sup>   | 200PP                           | —                                  | —             | —             | 200KDDG         | —           | 200PPG        | —                       | 34.5           | 1 23/64              | 1.07      | 0.042 | 3.05   | 0.120 |
| 201KD             | 201KDD         | 201P           | 201PD                  | 201PP                           | 201KG                              | 201KDG        | —             | 201KDDG         | —           | 201PPG        | —                       | 36.5           | 1 7/16               | 1.07      | 0.042 | 3.05   | 0.120 |
| 202KD             | 202KDD         | 202P           | 202PD                  | 202PP                           | 202KG                              | 202KDG        | —             | 202KDDG         | —           | 202PPG        | —                       | 39.3           | 1 35/64              | 1.07      | 0.042 | 3.05   | 0.120 |
| 203KD             | 203KDD         | 203P           | 203PD                  | 203PP                           | 203KG                              | 203KDG        | —             | 203KDDG         | —           | 203PPG        | —                       | 44.4           | 1 3/4                | 1.07      | 0.042 | 3.05   | 0.120 |
| 204KD             | 204KDD         | 204P           | 204PD                  | 204PP                           | 204KG                              | 204KDG        | —             | 204KDDG         | —           | 204PPG        | —                       | 52.4           | 2 1/16               | 1.07      | 0.042 | 3.45   | 0.136 |
| 205KD             | 205KDD         | 205P           | 205PD                  | 205PP                           | 205KG                              | 205KDG        | —             | 205KDDG         | —           | 205PPG        | —                       | 57.5           | 2 17/64              | 1.07      | 0.042 | 3.45   | 0.136 |
| 206KD             | 206KDD         | 206P           | 206PD                  | 206PP                           | 206KG                              | 206KDG        | —             | 206KDDG         | —           | 206PPG        | —                       | 67.6           | 2 21/32              | 1.65      | 0.065 | 4.83   | 0.190 |
| 207KD             | 207KDD         | 207P           | 207PD                  | 207PP                           | 207KG                              | 207KDG        | —             | 207KDDG         | —           | 207PPG        | —                       | 78.2           | 3 5/64               | 1.65      | 0.065 | 4.83   | 0.190 |
| 208KD             | 208KDD         | 208P           | —                      | 208PP                           | 208KG                              | 208KDG        | —             | 208KDDG         | —           | 208PPG        | —                       | 86.5           | 3 13/32              | 1.65      | 0.065 | 4.83   | 0.190 |
| 209KD             | 209KDD         | 209P           | —                      | 209PP                           | 209KG                              | 209KDG        | —             | 209KDDG         | —           | —             | —                       | 91.3           | 3 19/32              | 1.65      | 0.065 | 4.83   | 0.190 |
| 210KD             | 210KDD         | 210P           | —                      | 210PP                           | 210KG                              | 210KDG        | —             | 210KDDG         | —           | 210NPPG       | —                       | 96.4           | 3 51/64              | 2.41      | 0.095 | 5.59   | 0.220 |
| 211KD             | 211KDD         | 211NP          | 211NPD                 | 211NPP                          | 211KG                              | 211KDG        | 211KGD        | 211KDDG         | —           | 211NPPG       | 211NPDG                 | 106.3          | 4 3/16               | 2.41      | 0.095 | 5.59   | 0.220 |
| 212KD             | 212KDD         | 212NP          | 212NPD                 | 212NPP                          | 212KG                              | 212KDG        | —             | —               | —           | 212NPPG       | 212NPDG                 | 116.3          | 4 37/64              | 2.41      | 0.095 | 5.59   | 0.220 |
| 213KD             | 213KDD         | 213NP          | —                      | 213NPP                          | 213KG                              | —             | —             | 213KDDG         | —           | 213NPPG       | 213NPDG                 | 129.4          | 5 3/32               | 2.77      | 0.109 | 6.73   | 0.265 |
| 214KD             | 214KDD         | 214P           | —                      | 214NPP                          | 214KG                              | 214KDG        | —             | —               | —           | —             | —                       | 134.5          | 5 19/64              | 2.77      | 0.109 | 6.73   | 0.265 |
| 215KD             | 215KDD         | 215P           | —                      | 215NPP                          | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| 216KD             | 216KDD         | —              | —                      | 216NPP                          | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| 217KD             | 217KDD         | —              | —                      | —                               | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| 218KD             | 218KDD         | —              | —                      | —                               | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| —                 | —              | —              | —                      | —                               | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| —                 | —              | —              | —                      | —                               | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |
| 222KD             | —              | —              | —                      | —                               | —                                  | —             | —             | —               | —           | —             | —                       | —              | —                    | —         | —     | —      | —     |

<sup>(1)</sup> The snap ring is normally packaged separately in the box with the bearing.

<sup>(2)</sup> Available with snap ring as 200PDG.

<sup>(3)</sup> Also available in "VV" sealed design. Check for availability.

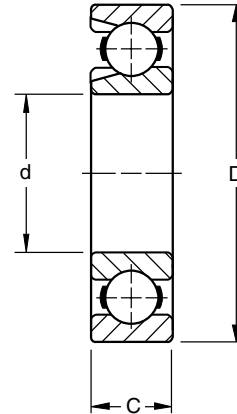
**Note:** "N" prefix for NP(P) seals indicate non-removable seal.



# BALL BEARINGS

## LIGHT 200W SERIES

- 200W Series, maximum capacity type, is dimensionally interchangeable with the 200K type, but has greater capacity for supporting heavier radial loads and light thrust loads in either direction.
- Maximum capacity bearings feature a filling slot in shoulder of each raceway to assemble an extra-large complement of balls.
- Consult your Timken representative for the availability of sizes other than those listed here.



### DIMENSIONS – TOLERANCES

| Bearing Number      | Bore d |         | tolerance +0.000 mm +0.0000" to minus |         | Outside Diameter D |         | tolerance +0.000 mm +0.0000" to minus |         | Width C |        | tolerance +0.000 mm +0.0000" to minus |       | Fillet Radius <sup>(1)</sup> |       | Wt.    |        | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating* C <sub>E</sub> <sup>(3)</sup> |        |
|---------------------|--------|---------|---------------------------------------|---------|--------------------|---------|---------------------------------------|---------|---------|--------|---------------------------------------|-------|------------------------------|-------|--------|--------|-----------------------------------|--------|-------------------------------------------------------------|--------|
|                     | mm     | in.     | mm                                    | in.     | mm                 | in.     | mm                                    | in.     | mm      | in.    | mm                                    | in.   | mm                           | in.   | kg     | lbs.   | N                                 | lbs.   | N                                                           | lbs.   |
| 202W                | 15     | 0.5906  | 0.008                                 | 0.0003  | 35                 | 1.3780  | 0.011                                 | 0.00045 | 11      | 0.4331 | 0.12                                  | 0.005 | 0.6                          | 0.024 | 0.054  | 0.12   | 5060                              | 1140   | 11000                                                       | 2450   |
| 204W <sup>(2)</sup> | 20     | 0.7874  | 0.010                                 | 0.0004  | 47                 | 1.8504  | 0.011                                 | 0.00045 | 14      | 0.5512 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.113  | 0.25   | 9300                              | 2120   | 19500                                                       | 4400   |
| 205W <sup>(2)</sup> | 25     | 0.9843  | 0.010                                 | 0.0004  | 52                 | 2.0472  | 0.013                                 | 0.0005  | 15      | 0.5906 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.141  | 0.31   | 12200                             | 2750   | 22600                                                       | 5100   |
| 206W                | 30     | 1.1811  | 0.010                                 | 0.0004  | 62                 | 2.4409  | 0.013                                 | 0.0005  | 16      | 0.6299 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.213  | 0.47   | 16900                             | 3800   | 31000                                                       | 6950   |
| 207W                | 35     | 1.3780  | 0.012                                 | 0.00047 | 72                 | 2.8346  | 0.013                                 | 0.0005  | 17      | 0.6693 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.313  | 0.69   | 22600                             | 5100   | 40000                                                       | 9000   |
| 208W                | 40     | 1.5748  | 0.012                                 | 0.00047 | 80                 | 3.1496  | 0.013                                 | 0.0005  | 18      | 0.7087 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.413  | 0.91   | 28400                             | 6400   | 47000                                                       | 10600  |
| 209W                | 45     | 1.7717  | 0.012                                 | 0.00047 | 85                 | 3.3465  | 0.015                                 | 0.0006  | 19      | 0.7480 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.463  | 1.02   | 31500                             | 7100   | 50000                                                       | 11200  |
| 210W                | 50     | 1.9685  | 0.012                                 | 0.00047 | 90                 | 3.5433  | 0.015                                 | 0.0006  | 20      | 0.7874 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.522  | 1.15   | 34600                             | 7800   | 52000                                                       | 11800  |
| 211W                | 55     | 2.1654  | 0.015                                 | 0.0006  | 100                | 3.9370  | 0.015                                 | 0.0006  | 21      | 0.8268 | 0.15                                  | 0.006 | 1.5                          | 0.059 | 0.681  | 1.50   | 40600                             | 9150   | 61000                                                       | 13700  |
| 212W                | 60     | 2.3622  | 0.015                                 | 0.0006  | 110                | 4.3307  | 0.015                                 | 0.0006  | 22      | 0.8661 | 0.15                                  | 0.006 | 1.5                          | 0.059 | 0.885  | 1.95   | 54200                             | 12200  | 78000                                                       | 17600  |
| 213W                | 65     | 2.5591  | 0.015                                 | 0.0006  | 120                | 4.7244  | 0.015                                 | 0.0006  | 23      | 0.9055 | 0.15                                  | 0.006 | 1.5                          | 0.059 | 1.207  | 2.66   | 64800                             | 14600  | 92000                                                       | 20800  |
| 214W                | 70     | 2.7559  | 0.015                                 | 0.0006  | 125                | 4.9213  | 0.018                                 | 0.0007  | 24      | 0.9449 | 0.15                                  | 0.006 | 1.5                          | 0.059 | 1.225  | 2.70   | 71100                             | 16000  | 96000                                                       | 21600  |
| 215W                | 75     | 2.9528  | 0.015                                 | 0.0006  | 130                | 5.1181  | 0.018                                 | 0.0007  | 25      | 0.9843 | 0.15                                  | 0.006 | 1.5                          | 0.059 | 1.334  | 2.94   | 75500                             | 17000  | 99000                                                       | 22400  |
| 216W                | 80     | 3.1496  | 0.015                                 | 0.0006  | 140                | 5.5118  | 0.018                                 | 0.0007  | 26      | 1.0236 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 1.633  | 3.60   | 90600                             | 20400  | 114000                                                      | 26000  |
| 217W                | 85     | 3.3465  | 0.020                                 | 0.0008  | 150                | 5.9055  | 0.018                                 | 0.0007  | 28      | 1.1024 | 0.20                                  | 0.008 | 2.0                          | 0.079 | 2.019  | 4.45   | 96000                             | 22400  | 129000                                                      | 29000  |
| 218W                | 90     | 3.5433  | 0.020                                 | 0.0008  | 160                | 6.2992  | 0.025                                 | 0.0010  | 30      | 1.1811 | 0.20                                  | 0.008 | 2.0                          | 0.079 | 2.493  | 5.49   | 96500                             | 25500  | 149000                                                      | 33500  |
| 219W                | 95     | 3.7402  | 0.020                                 | 0.0008  | 170                | 6.6929  | 0.025                                 | 0.0010  | 32      | 1.2598 | 0.20                                  | 0.008 | 2.0                          | 0.079 | 3.039  | 6.70   | 112000                            | 29000  | 169000                                                      | 38000  |
| 220W                | 100    | 3.9370  | 0.020                                 | 0.0008  | 180                | 7.0866  | 0.025                                 | 0.0010  | 34      | 1.3386 | 0.20                                  | 0.008 | 2.0                          | 0.080 | 3.673  | 8.09   | 127000                            | 33500  | 188000                                                      | 42500  |
| 221W                | 105    | 4.1339  | 0.020                                 | 0.0008  | 190                | 7.4803  | 0.030                                 | 0.0012  | 36      | 1.4173 | 0.20                                  | 0.008 | 2.0                          | 0.080 | 4.277  | 9.43   | 134000                            | 35500  | 195000                                                      | 44000  |
| 222W                | 110    | 4.3307  | 0.020                                 | 0.0008  | 200                | 7.8740  | 0.030                                 | 0.0012  | 38      | 1.4961 | 0.20                                  | 0.008 | 2.0                          | 0.080 | 5.144  | 11.34  | 160000                            | 42500  | 222000                                                      | 50000  |
| 224W3               | 120    | 4.7244  | 0.020                                 | 0.0008  | 215                | 8.4646  | 0.030                                 | 0.0012  | 40      | 1.5748 | 0.25                                  | 0.010 | 2.0                          | 0.080 | 6.586  | 14.52  | 156000                            | 41500  | 222000                                                      | 50000  |
| 226W3               | 130    | 5.1181  | 0.020                                 | 0.0010  | 230                | 9.0551  | 0.030                                 | 0.0012  | 40      | 1.5748 | 0.25                                  | 0.010 | 3.0                          | 0.120 | 7.627  | 16.80  | 196000                            | 53000  | 260000                                                      | 58500  |
| 228W3               | 140    | 5.5118  | 0.025                                 | 0.0010  | 250                | 9.8425  | 0.030                                 | 0.0012  | 42      | 1.6535 | 0.25                                  | 0.010 | 3.0                          | 0.120 | 9.307  | 20.50  | 260000                            | 58500  | 270000                                                      | 61000  |
| 230W                | 150    | 5.9055  | 0.025                                 | 0.0010  | 270                | 10.6299 | 0.035                                 | 0.0014  | 45      | 1.7717 | 0.25                                  | 0.010 | 3.0                          | 0.120 | 12.485 | 27.50  | 290000                            | 65500  | 300000                                                      | 67000  |
| 232W                | 160    | 6.2992  | 0.025                                 | 0.0010  | 290                | 11.4173 | 0.035                                 | 0.0014  | 48      | 1.8898 | 0.25                                  | 0.010 | 3.0                          | 0.120 | 15.436 | 34.00  | 340000                            | 76500  | 325000                                                      | 73500  |
| 234W                | 170    | 6.6929  | 0.025                                 | 0.0010  | 310                | 12.2047 | 0.035                                 | 0.0014  | 52      | 2.0472 | 0.25                                  | 0.010 | 4.0                          | 0.160 | 19.068 | 42.00  | 375000                            | 85000  | 345000                                                      | 78000  |
| 236W                | 180    | 7.0866  | 0.025                                 | 0.0010  | 320                | 12.5984 | 0.040                                 | 0.0016  | 52      | 2.0472 | 0.25                                  | 0.010 | 4.0                          | 0.160 | 19.886 | 43.80  | 405000                            | 90000  | 365000                                                      | 81500  |
| 238W                | 190    | 7.4803  | 0.030                                 | 0.0012  | 340                | 13.3858 | 0.040                                 | 0.0016  | 55      | 2.1654 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 23.608 | 52.00  | 465000                            | 104000 | 405000                                                      | 91500  |
| 240W                | 200    | 7.8740  | 0.030                                 | 0.0012  | 360                | 14.1732 | 0.040                                 | 0.0016  | 58      | 2.2835 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 27.150 | 59.80  | 560000                            | 125000 | 465000                                                      | 106000 |
| 242W                | 210    | 8.2677  | 0.030                                 | 0.0012  | 380                | 14.9606 | 0.040                                 | 0.0016  | 61      | 2.4016 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 33.279 | 73.30  | 570000                            | 129000 | 465000                                                      | 104000 |
| 244W                | 220    | 8.6614  | 0.030                                 | 0.0012  | 400                | 15.7480 | 0.040                                 | 0.0016  | 65      | 2.5591 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 38.091 | 83.90  | 680000                            | 153000 | 530000                                                      | 120000 |
| 246W                | 230    | 9.0551  | 0.030                                 | 0.0012  | 420                | 16.5354 | 0.045                                 | 0.0018  | 68      | 2.6772 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 45.719 | 100.70 | 695000                            | 156000 | 530000                                                      | 118000 |
| 248W                | 240    | 9.4488  | 0.030                                 | 0.0012  | 440                | 17.3228 | 0.045                                 | 0.0018  | 72      | 2.8346 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 48.761 | 107.40 | 865000                            | 193000 | 640000                                                      | 143000 |
| 250W                | 250    | 9.8425  | 0.030                                 | 0.0012  | 460                | 18.1102 | 0.045                                 | 0.0018  | 76      | 2.9921 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 57.568 | 126.80 | 930000                            | 208000 | 670000                                                      | 150000 |
| 252W                | 260    | 10.2362 | 0.035                                 | 0.0014  | 480                | 18.8976 | 0.045                                 | 0.0018  | 80      | 3.1496 | 0.35                                  | 0.014 | 5.0                          | 0.200 | 65.468 | 144.20 | 1020000                           | 232000 | 720000                                                      | 160000 |
| 256W                | 280    | 11.0236 | 0.035                                 | 0.0014  | 500                | 19.6850 | 0.045                                 | 0.0018  | 80      | 3.1496 | 0.35                                  | 0.014 | 5.0                          | 0.200 | 66.921 | 147.40 | 1120000                           | 255000 | 765000                                                      | 170000 |
| 260W                | 300    | 11.8110 | 0.035                                 | 0.0014  | 540                | 21.2598 | 0.050                                 | 0.0020  | 85      | 3.3465 | 0.35                                  | 0.014 | 5.0                          | 0.200 | 89.894 | 198.00 | 1100000                           | 245000 | 720000                                                      | 160000 |
| 264W                | 320    | 12.5984 | 0.040                                 | 0.0016  | 580                | 22.8346 | 0.050                                 | 0.0020  | 92      | 3.6220 | 0.40                                  | 0.016 | 5.0                          | 0.200 | 99.473 | 219.10 | 1560000                           | 355000 | 965000                                                      | 216000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> These sizes have molded nylon cages.

<sup>(3)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

\* For applications where thrust load exceeds 60% of radial load, consult your Timken representative.

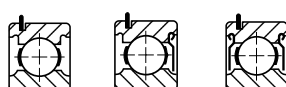
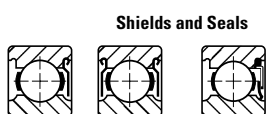
## Radial and Angular Contact Ball Bearings

Listed in the table below are Timken maximum capacity type bearings (200W Series) with shields, seals and snap ring combinations.

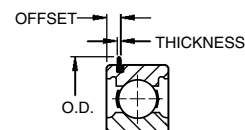
The suffixes of the bearing numbers denote the following:

- **WD** - Filling slot opposite single shield
- **WNP** - Filling slot opposite single seal
- **WG** - Filling slot opposite snap ring
- **WDD** - Two shields
- **WNPP** - Two seals
- **WDG** - Filling slot and snap ring opposite shield
- **WDDG** - Two shields with filling slot opposite snap ring

### SHIELDS, SEALS AND SNAP RING COMBINATIONS



Snap Ring (Wireloc)<sup>(1)</sup>



| One Shield<br>D      | Two Shields<br>DD | One Seal<br>P | Two Seals<br>PP | Open Type<br>G       | One Shield<br>DG      | Two Shields<br>DDG | O.D.  |         | Thickness |       | Offset |       |
|----------------------|-------------------|---------------|-----------------|----------------------|-----------------------|--------------------|-------|---------|-----------|-------|--------|-------|
|                      |                   |               |                 |                      |                       |                    | mm    | in.     | mm        | in.   | mm     | in.   |
| 204WD                | —                 | —             | —               | 204WG                | —                     | —                  | 52.4  | 2 1/16  | 1.07      | 0.042 | 3.45   | 0.136 |
| 205WD                | —                 | —             | —               | 205WG                | —                     | —                  | 57.5  | 2 17/64 | 1.07      | 0.042 | 3.45   | 0.136 |
| 206WD                | —                 | —             | —               | 206WG                | 206WDG                | —                  | 67.5  | 2 21/32 | 1.65      | 0.065 | 4.83   | 0.190 |
| 207WD                | —                 | —             | —               | 207WG                | 207WDG                | —                  | 78.2  | 3 5/64  | 1.65      | 0.065 | 4.83   | 0.190 |
| 208WD                | 208WDD            | —             | —               | 208WG                | 208WDG                | 208WDDG            | 86.5  | 3 13/32 | 1.65      | 0.065 | 4.83   | 0.190 |
| 209WD                | 209WDD            | —             | —               | 209WG                | 209WDG                | —                  | 91.3  | 3 19/32 | 1.65      | 0.065 | 4.83   | 0.190 |
| 210WD                | 210WDD            | —             | —               | 210WG                | 210WDG <sup>(2)</sup> | —                  | 96.4  | 3 51/64 | 2.41      | 0.095 | 5.59   | 0.220 |
| 211WD                | 211WDD            | —             | —               | 211WG <sup>(3)</sup> | 211WDG                | —                  | 106.4 | 4 3/16  | 2.41      | 0.095 | 5.59   | 0.220 |
| 212WD                | 212WDD            | —             | —               | 212WG                | 212WDG                | 212WDDG            | 116.3 | 4 37/64 | 2.41      | 0.095 | 5.59   | 0.220 |
| 213WD                | 213WDD            | 213WNP        | 213WNPP         | 213WG                | 213WDG                | 213WDDG            | 129.4 | 5 3/32  | 2.77      | 0.109 | 6.73   | 0.265 |
| 214WD                | 214WDD            | —             | —               | 214WG                | 214WDG                | —                  | 134.5 | 5 19/64 | 2.77      | 0.109 | 6.73   | 0.265 |
| 215WD                | 215WDD            | 215WNP        | 215WNPP         | 215WG                | 215WDG                | 215WDDG            | 139.7 | 5 1/2   | 2.77      | 0.109 | 6.73   | 0.265 |
| 216WD                | 216WDD            | —             | —               | 216WG                | 216WDG                | —                  | 149.6 | 5 57/64 | 2.77      | 0.109 | 7.54   | 0.297 |
| 217WD                | 217WDD            | —             | —               | 217WG                | 217WDG                | —                  | 159.5 | 6 9/32  | 2.77      | 0.109 | 7.54   | 0.297 |
| 218WD                | 218WDD            | 218WNP        | —               | 218WG                | —                     | —                  | 169.5 | 6 43/64 | 2.77      | 0.109 | 7.54   | 0.297 |
| 219WD                | 219WDD            | —             | —               | —                    | —                     | —                  | —     | —       | —         | —     | —      | —     |
| 220WD                | 220WDD            | —             | —               | 220WG                | —                     | —                  | 192.9 | 7 19/32 | 3.05      | 0.12  | 8.61   | 0.339 |
| 221WD                | —                 | —             | —               | —                    | —                     | —                  | —     | —       | —         | —     | —      | —     |
| 222WD                | —                 | —             | —               | —                    | —                     | —                  | —     | —       | —         | —     | —      | —     |
| 224WD <sup>(4)</sup> | —                 | —             | —               | —                    | —                     | —                  | —     | —       | —         | —     | —      | —     |

<sup>(1)</sup> The snap ring is normally packaged separately in the box with the bearing.

<sup>(2)</sup> Also available as a GWD-type filling slot opposite the shield and snap ring.

<sup>(3)</sup> Also available as 211GW with filling slot on same side as snap ring.

<sup>(4)</sup> Width is 1.6535" for the 224WD bearing.





# BALL BEARINGS

## LIGHT 200 SERIES EXTRA WIDTH INNER RING

- Sizes available in rubber seal (P) and Mechani-Seal (L) design.
- Extra width inner ring provides greater shaft support.
- P seal version uses a Buna N rubber contact seal.
- L seal employs a frictionless metallic member to form a labyrinth.
- Used extensively in high-speed pneumatic tools, small pumps, electric motors, domestic appliances, etc.
- Electric motor quality for applications where quietness is a requirement.

### DIMENSIONS – TOLERANCES

| Bearing Number |                        | Bore d                                |        | Outside Diameter D                    |         | Width B <sub>1</sub> |        | Inner Ring Offset |         | Ring Widths<br>0.00, -.12 mm<br>+0.000", -.005" |         | Fillet Radius <sup>(1)</sup> | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(1)</sup> |     |       |       |      |       |      |       |       |
|----------------|------------------------|---------------------------------------|--------|---------------------------------------|---------|----------------------|--------|-------------------|---------|-------------------------------------------------|---------|------------------------------|-------|-------|-----------------------------------|-------|------------------------------------------------------------|-----|-------|-------|------|-------|------|-------|-------|
| one seal L     | one seal and shield LD | tolerance +0.000 mm +0.0000" to minus |        | tolerance +0.000 mm +0.0000" to minus |         |                      |        |                   |         | Inner B                                         | Outer C |                              |       |       |                                   |       |                                                            |     |       |       |      |       |      |       |       |
|                |                        | mm                                    | in.    | mm                                    | in.     | mm                   | in.    | mm                | in.     | mm                                              | in.     | mm                           | in.   | kg    | lbs.                              | N     | lbs.                                                       | N   | lbs.  |       |      |       |      |       |       |
| 200KL          | 200KLD                 | 10                                    | 0.3937 | 0.008                                 | 0.0003  | 30                   | 1.1811 | 0.009             | 0.00035 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 8.99  | 0.354                                                      | 0.6 | 0.024 | 0.036 | 0.08 | 2650  | 585  | 6550  | 1530  |
| 201KL          | 201KLD                 | 12                                    | 0.4724 | 0.008                                 | 0.0003  | 32                   | 1.2598 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 10.01 | 0.394                                                      | 0.6 | 0.024 | 0.041 | 0.09 | 3000  | 680  | 7500  | 1730  |
| —              | 201KLD2                | 13                                    | 0.5118 | 0.008                                 | 0.0003  | 32                   | 1.2598 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 10.01 | 0.394                                                      | 0.6 | 0.024 | 0.041 | 0.09 | 3000  | 680  | 7500  | 1730  |
| 201KL3         | —                      | 11.07                                 | 0.4358 | 0.008                                 | 0.0003  | 32                   | 1.2598 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 10.01 | 0.394                                                      | 0.6 | 0.024 | 0.041 | 0.09 | 3000  | 680  | 7500  | 1730  |
| 202KL4         | 202KLD4                | 14                                    | 0.5512 | 0.008                                 | 0.0003  | 35                   | 1.3780 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 11.00 | 0.433                                                      | 0.6 | 0.024 | 0.045 | 0.10 | 3690  | 830  | 8650  | 1930  |
| 202KL          | 202KLD                 | 15                                    | 0.5906 | 0.008                                 | 0.0003  | 35                   | 1.3780 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 11.00 | 0.433                                                      | 0.6 | 0.024 | 0.045 | 0.10 | 3450  | 830  | 8650  | 1930  |
| 202KL3         | 202KLD3                | 16                                    | 0.6299 | 0.008                                 | 0.0003  | 35                   | 1.3780 | 0.011             | 0.00045 | 12.70                                           | 0.500   | 0.51                         | 0.020 | 12.19 | 0.480                             | 11.00 | 0.433                                                      | 0.6 | 0.024 | 0.045 | 0.10 | 3450  | 830  | 8650  | 1930  |
| 203KL          | 203KLD                 | 17                                    | 0.6693 | 0.008                                 | 0.0003  | 40                   | 1.5748 | 0.011             | 0.00045 | 14.30                                           | 0.563   | 0.64                         | 0.025 | 13.67 | 0.538                             | 11.99 | 0.472                                                      | 0.6 | 0.024 | 0.073 | 0.16 | 4700  | 1060 | 10800 | 2450  |
| 204KL          | 204KLD                 | 20                                    | 0.7874 | 0.010                                 | 0.0004  | 47                   | 1.8504 | 0.011             | 0.00045 | 15.88                                           | 0.625   | 0.64                         | 0.025 | 15.24 | 0.600                             | 14.00 | 0.551                                                      | 1.0 | 0.039 | 0.113 | 0.25 | 6200  | 1460 | 14300 | 3200  |
| 205KL          | 205KLD                 | 25                                    | 0.9843 | 0.010                                 | 0.0004  | 52                   | 2.0472 | 0.013             | 0.0005  | 15.88                                           | 0.625   | 0.64                         | 0.025 | 15.24 | 0.600                             | 15.01 | 0.591                                                      | 1.0 | 0.039 | 0.132 | 0.29 | 7800  | 1760 | 16000 | 3600  |
| 206KL          | 206KLD                 | 30                                    | 1.1811 | 0.010                                 | 0.0004  | 62                   | 2.4409 | 0.013             | 0.0005  | 20.00                                           | 0.787   | 0.99                         | 0.039 | 19.00 | 0.748                             | 16.00 | 0.630                                                      | 1.0 | 0.039 | 0.231 | 0.51 | 10000 | 2550 | 22200 | 5000  |
| 207KL          | 207KLD                 | 35                                    | 1.3780 | 0.012                                 | 0.00045 | 72                   | 2.8346 | 0.013             | 0.0005  | 21.00                                           | 0.827   | 0.99                         | 0.039 | 20.00 | 0.787                             | 17.00 | 0.669                                                      | 1.0 | 0.039 | 0.322 | 0.71 | 13700 | 3450 | 29000 | 6550  |
| 209KL          | 209KLD                 | 45                                    | 1.7717 | 0.012                                 | 0.00045 | 85                   | 3.3465 | 0.015             | 0.0006  | 26.00                                           | 1.024   | —                            | —     | 26.00 | 1.024                             | 19.00 | 0.748                                                      | 1.0 | 0.039 | 0.508 | 1.12 | 17600 | 4550 | 37000 | 8300  |
| 211KL          | 211KLD                 | 55                                    | 2.1654 | 0.015                                 | 0.0006  | 100                  | 3.9370 | 0.015             | 0.0006  | 27.00                                           | 1.063   | —                            | —     | 27.00 | 1.063                             | 21.01 | 0.827                                                      | 1.5 | 0.059 | 0.748 | 1.65 | 29100 | 6550 | 49000 | 11000 |

<sup>(1)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### DIMENSIONS – TOLERANCES

| Bearing Number         |                        | Bore d                                |        | Outside Diameter D                    |         | Ring Widths<br>0.00, -.12 mm<br>+0.000", -.005" |        | Fillet Radius <sup>(1)</sup> |         | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(5)</sup> |       |       |      |       |      |       |      |
|------------------------|------------------------|---------------------------------------|--------|---------------------------------------|---------|-------------------------------------------------|--------|------------------------------|---------|-------|-------|-----------------------------------|-------|------------------------------------------------------------|-------|-------|------|-------|------|-------|------|
| two seals LL           | two seals NPP          | tolerance +0.000 mm +0.0000" to minus |        | tolerance +0.000 mm +0.0000" to minus |         |                                                 |        |                              |         |       |       |                                   |       |                                                            |       |       |      |       |      |       |      |
|                        |                        | mm                                    | in.    | mm                                    | in.     | mm                                              | in.    | mm                           | in.     | kg    | lbs.  | N                                 | lbs.  | N                                                          | lbs.  |       |      |       |      |       |      |
| 200KLL2                | 200KRR3 <sup>(4)</sup> | 10                                    | 0.3937 | 0.008                                 | 0.0003  | 30                                              | 1.1811 | 0.009                        | 0.00035 | 16.40 | 0.646 | 8.99                              | 0.354 | 0.6                                                        | 0.024 | 0.036 | 0.08 | 2650  | 585  | 6800  | 1530 |
| 201KLL2                | —                      | 12                                    | 0.4724 | 0.008                                 | 0.0003  | 32                                              | 1.2598 | 0.011                        | 0.00045 | 15.40 | 0.606 | 10.01                             | 0.394 | 0.6                                                        | 0.024 | 0.041 | 0.09 | 3000  | 680  | 7500  | 1700 |
| 201KLL3                | —                      | 13                                    | 0.5118 | 0.008                                 | 0.0003  | 32                                              | 1.2598 | 0.011                        | 0.00045 | 15.40 | 0.606 | 10.01                             | 0.394 | 0.6                                                        | 0.024 | 0.041 | 0.09 | 3000  | 680  | 7500  | 1700 |
| 202KLL2                | —                      | 15                                    | 0.5906 | 0.008                                 | 0.0003  | 35                                              | 1.3780 | 0.011                        | 0.00045 | 14.40 | 0.567 | 11.00                             | 0.433 | 0.6                                                        | 0.024 | 0.045 | 0.10 | 3690  | 830  | 8650  | 1930 |
| 202KLL3                | 202NPP11               | 16                                    | 0.6299 | 0.008                                 | 0.0003  | 35                                              | 1.3780 | 0.011                        | 0.00045 | 14.40 | 0.567 | 11.00                             | 0.433 | 0.6                                                        | 0.024 | 0.045 | 0.10 | 3690  | 830  | 8650  | 1930 |
| 203KLL2 <sup>(2)</sup> | 203NPP8                | 17                                    | 0.6693 | 0.008                                 | 0.0003  | 40                                              | 1.5748 | 0.011                        | 0.00045 | 16.60 | 0.654 | 11.99                             | 0.472 | 0.6                                                        | 0.024 | 0.073 | 0.16 | 4700  | 1060 | 10800 | 2450 |
| 204KLL2                | 204NPP7                | 20                                    | 0.7874 | 0.010                                 | 0.0004  | 47                                              | 1.8504 | 0.011                        | 0.00045 | 17.75 | 0.699 | 14.00                             | 0.551 | 1.0                                                        | 0.039 | 0.113 | 0.25 | 6200  | 1460 | 14300 | 3200 |
| 205KLL2 <sup>(3)</sup> | 205NPP2                | 25                                    | 0.9843 | 0.010                                 | 0.0004  | 52                                              | 2.0472 | 0.013                        | 0.0005  | 16.75 | 0.659 | 15.01                             | 0.591 | 1.0                                                        | 0.039 | 0.132 | 0.29 | 7800  | 1760 | 16000 | 3600 |
| 206KLL                 | 206NPP2                | 30                                    | 1.1811 | 0.010                                 | 0.0004  | 62                                              | 2.4409 | 0.013                        | 0.0005  | 24.00 | 0.945 | 16.00                             | 0.630 | 1.0                                                        | 0.039 | 0.231 | 0.51 | 11300 | 2550 | 22200 | 5000 |
| 207KLL                 | —                      | 35                                    | 1.3780 | 0.012                                 | 0.00045 | 72                                              | 2.8346 | 0.013                        | 0.0005  | 25.00 | 0.984 | 17.00                             | 0.669 | 1.0                                                        | 0.039 | 0.322 | 0.71 | 15300 | 3450 | 29000 | 6550 |
| 208KLL                 | —                      | 40                                    | 1.5748 | 0.012                                 | 0.00045 | 80                                              | 3.1496 | 0.013                        | 0.0005  | 30.18 | 1.188 | 18.01                             | 0.709 | 1.0                                                        | 0.039 | 0.463 | 1.02 | 20200 | 4550 | 36000 | 8150 |
| 209KLL                 | —                      | 45                                    | 1.7717 | 0.012                                 | 0.00045 | 85                                              | 3.3465 | 0.015                        | 0.0006  | 30.00 | 1.181 | 19.00                             | 0.748 | 1.0                                                        | 0.039 | 0.508 | 1.12 | 20200 | 4550 | 37000 | 8300 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

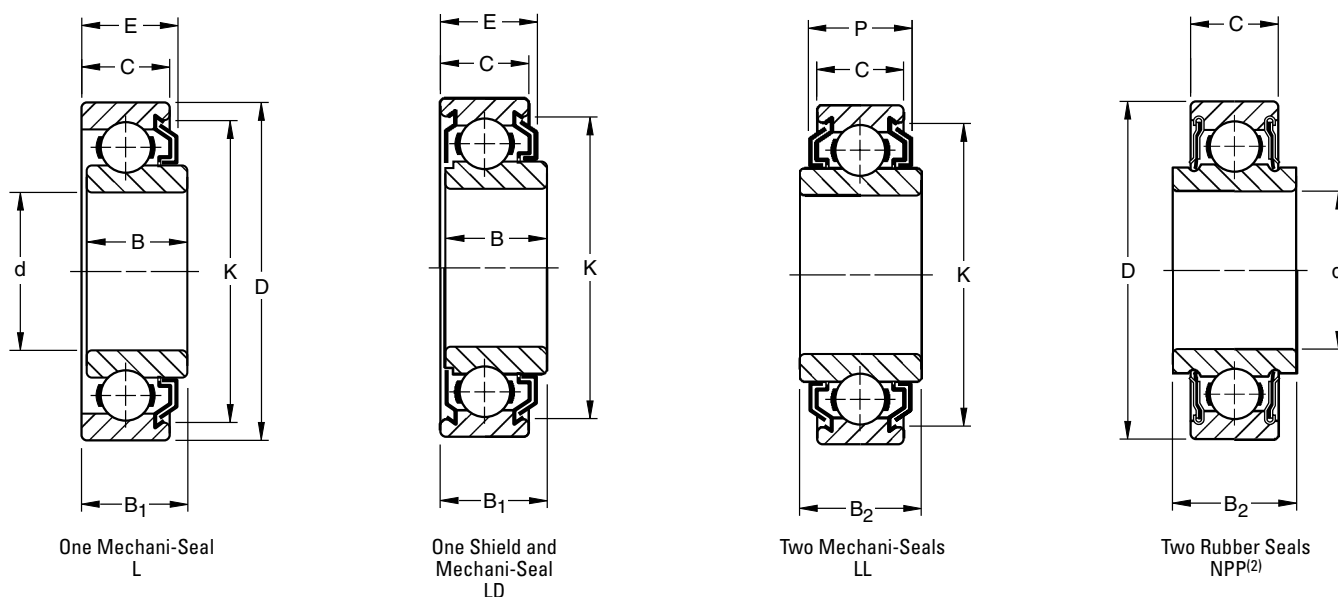
<sup>(2)</sup> Also available as 203KLL with 18.24 mm (.718") inner ring width.

<sup>(3)</sup> Also available as 205KLL with 20.64 mm (.812") inner ring width.

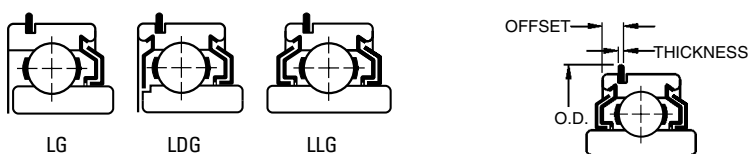
<sup>(4)</sup> Equipped with R-Seal.

<sup>(5)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## Radial and Angular Contact Ball Bearings



### MECHANI-SEAL SNAP RING COMBINATIONS



| (Seal Projection)<br>(L, LD, LL Types Only) |       |       |       |           |                                 | One Mechani-Seal |          |          | One Mechani-Seal and Shield |                                 |           | Two Mechani-Seals |        |       | Snap Ring <sup>(1)</sup> |  |  |  |  |  |
|---------------------------------------------|-------|-------|-------|-----------|---------------------------------|------------------|----------|----------|-----------------------------|---------------------------------|-----------|-------------------|--------|-------|--------------------------|--|--|--|--|--|
| E                                           |       | Width |       | O.D.<br>K |                                 | LG               | LDG      | LLG      | O.D.                        |                                 | Thickness |                   | Offset |       |                          |  |  |  |  |  |
| mm                                          | in.   | mm    | in.   | mm        | in.                             |                  |          |          | mm                          | in.                             | mm        | in.               | mm     | in.   |                          |  |  |  |  |  |
| 12.22                                       | 0.481 | 15.57 | 0.613 | 25.4      | 1                               | —                | —        | 200KLLG2 | 34.5                        | 1 <sup>23</sup> / <sub>64</sub> | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 12.19                                       | 0.480 | 14.40 | 0.567 | 27.0      | 1 <sup>1</sup> / <sub>16</sub>  | —                | —        | 201KLLG2 | 36.5                        | 1 <sup>7</sup> / <sub>16</sub>  | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 12.19                                       | 0.480 | 14.40 | 0.567 | 27.0      | 1 <sup>1</sup> / <sub>16</sub>  | —                | 201KLDG3 | —        | 36.5                        | 1 <sup>7</sup> / <sub>16</sub>  | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 12.37                                       | 0.487 | 13.79 | 0.543 | 30.2      | 1 <sup>3</sup> / <sub>16</sub>  | —                | 202KLDG  | 202KLLG2 | 39.3                        | 1 <sup>35</sup> / <sub>64</sub> | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 12.37                                       | 0.487 | 13.79 | 0.543 | 30.2      | 1 <sup>3</sup> / <sub>16</sub>  | —                | —        | 202KLLG3 | 39.3                        | 1 <sup>35</sup> / <sub>64</sub> | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 14.00                                       | 0.551 | 16.00 | 0.630 | 34.9      | 1 <sup>3</sup> / <sub>8</sub>   | 203KLG           | —        | 203KLLG2 | 44.4                        | 1 <sup>3</sup> / <sub>4</sub>   | 1.07      | 0.042             | 3.05   | 0.120 |                          |  |  |  |  |  |
| 15.57                                       | 0.613 | 17.14 | 0.675 | 40.1      | 1 <sup>37</sup> / <sub>64</sub> | 204KLG2          | —        | 204KLLG2 | 52.4                        | 2 <sup>1</sup> / <sub>16</sub>  | 1.07      | 0.042             | 3.45   | 0.136 |                          |  |  |  |  |  |
| 15.57                                       | 0.613 | 16.13 | 0.635 | 45.6      | 1 <sup>51</sup> / <sub>64</sub> | 205KLG2          | —        | 205KLLG2 | 57.5                        | 2 <sup>17</sup> / <sub>64</sub> | 1.07      | 0.042             | 3.45   | 0.136 |                          |  |  |  |  |  |
| 19.48                                       | 0.767 | 22.99 | 0.905 | 54.4      | 2 <sup>9</sup> / <sub>64</sub>  | —                | —        | 206KLLG  | 67.5                        | 2 <sup>21</sup> / <sub>32</sub> | 1.65      | 0.065             | 4.83   | 0.190 |                          |  |  |  |  |  |
| 20.50                                       | 0.807 | 23.98 | 0.944 | 62.7      | 2 <sup>15</sup> / <sub>32</sub> | —                | —        | 207KLLG  | 78.2                        | 3 <sup>5</sup> / <sub>64</sub>  | 1.65      | 0.065             | 4.83   | 0.190 |                          |  |  |  |  |  |
| 23.32                                       | 0.918 | 28.63 | 1.127 | 69.8      | 2 <sup>3</sup> / <sub>4</sub>   | —                | —        | —        | 86.5                        | 3 <sup>13</sup> / <sub>32</sub> | 1.65      | 0.065             | 4.83   | 0.190 |                          |  |  |  |  |  |
| 24.23                                       | 0.954 | 29.46 | 1.160 | 75.4      | 2 <sup>31</sup> / <sub>32</sub> | —                | —        | 209KLLG  | 91.3                        | 3 <sup>19</sup> / <sub>32</sub> | 1.65      | 0.065             | 4.83   | 0.190 |                          |  |  |  |  |  |

<sup>(1)</sup> The snap ring is normally packaged separately in the box with the bearing.

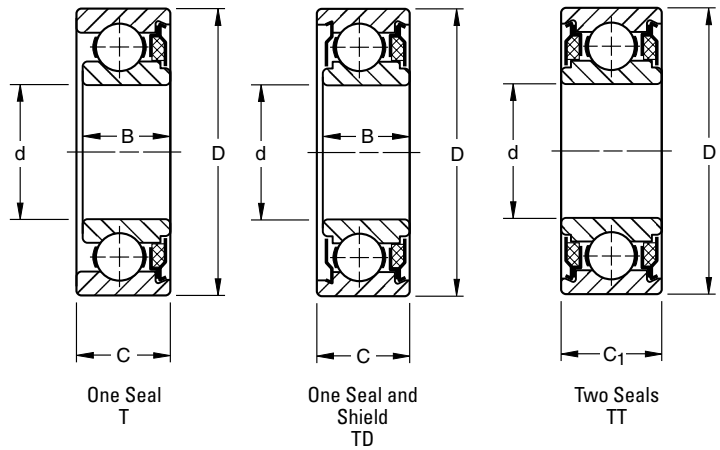
**NOTE:** "N" prefix indicates a non-removable seal.



# BALL BEARINGS

## LIGHT 200 SERIES FELT SEAL TYPE

- Permits certain design economies, but cannot be assumed to be suitable for all conditions of service.
- In many cases, they are supplemented by adjacent parts in the application for adequate bearing protection in small equipment such as fractional horsepower motors, electric vacuum cleaners, small gear units, electric and pneumatic tools, etc.
- Suggested for effective grease retention and exclusion of foreign matter.
- Electric motor quality for applications where quietness is a requirement.



### DIMENSIONS – TOLERANCES

| Bearing Number        | Bore d                 |                        | Outside Diameter D                    |                                       | Ring Widths                       |                                   | Inner Ring Offset | Fillet Radius <sup>(1)</sup> |         | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |       |     |       |       |      |       |      |       |      |
|-----------------------|------------------------|------------------------|---------------------------------------|---------------------------------------|-----------------------------------|-----------------------------------|-------------------|------------------------------|---------|-------|-------|-----------------------------------|-------|------------------------------------------------------------|-------|-----|-------|-------|------|-------|------|-------|------|
|                       | one seal seals T       | one seal and shield TD | tolerance +0.000 mm +0.0000" to minus | tolerance +0.000 mm +0.0000" to minus | +0.00 mm, -0.12 mm 0.000, -0.005" | +0.00 mm, -0.12 mm 0.000, -0.005" |                   | mm                           | in.     | mm    | in.   | kg                                | lbs.  | N                                                          | lbs.  | N   | lbs.  |       |      |       |      |       |      |
| 200KT                 | 200KTD                 | 10                     | 0.3937                                | 0.008                                 | 0.0003                            | 30                                | 1.1811            | 0.009                        | 0.00035 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.045 | 0.10 | 2600  | 585  | 6790  | 1530 |
| —                     | 200KTD2                | 12                     | 0.4724                                | 0.008                                 | 0.0003                            | 30                                | 1.1811            | 0.009                        | 0.00035 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.045 | 0.10 | 2600  | 585  | 6790  | 1530 |
| 201KT                 | 201KTD                 | 12                     | 0.4724                                | 0.008                                 | 0.0003                            | 32                                | 1.2598            | 0.011                        | 0.00045 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.045 | 0.10 | 3000  | 680  | 7680  | 1730 |
| 201KT2                | 201KTD2                | 13                     | 0.5118                                | 0.008                                 | 0.0003                            | 32                                | 1.2598            | 0.011                        | 0.00045 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.045 | 0.10 | 3000  | 680  | 7680  | 1730 |
| 202KT                 | 202KTD                 | 15                     | 0.5906                                | 0.008                                 | 0.0003                            | 35                                | 1.3780            | 0.011                        | 0.00045 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.050 | 0.11 | 3600  | 830  | 8650  | 1930 |
| 202KT3 <sup>(2)</sup> | 202KTD3 <sup>(2)</sup> | 16                     | 0.6299                                | 0.008                                 | 0.0003                            | 35                                | 1.3780            | 0.011                        | 0.00045 | 12.19 | 0.480 | 12.70                             | 0.500 | 0.51                                                       | 0.020 | 0.6 | 0.024 | 0.050 | 0.11 | 3600  | 830  | 8650  | 1930 |
| 203KT                 | 203KTD                 | 17                     | 0.6693                                | 0.008                                 | 0.0003                            | 40                                | 1.5748            | 0.011                        | 0.00045 | 13.67 | 0.538 | 14.30                             | 0.563 | 0.64                                                       | 0.025 | 0.6 | 0.024 | 0.077 | 0.17 | 4700  | 1060 | 10900 | 2450 |
| 204KT                 | 204KTD                 | 20                     | 0.7874                                | 0.010                                 | 0.0004                            | 47                                | 1.8504            | 0.011                        | 0.00045 | 15.24 | 0.600 | 15.88                             | 0.625 | 0.64                                                       | 0.025 | 1.0 | 0.039 | 0.118 | 0.26 | 6500  | 1460 | 14400 | 3250 |
| 205KT                 | 205KTD                 | 25                     | 0.9843                                | 0.010                                 | 0.0004                            | 52                                | 2.0472            | 0.013                        | 0.00050 | 15.24 | 0.600 | 15.88                             | 0.625 | 0.64                                                       | 0.025 | 1.0 | 0.039 | 0.132 | 0.29 | 7800  | 1760 | 16000 | 3600 |
| 206KT                 | 206KTD                 | 30                     | 1.1811                                | 0.010                                 | 0.0004                            | 62                                | 2.4409            | 0.013                        | 0.00050 | 19.00 | 0.748 | 19.99                             | 0.788 | 0.99                                                       | 0.039 | 1.0 | 0.039 | 0.245 | 0.54 | 11300 | 2550 | 22200 | 5000 |
| 207KT                 | 207KTD                 | 35                     | 1.3780                                | 0.012                                 | 0.00045                           | 72                                | 2.8346            | 0.013                        | 0.00050 | 19.99 | 0.787 | 21.01                             | 0.827 | 0.99                                                       | 0.039 | 1.0 | 0.039 | 0.358 | 0.79 | 15300 | 3450 | 29000 | 6550 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> 202KT3 has 12.29 mm (.484") inner ring width.

<sup>(3)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### DIMENSIONS – TOLERANCES

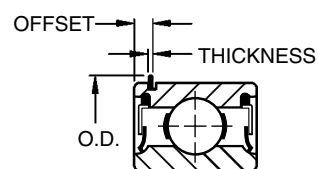
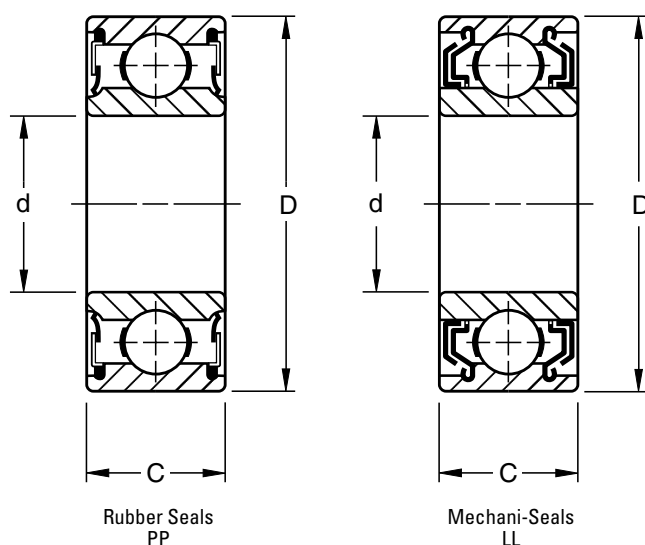
| Bearing Number | Bore d       |                                       | Outside Diameter D                    |                                    | Ring Width C <sub>1</sub>          |        | Fillet Radius <sup>(1)</sup> |         | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |      |       |      |       |      |
|----------------|--------------|---------------------------------------|---------------------------------------|------------------------------------|------------------------------------|--------|------------------------------|---------|-------|-------|-----------------------------------|-------|------------------------------------------------------------|------|-------|------|-------|------|
|                | two seals TT | tolerance +0.000 mm +0.0000" to minus | tolerance +0.000 mm +0.0000" to minus | +0.00 mm, -0.12 mm +0.000, -0.005" | +0.00 mm, -0.12 mm +0.000, -0.005" | mm     | in.                          | mm      | in.   | kg    | lbs.                              | N     | lbs.                                                       | N    | lbs.  |      |       |      |
| 200KTT         | 10           | 0.3937                                | 0.008                                 | 0.0003                             | 30                                 | 1.1811 | 0.009                        | 0.00035 | 16.66 | 0.656 | 0.6                               | 0.024 | 0.045                                                      | 0.10 | 2600  | 585  | 6790  | 1530 |
| 201KTT         | 12           | 0.4724                                | 0.008                                 | 0.0003                             | 32                                 | 1.2598 | 0.011                        | 0.00043 | 16.66 | 0.656 | 0.6                               | 0.024 | 0.045                                                      | 0.10 | 3000  | 680  | 7680  | 1730 |
| 201KTT3        | 13           | 0.5118                                | 0.008                                 | 0.0003                             | 32                                 | 1.2598 | 0.011                        | 0.00043 | 16.66 | 0.656 | 0.6                               | 0.024 | 0.045                                                      | 0.10 | 3000  | 680  | 7680  | 1730 |
| 202KTT         | 15           | 0.5906                                | 0.008                                 | 0.0003                             | 35                                 | 1.3780 | 0.011                        | 0.00043 | 16.66 | 0.656 | 0.6                               | 0.024 | 0.050                                                      | 0.11 | 3600  | 830  | 8650  | 1930 |
| 203KTT         | 17           | 0.6693                                | 0.008                                 | 0.0003                             | 40                                 | 1.5748 | 0.011                        | 0.00043 | 18.24 | 0.718 | 0.6                               | 0.024 | 0.077                                                      | 0.17 | 4700  | 1060 | 10900 | 2450 |
| 204KTT         | 20           | 0.7874                                | 0.010                                 | 0.0004                             | 47                                 | 1.8504 | 0.011                        | 0.00043 | 20.62 | 0.812 | 1.0                               | 0.039 | 0.118                                                      | 0.26 | 6500  | 1460 | 14400 | 3250 |
| 205KTT         | 25           | 0.9843                                | 0.010                                 | 0.0004                             | 52                                 | 2.0472 | 0.013                        | 0.00051 | 20.62 | 0.812 | 1.0                               | 0.039 | 0.132                                                      | 0.29 | 7800  | 1760 | 16000 | 3600 |
| 206KTT         | 30           | 1.1811                                | 0.010                                 | 0.0004                             | 62                                 | 2.4409 | 0.013                        | 0.00051 | 24.00 | 0.945 | 1.0                               | 0.039 | 0.245                                                      | 0.54 | 11300 | 2550 | 22200 | 5000 |
| 207KTT         | 35           | 1.3780                                | 0.012                                 | 0.00045                            | 72                                 | 2.8346 | 0.013                        | 0.00051 | 25.00 | 0.984 | 1.0                               | 0.039 | 0.358                                                      | 0.79 | 15300 | 3450 | 29000 | 6550 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### LIGHT, WIDE TYPE W200PP SERIES W200KLL SERIES

- Rubber seal (W200PP) and Mechani-Seal (W200KLL) types.
- Made with standard bores, standard outside diameters and a single row of balls.
- Same widths as double-row bearings of corresponding size.
- Extra width offers a larger support area for shaft and housing contact and added space for prepacked lubricant.
- Wide-type rubber seal bearings are particularly suited for use in electric motors, where they simplify housing design by eliminating auxiliary seals.
- Wide-type Mechani-Seal ball bearings are designed for applications where frictionless sealing and large grease capacity are required.
- Extremely effective grease retention and exclusion of foreign matter are assured by close running clearance between the seal members and slinger action of the outer member.



#### DIMENSIONS – TOLERANCES

| Bearing Number        |                 | Bore d                                |        | Outside Diameter D                    |         | Width C                           |        | Fillet Radius <sup>(1)</sup> |         | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load C <sub>E</sub> <sup>(4)</sup> |      | Snap Ring PPG <sup>(3)</sup> |           |        |       |      |         |      |       |      |       |
|-----------------------|-----------------|---------------------------------------|--------|---------------------------------------|---------|-----------------------------------|--------|------------------------------|---------|-------|-------|-----------------------------------|-------|-----------------------------------------------------|------|------------------------------|-----------|--------|-------|------|---------|------|-------|------|-------|
| Contact Seal PP       | Mechani-seal LL | tolerance +0.000 mm +0.0000" to minus |        | tolerance +0.000 mm +0.0000" to minus |         | +0.00 mm -0.12 mm +0.000" -0.005" |        |                              |         |       |       |                                   |       |                                                     |      | O.D.                         | thickness | offset |       |      |         |      |       |      |       |
|                       |                 | mm                                    | in.    | mm                                    | in.     | mm                                | in.    | mm                           | in.     | kg    | lbs.  | N                                 | lbs.  | N                                                   | lbs. | mm                           | in.       | mm     | in.   |      |         |      |       |      |       |
| W200PP                | —               | 10                                    | 0.3937 | 0.008                                 | 0.0003  | 30                                | 1.1811 | 0.009                        | 0.00035 | 14.27 | 0.562 | 0.6                               | 0.024 | 0.045                                               | 0.10 | 2650                         | 600       | 6550   | 1500  | —    | —       | —    | —     | —    | —     |
| W201PP                | —               | 12                                    | 0.4724 | 0.008                                 | 0.0003  | 32                                | 1.2598 | 0.011                        | 0.00045 | 15.88 | 0.625 | 0.6                               | 0.024 | 0.054                                               | 0.12 | 3000                         | 695       | 7500   | 1700  | —    | —       | —    | —     | —    | —     |
| W202PP                | —               | 15                                    | 0.5906 | 0.008                                 | 0.0003  | 35                                | 1.3780 | 0.011                        | 0.00045 | 15.88 | 0.625 | 0.6                               | 0.024 | 0.064                                               | 0.14 | 3450                         | 780       | 8650   | 1930  | —    | —       | —    | —     | —    | —     |
| W203PP <sup>(2)</sup> | —               | 17                                    | 0.6693 | 0.008                                 | 0.0003  | 40                                | 1.5748 | 0.011                        | 0.00045 | 17.48 | 0.688 | 0.6                               | 0.024 | 0.091                                               | 0.20 | 4400                         | 1000      | 10600  | 2360  | 44.4 | 1 3/4   | 1.07 | 0.042 | 4.7  | 0.185 |
| W204PP                | W204KLL         | 20                                    | 0.7874 | 0.010                                 | 0.0004  | 47                                | 1.8504 | 0.011                        | 0.00045 | 20.62 | 0.812 | 1.0                               | 0.039 | 0.150                                               | 0.33 | 6200                         | 1400      | 14300  | 3200  | —    | —       | —    | —     | —    | —     |
| W205PP <sup>(2)</sup> | W205KLL         | 25                                    | 0.9843 | 0.010                                 | 0.0004  | 52                                | 2.0472 | 0.013                        | 0.0005  | 20.62 | 0.812 | 1.0                               | 0.039 | 0.177                                               | 0.39 | 6950                         | 1560      | 15600  | 3450  | 57.5 | 2 17/64 | 1.07 | 0.042 | 5.72 | 0.225 |
| W206PP <sup>(2)</sup> | W206KLL         | 30                                    | 1.1811 | 0.010                                 | 0.0004  | 62                                | 2.4409 | 0.013                        | 0.0005  | 23.83 | 0.938 | 1.0                               | 0.039 | 0.295                                               | 0.65 | 10000                        | 2280      | 21600  | 4800  | 67.5 | 2 21/32 | 1.65 | 0.065 | 6.15 | 0.242 |
| W207PP                | W207KLL         | 35                                    | 1.3780 | 0.012                                 | 0.00045 | 72                                | 2.8346 | 0.013                        | 0.0005  | 26.97 | 1.062 | 1.0                               | 0.039 | 0.458                                               | 1.01 | 13700                        | 3050      | 28500  | 6400  | —    | —       | —    | —     | —    | —     |
| W208PP                | W208KLL         | 40                                    | 1.5748 | 0.012                                 | 0.00045 | 80                                | 3.1496 | 0.013                        | 0.0005  | 30.18 | 1.188 | 1.0                               | 0.039 | 0.630                                               | 1.39 | 17600                        | 4000      | 36000  | 8150  | —    | —       | —    | —     | —    | —     |
| W209PP                | W209KLL         | 45                                    | 1.7717 | 0.012                                 | 0.00045 | 85                                | 3.3465 | 0.015                        | 0.0006  | 30.18 | 1.188 | 1.0                               | 0.039 | 0.668                                               | 1.47 | 17600                        | 4000      | 36000  | 8150  | —    | —       | —    | —     | —    | —     |
| W210PP                | —               | 50                                    | 1.9685 | 0.012                                 | 0.00045 | 90                                | 3.5433 | 0.015                        | 0.0006  | 30.18 | 1.188 | 1.0                               | 0.039 | 0.767                                               | 1.69 | 19600                        | 4500      | 39000  | 8800  | —    | —       | —    | —     | —    | —     |
| W214PP                | —               | 70                                    | 2.7559 | 0.015                                 | 0.0006  | 125                               | 4.9213 | 0.018                        | 0.0007  | 39.67 | 1.562 | 1.5                               | 0.059 | 1.810                                               | 3.99 | 37500                        | 8500      | 69500  | 15600 | —    | —       | —    | —     | —    | —     |

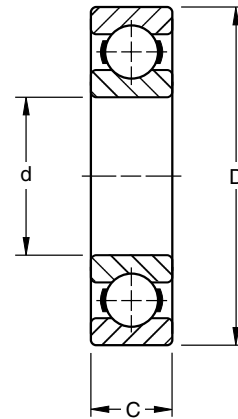
(1) Maximum shaft or housing fillet radius that bearing corners will clear.  
 (2) Also available with snap ring. To order, add suffix "G" to bearing number. Example: W205PPG.  
 (3) The snap ring is normally packaged separately in the box with the bearing.  
 (4) Based on 10<sup>6</sup> revolutions of calculated fatigue life.



# BALL BEARINGS

## MEDIUM 300K SERIES

- A heavier cross section than the 200 Series.
- Capable of carrying considerably heavier radial, thrust and combined loads for a given bore size.
- Capable of withstanding heavy shock loads. A ball bearing of heavier cross section is rarely required.
- Uses Conrad-type bearing that is well-balanced, with deep races and uninterrupted race shoulders.
- Electric motor quality where quietness is a requirement.



### DIMENSIONS – TOLERANCES

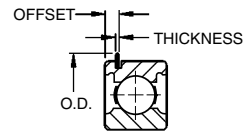
| Bearing Number | Bore d |         | tolerance +0.000 mm +0.0000" to minus |         | Outside Diameter D |         | tolerance +0.000 mm +0.0000" to minus |         | Width C |       | tolerance +0.000 mm +0.0000" to minus |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |       | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |        |
|----------------|--------|---------|---------------------------------------|---------|--------------------|---------|---------------------------------------|---------|---------|-------|---------------------------------------|-------|------------------------------|-------|-------|-------|-----------------------------------|--------|------------------------------------------------------------|--------|
|                | mm     | in.     | mm                                    | in.     | mm                 | in.     | mm                                    | in.     | mm      | in.   | mm                                    | in.   | mm                           | in.   | kg    | lbs.  | N                                 | lbs.   | N                                                          | lbs.   |
| 300K           | 10     | 0.3937  | 0.008                                 | 0.0003  | 35                 | 1.3780  | 0.011                                 | 0.00043 | 11      | 0.433 | 0.12                                  | 0.005 | 0.6                          | 0.024 | 0.054 | 0.12  | 3460                              | 780    | 9200                                                       | 2080   |
| 301K           | 12     | 0.4724  | 0.008                                 | 0.0003  | 37                 | 1.4567  | 0.011                                 | 0.00043 | 12      | 0.472 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.064 | 0.14  | 3620                              | 815    | 9400                                                       | 2120   |
| 302K           | 15     | 0.5906  | 0.008                                 | 0.0003  | 42                 | 1.6535  | 0.011                                 | 0.00043 | 13      | 0.512 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.082 | 0.18  | 5240                              | 1180   | 13300                                                      | 3000   |
| 303K           | 17     | 0.6693  | 0.008                                 | 0.0003  | 47                 | 1.8504  | 0.011                                 | 0.00043 | 14      | 0.551 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.109 | 0.24  | 6550                              | 1460   | 15300                                                      | 3450   |
| 304K           | 20     | 0.7874  | 0.010                                 | 0.0004  | 52                 | 2.0472  | 0.013                                 | 0.0005  | 15      | 0.591 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.141 | 0.31  | 7800                              | 1760   | 17900                                                      | 4050   |
| 305K           | 25     | 0.9843  | 0.010                                 | 0.0004  | 62                 | 2.4409  | 0.013                                 | 0.0005  | 17      | 0.669 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.236 | 0.52  | 12200                             | 2750   | 26600                                                      | 6000   |
| 306K           | 30     | 1.1811  | 0.010                                 | 0.0004  | 72                 | 2.8346  | 0.013                                 | 0.0005  | 19      | 0.748 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.354 | 0.78  | 15600                             | 3550   | 33900                                                      | 7650   |
| 307K           | 35     | 1.3780  | 0.012                                 | 0.00047 | 80                 | 3.1496  | 0.013                                 | 0.0005  | 21      | 0.827 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.472 | 1.04  | 18400                             | 4150   | 37700                                                      | 8500   |
| 308K           | 40     | 1.5748  | 0.012                                 | 0.00047 | 90                 | 3.5433  | 0.015                                 | 0.0006  | 23      | 0.906 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.644 | 1.42  | 25900                             | 5850   | 50600                                                      | 11400  |
| 309K           | 45     | 1.7717  | 0.012                                 | 0.00047 | 100                | 3.9370  | 0.015                                 | 0.0006  | 25      | 0.984 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.862 | 1.90  | 31500                             | 7100   | 59500                                                      | 13400  |
| 310K           | 50     | 1.9685  | 0.012                                 | 0.00047 | 110                | 4.3307  | 0.015                                 | 0.0006  | 27      | 1.063 | 0.12                                  | 0.005 | 2.0                          | 0.079 | 1.125 | 2.48  | 37700                             | 8500   | 69300                                                      | 15600  |
| 311K           | 55     | 2.1654  | 0.015                                 | 0.0006  | 120                | 4.7244  | 0.015                                 | 0.0006  | 29      | 1.142 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 1.424 | 3.14  | 44400                             | 10000  | 81200                                                      | 18300  |
| 312K           | 60     | 2.3622  | 0.015                                 | 0.0006  | 130                | 5.1181  | 0.018                                 | 0.0007  | 31      | 1.220 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 1.765 | 3.89  | 51500                             | 11600  | 92300                                                      | 20800  |
| 313K           | 65     | 2.5591  | 0.015                                 | 0.0006  | 140                | 5.5118  | 0.018                                 | 0.0007  | 33      | 1.299 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 2.168 | 4.78  | 59500                             | 13400  | 104000                                                     | 23600  |
| 314K           | 70     | 2.7559  | 0.015                                 | 0.0006  | 150                | 5.9055  | 0.025                                 | 0.0010  | 35      | 1.378 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 2.617 | 5.77  | 67900                             | 15300  | 116000                                                     | 26000  |
| 315K           | 75     | 2.9528  | 0.015                                 | 0.0006  | 160                | 6.2992  | 0.018                                 | 0.0007  | 37      | 1.457 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 3.175 | 7.00  | 76800                             | 17300  | 128000                                                     | 29000  |
| 316K           | 80     | 3.1496  | 0.015                                 | 0.0006  | 170                | 6.6929  | 0.025                                 | 0.0010  | 39      | 1.535 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 3.756 | 8.28  | 85700                             | 19300  | 139000                                                     | 31500  |
| 317K           | 85     | 3.3465  | 0.020                                 | 0.0008  | 180                | 7.0866  | 0.025                                 | 0.0010  | 41      | 1.614 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 5.008 | 11.04 | 95900                             | 21600  | 151000                                                     | 34000  |
| 318K           | 90     | 3.5433  | 0.020                                 | 0.0008  | 190                | 7.4803  | 0.030                                 | 0.0012  | 43      | 1.693 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 5.121 | 11.29 | 106000                            | 24000  | 162000                                                     | 36500  |
| 320K           | 100    | 3.9370  | 0.020                                 | 0.0008  | 215                | 8.4646  | 0.030                                 | 0.0012  | 47      | 1.850 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 7.085 | 15.62 | 139000                            | 31500  | 195000                                                     | 41500  |
| 321K           | 105    | 4.1339  | 0.020                                 | 0.0008  | 225                | 8.8583  | 0.030                                 | 0.0012  | 49      | 1.929 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 10.21 | 22.52 | 163000                            | 36500  | 126000                                                     | 48000  |
| 322K           | 110    | 4.3307  | 0.020                                 | 0.0008  | 240                | 9.4488  | 0.030                                 | 0.0012  | 50      | 1.969 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 12.17 | 26.82 | 166000                            | 37500  | 220000                                                     | 49000  |
| 326K           | 130    | 5.1181  | 0.020                                 | 0.0010  | 280                | 11.0236 | 0.035                                 | 0.0014  | 58      | 2.323 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 18.90 | 41.60 | 240000                            | 54000  | 280000                                                     | 63000  |
| 330K           | 150    | 5.9055  | 0.025                                 | 0.0010  | 320                | 12.5984 | 0.040                                 | 0.0016  | 65      | 2.559 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 27.10 | 59.70 | 310000                            | 69500  | 335000                                                     | 75000  |
| 332K           | 160    | 6.2992  | 0.025                                 | 0.0010  | 340                | 13.3858 | 0.040                                 | 0.0016  | 68      | 2.677 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 31.51 | 69.40 | 310000                            | 69500  | 335000                                                     | 75000  |
| 334K           | 170    | 6.6929  | 0.025                                 | 0.0010  | 360                | 14.1732 | 0.040                                 | 0.0016  | 72      | 2.835 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 36.82 | 81.10 | 355000                            | 80000  | 360000                                                     | 81500  |
| 336K           | 180    | 7.0866  | 0.025                                 | 0.0010  | 380                | 14.9606 | 0.040                                 | 0.0016  | 75      | 2.953 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 42.04 | 92.60 | 390000                            | 88000  | 390000                                                     | 88000  |
| 338K           | 190    | 7.4803  | 0.030                                 | 0.0012  | 400                | 15.7480 | 0.040                                 | 0.0016  | 78      | 3.071 | 0.30                                  | 0.012 | 4.0                          | 0.16  | 47.6  | 105.0 | 440000                            | 98000  | 425000                                                     | 95000  |
| 340K           | 200    | 7.8740  | 0.030                                 | 0.0012  | 420                | 16.5354 | 0.045                                 | 0.0018  | 80      | 3.150 | 0.30                                  | 0.012 | 4.0                          | 0.16  | 56.1  | 123.6 | 465000                            | 104000 | 425000                                                     | 95000  |
| 342K           | 210    | 8.2677  | 0.030                                 | 0.0012  | 440                | 17.3228 | 0.045                                 | 0.0018  | 84      | 3.307 | 0.30                                  | 0.012 | 4.0                          | 0.16  | 58.1  | 128.2 | 570000                            | 129000 | 510000                                                     | 114000 |
| 344K           | 220    | 8.6614  | 0.030                                 | 0.0012  | 460                | 18.1102 | 0.045                                 | 0.0018  | 88      | 3.465 | 0.30                                  | 0.012 | 4.0                          | 0.16  | 69.8  | 154.0 | 610000                            | 137000 | 520000                                                     | 116000 |
| 348K           | 240    | 9.4488  | 0.030                                 | 0.0012  | 500                | 19.6850 | 0.045                                 | 0.0018  | 95      | 3.740 | 0.30                                  | 0.012 | 4.0                          | 0.16  | 81.1  | 178.9 | 735000                            | 163000 | 600000                                                     | 134000 |
| 352K           | 260    | 10.2362 | 0.035                                 | 0.0014  | 540                | 21.2598 | 0.050                                 | 0.0020  | 102     | 4.016 | 0.35                                  | 0.014 | 4.0                          | 0.16  | 98.4  | 217.0 | 850000                            | 190000 | 670000                                                     | 150000 |
| 356K           | 280    | 11.0236 | 0.035                                 | 0.0014  | 580                | 22.8346 | 0.050                                 | 0.0020  | 108     | 4.252 | 0.35                                  | 0.014 | 4.0                          | 0.16  | 142.8 | 315.0 | 780000                            | 176000 | 585000                                                     | 134000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## SHIELDS, SEALS AND SNAP RING COMBINATIONS

| Shields and Seals |                   |               |                              |                 | Snap Ring (Wireloc) <sup>(1)</sup> |                     |                     |                       | O.D.  |                                 | Thickness |       | Offset |       |
|-------------------|-------------------|---------------|------------------------------|-----------------|------------------------------------|---------------------|---------------------|-----------------------|-------|---------------------------------|-----------|-------|--------|-------|
| One Shield<br>D   | Two Shields<br>DD | One Seal<br>P | One Seal<br>One Shield<br>PD | Two Seals<br>PP | Open<br>Type<br>G                  | One<br>Shield<br>PG | One<br>Shield<br>DG | Two<br>Shields<br>DDG | mm    | in.                             | mm        | in.   | mm     | in.   |
| 300KD             | 300KDD            | 300P          | —                            | —               | —                                  | —                   | —                   | —                     | 39.3  | 1 <sup>35</sup> / <sub>64</sub> | 1.07      | 0.042 | 3.05   | 0.120 |
| 301KD             | 301KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | 40.9  | 1 <sup>39</sup> / <sub>64</sub> | 1.07      | 0.042 | 3.05   | 0.120 |
| 302KD             | 302KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | 46.0  | 1 <sup>13</sup> / <sub>16</sub> | 1.07      | 0.042 | 3.05   | 0.120 |
| 303KD             | 303KDD            | 303P          | —                            | 303PP           | 303KG                              | —                   | —                   | —                     | 52.4  | 2 <sup>1</sup> / <sub>16</sub>  | 1.07      | 0.042 | 3.45   | 0.136 |
| 304KD             | 304KDD            | 304P          | —                            | 304PP           | 304KG                              | —                   | 304KDG              | 304KDDG               | 57.5  | 2 <sup>17</sup> / <sub>64</sub> | 1.07      | 0.042 | 3.45   | 0.136 |
| 305KD             | 305KDD            | 305P          | —                            | 305PP           | 305KG                              | —                   | 305KDG              | 305KDDG               | 67.5  | 2 <sup>21</sup> / <sub>32</sub> | 1.65      | 0.065 | 4.83   | 0.190 |
| 306KD             | 306KDD            | 306P          | —                            | 306PP           | 306KG                              | —                   | 306KDG              | 306KDDG               | 78.2  | 3 <sup>5</sup> / <sub>64</sub>  | 1.65      | 0.065 | 4.83   | 0.190 |
| 307KD             | 307KDD            | 307P          | —                            | 307PP           | 307KG                              | —                   | 307KDG              | 307KDDG               | 86.5  | 3 <sup>13</sup> / <sub>32</sub> | 1.65      | 0.065 | 4.83   | 0.190 |
| 308KD             | 308KDD            | 308P          | —                            | 308PP           | 308KG                              | —                   | 308KDG              | 308KDDG               | 96.4  | 3 <sup>51</sup> / <sub>64</sub> | 2.41      | 0.095 | 5.59   | 0.220 |
| 309KD             | 309KDD            | 309P          | —                            | 309PP           | 309KG                              | —                   | 309KDG              | 309KDDG               | 106.4 | 4 <sup>3</sup> / <sub>16</sub>  | 2.41      | 0.095 | 5.59   | 0.220 |
| 310KD             | 310KDD            | 310P          | —                            | 310PP           | 310KG                              | —                   | 310KDG              | 310KDDG               | 116.3 | 4 <sup>37</sup> / <sub>64</sub> | 2.41      | 0.095 | 5.59   | 0.220 |
| 311KD             | 311KDD            | 311NP         | 311NPD                       | 311NPP          | 311KG                              | 311NPG              | —                   | 311KDDG               | 129.4 | 5 <sup>3</sup> / <sub>32</sub>  | 2.77      | 0.109 | 6.73   | 0.265 |
| 312KD             | 312KDD            | —             | —                            | 312NPP          | 312KG                              | —                   | —                   | 312KDDG               | 139.7 | 5 <sup>1</sup> / <sub>2</sub>   | 2.77      | 0.109 | 6.73   | 0.265 |
| 313KD             | 313KDD            | —             | —                            | —               | —                                  | —                   | —                   | 313KDDG               | 149.6 | 5 <sup>57</sup> / <sub>64</sub> | 2.77      | 0.109 | 7.54   | 0.297 |
| 314KD             | 314KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |
| 315KD             | 315KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |
| 316KD             | 316KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |
| 317KD             | 317KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |
| —                 | —                 | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |
| 320KD             | 320KDD            | —             | —                            | —               | —                                  | —                   | —                   | —                     | —     | —                               | —         | —     | —      | —     |



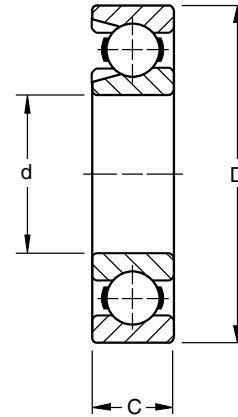
<sup>(1)</sup> The snap ring is normally packaged separately in the box with the bearing.  
**Note:** "N" prefix indicates a non-removable seal in NP (P) designs.



# BALL BEARINGS

## MEDIUM 300W SERIES

- A heavier cross section than the 200 Series.
- Capable of carrying considerably heavier radial, thrust and combined loads for a given bore size.
- Capable of withstanding heavy shock loads. A ball bearing of heavier cross section is rarely required.
- 300W Series bearings are dimensionally interchangeable with the 300K Series. However, bearings within the 300W Series are capable of carrying heavier radial loads, due to their larger ball complements.



### DIMENSIONS – TOLERANCES

| Bearing Number | Bore d |         | tolerance +0.000 mm +0.0000" to minus |         | Outside Diameter D |         | tolerance +0.000 mm +0.0000" to minus |         | Width C |       | tolerance +0.000 mm +0.0000" to minus |       | Fillet Radius <sup>(1)</sup> |       | Wt.    |        | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |        |
|----------------|--------|---------|---------------------------------------|---------|--------------------|---------|---------------------------------------|---------|---------|-------|---------------------------------------|-------|------------------------------|-------|--------|--------|-----------------------------------|--------|------------------------------------------------------------|--------|
|                | mm     | in.     | mm                                    | in.     | mm                 | in.     | mm                                    | in.     | mm      | in.   | mm                                    | in.   | mm                           | in.   | kg     | lbs.   | N                                 | lbs.   | N                                                          | lbs.   |
| 303W           | 17     | 0.6693  | 0.008                                 | 0.0003  | 47                 | 1.8504  | 0.011                                 | 0.00045 | 14      | 0.551 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.118  | 0.26   | 9400                              | 2120   | 20600                                                      | 4650   |
| 304W           | 20     | 0.7874  | 0.010                                 | 0.0004  | 52                 | 2.0472  | 0.013                                 | 0.0005  | 15      | 0.591 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.154  | 0.34   | 11300                             | 2550   | 23900                                                      | 5400   |
| 305W           | 25     | 0.9843  | 0.010                                 | 0.0004  | 62                 | 2.4409  | 0.013                                 | 0.0005  | 17      | 0.669 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.259  | 0.57   | 17300                             | 3900   | 33900                                                      | 7650   |
| 306W           | 30     | 1.1811  | 0.010                                 | 0.0004  | 72                 | 2.8346  | 0.013                                 | 0.0005  | 19      | 0.748 | 0.12                                  | 0.005 | 1.0                          | 0.039 | 0.386  | 0.85   | 22600                             | 5100   | 42800                                                      | 9650   |
| 307W           | 35     | 1.3780  | 0.012                                 | 0.00047 | 80                 | 3.1496  | 0.013                                 | 0.0005  | 21      | 0.827 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.513  | 1.13   | 29000                             | 6550   | 51500                                                      | 11600  |
| 308W           | 40     | 1.5748  | 0.012                                 | 0.00047 | 90                 | 3.5433  | 0.015                                 | 0.0006  | 23      | 0.906 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.844  | 1.86   | 39000                             | 8000   | 66000                                                      | 15000  |
| 309W           | 45     | 1.7717  | 0.012                                 | 0.00047 | 100                | 3.9370  | 0.015                                 | 0.0006  | 25      | 0.984 | 0.12                                  | 0.005 | 1.5                          | 0.059 | 0.934  | 2.06   | 47000                             | 10600  | 78100                                                      | 17600  |
| 310W           | 50     | 1.9685  | 0.012                                 | 0.00047 | 110                | 4.3307  | 0.015                                 | 0.0006  | 27      | 1.063 | 0.12                                  | 0.005 | 2.0                          | 0.079 | 1.207  | 2.66   | 56000                             | 12700  | 92000                                                      | 20800  |
| 311W           | 55     | 2.1654  | 0.015                                 | 0.0006  | 120                | 4.7244  | 0.015                                 | 0.0006  | 29      | 1.142 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 1.542  | 3.40   | 66000                             | 15000  | 106000                                                     | 24000  |
| 312W           | 60     | 2.3622  | 0.015                                 | 0.0006  | 130                | 5.1181  | 0.018                                 | 0.0007  | 31      | 1.220 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 1.923  | 4.24   | 78000                             | 17600  | 122000                                                     | 27500  |
| 313W           | 65     | 2.5591  | 0.015                                 | 0.0006  | 140                | 5.5118  | 0.018                                 | 0.0007  | 33      | 1.299 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 2.413  | 5.32   | 96000                             | 21600  | 144000                                                     | 32500  |
| 314W           | 70     | 2.7559  | 0.015                                 | 0.0006  | 150                | 5.9055  | 0.018                                 | 0.0007  | 35      | 1.378 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 2.885  | 6.36   | 101000                            | 22800  | 153000                                                     | 34500  |
| 315W           | 75     | 2.9528  | 0.015                                 | 0.0006  | 160                | 6.2992  | 0.025                                 | 0.0010  | 37      | 1.457 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 3.497  | 7.71   | 127000                            | 28500  | 180000                                                     | 40500  |
| 316W           | 80     | 3.1496  | 0.015                                 | 0.0006  | 170                | 6.6929  | 0.025                                 | 0.0010  | 39      | 1.535 | 0.15                                  | 0.006 | 2.0                          | 0.079 | 4.154  | 9.15   | 142000                            | 32000  | 195000                                                     | 44000  |
| 317W           | 85     | 3.3465  | 0.020                                 | 0.0008  | 180                | 7.0866  | 0.025                                 | 0.0010  | 41      | 1.614 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 4.872  | 10.74  | 157000                            | 35500  | 211000                                                     | 47500  |
| 318W           | 90     | 3.5433  | 0.020                                 | 0.0008  | 190                | 7.4803  | 0.030                                 | 0.0012  | 43      | 1.693 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 5.625  | 12.39  | 173000                            | 39000  | 226000                                                     | 51000  |
| 319W           | 95     | 3.7402  | 0.020                                 | 0.0008  | 200                | 7.8740  | 0.030                                 | 0.0012  | 45      | 1.772 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 6.514  | 14.36  | 191000                            | 43000  | 239000                                                     | 54000  |
| 320W           | 100    | 3.9370  | 0.020                                 | 0.0008  | 215                | 8.4646  | 0.030                                 | 0.0012  | 47      | 1.850 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 7.992  | 17.62  | 226000                            | 51000  | 270000                                                     | 61000  |
| 321W           | 105    | 4.1339  | 0.020                                 | 0.0008  | 225                | 8.8583  | 0.030                                 | 0.0012  | 49      | 1.929 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 9.117  | 20.10  | 244000                            | 55000  | 284000                                                     | 64000  |
| 322W           | 110    | 4.3307  | 0.020                                 | 0.0008  | 240                | 9.4488  | 0.030                                 | 0.0012  | 50      | 1.968 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 10.81  | 23.84  | 266000                            | 60000  | 302000                                                     | 68000  |
| 324W           | 120    | 4.7244  | 0.020                                 | 0.0008  | 260                | 10.2362 | 0.035                                 | 0.0014  | 55      | 2.165 | 0.20                                  | 0.008 | 2.5                          | 0.098 | 15.01  | 33.10  | 284000                            | 64000  | 319000                                                     | 72000  |
| 326W           | 130    | 5.1181  | 0.025                                 | 0.0010  | 280                | 11.0236 | 0.035                                 | 0.0014  | 58      | 2.323 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 19.56  | 43.12  | 326000                            | 73500  | 355000                                                     | 80000  |
| 328W           | 140    | 5.5118  | 0.025                                 | 0.0010  | 300                | 11.8110 | 0.035                                 | 0.0014  | 62      | 2.441 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 23.06  | 50.80  | 410000                            | 91500  | 400000                                                     | 90000  |
| 330W           | 150    | 5.9055  | 0.025                                 | 0.0010  | 320                | 12.5984 | 0.040                                 | 0.0016  | 65      | 2.559 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 26.81  | 59.10  | 422000                            | 95000  | 422000                                                     | 95000  |
| 336W           | 180    | 7.0866  | 0.025                                 | 0.0010  | 380                | 14.9606 | 0.040                                 | 0.0016  | 79      | 3.110 | 0.25                                  | 0.010 | 2.5                          | 0.098 | 47.66  | 105.10 | 600000                            | 132000 | 524000                                                     | 118000 |
| 338W           | 190    | 7.4803  | 0.030                                 | 0.0012  | 400                | 15.7480 | 0.040                                 | 0.0016  | 78      | 3.071 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 49.21  | 108.40 | 720000                            | 160000 | 580000                                                     | 129000 |
| 340W           | 200    | 7.8740  | 0.030                                 | 0.0012  | 420                | 16.5354 | 0.045                                 | 0.0018  | 80      | 3.150 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 57.48  | 126.60 | 730000                            | 163000 | 570000                                                     | 127000 |
| 342W           | 210    | 8.2677  | 0.030                                 | 0.0012  | 440                | 17.3228 | 0.045                                 | 0.0018  | 84      | 3.307 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 60.70  | 133.70 | 935000                            | 208000 | 720000                                                     | 160000 |
| 344W           | 220    | 8.6614  | 0.030                                 | 0.0012  | 460                | 18.1102 | 0.045                                 | 0.0018  | 88      | 3.465 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 72.10  | 158.80 | 880000                            | 196000 | 700000                                                     | 150000 |
| 348W           | 240    | 9.4488  | 0.030                                 | 0.0012  | 500                | 19.6850 | 0.045                                 | 0.0018  | 95      | 3.740 | 0.30                                  | 0.012 | 4.0                          | 0.160 | 84.99  | 187.20 | 1200000                           | 260000 | 850000                                                     | 186000 |
| 352W           | 260    | 10.2362 | 0.035                                 | 0.0014  | 540                | 21.2598 | 0.050                                 | 0.0020  | 102     | 4.016 | 0.35                                  | 0.014 | 4.0                          | 0.160 | 103.38 | 227.70 | 1400000                           | 310000 | 950000                                                     | 208000 |
| 356W           | 280    | 11.0236 | 0.035                                 | 0.0014  | 580                | 22.8346 | 0.050                                 | 0.0020  | 108     | 4.252 | 0.35                                  | 0.014 | 4.0                          | 0.160 | 146.78 | 323.30 | 1350000                           | 300000 | 855000                                                     | 190000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

For applications where thrust load exceeds 60% Radial Load, consult your Timken representative.

## Radial and Angular Contact Ball Bearings

Listed in the table below are Timken maximum capacity type bearings (300W Series) with shields, seals and snap ring combinations.

The bearing number suffixes denote the following:

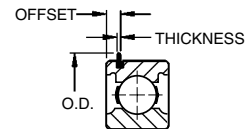
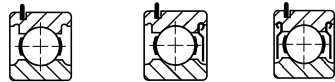
- **WD** - filling slot opposite single shield
- **WG** - filling slot opposite snap ring
- **WDD** - two shields
- **WDG** - filling slot and snap ring opposite shield

### SHIELDS, SEALS AND SNAP RING COMBINATIONS

#### Shields and Seals



#### Snap Ring (Wireloc)<sup>(1)</sup>



| One Shield<br>D | Two Shields<br>DD | Open Type<br>G       | Open Shield<br>DG | Two Shields<br>DDG | O.D.  |                                 | Thickness |       | Offset |       |
|-----------------|-------------------|----------------------|-------------------|--------------------|-------|---------------------------------|-----------|-------|--------|-------|
|                 |                   |                      |                   |                    | mm    | in.                             | mm        | in.   | mm     | in.   |
| —               | —                 | —                    | —                 | —                  | 57.5  | 2 <sup>17</sup> / <sub>64</sub> | 1.07      | 0.042 | 3.45   | 0.136 |
| 305WD           | —                 | 305WG                | —                 | —                  | 67.5  | 2 <sup>21</sup> / <sub>32</sub> | 1.65      | 0.065 | 4.83   | 0.190 |
| 306WD           | 306WDD            | 306WG                | 306WDG            | —                  | 78.2  | 3 <sup>5</sup> / <sub>64</sub>  | 1.65      | 0.065 | 4.83   | 0.190 |
| 307WD           | 307WDD            | 307WG                | 307WDG            | —                  | 86.5  | 3 <sup>13</sup> / <sub>32</sub> | 1.65      | 0.065 | 4.83   | 0.190 |
| 308WD           | 308WDD            | 308WG <sup>(2)</sup> | 308WDG            | —                  | 96.4  | 3 <sup>51</sup> / <sub>64</sub> | 2.41      | 0.095 | 5.59   | 0.220 |
| 309WD           | 309WDD            | 309WG                | 309WDG            | —                  | 106.4 | 4 <sup>3</sup> / <sub>16</sub>  | 2.41      | 0.095 | 5.59   | 0.220 |
| 310WD           | 310WDD            | 310WG                | 310WDG            | 310WDDG            | 116.3 | 4 <sup>37</sup> / <sub>64</sub> | 2.41      | 0.095 | 5.59   | 0.220 |
| 311WD           | 311WDD            | 311WG                | 311WDG            | —                  | 129.4 | 5 <sup>3</sup> / <sub>32</sub>  | 2.77      | 0.109 | 6.73   | 0.265 |
| 312WD           | 312WDD            | 312WG <sup>(3)</sup> | 312WDG            | 312WDDG            | 139.7 | 5 <sup>1</sup> / <sub>2</sub>   | 2.77      | 0.109 | 6.73   | 0.265 |
| 313WD           | 313WDD            | 313WG                | 313WDG            | 313WDDG            | 149.6 | 5 <sup>57</sup> / <sub>64</sub> | 2.77      | 0.109 | 7.54   | 0.297 |
| 314WD           | 314WDD            | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| 315WD           | 315WDD            | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| 316WD           | 316WDD            | 316WG                | —                 | —                  | 182.6 | 7 <sup>3</sup> / <sub>16</sub>  | 3.05      | 0.120 | 8.61   | 0.339 |
| 317WD           | 317WDD            | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| —               | —                 | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| —               | —                 | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| 320WD           | —                 | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| —               | —                 | —                    | —                 | —                  | —     | —                               | —         | —     | —      | —     |
| —               | —                 | 322WG                | —                 | —                  | 252.8 | 9 <sup>61</sup> / <sub>64</sub> | 3.05      | 0.120 | 8.61   | 0.339 |

<sup>(1)</sup> The snap ring is normally packaged separately in the box with the bearing.

<sup>(2)</sup> Also available as a GW-Type filling slot and snap ring on same side. Also available 308GW2 with 20 mm width.

<sup>(3)</sup> Also available as 312WG-3 with filling slot on same side as snap ring.

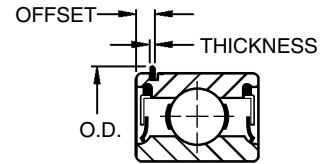
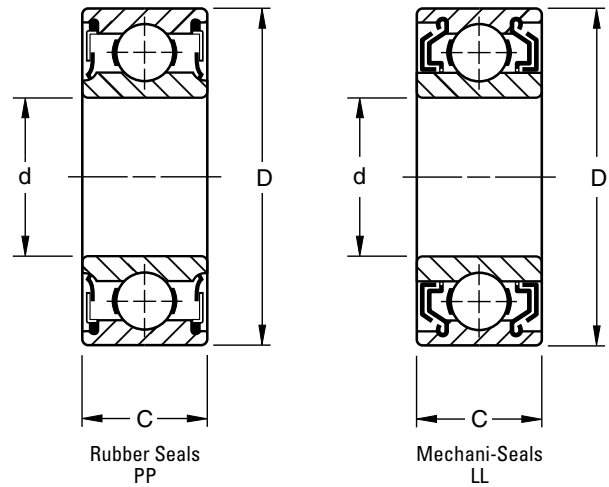




# BALL BEARINGS

## MEDIUM, WIDE TYPE W300PP SERIES AND W300KLL SERIES

- The W300PP (rubber seal) Series and the W300KLL (Mechani-Seal) Series have the same bores and outside diameters as standard 300 Series ball bearings.
- Widths are equal to 5300 Series double-row ball bearings.
- Added width provides extra support on shafts and in housings and eliminates the need for locknuts and lockwashers on applications such as electric motors.
- Prepacked with the right amount of long-life, factory-filtered grease.
- These series incorporate the same advantages as the standard width Mechani-Seal and rubber seal bearings.
- Electric motor quality for applications where quietness is a requirement.



### DIMENSIONS – TOLERANCES

| Bearing Number        |                        | Bore d                                |        | Outside Diameter D                    |         | Width C                           |        | Fillet Radius <sup>(1)</sup> | Wt.    | Static Load Rating C <sub>0</sub> | Extended Dynamic Load C <sub>E</sub> <sup>(4)</sup> | Snap Ring PPG |           |        |       |       |       |        |       |       |                                 |      |       |      |       |
|-----------------------|------------------------|---------------------------------------|--------|---------------------------------------|---------|-----------------------------------|--------|------------------------------|--------|-----------------------------------|-----------------------------------------------------|---------------|-----------|--------|-------|-------|-------|--------|-------|-------|---------------------------------|------|-------|------|-------|
| Contact Seal PP       | Mechani-Seal LL        | tolerance +0.000 mm +0.0000" to minus |        | tolerance +0.000 mm +0.0000" to minus |         | +0.00 mm -0.12 mm +0.000" -0.005" |        |                              |        |                                   |                                                     | O.D.          | Thickness | Offset |       |       |       |        |       |       |                                 |      |       |      |       |
|                       |                        | mm                                    | in.    | mm                                    | in.     | mm                                | in.    | mm                           | in.    | kg                                | lbs.                                                | N             | lbs.      | mm     | in.   | mm    | in.   | mm     | in.   |       |                                 |      |       |      |       |
| W304PP                | —                      | 20                                    | 0.7874 | 0.010                                 | 0.0004  | 52                                | 2.0472 | 0.013                        | 0.0005 | 22.22                             | 0.875                                               | 1.0           | 0.039     | 0.213  | 0.47  | 7800  | 1760  | 17900  | 4050  | —     | —                               | —    | —     | —    | —     |
| W305PP <sup>(2)</sup> | —                      | 25                                    | 0.9843 | 0.010                                 | 0.0004  | 62                                | 2.4409 | 0.013                        | 0.0005 | 25.40                             | 1.000                                               | 1.0           | 0.039     | 0.354  | 0.78  | 12200 | 2750  | 26600  | 6000  | 67.5  | 2 <sup>21</sup> / <sub>32</sub> | 1.65 | 0.065 | 4.82 | 0.190 |
| W306PP                | —                      | 30                                    | 1.1811 | 0.010                                 | 0.0004  | 72                                | 2.8346 | 0.013                        | 0.0005 | 30.18                             | 1.188                                               | 1.0           | 0.039     | 0.558  | 1.23  | 15600 | 3550  | 33900  | 7650  | —     | —                               | —    | —     | —    | —     |
| W307PP                | W307KLL                | 35                                    | 1.3780 | 0.012                                 | 0.00047 | 80                                | 3.1496 | 0.013                        | 0.0005 | 34.92                             | 1.375                                               | 1.5           | 0.059     | 0.780  | 1.72  | 18400 | 4150  | 37700  | 8500  | —     | —                               | —    | —     | —    | —     |
| W308PP <sup>(2)</sup> | W308KLL <sup>(2)</sup> | 40                                    | 1.5748 | 0.012                                 | 0.00047 | 90                                | 3.5433 | 0.015                        | 0.0006 | 36.53                             | 1.438                                               | 1.5           | 0.059     | 1.021  | 2.25  | 25900 | 5850  | 50600  | 11400 | 96.4  | 3 <sup>51</sup> / <sub>64</sub> | 2.41 | 0.095 | 5.59 | 0.220 |
| W309PP                | W309KLL                | 45                                    | 1.7717 | 0.012                                 | 0.00047 | 100                               | 3.9370 | 0.015                        | 0.0006 | 39.67                             | 1.562                                               | 1.5           | 0.059     | 1.370  | 3.02  | 31500 | 7100  | 59000  | 13400 | —     | —                               | —    | —     | —    | —     |
| W310PP                | —                      | 50                                    | 1.9685 | 0.012                                 | 0.00047 | 110                               | 4.3307 | 0.015                        | 0.0006 | 44.45                             | 1.750                                               | 2.0           | 0.079     | 1.828  | 4.03  | 37700 | 8500  | 69000  | 15600 | —     | —                               | —    | —     | —    | —     |
| W311PP <sup>(2)</sup> | W311KLL                | 55                                    | 2.1654 | 0.015                                 | 0.0006  | 120                               | 4.7244 | 0.015                        | 0.0006 | 49.23                             | 1.938 <sup>(3)</sup>                                | 2.0           | 0.079     | 2.386  | 5.26  | 44400 | 10000 | 81000  | 18300 | 129.4 | 5 <sup>3</sup> / <sub>32</sub>  | 2.77 | 0.109 | 0.73 | 0.265 |
| W312PP <sup>(2)</sup> | W312KLL                | 60                                    | 2.3622 | 0.015                                 | 0.0006  | 130                               | 5.1181 | 0.018                        | 0.0007 | 53.98                             | 2.125 <sup>(3)</sup>                                | 2.0           | 0.079     | 3.053  | 6.73  | 51500 | 11600 | 92000  | 20800 | 139.7 | 5 <sup>1</sup> / <sub>2</sub>   | 2.77 | 0.109 | 0.73 | 0.265 |
| W313PP                | —                      | 65                                    | 2.5591 | 0.015                                 | 0.0006  | 140                               | 5.5118 | 0.018                        | 0.0007 | 58.72                             | 2.312 <sup>(3)</sup>                                | 2.0           | 0.079     | 3.883  | 8.56  | 59500 | 13400 | 104000 | 23600 | —     | —                               | —    | —     | —    | —     |
| W314PP                | —                      | 70                                    | 2.7559 | 0.015                                 | 0.0006  | 150                               | 5.9055 | 0.018                        | 0.0007 | 63.50                             | 2.500 <sup>(3)</sup>                                | 2.0           | 0.079     | 4.731  | 10.43 | 67000 | 15300 | 116000 | 26000 | —     | —                               | —    | —     | —    | —     |
| W315PP                | —                      | 75                                    | 2.9528 | 0.015                                 | 0.0006  | 160                               | 6.2992 | 0.025                        | 0.0010 | 68.28                             | 2.688 <sup>(3)</sup>                                | 2.0           | 0.079     | 5.811  | 12.81 | 76000 | 17300 | 128000 | 29000 | —     | —                               | —    | —     | —    | —     |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.  
<sup>(2)</sup> Also available with snap ring. To order, add suffix "G" to bearing number. Example: W305PPG.  
 The snap ring is normally packaged separately in the box with the bearing.  
<sup>(3)</sup> Width tolerance is .00 mm to -.15 mm (.000" to -.006").  
<sup>(4)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### TRI-PLY SEAL SERIES NON-RELUBRICATABLE TYPE CYLINDRICAL O.D.

- Designed for environments where severe contamination is present, such as agricultural tillage equipment.
- One-piece Tri-Ply seal:
  - Incorporate a highly effective design molded to an exterior shroud cap.
  - Provide exceptionally effective protection against loss of lubricant and entrance of wet or abrasive contaminants.
- Seven-piece Tri-Ply construction:
  - Standard on certain sizes.
  - Shroud cap nests closely with the outside seal.
  - Helps protect the rubber seal members from fiber wrap warpage and abrasion.
  - Balanced design, identified by deep races, large balls and extra-wide or heavy, shock-resistant inner and outer rings.
- Use of Tri-Ply Seal bearings simplifies housing designs and their extra inner ring width provides greater support on the shaft.
- For speeds in excess of 500 RPM, consult your Timken representative.

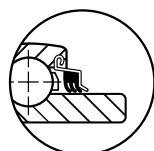
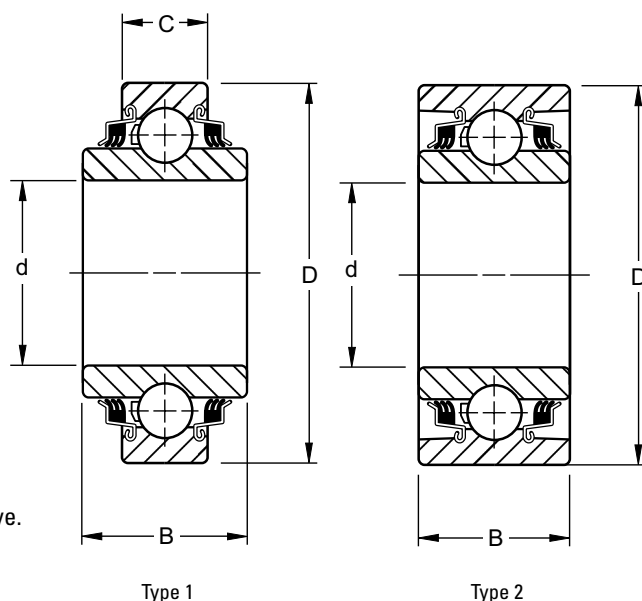


Figure 1

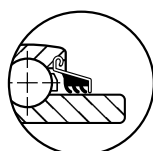


Figure 2

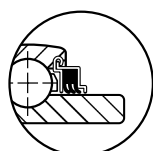


Figure 3

#### ROUND BORE

| Bearing Number | Type-Fig. | Bore d |        | Outside Diameter D |        | Ring Widths 0.00, -.12 mm +0.000", -.0005" |        | Balls |        | Wt.                  |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |        |       |       |       |       |        |       |
|----------------|-----------|--------|--------|--------------------|--------|--------------------------------------------|--------|-------|--------|----------------------|-------|-----------------------------------|-------|------------------------------------------------------------|--------|-------|-------|-------|-------|--------|-------|
|                |           | mm     | in.    | mm                 | in.    | mm                                         | in.    | mm    | in.    | mm                   | in.   | kg                                | lbs.  | N                                                          | lbs.   | N     | lbs.  |       |       |        |       |
| W208PP10       | 1-1       | 38.113 | 1.5005 | 0.013              | 0.0005 | 80                                         | 3.1496 | 0.013 | 0.0005 | 42.87                | 1.688 | 21.00                             | 0.827 | 9                                                          | 1/2    | 0.681 | 1.50  | 19900 | 4500  | 36800  | 8300  |
| W210PP8        | 2-        | 38.860 | 1.5300 | 0.250              | 0.0100 | 90                                         | 3.5433 | 0.015 | 0.0006 | 30.18                | 1.188 | 30.18                             | 1.188 | 10                                                         | 1/2    | 0.894 | 1.97  | 23000 | 5200  | 39900  | 9000  |
| W210PP2        | 2-        | 49.230 | 1.9380 | 0.013              | 0.0005 | 90                                         | 3.5433 | 0.015 | 0.0006 | 30.18                | 1.188 | 30.18                             | 1.188 | 10                                                         | 1/2    | 0.767 | 1.69  | 23000 | 5200  | 39900  | 9000  |
| W211PP2        | 2-2       | 55.580 | 2.1880 | 0.015              | 0.0006 | 100                                        | 3.9370 | 0.015 | 0.0006 | 33.34 <sup>(1)</sup> | 1.312 | 33.34                             | 1.312 | 10                                                         | 9/16   | 1.056 | 2.33  | 29000 | 6550  | 48800  | 11000 |
| W214PP2        | 2-        | 70.000 | 2.7559 | 0.015              | 0.0006 | 125                                        | 4.9213 | 0.020 | 0.0008 | 39.69 <sup>(1)</sup> | 1.562 | 39.69                             | 1.562 | 10                                                         | 1 1/16 | 1.901 | 4.19  | 43500 | 9800  | 71000  | 16000 |
| W315PP2        | 2-        | 76.342 | 3.0056 | 0.015              | 0.0006 | 160                                        | 6.2992 | 0.025 | 0.0010 | 68.26 <sup>(1)</sup> | 2.688 | 68.26                             | 2.688 | 8                                                          | 1 1/16 | 5.956 | 13.13 | 76800 | 17300 | 128000 | 29000 |

<sup>(1)</sup> Inner and outer width tolerance is .00 mm to -.15 mm (.000" to .006").

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

#### SQUARE BORE

| Bearing Number | Type-Fig. | Shaft Size d |       | Outside Diameter D |        | Ring Widths 0.00, -.12 mm +0.000", -.0005" |        | Balls                |       | Wt.   |       | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |      |       |      |       |       |
|----------------|-----------|--------------|-------|--------------------|--------|--------------------------------------------|--------|----------------------|-------|-------|-------|-----------------------------------|------|------------------------------------------------------------|------|-------|------|-------|-------|
|                |           | mm           | in.   | mm                 | in.    | mm                                         | in.    | mm                   | in.   | mm    | in.   | kg                                | lbs. | N                                                          | lbs. | N     | lbs. |       |       |
| W208PP6        | 1-1       | 25.4         | 1     | 80                 | 3.1496 | 0.013                                      | 0.0005 | 36.51                | 1.438 | 18    | 0.709 | 9                                 | 1/2  | 0.73                                                       | 1.62 | 19900 | 4500 | 36800 | 8300  |
| W208PP5        | 1-1       | 28.6         | 1 1/8 | 80                 | 3.1496 | 0.013                                      | 0.0005 | 36.51                | 1.438 | 18    | 0.709 | 9                                 | 1/2  | 0.68                                                       | 1.50 | 19900 | 4500 | 36800 | 8300  |
| W208PP8        | 1-1       | 28.6         | 1 1/8 | 80                 | 3.1496 | 0.013                                      | 0.0005 | 36.51                | 1.438 | 30.18 | 1.188 | 9                                 | 1/2  | 0.75                                                       | 1.66 | 19900 | 4500 | 36800 | 8300  |
| W211PP3        | 2-2       | 38.1         | 1 1/2 | 100                | 3.9370 | 0.015                                      | 0.0006 | 33.34 <sup>(1)</sup> | 1.312 | 33.34 | 1.312 | 10                                | 9/16 | 1.27                                                       | 2.79 | 29000 | 6550 | 48800 | 11000 |
| W211PP5        | 1-2       | 38.1         | 1 1/2 | 101.6              | 4.0000 | 0.015                                      | 0.0006 | 44.45 <sup>(1)</sup> | 1.750 | 36.52 | 1.438 | 10                                | 7/16 | 1.58                                                       | 3.48 | 29000 | 6550 | 48800 | 11000 |

<sup>(1)</sup> Inner and outer width tolerance is .00 mm to -.15 mm (.000" to .006").

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.



# BALL BEARINGS

## TRI-PLY SEAL SERIES NON-RELUBRICATABLE TYPE SPHERICAL O.D.

- Similar in design and features to bearings shown on D27, except for a spherical O.D.

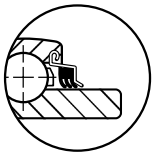


Figure 1

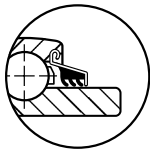


Figure 2

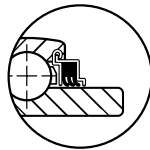
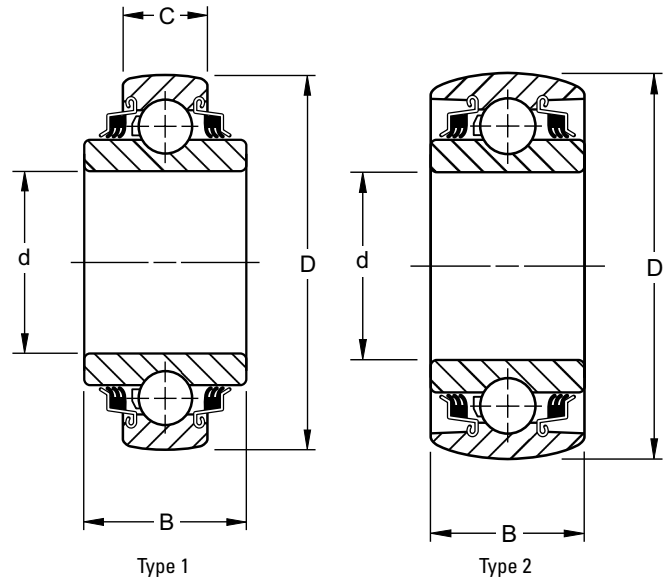


Figure 3



### ROUND BORE

| Bearing Number | Type-Fig. | Bore d |        |       |        | Outside Diameter D |       |       |        | Ring Widths +0.00, -12 mm +0.000", -0.005" |       |       |       | Balls No. | Stamping Size | Wt. kg lbs. | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |       |       |
|----------------|-----------|--------|--------|-------|--------|--------------------|-------|-------|--------|--------------------------------------------|-------|-------|-------|-----------|---------------|-------------|-----------------------------------|-------|------------------------------------------------------------|-------|-------|
|                |           | mm     | in.    | mm    | in.    | mm                 | in.   | mm    | in.    | mm                                         | in.   | mm    | in.   |           |               |             | N                                 | lbs.  | N                                                          | lbs.  |       |
| W208PPB7       | 1-1       | 30.170 | 1.1880 | 0.013 | 0.0005 | 80                 | 3.150 | 0.013 | 0.0005 | 30.18                                      | 1.188 | 18.00 | 0.709 | 9         | 1/2 80MS      | 0.640       | 1.41                              | 19900 | 4500                                                       | 36800 | 8300  |
| W208PPB2       | 1-        | 38.113 | 1.5005 | 0.013 | 0.0005 | 80                 | 3.150 | 0.013 | 0.0005 | 42.96                                      | 1.688 | 18.00 | 0.709 | 9         | 1/2 80MS      | 0.721       | 1.59                              | 19900 | 4500                                                       | 36800 | 8300  |
| W208PPB23      | 1-1       | 38.113 | 1.5005 | 0.013 | 0.0005 | 80                 | 3.150 | 0.013 | 0.0005 | 42.96                                      | 1.688 | 30.18 | 1.188 | 9         | 15/32 80MS    | 0.681       | 1.50                              | 15600 | 3550                                                       | 32000 | 7200  |
| W209PPB2       | 2-2       | 45.000 | 1.7717 | 0.013 | 0.0005 | 85                 | 3.346 | 0.015 | 0.0006 | 30.18                                      | 1.188 | 30.18 | 1.188 | 9         | 1/2 85MS      | 0.653       | 1.44                              | 20200 | 4550                                                       | 36800 | 8300  |
| W209PPB4       | 2-2       | 39.000 | 1.5350 | 0.250 | 0.0100 | 85                 | 3.346 | 0.015 | 0.0006 | 30.18                                      | 1.188 | 30.18 | 1.188 | 9         | 1/2 85MS      | 0.748       | 1.65                              | 20200 | 4550                                                       | 36800 | 8300  |
| W210PPB2       | 2-        | 49.230 | 1.9380 | 0.013 | 0.0005 | 90                 | 3.543 | 0.015 | 0.0006 | 30.18                                      | 1.188 | 30.18 | 1.188 | 10        | 1/2 90MS      | 0.708       | 1.56                              | 23000 | 5200                                                       | 39900 | 9000  |
| W210PPB5       | 2-        | 45.340 | 1.7850 | 0.250 | 0.0100 | 90                 | 3.543 | 0.015 | 0.0006 | 30.18                                      | 1.188 | 30.18 | 1.188 | 10        | 1/2 90MS      | 0.794       | 1.75                              | 23000 | 5200                                                       | 39900 | 9000  |
| W211PPB2       | 2-2       | 55.580 | 2.1880 | 0.015 | 0.0006 | 100                | 3.937 | 0.015 | 0.0006 | 33.34 <sup>(1)</sup>                       | 1.312 | 33.34 | 1.312 | 10        | 9/16 100MS    | 0.966       | 3.63                              | 29000 | 6550                                                       | 48800 | 11000 |
| W214PPB2       | 2-        | 70.000 | 2.7559 | 0.015 | 0.0006 | 125                | 4.921 | 0.02  | 0.0008 | 39.69 <sup>(1)</sup>                       | 1.562 | 39.69 | 1.562 | 10        | 11/16 —       | 1.796       | 3.96                              | 43500 | 9800                                                       | 71000 | 16000 |
| W214PPB9       | 1-        | 70.260 | 2.7660 | 0.025 | 0.0010 | 125                | 4.921 | 0.02  | 0.0008 | 44.45 <sup>(1)</sup>                       | 1.750 | 28.00 | 1.102 | 10        | 11/16 —       | 1.796       | 3.96                              | 43500 | 9800                                                       | 71000 | 16000 |

<sup>(1)</sup> Inner and outer width tolerance is .00 mm to -.15 mm (.000" to -.006").

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### SQUARE BORE

| Bearing Number | Type-Fig. | Shaft Size |       | Outside Diameter D |        |       |        | Ring Widths +0.00, -12 mm +0.000", -0.005" |       |       |       | Balls No. | Stamping Size | Wt. mm in. | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |       |       |
|----------------|-----------|------------|-------|--------------------|--------|-------|--------|--------------------------------------------|-------|-------|-------|-----------|---------------|------------|-----------------------------------|-------|------------------------------------------------------------|-------|-------|
|                |           | mm         | in.   | mm                 | in.    | mm    | in.    | mm                                         | in.   | mm    | in.   |           |               |            | mm                                | in.   | kg                                                         | lbs.  | N     |
| W208PPB13      | 1-1       | 22.2       | 7/8   | 80                 | 3.1496 | 0.013 | 0.0005 | 36.53                                      | 1.438 | 18.00 | 0.709 | 9         | 1/2 80MS      | 0.735      | 1.62                              | 19900 | 4500                                                       | 36800 | 8300  |
| W208PPB6       | 1-1       | 25.4       | 1     | 80                 | 3.1496 | 0.013 | 0.0005 | 36.53                                      | 1.438 | 18.00 | 0.709 | 9         | 1/2 80MS      | 0.721      | 1.59                              | 19900 | 4500                                                       | 36800 | 8300  |
| W208PPB5       | 1-1       | 28.6       | 1 1/8 | 80                 | 3.1496 | 0.013 | 0.0005 | 36.53                                      | 1.438 | 18.00 | 0.709 | 9         | 1/2 80MS      | 0.667      | 1.47                              | 19900 | 4500                                                       | 36800 | 8300  |
| W209PPB5       | 1-2       | 31.8       | 1 1/4 | 85                 | 3.3465 | 0.015 | 0.0006 | 36.53                                      | 1.438 | 30.18 | 1.188 | 9         | 1/2 85MS      | 0.794      | 1.75                              | 20200 | 4550                                                       | 36800 | 8300  |
| W210PPB4       | 2-        | 28.6       | 1 1/8 | 90                 | 3.5433 | 0.015 | 0.0006 | 30.18                                      | 1.188 | 30.18 | 1.188 | 10        | 1/2 90MS      | 0.957      | 2.11                              | 23000 | 5200                                                       | 39900 | 9000  |
| W210PPB6       | 1-        | 28.6       | 1 1/8 | 90                 | 3.5433 | 0.015 | 0.0006 | 36.53                                      | 1.438 | 30.18 | 1.188 | 10        | 1/2 90MS      | 1.021      | 2.25                              | 23000 | 5200                                                       | 39900 | 9000  |
| W211PPB3       | 2-2       | 38.1       | 1 1/2 | 100                | 3.9370 | 0.015 | 0.0006 | 33.34 <sup>(1)</sup>                       | 1.312 | 33.34 | 1.312 | 10        | 9/16 100MS    | 1.207      | 2.66                              | 29000 | 6550                                                       | 48800 | 11000 |

<sup>(1)</sup> Inner and outer width tolerance is .00 mm to -.15 mm (.000" to -.006").

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

TRI-PLY SEAL SERIES RELUBRICATABLE TYPE

- Similar in design and features to those shown on the preceding two pages.
- Includes a provision for relubrication.

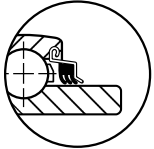


Figure 1

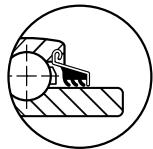


Figure 2

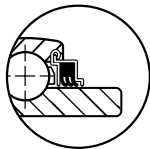
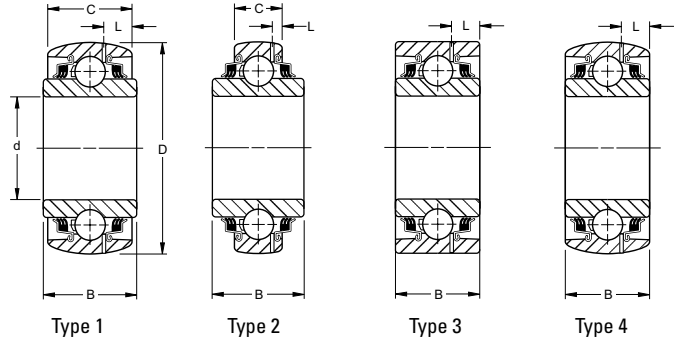


Figure 3



ROUND BORE

| Bearing Number          | Type-Fig. | Bore d    |            |           |            | Outside Diameter D |            |           |            | Ring Width +0.00 mm, -0.12 mm +0.000", -0.005" |            |           |            | Balls     |            | L         |             | Wt.      |             | Static Load Rating C <sub>0</sub> |             | Extended Dynamic Load C <sub>e</sub> <sup>(3)</sup> |       |
|-------------------------|-----------|-----------|------------|-----------|------------|--------------------|------------|-----------|------------|------------------------------------------------|------------|-----------|------------|-----------|------------|-----------|-------------|----------|-------------|-----------------------------------|-------------|-----------------------------------------------------|-------|
|                         |           | mm        | in.        | mm        | in.        | mm                 | in.        | mm        | in.        | B Inner                                        | C Outer    | in.       | mm         | in.       | kg         | lbs.      | N           | lbs.     | N           | lbs.                              |             |                                                     |       |
| <b>ROUND BORE</b>       |           | <b>mm</b> | <b>in.</b> | <b>mm</b> | <b>in.</b> | <b>mm</b>          | <b>in.</b> | <b>mm</b> | <b>in.</b> | <b>mm</b>                                      | <b>in.</b> | <b>mm</b> | <b>in.</b> | <b>mm</b> | <b>in.</b> | <b>kg</b> | <b>lbs.</b> | <b>N</b> | <b>lbs.</b> | <b>N</b>                          | <b>lbs.</b> |                                                     |       |
| GW209PPB4               | 4-2       | 39.00     | 1.5350     | 0.250     | 0.0100     | 85                 | 3.3465     | 0.015     | 0.0006     | 30.18                                          | 1.188      | 30.18     | 1.188      | 9         | 1/2        | 8.79      | 0.346       | 0.748    | 1.65        | 20200                             | 4550        | 36800                                               | 8300  |
| GW209PPB2               | 4-2       | 45.00     | 1.7717     | 0.013     | 0.0005     | 85                 | 3.3465     | 0.015     | 0.0006     | 30.18                                          | 1.188      | 30.18     | 1.188      | 9         | 1/2        | 8.79      | 0.346       | 0.653    | 1.44        | 20200                             | 4550        | 36800                                               | 8300  |
| GW209PPB11              | 2-2       | 45.24     | 1.7810     | 0.250     | 0.0100     | 85                 | 3.3465     | 0.015     | 0.0006     | 36.53                                          | 1.438      | 22.00     | 0.866      | 9         | 1/2        | 4.55      | 0.179       | 0.621    | 1.37        | 20200                             | 4550        | 36800                                               | 8300  |
| GW210PP3                | 3-        | 37.53     | 1.4065     | 0.013     | 0.0005     | 90                 | 3.5433     | 0.015     | 0.0006     | 30.18                                          | 1.188      | 30.18     | 1.188      | 10        | 1/2        | 9.02      | 0.355       | 1.021    | 2.25        | 23000                             | 5200        | 39900                                               | 9000  |
| GW210PPB5               | 4-        | 45.34     | 1.7850     | 0.250     | 0.0100     | 90                 | 3.5433     | 0.015     | 0.0006     | 30.18                                          | 1.188      | 30.18     | 1.188      | 10        | 1/2        | 9.02      | 0.355       | 0.794    | 1.75        | 23000                             | 5200        | 39900                                               | 9000  |
| GW210PPB2               | 4-        | 49.23     | 1.9380     | 0.013     | 0.0005     | 90                 | 3.5433     | 0.015     | 0.0006     | 30.18                                          | 1.188      | 30.18     | 1.188      | 10        | 1/2        | 9.02      | 0.355       | 0.681    | 1.50        | 23000                             | 5200        | 39900                                               | 9000  |
| GW210PP9 <sup>(1)</sup> | 2-        | 49.40     | 1.9450     | 0.180     | 0.0070     | 90                 | 3.5433     | 0.015     | 0.0006     | 36.53                                          | 1.438      | 23.00     | 0.906      | 10        | 1/2        | 4.70      | 0.185       | 0.794    | 1.75        | 23000                             | 5200        | 39900                                               | 9000  |
| GW211PPB13              | 2-2       | 45.34     | 1.7850     | 0.250     | 0.0100     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34                                          | 1.312      | 25.00     | 0.984      | 10        | 9/16       | 5.82      | 0.299       | 0.916    | 2.02        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PPB10              | 4-2       | 49.23     | 1.9380     | 0.015     | 0.0006     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34 <sup>(2)</sup>                           | 1.312      | 33.34     | 1.312      | 10        | 9/16       | 9.96      | 0.392       | 1.025    | 2.26        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PPB14              | 2-2       | 51.18     | 2.0150     | 0.250     | 0.0100     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34 <sup>(2)</sup>                           | 1.312      | 25.00     | 0.984      | 10        | 9/16       | 5.82      | 0.229       | 0.907    | 2.00        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PP2                | 3-2       | 55.58     | 2.1880     | 0.015     | 0.0006     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34 <sup>(2)</sup>                           | 1.312      | 33.34     | 1.312      | 10        | 9/16       | 9.96      | 0.392       | 1.361    | 3.00        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PPB2               | 4-2       | 55.58     | 2.1880     | 0.015     | 0.0006     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34 <sup>(2)</sup>                           | 1.312      | 33.34     | 1.312      | 10        | 9/16       | 9.96      | 0.392       | 1.188    | 2.62        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PPB8               | 2-2       | 55.58     | 2.1880     | 0.015     | 0.0006     | 100                | 3.9370     | 0.015     | 0.0006     | 33.34 <sup>(2)</sup>                           | 1.312      | 25.00     | 0.984      | 10        | 9/16       | 5.82      | 0.229       | 0.839    | 1.85        | 29000                             | 6550        | 48800                                               | 11000 |
| GW211PPB9               | 2-2       | 55.75     | 2.1950     | 0.180     | 0.0070     | 100                | 3.9370     | 0.015     | 0.0006     | 39.69 <sup>(2)</sup>                           | 1.562      | 25.00     | 0.984      | 10        | 9/16       | 5.41      | 0.213       | 0.916    | 2.02        | 29000                             | 6550        | 48800                                               | 11000 |
| GW214PPB6               | 2-        | 68.28     | 2.6881     | 0.015     | 0.0006     | 125                | 4.9213     | 0.020     | 0.0008     | 68.26 <sup>(2)</sup>                           | 2.688      | 28.00     | 1.102      | 10        | 11/16      | 5.54      | 0.218       | 2.155    | 4.75        | 43500                             | 9800        | 71000                                               | 16000 |
| GW214PP2                | 3-        | 70.00     | 2.7559     | 0.015     | 0.0006     | 125                | 4.9213     | 0.020     | 0.0008     | 39.69 <sup>(2)</sup>                           | 1.562      | 39.69     | 1.562      | 10        | 11/16      | 10.52     | 0.414       | 1.901    | 4.19        | 43500                             | 9800        | 71000                                               | 16000 |
| GW214PPB2               | 4-        | 70.00     | 2.7559     | 0.015     | 0.0006     | 125                | 4.9213     | 0.020     | 0.0008     | 39.69 <sup>(2)</sup>                           | 1.562      | 39.69     | 1.562      | 10        | 11/16      | 10.52     | 0.414       | 1.796    | 3.96        | 43500                             | 9800        | 71000                                               | 16000 |
| GW214PPB5               | 1-        | 70.00     | 2.7559     | 0.015     | 0.0006     | 125                | 4.9213     | 0.020     | 0.0008     | 61.90 <sup>(2)</sup>                           | 2.438      | 39.69     | 1.562      | 10        | 11/16      | 10.52     | 0.414       | 2.155    | 4.75        | 43500                             | 9800        | 71000                                               | 16000 |
| GW216PPB3               | 2-3       | 76.45     | 3.0100     | 0.250     | 0.0100     | 140                | 5.5118     | 0.020     | 0.0008     | 63.50 <sup>(2)</sup>                           | 2.500      | 30.00     | 1.181      | 11        | 23/32      | 6.10      | 0.240       | —        | —           | 54000                             | 12200       | 81000                                               | 18300 |
| GW216PP5                | 3-3       | 63.88     | 2.5150     | 0.250     | 0.0100     | 140                | 5.5118     | 0.020     | 0.0008     | 63.50 <sup>(2)</sup>                           | 2.500      | 30.00     | 1.181      | 11        | 23/32      | 6.10      | 0.240       | —        | —           | 54000                             | 12200       | 81000                                               | 18300 |

SQUARE BORE

| Bearing Number          | Type-Fig. | Shaft Size |       |     |        | Ring Width |        |                      |       | Balls |       | L   |       | Wt.   |       | Static Load Rating C <sub>0</sub> |      | Extended Dynamic Load C <sub>e</sub> <sup>(3)</sup> |       |       |       |
|-------------------------|-----------|------------|-------|-----|--------|------------|--------|----------------------|-------|-------|-------|-----|-------|-------|-------|-----------------------------------|------|-----------------------------------------------------|-------|-------|-------|
|                         |           | mm         | in.   | mm  | in.    | mm         | in.    | mm                   | in.   | in.   | mm    | in. | kg    | lbs.  | N     | lbs.                              | N    | lbs.                                                |       |       |       |
| GW208PPB6               | 2-1       | 25.4       | 1     | 80  | 3.1496 | 0.013      | 0.0005 | 36.53                | 1.438 | 21.00 | 0.827 | 9   | 1/2   | 5.66  | 0.223 | 0.794                             | 1.75 | 19900                                               | 4500  | 36800 | 8300  |
| GW208PPB5               | 2-1       | 28.6       | 1 1/8 | 80  | 3.1496 | 0.013      | 0.0005 | 36.53                | 1.438 | 21.00 | 0.827 | 9   | 1/2   | 5.66  | 0.223 | 0.667                             | 1.47 | 19900                                               | 4500  | 36800 | 8300  |
| GW208PPB8               | 1-1       | 28.6       | 1 1/8 | 80  | 3.1496 | 0.013      | 0.0005 | 36.53                | 1.438 | 30.18 | 1.188 | 9   | 1/2   | 8.36  | 0.329 | 0.794                             | 1.75 | 19900                                               | 4500  | 36800 | 8300  |
| GW208PPB17              | 3-1       | 28.6       | 1 1/8 | 80  | 3.3755 | 0.013      | 0.0005 | 36.53                | 1.438 | 30.18 | 1.188 | 9   | 1/2   | 8.28  | 0.326 | 0.925                             | 2.04 | 19900                                               | 4500  | 36800 | 8300  |
| GW209PPB5               | 1-2       | 31.8       | 1 1/4 | 85  | 3.3456 | 0.015      | 0.0006 | 36.53                | 1.438 | 30.18 | 1.188 | 9   | 1/2   | 8.79  | 0.346 | 0.794                             | 1.75 | 20200                                               | 4550  | 36800 | 8300  |
| GW209PPB8               | 2-2       | 31.8       | 1 1/4 | 85  | 3.3456 | 0.015      | 0.0006 | 36.53                | 1.438 | 22.00 | 0.866 | 9   | 1/2   | 4.55  | 0.179 | 0.748                             | 1.65 | 20200                                               | 4550  | 36800 | 8300  |
| GW210PP4                | 3-        | 28.6       | 1 1/8 | 90  | 3.5433 | 0.015      | 0.0006 | 30.18                | 1.188 | 30.18 | 1.188 | 10  | 1/2   | 9.02  | 0.355 | 1.048                             | 2.31 | 23000                                               | 5200  | 39900 | 9000  |
| GW210PPB4               | 4-        | 28.6       | 1 1/8 | 90  | 3.5433 | 0.015      | 0.0006 | 30.18                | 1.188 | 30.18 | 1.188 | 10  | 1/2   | 9.02  | 0.355 | 0.794                             | 1.75 | 23000                                               | 5200  | 39900 | 9000  |
| GW211PP3                | 3-2       | 38.1       | 1 1/2 | 100 | 3.9370 | 0.015      | 0.0006 | 33.34 <sup>(2)</sup> | 1.312 | 33.34 | 1.312 | 10  | 9/16  | 9.96  | 0.392 | 1.266                             | 2.79 | 29000                                               | 6550  | 48800 | 11000 |
| GW211PPB3               | 4-2       | 38.1       | 1 1/2 | 100 | 3.9370 | 0.015      | 0.0006 | 33.34 <sup>(2)</sup> | 1.312 | 33.34 | 1.312 | 10  | 9/16  | 9.96  | 0.392 | 1.207                             | 2.66 | 29000                                               | 6550  | 48800 | 11000 |
| GW211PP17               | 3-2       | 38.1       | 1 1/2 | 100 | 3.9370 | 0.015      | 0.0006 | 44.45 <sup>(2)</sup> | 1.750 | 33.34 | 1.312 | 10  | 9/16  | 9.96  | 0.392 | 1.188                             | 2.62 | 29000                                               | 6550  | 48800 | 11000 |
| GW214PPB4               | 4-        | 50.8       | 2     | 125 | 4.9213 | 0.020      | 0.0008 | 39.69 <sup>(2)</sup> | 1.562 | 39.69 | 1.562 | 10  | 11/16 | 10.52 | 0.414 | 2.155                             | 4.75 | 43500                                               | 9800  | 71000 | 16000 |
| GW216PPB4               | 2-3       | 44.4       | 1 3/4 | 140 | 5.5118 | 0.020      | 0.0008 | 63.50 <sup>(2)</sup> | 2.500 | 30.00 | 1.181 | 11  | 23/32 | 6.10  | 0.240 | —                                 | —    | 54000                                               | 12200 | 81000 | 18300 |
| GW216PP2 <sup>(1)</sup> | 2-3       | 57.2       | 2 1/4 | 140 | 5.5118 | 0.020      | 0.0008 | 63.50 <sup>(2)</sup> | 2.500 | 30.00 | 1.181 | 11  | 23/32 | 6.10  | 0.240 | —                                 | —    | 54000                                               | 12200 | 81000 | 18300 |
| GW226PPB2               | 2-3       | 57.2       | 2 1/4 | 140 | 5.5118 | 0.020      | 0.0008 | 63.50 <sup>(2)</sup> | 2.500 | 30.00 | 1.181 | 11  | 23/32 | 6.10  | 0.240 | —                                 | —    | 54000                                               | 12200 | 81000 | 18300 |

(1) Cylindrical O.D.

(2) Inner and outer width tolerance is .00 mm to -.15 mm (.000" to -.006").

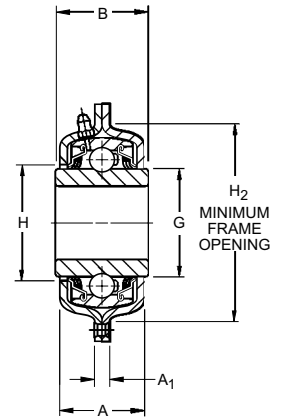
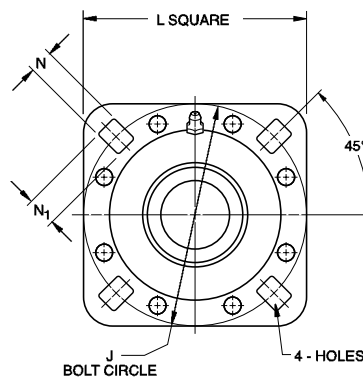
(3) Based on 10<sup>6</sup> revolutions of calculated fatigue life.



# BALL BEARINGS

## TRI-PLY SERIES DISK HARROW UNITS

- The answer to versatility in design.
- For extra-special design needs, this unit incorporates a Tri-Ply bearing mounted in two stampings, riveted together with two o-rings.
- Available in two basic size groups, one incorporating a 209 and the other a 211 bearing.
- Both size groups offer these features:
  - Dynamic alignment capability ( $\pm 3^\circ$ ).
  - Shroud effect from close clearance of stamping to inner ring.
  - Relubrication.
  - One unit piece for ease of handling and assembly.
  - Fitting flange mates with outer ring milled recess, preventing possibility of outer ring circumferential movement.
  - Stampings are case hardened to minimize wear.
  - Units are equipped with nylon retainer, molded one-piece seals and patented notched outer ring seal grooves.



### 209 METRIC SERIES

| Unit Number | Shaft Diameter | B  | H <sub>2</sub> | J     | N <sub>1</sub> | N    | L     | G Ref. | H    | A    | A <sub>1</sub> | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>E</sub> <sup>(1)</sup> |
|-------------|----------------|----|----------------|-------|----------------|------|-------|--------|------|------|----------------|-----------------------------------|------------------------------------------------------------|
|             | mm             | mm | mm             | mm    | mm             | mm   | mm    | mm     | mm   | mm   | mm             | N                                 | N                                                          |
| DHU 30S-209 | 30 SQ.         | 43 | 101.6          | 127.0 | 16.7           | 13.5 | 127.0 | 57.9   | 59.9 | 42.5 | 6.7            | 18000                             | 36500                                                      |
| DHU 40R-209 | 40 SQ.         | 43 | 101.6          | 127.0 | 16.7           | 13.5 | 127.0 | 57.9   | 59.9 | 42.5 | 6.7            | 18000                             | 36500                                                      |
| DHU 45R-209 | 45 RD.         | 43 | 101.6          | 127.0 | 16.7           | 13.5 | 127.0 | 57.9   | 59.9 | 42.5 | 6.7            | 18000                             | 36500                                                      |

### 211 METRIC SERIES

|             |        |    |       |       |      |      |       |      |      |      |     |       |       |
|-------------|--------|----|-------|-------|------|------|-------|------|------|------|-----|-------|-------|
| DHU 40S-211 | 40 SQ. | 51 | 113.5 | 139.7 | 15.1 | 13.5 | 139.7 | 69.7 | 73.0 | 49.2 | 7.5 | 25000 | 48000 |
| DHU 50R-211 | 50 RD. | 51 | 113.5 | 139.7 | 15.1 | 13.5 | 139.7 | 69.7 | 73.0 | 49.2 | 7.5 | 25000 | 48000 |
| DHU 55R-211 | 55 RD. | 51 | 113.5 | 139.7 | 15.1 | 13.5 | 139.7 | 69.7 | 73.0 | 49.2 | 7.5 | 25000 | 48000 |

### 209 SERIES

| Unit Number     | Shaft Diameter | B       | H <sub>2</sub> | J   | N <sub>1</sub> | N     | L   | G Ref. | H       | A       | A <sub>1</sub> | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>E</sub> <sup>(1)</sup> |
|-----------------|----------------|---------|----------------|-----|----------------|-------|-----|--------|---------|---------|----------------|-----------------------------------|------------------------------------------------------------|
|                 | in.            | in.     | in.            | in. | in.            | in.   | in. | in.    | in.     | in.     | in.            | lbs.                              | lbs.                                                       |
| DHU 1½ R-209    | 1 ½ RD.        | 1 11/16 | 4              | 5   | 21/32          | 17/32 | 5   | 2.279  | 2 23/64 | 1 43/64 | 17/64          | 4000                              | 8150                                                       |
| DHU 1 1/8 S-209 | 1 1/8 SQ.      | 1 11/16 | 4              | 5   | 21/32          | 17/32 | 5   | 2.279  | 2 23/64 | 1 43/64 | 17/64          | 4000                              | 8150                                                       |
| DHU 1 3/4 R-209 | 1 ¾ RD.        | 1 11/16 | 4              | 5   | 21/32          | 17/32 | 5   | 2.279  | 2 23/64 | 1 43/64 | 17/64          | 4000                              | 8150                                                       |
| DHU 1 1/4 S-209 | 1 ¼ SQ.        | 1 ¾     | 4              | 5   | 21/32          | 17/32 | 5   | 2.279  | 2 23/64 | 1 43/64 | 17/64          | 4000                              | 8150                                                       |
| DHU 491 A       | 1 ¾ RD.        | 1 ¾     | 4              | 5   | 21/32          | 17/32 | 5   | 2.279  | 2 23/64 | 1 43/64 | 17/64          | 4000                              | 8150                                                       |

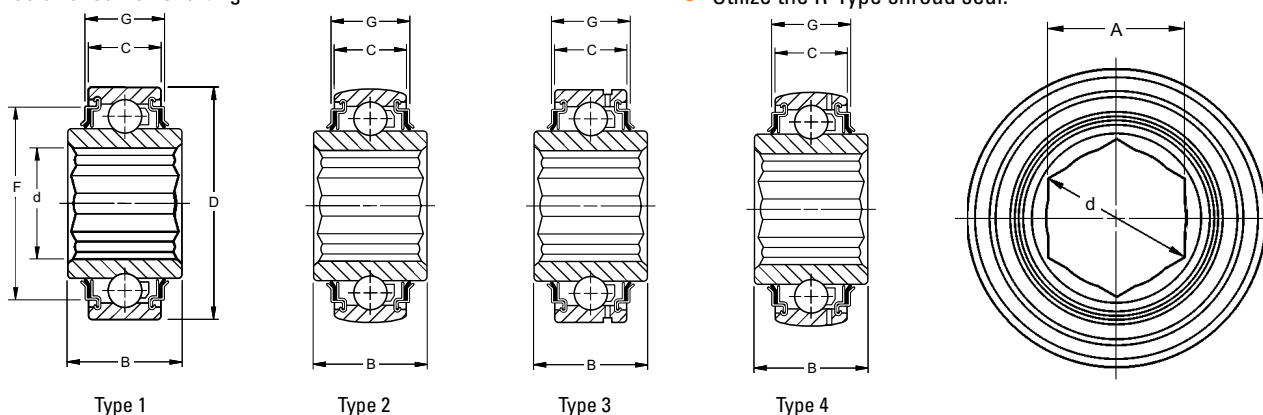
### 211 SERIES

|                  |            |        |   |     |       |       |     |       |       |         |       |      |       |
|------------------|------------|--------|---|-----|-------|-------|-----|-------|-------|---------|-------|------|-------|
| DHU 1 1/2 S-211  | 1 ½ SQ.    | 2      | 4 | 5 ½ | 19/32 | 17/32 | 5 ½ | 2.746 | 2 7/8 | 1 15/16 | 19/64 | 5600 | 10800 |
| DHU 1 3/4 R-211  | 1 ¾ RD.    | 2 1/8  | 4 | 5 ½ | 19/32 | 17/32 | 5 ½ | 2.746 | 2 7/8 | 1 15/16 | 19/64 | 5600 | 10800 |
| DHU 2 3/16 R-211 | 2 3/16 RD. | 2 3/16 | 4 | 5 ½ | 19/32 | 17/32 | 5 ½ | 2.746 | 2 7/8 | 1 15/16 | 19/64 | 5600 | 10800 |

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## HEX BORE BEARINGS

- Designed to be used for outer or inner ring rotation in low-speed, moderately-loaded applications, primarily in agricultural implements and conveyors.
- Tolerances of the hex bore are suitable for mounting on cold rolled hex shafting.
- Main advantage is ease of mounting. Except for axial positioning by adjacent parts, no collars, setscrews or other locking devices are required to lock the inner ring to the hex shaft.
- Utilize the R-Type shroud seal.



| Bearing Number                 | Type | Hex Shaft Size | A            |       | Hex Bore tolerance |          | d       |       | Outside Diameter D |        | Width |           | F                 |       | G     |       | Balls | Wt.   | Static Load Rating Co | Extended Dynamic Load Rating C <sub>e</sub> <sup>(3)</sup> |     |          |       |      |       |      |       |      |
|--------------------------------|------|----------------|--------------|-------|--------------------|----------|---------|-------|--------------------|--------|-------|-----------|-------------------|-------|-------|-------|-------|-------|-----------------------|------------------------------------------------------------|-----|----------|-------|------|-------|------|-------|------|
|                                |      |                | Across Flats | mm    | in.                | -0.00 mm | +0.000" | mm    | in.                | mm     | in.   | +0.000 mm | -0.12 mm          | mm    | in.   | mm    |       |       |                       |                                                            | in. | No. Size | kg    | lbs. | N     | lbs. | N     | lbs. |
| <b>NON-RELUBRICATABLE TYPE</b> |      |                |              |       |                    |          |         |       |                    |        |       |           |                   |       |       |       |       |       |                       |                                                            |     |          |       |      |       |      |       |      |
| 202KRR3                        | 1    | 9/16           | 14.30        | 0.563 | 0.13               | 0.005    | 16.46   | 0.648 | 35                 | 1.3780 | 0.013 | 0.0005    | 11                | 0.433 | 13.00 | 0.512 | —     | —     | —                     | —                                                          | 8   | 7/32     | 0.054 | 0.12 | 4400  | 1000 | 10600 | 2360 |
| 204KRR2                        | 1    | 11/16          | 17.65        | 0.695 | 0.13               | 0.005    | 20.22   | 0.796 | 47                 | 1.8504 | 0.013 | 0.0005    | 14                | 0.551 | 20.96 | 0.825 | —     | —     | —                     | —                                                          | 8   | 5/16     | 0.145 | 0.32 | 6200  | 1400 | 14300 | 3200 |
| 205KRR2                        | 1    | 7/8            | 22.25        | 0.876 | 0.13               | 0.005    | 25.65   | 1.010 | 52                 | 2.0472 | 0.013 | 0.0005    | 15                | 0.591 | 25.40 | 1.000 | —     | —     | —                     | —                                                          | 9   | 5/16     | 0.200 | 0.44 | 6950  | 1560 | 15600 | 3450 |
| 205KRRB2                       | 2    | 7/8            | 22.25        | 0.876 | 0.13               | 0.005    | 25.65   | 1.010 | 52                 | 2.0472 | 0.013 | 0.0005    | 15                | 0.591 | 25.40 | 1.000 | —     | —     | —                     | —                                                          | 9   | 5/16     | 0.200 | 0.44 | 6950  | 1560 | 15600 | 3450 |
| 205PPB13 <sup>(1)</sup>        | 2    | 7/8            | 22.25        | 0.876 | 0.13               | 0.005    | 25.65   | 1.010 | 52                 | 2.0472 | 0.013 | 0.0005    | 15                | 0.591 | 25.40 | 1.000 | 42.67 | 1.680 | 20.19                 | 0.795                                                      | 9   | 5/16     | 0.200 | 0.44 | 6950  | 1560 | 15600 | 3450 |
| 206KPP3 <sup>(1)</sup>         | 1    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.31   | 1.154 | 62                 | 2.4409 | 0.013 | 0.0005    | 16                | 0.630 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.345 | 0.76 | 10000 | 2280 | 21600 | 4800 |
| 206KPPB3 <sup>(1)</sup>        | 2    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.31   | 1.154 | 62                 | 2.4409 | 0.013 | 0.0005    | 16                | 0.630 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.345 | 0.76 | 10000 | 2280 | 21600 | 4800 |
| 206KRR6                        | 1    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.31   | 1.154 | 62                 | 2.4409 | 0.013 | 0.0005    | 16                | 0.630 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.341 | 0.75 | 10000 | 2280 | 21600 | 4800 |
| 206KRRB6                       | 2    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.31   | 1.154 | 62                 | 2.4409 | 0.013 | 0.0005    | 16                | 0.630 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.341 | 0.75 | 10000 | 2280 | 21600 | 4800 |
| 207KPP3                        | 1    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.40   | 1.433 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.454 | 1.00 | 13700 | 3050 | 28500 | 6400 |
| 207KPPB3                       | 2    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.40   | 1.433 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.395 | 0.87 | 13700 | 3050 | 28500 | 6400 |
| 207KRRB9                       | 2    | 1 1/8          | 28.60        | 1.126 | 0.13               | 0.005    | 32.97   | 1.298 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.454 | 1.00 | 13700 | 3050 | 28500 | 6400 |
| 207KRRB12                      | 2    | 1 1/8          | 28.60        | 1.126 | 0.13               | 0.005    | 32.97   | 1.298 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.395 | 0.87 | 13700 | 3050 | 28500 | 6400 |
| 207KRR17                       | 1    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.65   | 1.443 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.395 | 0.87 | 13700 | 3050 | 28500 | 6400 |
| 207KRRB17                      | 2    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.65   | 1.443 | 72                 | 2.8346 | 0.013 | 0.0005    | 17                | 0.669 | 37.70 | 1.484 | 60.35 | 2.376 | 19.68                 | 0.775                                                      | 9   | 7/16     | 0.395 | 0.87 | 13700 | 3050 | 28500 | 6400 |
| W208PPB16 <sup>(1)</sup>       | 2    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.65   | 1.443 | 80                 | 3.1496 | 0.013 | 0.0005    | 18                | 0.709 | 36.53 | 1.438 | 68.43 | 2.694 | 25.27                 | 0.995                                                      | 9   | 1/2      | 0.658 | 1.45 | 17600 | 4000 | 36000 | 8150 |
| W208KRRB6                      | 2    | 1 3/8          | 34.95        | 1.376 | 0.13               | 0.005    | 40.30   | 1.587 | 80                 | 3.1496 | 0.013 | 0.0005    | 21                | 0.827 | 36.53 | 1.438 | 68.43 | 2.694 | 23.54                 | 0.927                                                      | 9   | 1/2      | —     | —    | 17600 | 4000 | 36000 | 8150 |
| W208KRR8                       | 1    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.65   | 1.443 | 80                 | 3.1496 | 0.013 | 0.0005    | 18                | 0.709 | 36.53 | 1.438 | 68.43 | 2.694 | 20.45                 | 0.805                                                      | 9   | 1/2      | 0.658 | 1.45 | 17600 | 4000 | 36000 | 8150 |
| 209KRRB2                       | 2    | 1 1/2          | 38.12        | 1.501 | 0.13               | 0.005    | 43.99   | 1.732 | 85                 | 3.3456 | 0.015 | 0.0006    | 19                | 0.748 | 30.00 | 1.181 | 73.86 | 2.908 | 23.27                 | 0.916                                                      | 9   | 1/2      | 0.576 | 1.27 | 17600 | 4000 | 36000 | 8150 |
| W210PPB7 <sup>(1)</sup>        | 2    | 1 5/8          | 41.30        | 1.626 | 0.13               | 0.005    | 47.65   | 1.876 | 90                 | 3.5433 | 0.015 | 0.0006    | 30                | 1.188 | 30.18 | 1.188 | —     | —     | —                     | —                                                          | 10  | 1/2      | 0.794 | 1.75 | 19600 | 4500 | 39000 | 8800 |
| <b>RELUBRICATABLE TYPE</b>     |      |                |              |       |                    |          |         |       |                    |        |       |           |                   |       |       |       |       |       |                       |                                                            |     |          |       |      |       |      |       |      |
| G206KPP4 <sup>(1)</sup>        | 3    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.26   | 1.152 | 62                 | 2.4409 | 0.013 | 0.005     | 18                | 0.709 | 24.00 | 0.945 | —     | —     | —                     | —                                                          | 9   | 3/8      | 0.281 | 0.62 | 10000 | 2280 | 21600 | 4800 |
| G206KPPB4 <sup>(1)</sup>       | 4    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.26   | 1.152 | 62                 | 2.4409 | 0.013 | 0.005     | 18                | 0.709 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.277 | 0.61 | 10000 | 2280 | 21600 | 4800 |
| G206KRRB6                      | 4    | 1              | 25.43        | 1.001 | 0.13               | 0.005    | 29.26   | 1.152 | 62                 | 2.4409 | 0.013 | 0.005     | 18                | 0.709 | 24.00 | 0.945 | 52.07 | 2.050 | 19.56                 | 0.770                                                      | 9   | 3/8      | 0.268 | 0.59 | 10000 | 2280 | 21600 | 4800 |
| G207KPPB2 <sup>(1)</sup>       | 4    | 1 1/8          | 28.60        | 1.126 | 0.13               | 0.005    | 32.97   | 1.298 | 72                 | 2.8346 | 0.013 | 0.005     | 19                | 0.748 | 37.70 | 1.484 | 60.32 | 2.375 | 25.40                 | 1.000                                                      | 9   | 7/16     | 0.454 | 1.00 | 13700 | 3050 | 28500 | 6400 |
| GW208KRRB5                     | 4    | 1 1/4          | 31.77        | 1.251 | 0.13               | 0.005    | 36.65   | 1.443 | 80                 | 3.1496 | 0.013 | 0.005     | 21                | 0.827 | 36.51 | 1.438 | 60.35 | 2.694 | 22.43                 | 0.883                                                      | 9   | 1/2      | 0.635 | 1.40 | 17600 | 4000 | 36000 | 8150 |
| GW208PPB22 <sup>(1)</sup>      | 2    | 1 1/4          | 31.88        | 1.255 | 0.13               | 0.005    | 36.75   | 1.447 | 80                 | 3.1496 | 0.013 | 0.005     | 21                | 0.827 | 36.51 | 1.438 | 52.07 | 2.050 | 28.32                 | 1.115                                                      | 9   | 1/2      | 0.681 | 1.50 | 17600 | 4000 | 36000 | 8150 |
| GC1200KPPB2 <sup>(1)</sup>     | 1    | 1 3/4          | 44.48        | 1.751 | 0.13               | 0.005    | 51.31   | 2.020 | 100                | 3.9370 | 0.015 | 0.0006    | 25 <sup>(2)</sup> | 0.984 | 57.15 | 2.250 | 86.11 | 3.390 | 29.01                 | 1.142                                                      | 10  | 9/16     | 1.521 | 3.35 | 19600 | 4500 | 39000 | 8800 |

<sup>(1)</sup> Tri-Ply Seal bearing.

<sup>(2)</sup> Inner and outer ring tolerance is .00 mm to -15 mm (.000" to -.006").

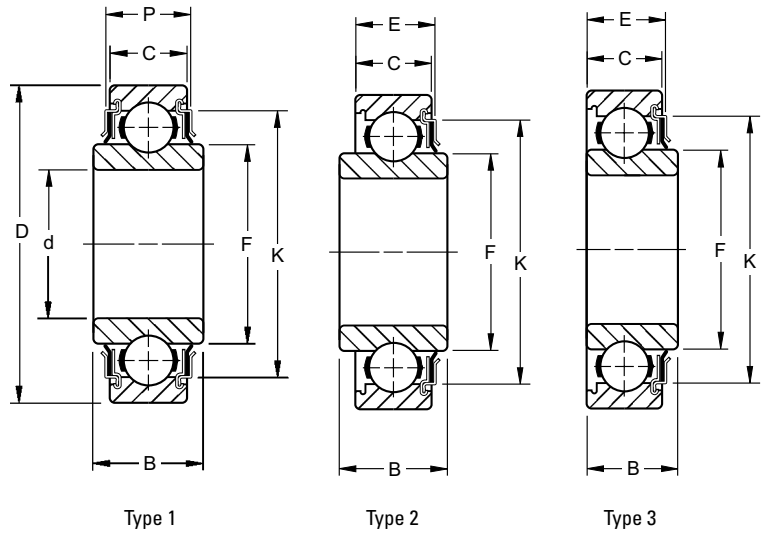
<sup>(3)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.



# BALL BEARINGS

## LIGHT 200 SERIES R-SEAL TYPE

- Consists of deep groove, Conrad-type bearings.
- Incorporates a flare-out, contact R-Seal.
- Synthetic rubber impregnated washer is enclosed between two metal shields, providing excellent protection against contaminants.
- Because of the heavy contact seal, this series is normally employed in moderate-speed service.



### DIMENSIONS – TOLERANCES

| Bearing Type Number | Bore d                       |        |                              |        | Outside Diameter D |        |                |        | Width                |       |       |       | E      |       | P       |       | K      |       | Fillet Radius <sup>(1)</sup> | F     |       | Static Load Rating Co | Extended Dynamic Load Rating C <sub>e</sub> <sup>(3)</sup> |      |       |       |
|---------------------|------------------------------|--------|------------------------------|--------|--------------------|--------|----------------|--------|----------------------|-------|-------|-------|--------|-------|---------|-------|--------|-------|------------------------------|-------|-------|-----------------------|------------------------------------------------------------|------|-------|-------|
|                     | tolerance +0.000 mm to minus |        | tolerance +0.000 mm to minus |        | +0.00 -0.12 mm     |        | +0.000 -0.005" |        | Max.                 |       | Max.  |       | Max.   |       | mm. in. |       | N lbs. |       |                              |       |       |                       |                                                            |      |       |       |
|                     | mm                           | in.    | mm                           | in.    | mm                 | in.    | mm             | in.    | mm                   | in.   | mm    | in.   | mm     | in.   | mm      | in.   | mm     | in.   | mm.                          | in.   | N     | lbs.                  | N                                                          | lbs. |       |       |
| 203KR2 3            | 15.883                       | 0.6253 | 0.008                        | 0.0003 | 40                 | 1.5748 | 0.013          | 0.0005 | 14.00                | 0.551 | 12    | 0.472 | —      | —     | —       | —     | —      | —     | 0.6                          | 0.024 | 24.44 | 0.962                 | 4700                                                       | 1060 | 10900 | 2450  |
| 203KRR2 1           | 16.256                       | 0.6400 | 0.130                        | 0.0005 | 40                 | 1.5748 | 0.013          | 0.0005 | 18.29                | 0.720 | 12    | 0.472 | —      | —     | —       | —     | —      | —     | 0.6                          | 0.024 | 24.44 | 0.962                 | 4700                                                       | 1060 | 10900 | 2450  |
| 203KRR5 1           | 13.081                       | 0.5150 | 0.130                        | 0.0005 | 40                 | 1.5748 | 0.013          | 0.0005 | 18.29                | 0.720 | 12    | 0.472 | —      | —     | —       | —     | —      | —     | 0.6                          | 0.024 | 24.44 | 0.962                 | 4700                                                       | 1060 | 10900 | 2450  |
| 203KRR7 1           | 17                           | 0.6693 | 0.008                        | 0.0003 | 40                 | 1.5748 | 0.013          | 0.0005 | 16.61                | 0.654 | 12    | 0.472 | —      | —     | —       | —     | —      | —     | 0.6                          | 0.024 | 24.44 | 0.962                 | 4700                                                       | 1060 | 10900 | 2450  |
| 204KR2 3            | 19.063                       | 0.7505 | 0.013                        | 0.0005 | 45.225             | 1.7805 | 0.013          | 0.0005 | 15.49                | 0.610 | 15.49 | 0.610 | —      | —     | —       | —     | —      | —     | 1                            | 0.039 | 28.73 | 1.131                 | 6500                                                       | 1460 | 14400 | 3250  |
| 204KRR3 1           | 20                           | 0.7874 | 0.010                        | 0.0004 | 47                 | 1.8504 | 0.013          | 0.0005 | 17.75                | 0.699 | 14    | 0.551 | —      | —     | —       | —     | —      | —     | 1                            | 0.039 | 28.73 | 1.131                 | 6500                                                       | 1460 | 14400 | 3250  |
| 205KR4 2            | 25.413                       | 1.0005 | 0.013                        | 0.0005 | 52                 | 2.0472 | 0.013          | 0.0005 | 25.40                | 1.000 | 15    | 0.591 | 15.875 | 0.625 | —       | —     | 42.67  | 1.68  | 1                            | 0.039 | 33.81 | 1.331                 | 7800                                                       | 1760 | 16000 | 3600  |
| 206KR7 2            | 30                           | 1.1811 | 0.010                        | 0.0004 | 62                 | 2.4409 | 0.013          | 0.0005 | 24.00                | 0.945 | 16    | 0.630 | 17.780 | 0.700 | —       | —     | 52.07  | 2.05  | 1                            | 0.039 | 40.28 | 1.586                 | 11300                                                      | 2550 | 21800 | 4900  |
| 206KRR8 1           | 30                           | 1.1811 | 0.013                        | 0.0004 | 62                 | 2.4409 | 0.013          | 0.0005 | 24.00                | 0.945 | 16    | 0.630 | —      | —     | 19.56   | 0.77  | 52.07  | 2.05  | 1                            | 0.039 | 39.09 | 1.539                 | 11300                                                      | 2250 | 21800 | 4900  |
| 207KRR 1            | 35                           | 1.3780 | 0.013                        | 0.0005 | 72                 | 2.8346 | 0.013          | 0.0005 | 25.00                | 0.984 | 17    | 0.669 | —      | —     | 19.68   | 0.775 | 60.35  | 2.376 | 1                            | 0.039 | 46.94 | 1.848                 | 15000                                                      | 3450 | 29000 | 6550  |
| 208KRR2 1           | 40                           | 1.5748 | 0.013                        | 0.0005 | 80                 | 3.1496 | 0.013          | 0.0005 | 27.00                | 1.063 | 21    | 0.827 | —      | —     | 21.31   | 0.839 | 68.45  | 2.695 | 1                            | 0.039 | 52.25 | 2.057                 | 19800                                                      | 4460 | 36200 | 8130  |
| 209KRR3 1           | 45                           | 1.7717 | 0.013                        | 0.0005 | 85                 | 3.3465 | 0.013          | 0.0005 | 27.00                | 1.063 | 21    | 0.827 | —      | —     | 24.18   | 0.952 | 72.42  | 2.851 | 1                            | 0.039 | 57.89 | 2.279                 | 20500                                                      | 4600 | 36300 | 8160  |
| 210KRR 1            | 50                           | 1.9685 | 0.013                        | 0.0005 | 90                 | 3.5433 | 0.015          | 0.0006 | 30.00                | 1.181 | 20    | 0.787 | —      | —     | 24.03   | 0.946 | 77.60  | 3.055 | 1                            | 0.039 | 62.81 | 2.473                 | 23100                                                      | 5200 | 40000 | 9000  |
| 212KRR 1            | 60                           | 2.3622 | 0.015                        | 0.0006 | 110                | 4.3307 | 0.015          | 0.0006 | 36.00 <sup>(2)</sup> | 1.417 | 22    | 0.866 | —      | —     | 30.02   | 1.182 | 99.87  | 3.932 | 1                            | 0.039 | 76.45 | 3.010                 | 35500                                                      | 8000 | 58600 | 13200 |

<sup>(1)</sup> Maximum shaft or housing fillet radius which bearing corners will clear.

<sup>(2)</sup> Inner and outer width tolerance is .00 mm to -.15 mm (.000" to .0006").

<sup>(3)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## FARM RADIAL SPECIALS

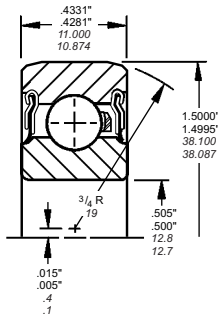
### BEARING NUMBER 202NPP9

#### SPECIAL FEATURES

- 1/2 in. Bore
- O.D. corner turned to a 3/4 in. radius
- Special heavy stiff seals of Buna-N rubber
- Crimped-in seal

#### TYPICAL APPLICATIONS

Cam Follower



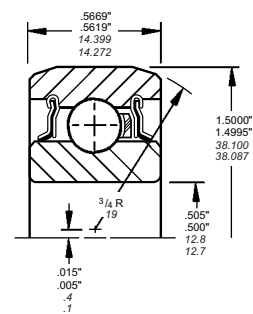
### BEARING NUMBER 202KRR7

#### SPECIAL FEATURES

- 1/2 in. Bore
- 1 1/2 in. O.D.
- Thick outer ring

#### TYPICAL APPLICATIONS

Cam Follower



Continued on the next page.



**FARM RADIAL SPECIALS** (continued)

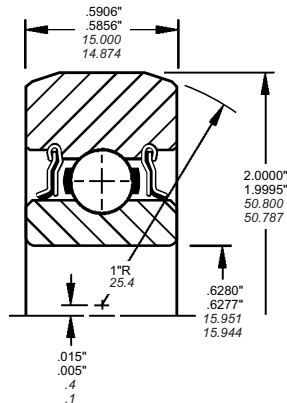
**BEARING NUMBER**  
**203KRR3**

**SPECIAL FEATURES**

- 5/8 in. Bore
- 2 in. O.D.
- Thick outer ring

**TYPICAL APPLICATIONS**

Cam Follower  
Guide Rolls for Baler Plunger



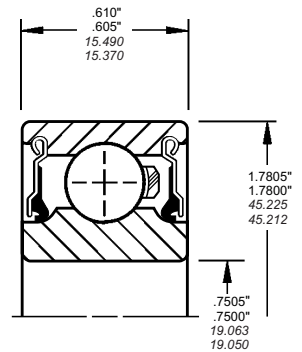
**BEARING NUMBER**  
**P204RR6**

**SPECIAL FEATURES**

- 3/4 in. Bore
- 1.7805 in. O.D.
- Replaces 204KRNP2

**TYPICAL APPLICATIONS**

Mower Spindle



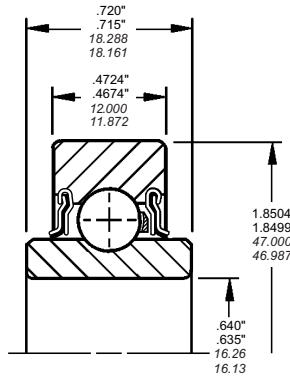
**BEARING NUMBER**  
**203KRR6**

**SPECIAL FEATURES**

- 5/8 in. Bore
- 47 mm O.D.
- Thick outer ring

**TYPICAL APPLICATIONS**

Idler Pulley  
Idler Sprocket



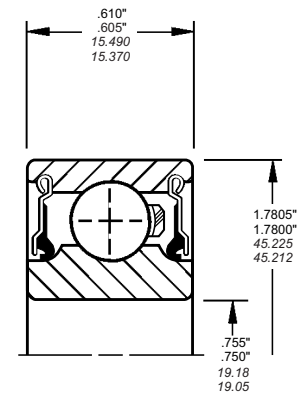
**BEARING NUMBER**  
**204RR7**

**SPECIAL FEATURES**

- 3/4 in. Bore
- 1.7805 in. O.D.
- Replaces 204KRNP3

**TYPICAL APPLICATIONS**

Rolling Cultivator  
Disk



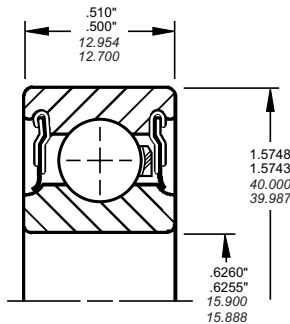
**BEARING NUMBER**  
**203NPP9**

**SPECIAL FEATURES**

- 5/8 in. Bore
- Width .500"

**TYPICAL APPLICATIONS**

Disk Grain Drill



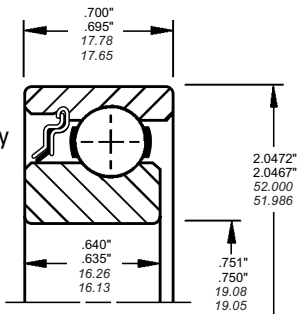
**BEARING NUMBER**  
**205KR3**

**SPECIAL FEATURES**

- 3/4 in. Bore
- Excellent moment load capacity available from special internal geometry of races
- Heavy contact flare-out type R-Seal with shroud cap

**TYPICAL APPLICATIONS**

Disk Hiller, Planter



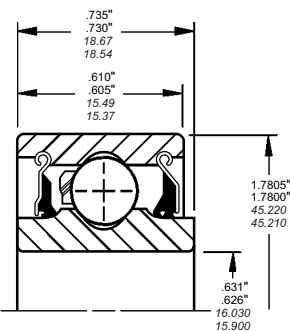
**BEARING NUMBER**  
**204RY2**

**SPECIAL FEATURES**

- 5/8 in. Bore
- Gothic Arch Race

**TYPICAL APPLICATIONS**

Planter  
Double Disk Opener



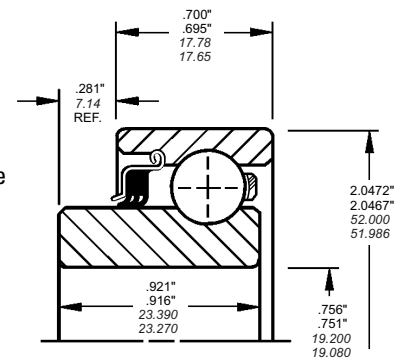
**BEARING NUMBER**  
**205KP6**

**SPECIAL FEATURES**

- 3/4 in. Bore
- Tri-Ply Seal on one side with shroud cap

**TYPICAL APPLICATIONS**

Rolling Cultivator



Continued on the next page.





# BALL BEARINGS

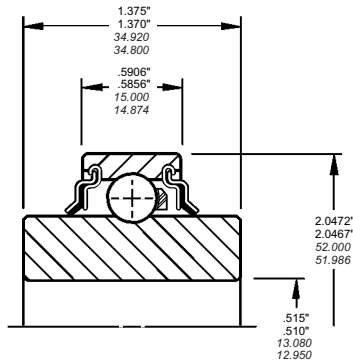
## FARM RADIAL SPECIALS (continued)

### BEARING NUMBER 205KRR6

#### SPECIAL FEATURES

- 1/2 in. Bore
- Extended inner ring

**TYPICAL APPLICATIONS**  
Potato Harvester

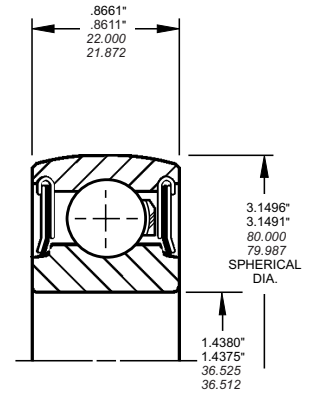


### BEARING NUMBER 208NPPB5

#### SPECIAL FEATURES

- 1 7/16 in. Bore
- PP Seals with shroud cap

**TYPICAL APPLICATIONS**  
Baler Crank Pin

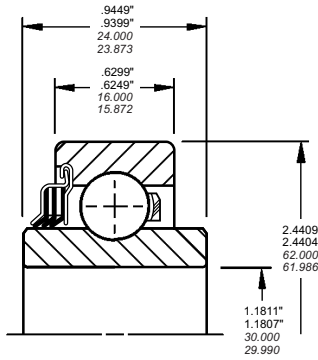


### BEARING NUMBER 206KP2

#### SPECIAL FEATURES

- Tri-Ply Seal on one side with shroud cap

**TYPICAL APPLICATIONS**  
Combine

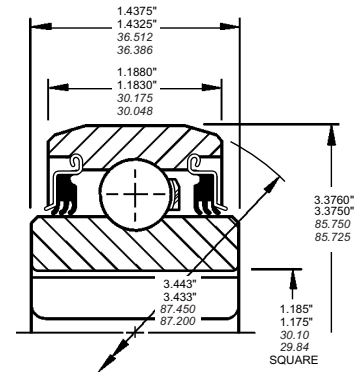


### BEARING NUMBER 208PPB12

#### SPECIAL FEATURES

- 1 1/8 in. Square Bore
- Molded Tri-Ply seal
- Heavy outer ring

**TYPICAL APPLICATIONS**  
Disk Harrow

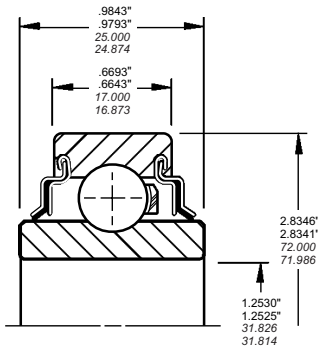


### BEARING NUMBER 207KRR14

#### SPECIAL FEATURES

- 1 1/4 in. Bore

**TYPICAL APPLICATIONS**  
Disk Harrow  
Transport Wheel

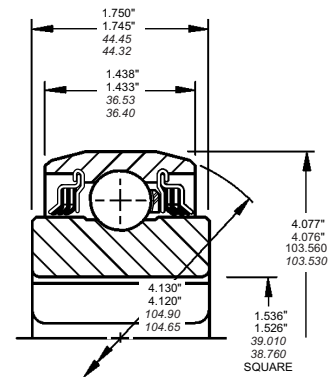


### BEARING NUMBER W211PPB6

#### SPECIAL FEATURES

- 1 1/2 in. Square Bore
- Tri-Ply seal with shroud cap
- Heavy outer ring

**TYPICAL APPLICATIONS**  
Disk Harrow

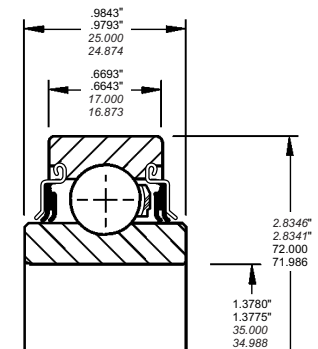


### BEARING NUMBER 207KYY

#### SPECIAL FEATURES

- Molded double lip seal

**TYPICAL APPLICATIONS**  
Disk Harrow  
Transport Wheel

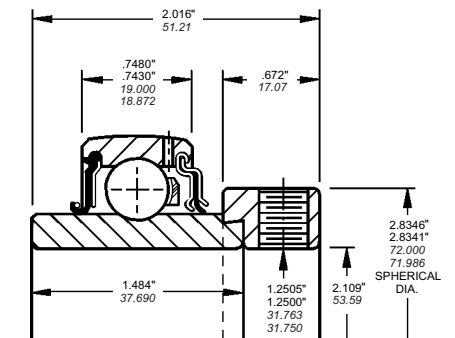


### BEARING NUMBER G1104KRXB2

#### SPECIAL FEATURES

- Oil Seal on one side

**TYPICAL APPLICATIONS**  
Chain Case



SPECIAL BEARINGS

| Size               | Special Features                                                                                     | Typical Application                                              |
|--------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 200KRR3            | Inner Ring Width .6457/.6407<br>One piece molded seals                                               | Windrower                                                        |
| J202KRR8           | Extended Inner Width .880/.875                                                                       | Tobacco Harvester                                                |
| 202NPP9            | 1/2" Bore-O.D. corner turned to<br>3/4" radius                                                       | Baler Cam Foller                                                 |
| P202NPP11          | Extra Wide Inner .5669/.5619 Bore<br>16mm .6299/.6296                                                | Cam Follower                                                     |
| P203KRR3           | 5/8" Bore 2" O.D. Heavy section<br>outer ring                                                        | Cam Follower Guide<br>Rolls for Baler Plunger                    |
| 203KRR6            | 5/8" Bore 47mm O.D. Heavy<br>section outer ring                                                      | Baler Pick-up                                                    |
| 203NPP9            | 5/8" Bore .500" width                                                                                | Disk Grain Drill Opener                                          |
| P203PP10           | .6255/.6260" Bore                                                                                    | Light Duty Disk Applications                                     |
| BB203KRR2<br>A2139 | Wide Inner .720/.715 Bore<br>.6400/.6350 Gothic arch races                                           | Rotary Hoe                                                       |
| P204KR2            | Bore .7505/.7500 Width .610/.605<br>O.D. 1.7805/1.7800                                               | Rotary Lawn Tractor<br>Blade Spindle Bearing                     |
| 204KRD4            | 5/8" Bore extended inner R-Seal<br>side .689/.685                                                    | Disk Opener Seed<br>Drill                                        |
| 204KRN5            | Bore .631/.626 Extended Inner<br>Width 1.125/1.120                                                   | Planter Opener Wheels                                            |
| P204KRR5           | Bore .793/.788 Inner Width<br>.6988/.6938                                                            | Row Crop Machine                                                 |
| 204RR6<br>E8728    | Ground Bore .7505/.7500 Width<br>.610 O.D. 1.7805 Extra loose radial<br>play. Replaces 204KRN2 E8728 | Planter Gage Wheels                                              |
| P204RR6            | Same as above except standard<br>radial play. Replaces 204KRN2                                       | Garden Tractor Mower<br>Spindle                                  |
| H204KRN6           | Bore, O.D., Width same as<br>P204KR2                                                                 | Planter                                                          |
| 204RR7<br>E8728    | 3/4" Bore 1.7805 O.D. .610 Width<br>Extra loose radial play. Replaces<br>204KRN2 E8728               | Rolling Cultivator Disk<br>Sprockets, Pulleys and<br>Disk Opener |
| 205NPP2            | Inner Width .6594/.6544                                                                              | Miscellaneous                                                    |
| 205KR3             | 3/4" Bore, Special Races, Heavy<br>R-Seal with Shroud Cap                                            | Disk Hiller Planter and<br>Cotton Picker                         |
| 205KP6             | 3/4" Bore Tri-Ply seal on one side<br>with shroud cap                                                | Rolling Cultivator<br>Coulter Bearing                            |
| 205KRR6            | 1/2" Bore extended inner ring                                                                        | Windrow Digger                                                   |
| 205KRR7            | 1/2" Bore 1.500/1.495 Extended<br>Inner Ring with Offset race                                        | Cone Roller Beet and<br>Potato Harvester                         |
| 205PP7<br>FS544    | 15/16" Bore Tri-Ply Seals<br>1.375/1.3760 Inner Width                                                | Rolling Cultivator                                               |
| G205KPRB11         | 7/8" Hex Bore, One R-Seal and<br>one Tri-Ply Seal Inner Width<br>1.000/.975                          | Corn Head Mechanism                                              |
| 205PP9<br>FS544    | 3/4" Bore Inner Width<br>1.3750/1.3700 Tri-Ply Seals                                                 | Cultivator                                                       |
| 205PP10            | 5/8" Bore Inner Width 1.375/1.370<br>Tri-Ply Seals                                                   | Potato Harvester                                                 |
| 205PP11            | 1" Bore Inner Width 1.187/1.185<br>Tri-Ply Seals                                                     | Marker Wheel                                                     |

| Size               | Special Features                                                                                                | Typical Application                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 205PP12            | 5/8" Bore Inner Width 1.500/1.495<br>Tri-Ply Seals                                                              | Cone Roller, Beet and<br>Potato Harvester |
| 205PP13            | 7/8" Hex Bore Inner Width<br>1.000/.995 Tri-Ply Seals                                                           | Corn Head Mechanism                       |
| 206KRD             | Offset Rings<br>Inner Width .748/.743<br>Outer Width .6299/.6249<br>R-Seal on extended inner side               | Combine                                   |
| 206KP2             | Tri-Ply Seal one side Wide Inner<br>Ring .9449/.9399                                                            | Combine                                   |
| 206KPP2            | Tri-Ply Seals Wide Inner Ring<br>.9449/.9399                                                                    | Forrage Harvester                         |
| H206KRP2<br>A1391  | 3/4" Bore Wide Inner Ring .9449/<br>.9399 Extended on R-Seal side                                               | Disk Hiller and Bedders                   |
| 206KPP3            | 1" Hex Bore Tri-Ply Seals Inner<br>Ring Width .9449/.9399                                                       | Disk Harrow                               |
| 206KRR4            | Large Inner Ring Bore Corner<br>to clear .090 R Shaft Fillet                                                    | Drive Shaft Bearing                       |
| 206KRRB3           | 1 1/8" Bore Flare out type R-Seal<br>with Shroud Cap                                                            | Corn Picker Snapping<br>Rolls             |
| 206KRRB9           | 1" Bore Inner Width .9450/.9400                                                                                 | Planter                                   |
| 206KRR13           | 3/4" Bore                                                                                                       | Idler Sprocket Bearing<br>for round Baler |
| 207KRR3            | Large Inner Ring Bore Corner to<br>clear .090 R Shaft Fillet                                                    | Trencher                                  |
| 207KRR8            | Large Inner Ring Bore Corner to<br>clear .090 R Shaft Fillet Narrow<br>Inner .8499/.8399"                       | Baler                                     |
| P207KRRB10         | 1 1/4" Bore Flare out type R-Seal<br>with Shroud Cap                                                            | Corn Picker Snapping<br>Rolls             |
| 207KRR12           | 1 1/8" Hex Bore                                                                                                 | Forrage Harvester                         |
| P207KRNBP13        | Bore 1.2505/1.2500 Extended<br>Inner 1.000/.945 on R-Seal Side                                                  | Corn Picker Gathering<br>Chain            |
| 207KRR14           | Bore 1.2530/1.2525                                                                                              | Disk Harrow Transport<br>Wheel            |
| 207KYY             | Double Lip Seal                                                                                                 | Disk Harrow Transport<br>Wheel            |
| P208KRR4<br>A1849  | Bore 1.5312/1.5307 Large Inner<br>Ring Bore Corner to clear .090R<br>Shaft Fillet                               | Clutch Shaft                              |
| 208NPP5            | Bore 1.4380/1.4375 Plya Seals<br>with Shroud Cap                                                                | Crank Pin for Square<br>Baler             |
| 209KRRB2           | 1" Hex Bore                                                                                                     | Round Baler                               |
| 304KR2             | Offset Inner Ring with .7087/<br>.7037 Width                                                                    | Tractor Water Pump                        |
| BB9105KRR2         | 1" Bore Inner Extended on one<br>side with 1.000/.995 Width Two<br>17/64 dia. holes in Inner Ring<br>180° apart | Hay Rake                                  |
| 9113KDD3<br>FS264C | Cap Extends Past Inner Face<br>on one side                                                                      | PTO Drive                                 |
| 9114KDD3<br>FS264C | Cap Extends Past Inner Face<br>on one side                                                                      | PTO Drive                                 |
| 9117K3             | Bore 3.2500/3.2492<br>O.D. 5.000/4.9992                                                                         | PTO Drive                                 |

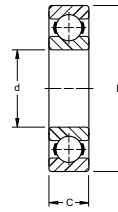




# BALL BEARINGS

## XLS/BIC SERIES – CONRAD TYPE

- An inch-dimension series with extra large diameters.
- Conrad or non-filling slot design.
- Compact sections for adaptability in applications where space is restricted.

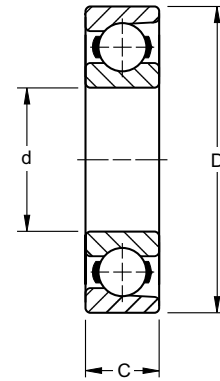


### DIMENSIONS – TOLERANCES

| Bearing Number | Bore d  |         |                                       |        | Outside Diameter D |                                       |       |        | Width C                               |        |      |       | Fillet Radius <sup>(1)</sup> |       | Wt.   |       | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>e</sub> <sup>(2)</sup> |       |
|----------------|---------|---------|---------------------------------------|--------|--------------------|---------------------------------------|-------|--------|---------------------------------------|--------|------|-------|------------------------------|-------|-------|-------|-----------------------------------|--------|------------------------------------------------------------|-------|
|                | mm      | in.     | tolerance +0.000 mm +0.0000" to minus | mm     | in.                | tolerance +0.000 mm +0.0000" to minus | mm    | in.    | tolerance +0.000 mm +0.0000" to minus | mm     | in.  | mm    | in.                          | kg    | lbs.  | N     | lbs.                              | N      | lbs.                                                       |       |
| XLS44K         | 69.850  | 2.7500  | 0.015                                 | 0.0006 | 104.775            | 4.1250                                | 0.015 | 0.0006 | 17.460                                | 0.6875 | 0.13 | 0.005 | 1.2                          | 0.047 | 0.449 | 0.99  | 22000                             | 4900   | 28500                                                      | 6400  |
| XLS48K2        | 76.200  | 3.0000  | 0.015                                 | 0.0006 | 114.300            | 4.5000                                | 0.015 | 0.0006 | 19.050                                | 0.7500 | 0.13 | 0.005 | 1.2                          | 0.047 | 0.567 | 1.25  | 33500                             | 7500   | 44000                                                      | 9800  |
| XLS52K         | 82.550  | 3.2500  | 0.020                                 | 0.0008 | 120.650            | 4.7500                                | 0.020 | 0.0008 | 19.050                                | 0.7500 | 0.13 | 0.005 | 1.2                          | 0.047 | 0.626 | 1.38  | 30000                             | 6700   | 35500                                                      | 8000  |
| XLS56K         | 88.900  | 3.5000  | 0.020                                 | 0.0008 | 127.000            | 5.0000                                | 0.020 | 0.0008 | 19.050                                | 0.7500 | 0.13 | 0.005 | 1.7                          | 0.065 | 0.671 | 1.48  | 31500                             | 7100   | 36500                                                      | 8150  |
| XLS60K2        | 95.250  | 3.7500  | 0.020                                 | 0.0008 | 133.350            | 5.2500                                | 0.020 | 0.0008 | 19.050                                | 0.7500 | 0.13 | 0.005 | 1.6                          | 0.063 | 0.712 | 1.57  | 34500                             | 7800   | 39000                                                      | 8650  |
| XLS64K2        | 101.600 | 4.0000  | 0.020                                 | 0.0008 | 142.849            | 5.6240                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.13 | 0.005 | 2.0                          | 0.080 | 0.794 | 1.75  | 41500                             | 9500   | 47500                                                      | 10600 |
| 41BIC196       | 104.648 | 4.1250  | 0.020                                 | 0.0008 | 152.400            | 6.0000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.5                          | 0.100 | 1.471 | 3.24  | 47500                             | 10600  | 55000                                                      | 12500 |
| 42BIC196       | 107.950 | 4.2500  | 0.020                                 | 0.0008 | 152.400            | 6.0000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.5                          | 0.100 | 1.374 | 3.03  | 47500                             | 10600  | 55000                                                      | 12500 |
| 43BIC206       | 111.125 | 4.3750  | 0.020                                 | 0.0008 | 165.100            | 6.5000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.5                          | 0.100 | 1.542 | 3.40  | 51000                             | 11400  | 57000                                                      | 12900 |
| XLS72KD2       | 114.300 | 4.5000  | 0.020                                 | 0.0008 | 158.730            | 6.2490                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.0                          | 0.080 | 1.121 | 2.47  | 54000                             | 12000  | 60000                                                      | 13400 |
| 45BIC206       | 114.300 | 4.5000  | 0.020                                 | 0.0008 | 158.750            | 6.2500                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.5                          | 0.100 | 1.442 | 3.18  | 51000                             | 11400  | 57000                                                      | 12900 |
| 46BIC216       | 117.475 | 4.6250  | 0.020                                 | 0.0008 | 165.100            | 6.5000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.20 | 0.008 | 2.5                          | 0.100 | 1.615 | 3.56  | 54000                             | 12000  | 58500                                                      | 13200 |
| 47BIC216       | 120.650 | 4.7500  | 0.025                                 | 0.0010 | 165.100            | 6.5000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.25 | 0.010 | 2.5                          | 0.100 | 1.512 | 3.33  | 57000                             | 12700  | 61000                                                      | 13700 |
| 48BIC225       | 123.825 | 4.8750  | 0.025                                 | 0.0010 | 177.800            | 7.0000                                | 0.025 | 0.0010 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.254 | 4.97  | 65500                             | 15000  | 75000                                                      | 16600 |
| XLS76K2        | 120.650 | 4.7500  | 0.025                                 | 0.0010 | 165.100            | 6.5000                                | 0.025 | 0.0010 | 22.230                                | 0.8750 | 0.25 | 0.010 | 1.7                          | 0.065 | 1.157 | 2.55  | 57000                             | 12700  | 61000                                                      | 13700 |
| XLS80K2        | 127.000 | 5.0000  | 0.025                                 | 0.0010 | 177.775            | 6.9990                                | 0.025 | 0.0010 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.0                          | 0.080 | 1.611 | 3.55  | 67000                             | 15000  | 72000                                                      | 16300 |
| 50BIC225       | 127.000 | 5.0000  | 0.025                                 | 0.0010 | 177.800            | 7.0000                                | 0.025 | 0.0010 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.3   | 5.0   | 65500                             | 15000  | 75000                                                      | 16600 |
| 51BIC240       | 130.175 | 5.1250  | 0.025                                 | 0.0010 | 184.150            | 7.2500                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.5   | 5.5   | 69500                             | 15600  | 76500                                                      | 17300 |
| 52BIC240       | 133.350 | 5.2500  | 0.025                                 | 0.0010 | 184.150            | 7.2500                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.4   | 5.2   | 69500                             | 15600  | 76500                                                      | 17300 |
| 53BIC247       | 136.525 | 5.3750  | 0.025                                 | 0.0010 | 190.500            | 7.5000                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.6   | 5.7   | 75000                             | 16600  | 80000                                                      | 17600 |
| 55BIC247       | 139.700 | 5.5000  | 0.025                                 | 0.0010 | 190.500            | 7.5000                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.5   | 5.4   | 75000                             | 16600  | 80000                                                      | 17600 |
| 56BIC251       | 142.875 | 5.6250  | 0.025                                 | 0.0010 | 196.850            | 7.7500                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.7   | 5.9   | 75000                             | 16600  | 80000                                                      | 17600 |
| 57BIC251       | 146.050 | 5.7500  | 0.025                                 | 0.0010 | 196.850            | 7.7500                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.5   | 5.6   | 75000                             | 16600  | 80000                                                      | 17600 |
| 58BIC258       | 149.225 | 5.8750  | 0.025                                 | 0.0010 | 203.200            | 8.0000                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.8   | 6.1   | 78000                             | 17300  | 81500                                                      | 18000 |
| 60BIC258       | 152.400 | 6.0000  | 0.025                                 | 0.0010 | 203.200            | 8.0000                                | 0.030 | 0.0012 | 25.400                                | 1.0000 | 0.25 | 0.010 | 2.5                          | 0.100 | 2.6   | 5.8   | 78000                             | 17300  | 81500                                                      | 18000 |
| 62BIC290       | 158.750 | 6.2500  | 0.025                                 | 0.0010 | 215.900            | 8.5000                                | 0.030 | 0.0012 | 28.575                                | 1.1250 | 0.25 | 0.010 | 3.0                          | 0.120 | 3.5   | 7.7   | 104000                            | 23200  | 106000                                                     | 23600 |
| 65BIC298       | 165.100 | 6.5000  | 0.025                                 | 0.0010 | 222.250            | 8.7500                                | 0.030 | 0.0012 | 28.575                                | 1.1250 | 0.25 | 0.010 | 3.0                          | 0.120 | 3.6   | 7.9   | 98000                             | 22000  | 102000                                                     | 22800 |
| 67BIC301       | 171.450 | 6.7500  | 0.025                                 | 0.0010 | 228.600            | 9.0000                                | 0.030 | 0.0012 | 28.575                                | 1.1250 | 0.25 | 0.010 | 3.0                          | 0.120 | 3.7   | 8.2   | 104000                            | 23200  | 104000                                                     | 23600 |
| 70BIC309       | 177.800 | 7.0000  | 0.025                                 | 0.0010 | 241.300            | 9.5000                                | 0.030 | 0.0012 | 31.750                                | 1.2500 | 0.25 | 0.010 | 3.0                          | 0.120 | 4.8   | 10.6  | 116000                            | 26000  | 118000                                                     | 26500 |
| 72BIC340       | 184.150 | 7.2500  | 0.030                                 | 0.0012 | 247.650            | 9.7500                                | 0.030 | 0.0012 | 31.750                                | 1.2500 | 0.31 | 0.012 | 3.0                          | 0.120 | 4.9   | 10.8  | 122000                            | 27500  | 122000                                                     | 27000 |
| 75BIC348       | 190.500 | 7.5000  | 0.030                                 | 0.0012 | 254.000            | 10.0000                               | 0.036 | 0.0014 | 31.750                                | 1.2500 | 0.31 | 0.012 | 3.0                          | 0.120 | 5.0   | 11.1  | 122000                            | 27500  | 122000                                                     | 27000 |
| 77BIC351       | 196.850 | 7.7500  | 0.030                                 | 0.0012 | 266.700            | 10.5000                               | 0.036 | 0.0014 | 34.925                                | 1.3750 | 0.31 | 0.012 | 3.0                          | 0.120 | 6.3   | 13.9  | 146000                            | 32500  | 143000                                                     | 32500 |
| 80BIC359       | 203.200 | 8.0000  | 0.030                                 | 0.0012 | 273.050            | 10.7500                               | 0.036 | 0.0014 | 34.925                                | 1.3750 | 0.31 | 0.012 | 3.0                          | 0.120 | 6.5   | 14.2  | 146000                            | 32500  | 143000                                                     | 32500 |
| 82BIC390       | 209.550 | 8.2500  | 0.030                                 | 0.0012 | 279.400            | 11.0000                               | 0.036 | 0.0014 | 34.925                                | 1.3750 | 0.31 | 0.012 | 3.0                          | 0.120 | 6.6   | 14.6  | 153000                            | 34500  | 150000                                                     | 33500 |
| 85BIC391       | 215.900 | 8.5000  | 0.030                                 | 0.0012 | 292.100            | 11.5000                               | 0.036 | 0.0014 | 38.100                                | 1.5000 | 0.31 | 0.012 | 3.0                          | 0.120 | 8.2   | 18.0  | 166000                            | 37500  | 163000                                                     | 36500 |
| 87BIC393       | 222.250 | 8.7500  | 0.030                                 | 0.0012 | 298.450            | 11.7500                               | 0.036 | 0.0014 | 38.100                                | 1.5000 | 0.31 | 0.012 | 3.0                          | 0.120 | 8.4   | 18.5  | 176000                            | 40000  | 170000                                                     | 38000 |
| 90BIC401       | 228.600 | 9.0000  | 0.030                                 | 0.0012 | 304.800            | 12.0000                               | 0.036 | 0.0014 | 38.100                                | 1.5000 | 0.31 | 0.012 | 3.0                          | 0.120 | 8.6   | 18.9  | 176000                            | 40000  | 166000                                                     | 37500 |
| 95BIC430       | 241.300 | 9.5000  | 0.030                                 | 0.0012 | 323.850            | 12.7500                               | 0.041 | 0.0016 | 41.275                                | 1.6250 | 0.36 | 0.014 | 4.0                          | 0.160 | 10.6  | 23.4  | 200000                            | 45000  | 190000                                                     | 42500 |
| 100BIC439      | 254.000 | 10.0000 | 0.036                                 | 0.0014 | 336.550            | 13.2500                               | 0.041 | 0.0016 | 41.275                                | 1.6250 | 0.36 | 0.014 | 4.0                          | 0.160 | 11.1  | 24.4  | 212000                            | 47500  | 193000                                                     | 43000 |
| 105BIC470      | 266.700 | 10.5000 | 0.036                                 | 0.0014 | 355.600            | 14.0000                               | 0.041 | 0.0016 | 44.450                                | 1.7500 | 0.36 | 0.014 | 4.0                          | 0.160 | 13.5  | 29.8  | 255000                            | 57000  | 224000                                                     | 50000 |
| 110BIC479      | 279.400 | 11.0000 | 0.036                                 | 0.0014 | 368.300            | 14.5000                               | 0.041 | 0.0016 | 44.450                                | 1.7500 | 0.36 | 0.014 | 4.0                          | 0.160 | 14.1  | 31.0  | 255000                            | 57000  | 220000                                                     | 50000 |
| 115BIC510      | 292.100 | 11.5000 | 0.036                                 | 0.0014 | 387.350            | 15.2500                               | 0.041 | 0.0016 | 47.625                                | 1.8750 | 0.36 | 0.014 | 5.0                          | 0.200 | 16.9  | 37.2  | 280000                            | 64000  | 240000                                                     | 54000 |
| 120BIC519      | 304.800 | 12.0000 | 0.036                                 | 0.0014 | 406.400            | 16.0000                               | 0.046 | 0.0018 | 50.800                                | 2.0000 | 0.36 | 0.014 | 5.0                          | 0.200 | 20.0  | 44.1  | 315000                            | 71000  | 255000                                                     | 58500 |
| 125BIC550      | 317.500 | 12.5000 | 0.041                                 | 0.0016 | 419.100            | 16.5000                               | 0.046 | 0.0018 | 50.800                                | 2.0000 | 0.41 | 0.016 | 5.0                          | 0.200 | 20.7  | 45.7  | 325000                            | 73500  | 265000                                                     | 60000 |
| 135BIC580      | 342.900 | 13.5000 | 0.041                                 | 0.0016 | 457.200            | 18.0000                               | 0.046 | 0.0018 | 57.150                                | 2.2500 | 0.41 | 0.016 | 5.0                          | 0.200 | 27.9  | 61.6  | 415000                            | 93000  | 315000                                                     | 71000 |
| 140BIC588      | 355.600 | 14.0000 | 0.041                                 | 0.0016 | 469.900            | 18.5000                               | 0.046 | 0.0018 | 57.150                                | 2.2500 | 0.41 | 0.016 | 5.0                          | 0.200 | 28.8  | 63.4  | 415000                            | 93000  | 310000                                                     | 69500 |
| 145BIC610      | 368.300 | 14.5000 | 0.041                                 | 0.0016 | 495.300            | 19.5000                               | 0.046 | 0.0018 | 63.500                                | 2.5000 | 0.41 | 0.016 | 5.0                          | 0.200 | 37.4  | 82.5  | 490000                            | 110000 | 355000                                                     | 80000 |
| 150BIC613      | 381.000 | 15.0000 | 0.041                                 | 0.0016 | 508.000            | 20.0000                               | 0.051 | 0.0020 | 63.500                                | 2.5000 | 0.41 | 0.016 | 5.0                          | 0.200 | 38.5  | 84.8  | 490000                            | 110000 | 355000                                                     | 80000 |
| 155BIC615      | 393.700 | 15.5000 | 0.041                                 | 0.0016 | 520.700            | 20.5000                               | 0.051 | 0.0020 | 63.500                                | 2.5000 | 0.41 | 0.016 | 5.0                          | 0.200 | 39.5  | 87.1  | 490000                            | 110000 | 345000                                                     | 78000 |
| 160BIC647      | 406.400 | 16.0000 | 0.046                                 | 0.0018 | 546.100            | 21.5000                               | 0.051 | 0.0020 | 69.850                                | 2.7500 | 0.46 | 0.018 | 5.0                          | 0.200 | 48.8  | 107.6 | 585000                            | 132000 | 400000                                                     | 90000 |
| 165BIC660      | 419.100 | 16.5000 | 0.046                                 | 0.0018 | 558.800            | 22.0000                               | 0.051 | 0.0020 | 69.850                                | 2.7500 | 0.46 | 0.018 | 5.0                          | 0.200 | 50.2  | 110.6 | 620000                            | 137000 | 415000                                                     | 93000 |
| 170BIC661      | 431.800 | 17.0000 | 0.046                                 | 0.0018 | 571.500            | 22.5000                               | 0.051 | 0.0020 | 69.850                                | 2.7500 | 0.46 | 0.018 | 5.0                          | 0.200 | 51.4  | 113.3 | 620000                            | 137000 | 415000                                                     | 93000 |
| 175BIC680      | 444.500 | 17.5000 | 0.046                                 | 0.0018 | 596.900            | 23.5000                               |       |        |                                       |        |      |       |                              |       |       |       |                                   |        |                                                            |       |

**BIH SERIES – MAXIMUM CAPACITY TYPE**

- An inch-dimension series with extra large diameters.
- Maximum capacity design.
- Feature a counterbored outer ring to permit increased number of balls.
- Can carry thrust in one direction only, against the full shouldered side of the outer race.
- Compact sections for adaptability to applications where space is restricted.



**DIMENSIONS – TOLERANCES BIH SERIES**

| Bearing Number | Bore d  |         |                                       |                  | Outside Diameter D |         |                                       |                  | Width C |        |                                       |                  | Fillet Radius <sup>(1)</sup> |      | Wt.   |      | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |       |
|----------------|---------|---------|---------------------------------------|------------------|--------------------|---------|---------------------------------------|------------------|---------|--------|---------------------------------------|------------------|------------------------------|------|-------|------|-----------------------------------|--------|------------------------------------------------------------|-------|
|                | mm      | in.     | tolerance +0.000 mm +0.0000" to minus | tolerance 0.0008 | mm                 | in.     | tolerance +0.000 mm +0.0000" to minus | tolerance 0.0010 | mm      | in.    | tolerance +0.000 mm +0.0000" to minus | tolerance 0.0010 | mm                           | in.  | kg    | lbs. | N                                 | lbs.   | N                                                          | lbs.  |
| 41BIH196       | 104.775 | 4.1250  | 0.020                                 | 0.0008           | 152.400            | 6.0000  | 0.025                                 | 0.0010           | 22.23   | 0.8750 | 0.20                                  | 0.008            | 2.5                          | 0.10 | 1.411 | 3.11 | 63000                             | 14000  | 65500                                                      | 14600 |
| 42BIH196       | 107.950 | 4.2500  | 0.020                                 | 0.0008           | 152.400            | 6.0000  | 0.025                                 | 0.0010           | 22.23   | 0.8750 | 0.20                                  | 0.008            | 2.5                          | 0.10 | 1.321 | 2.91 | 71000                             | 16000  | 72000                                                      | 16300 |
| 43BIH206       | 111.125 | 4.3750  | 0.020                                 | 0.0008           | 158.750            | 6.2500  | 0.025                                 | 0.0010           | 22.23   | 0.8750 | 0.20                                  | 0.008            | 2.5                          | 0.10 | 1.483 | 3.27 | 51000                             | 11400  | 57000                                                      | 12900 |
| 45BIH206       | 114.300 | 4.5000  | 0.020                                 | 0.0008           | 158.750            | 6.2500  | 0.025                                 | 0.0010           | 22.23   | 0.8750 | 0.20                                  | 0.008            | 2.5                          | 0.10 | 1.383 | 3.05 | 75000                             | 16600  | 73500                                                      | 16600 |
| 46BIH216       | 117.475 | 4.6250  | 0.020                                 | 0.0008           | 165.100            | 6.5000  | 0.025                                 | 0.0010           | 22.23   | 0.8750 | 0.20                                  | 0.008            | 2.5                          | 0.10 | 1.561 | 3.44 | 80000                             | 18000  | 76500                                                      | 17300 |
| 48BIH225       | 123.825 | 4.8750  | 0.025                                 | 0.0010           | 177.800            | 7.0000  | 0.025                                 | 0.0010           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.209 | 4.87 | 104000                            | 23200  | 100000                                                     | 22400 |
| 50BIH225       | 127.000 | 5.0000  | 0.025                                 | 0.0010           | 177.800            | 7.0000  | 0.025                                 | 0.0010           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.3   | 5.0  | 104000                            | 23200  | 100000                                                     | 22400 |
| 51BIH240       | 130.175 | 5.1250  | 0.025                                 | 0.0010           | 184.150            | 7.2500  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.5   | 5.5  | 108000                            | 24000  | 102000                                                     | 22800 |
| 52BIH240       | 133.350 | 5.2500  | 0.025                                 | 0.0010           | 184.150            | 7.2500  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.4   | 5.2  | 104000                            | 23200  | 100000                                                     | 22400 |
| 53BIH247       | 136.525 | 5.3750  | 0.025                                 | 0.0010           | 190.500            | 7.5000  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.6   | 5.7  | 112000                            | 25000  | 104000                                                     | 23200 |
| 55BIH247       | 139.700 | 5.5000  | 0.025                                 | 0.0010           | 190.500            | 7.5000  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.5   | 5.4  | 112000                            | 25000  | 104000                                                     | 23200 |
| 56BIH251       | 142.875 | 5.6250  | 0.025                                 | 0.0010           | 196.850            | 7.7500  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.7   | 5.9  | 116000                            | 26000  | 106000                                                     | 23600 |
| 57BIH251       | 146.050 | 5.7500  | 0.025                                 | 0.0010           | 196.850            | 7.7500  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.5   | 5.6  | 116000                            | 26000  | 106000                                                     | 23600 |
| 58BIH258       | 149.225 | 5.8750  | 0.025                                 | 0.0010           | 203.200            | 8.0000  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.8   | 6.1  | 118000                            | 26500  | 108000                                                     | 24000 |
| 60BIH258       | 152.400 | 6.0000  | 0.025                                 | 0.0010           | 203.200            | 8.0000  | 0.030                                 | 0.0012           | 25.40   | 1.0000 | 0.25                                  | 0.010            | 2.5                          | 0.10 | 2.6   | 5.8  | 118000                            | 26500  | 108000                                                     | 24000 |
| 62BIH290       | 158.750 | 6.2500  | 0.025                                 | 0.0010           | 215.900            | 8.5000  | 0.030                                 | 0.0012           | 28.575  | 1.1250 | 0.25                                  | 0.010            | 3.0                          | 0.12 | 3.5   | 7.7  | 146000                            | 33500  | 134000                                                     | 30000 |
| 65BIH298       | 165.100 | 6.5000  | 0.025                                 | 0.0010           | 222.250            | 8.7500  | 0.030                                 | 0.0012           | 28.575  | 1.1250 | 0.25                                  | 0.010            | 3.0                          | 0.12 | 3.6   | 7.9  | 153000                            | 34500  | 137000                                                     | 30500 |
| 67BIH301       | 171.450 | 6.7500  | 0.025                                 | 0.0010           | 228.600            | 9.0000  | 0.030                                 | 0.0012           | 28.575  | 1.1250 | 0.25                                  | 0.010            | 3.0                          | 0.12 | 3.7   | 8.2  | 160000                            | 35500  | 137000                                                     | 31000 |
| 70BIH309       | 177.800 | 7.0000  | 0.025                                 | 0.0010           | 241.300            | 9.5000  | 0.030                                 | 0.0012           | 31.750  | 1.2500 | 0.25                                  | 0.010            | 3.0                          | 0.12 | 4.8   | 10.6 | 180000                            | 40500  | 160000                                                     | 35500 |
| 72BIH340       | 184.150 | 7.2500  | 0.030                                 | 0.0012           | 247.650            | 9.7500  | 0.030                                 | 0.0012           | 31.750  | 1.2500 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 4.9   | 10.8 | 186000                            | 42500  | 160000                                                     | 36000 |
| 75BIH348       | 190.500 | 7.5000  | 0.030                                 | 0.0012           | 254.000            | 10.0000 | 0.036                                 | 0.0014           | 31.750  | 1.2500 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 5.0   | 11.1 | 193000                            | 43000  | 163000                                                     | 36500 |
| 77BIH351       | 196.850 | 7.7500  | 0.030                                 | 0.0012           | 266.700            | 10.5000 | 0.036                                 | 0.0014           | 34.925  | 1.3750 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 6.3   | 13.9 | 228000                            | 51000  | 193000                                                     | 44000 |
| 80BIH359       | 203.200 | 8.0000  | 0.030                                 | 0.0012           | 273.050            | 10.7500 | 0.036                                 | 0.0014           | 34.925  | 1.3750 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 6.5   | 14.2 | 236000                            | 53000  | 200000                                                     | 45000 |
| 82BIH390       | 209.550 | 8.2500  | 0.030                                 | 0.0012           | 279.400            | 11.0000 | 0.036                                 | 0.0014           | 34.925  | 1.3750 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 6.6   | 10.6 | 245000                            | 55000  | 200000                                                     | 45500 |
| 85BIH391       | 215.900 | 8.5000  | 0.030                                 | 0.0012           | 292.100            | 11.5000 | 0.036                                 | 0.0014           | 38.100  | 1.5000 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 8.2   | 18.0 | 270000                            | 61000  | 224000                                                     | 50000 |
| 87BIH393       | 222.250 | 8.7500  | 0.030                                 | 0.0012           | 298.450            | 11.7500 | 0.036                                 | 0.0014           | 38.100  | 1.5000 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 8.4   | 18.5 | 270000                            | 61000  | 224000                                                     | 50000 |
| 90BIH401       | 228.600 | 9.0000  | 0.030                                 | 0.0012           | 304.800            | 12.0000 | 0.036                                 | 0.0014           | 38.100  | 1.5000 | 0.31                                  | 0.012            | 3.0                          | 0.12 | 8.6   | 18.9 | 280000                            | 63000  | 228000                                                     | 51000 |
| 95BIH430       | 241.300 | 9.5000  | 0.030                                 | 0.0012           | 323.850            | 12.7500 | 0.036                                 | 0.0014           | 41.275  | 1.6250 | 0.36                                  | 0.014            | 4.0                          | 0.16 | 10.6  | 23.4 | 315000                            | 71000  | 255000                                                     | 57000 |
| 100BIH439      | 254.00  | 10.0000 | 0.036                                 | 0.0014           | 336.550            | 13.2500 | 0.041                                 | 0.0016           | 41.275  | 1.6250 | 0.36                                  | 0.014            | 4.0                          | 0.16 | 11.1  | 24.4 | 325000                            | 73500  | 260000                                                     | 58500 |
| 105BIH470      | 266.700 | 10.5000 | 0.036                                 | 0.0014           | 355.600            | 14.0000 | 0.041                                 | 0.0016           | 44.450  | 1.7500 | 0.36                                  | 0.014            | 4.0                          | 0.16 | 13.5  | 29.8 | 400000                            | 90000  | 300000                                                     | 68000 |
| 110BIH479      | 279.400 | 11.0000 | 0.036                                 | 0.0014           | 368.300            | 14.5000 | 0.041                                 | 0.0016           | 44.450  | 1.7500 | 0.36                                  | 0.014            | 4.0                          | 0.16 | 14.1  | 31.0 | 415000                            | 93000  | 305000                                                     | 69500 |
| 115BIH510      | 292.100 | 11.5000 | 0.036                                 | 0.0014           | 387.350            | 15.2500 | 0.041                                 | 0.0016           | 47.625  | 1.8750 | 0.36                                  | 0.014            | 5.0                          | 0.20 | 16.9  | 37.2 | 465000                            | 104000 | 335000                                                     | 75000 |
| 120BIH519      | 304.800 | 12.0000 | 0.036                                 | 0.0014           | 406.400            | 16.0000 | 0.046                                 | 0.0018           | 50.800  | 2.0000 | 0.36                                  | 0.014            | 5.0                          | 0.20 | 20.0  | 44.1 | 510000                            | 116000 | 355000                                                     | 80000 |
| 135BIH580      | 342.900 | 13.5000 | 0.041                                 | 0.0016           | 457.200            | 18.0000 | 0.046                                 | 0.0018           | 57.150  | 2.2500 | 0.41                                  | 0.016            | 5.0                          | 0.20 | 27.9  | 61.6 | 655000                            | 146000 | 425000                                                     | 95000 |
| 140BIH588      | 355.600 | 14.0000 | 0.041                                 | 0.0016           | 469.900            | 18.5000 | 0.046                                 | 0.0018           | 57.150  | 2.2500 | 0.41                                  | 0.016            | 5.0                          | 0.20 | 28.8  | 63.4 | 680000                            | 150000 | 430000                                                     | 96500 |

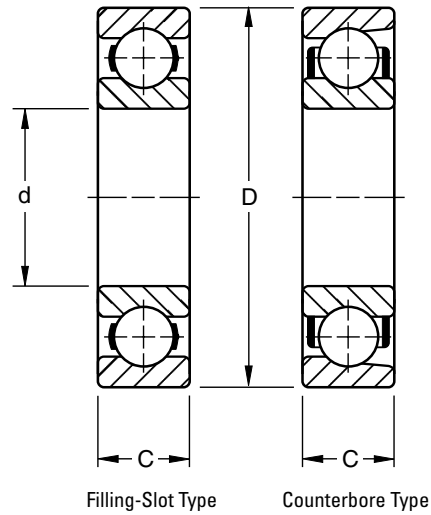
<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.  
<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.



# BALL BEARINGS

## EXTRA LARGE 100 SERIES

- Dimensions originally established to meet specific design requirements, before standard dimensions were established by the American Bearing Manufacturers Association (ABMA).
- A metric series.
- Available in the 100 Series (extra light).
- Available in a radially-fitted counterbore type, having a maximum complement of balls.
- Identified by the suffix "WI," these are designed to take thrust in one direction only.



### DIMENSIONS – TOLERANCES

| Bearing Number    |                   |                        | Bore d                                |        |       |        | Outside Diameter D                    |         |       |        | Width C                         |                      | Fillet Radius <sup>(1)</sup> |       | Wt.               |       |                   |       |               |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load C <sub>E</sub> <sup>(5)</sup> |       |
|-------------------|-------------------|------------------------|---------------------------------------|--------|-------|--------|---------------------------------------|---------|-------|--------|---------------------------------|----------------------|------------------------------|-------|-------------------|-------|-------------------|-------|---------------|-------|-----------------------------------|-------|-----------------------------------------------------|-------|
| Filling-slot Type | Counter-bore Type | One Shield D           | tolerance +0.000 mm +0.0000" to minus |        |       |        | tolerance +0.000 mm +0.0000" to minus |         |       |        | +0.00 mm -25 mm +0.000" -0.010" |                      |                              |       | Filling-slot Type |       | Counter-bore Type |       | Shielded Type |       | N lbs.                            |       | N lbs.                                              |       |
|                   |                   |                        | mm                                    | in.    | mm    | in.    | mm                                    | in.     | mm    | in.    | mm                              | in.                  | mm                           | in.   | kg                | lbs.  | kg                | lbs.  | kg            | lbs.  | N                                 | lbs.  | N                                                   | lbs.  |
| 120W2             | —                 | 120WD2N                | 100                                   | 3.9370 | 0.020 | 0.0008 | 160                                   | 6.2992  | 0.025 | 0.0010 | 28                              | 1.102 <sup>(4)</sup> | 2.01                         | 0.079 | 2.041             | 4.50  | —                 | —     | 2.041         | 4.50  | 75000                             | 17000 | 106000                                              | 24000 |
| 122W              | 122WI             | 122WD2N <sup>(3)</sup> | 110                                   | 4.3307 | 0.020 | 0.0008 | 175                                   | 6.8898  | 0.025 | 0.0010 | 30                              | 1.181 <sup>(4)</sup> | 2.01                         | 0.079 | 2.762             | 6.09  | 2.835             | 6.25  | 3.157         | 6.96  | 80000                             | 18000 | 116000                                              | 26000 |
| 124W              | 124WI             | 124WD                  | 120                                   | 4.7244 | 0.020 | 0.0008 | 190                                   | 7.4803  | 0.030 | 0.0012 | 32                              | 1.260 <sup>(4)</sup> | 2.01                         | 0.079 | 3.475             | 7.66  | 3.538             | 7.80  | 3.466         | 7.64  | 98000                             | 22400 | 140000                                              | 31500 |
| 126W              | 126WI             | 126WD                  | 130                                   | 5.1181 | 0.025 | 0.0010 | 205                                   | 8.0709  | 0.030 | 0.0012 | 34                              | 1.339                | 2.01                         | 0.079 | 4.336             | 9.56  | 4.318             | 9.52  | 4.332         | 9.55  | 110000                            | 24500 | 146000                                              | 33500 |
| 128W              | 128WI             | 128WD                  | 140                                   | 5.5118 | 0.025 | 0.0010 | 220                                   | 8.6614  | 0.030 | 0.0012 | 36                              | 1.417                | 2.01                         | 0.079 | 5.239             | 11.55 | 5.244             | 11.56 | 5.294         | 11.67 | 122000                            | 27000 | 163000                                              | 36500 |
| 130W              | —                 | 130WD                  | 150                                   | 5.9055 | 0.025 | 0.0010 | 235                                   | 9.2520  | 0.030 | 0.0012 | 38                              | 1.496                | 2.01                         | 0.079 | 6.278             | 13.84 | —                 | —     | 6.437         | 14.19 | 140000                            | 31500 | 183000                                              | 41500 |
| 132W              | —                 | 132WD                  | 160                                   | 6.2992 | 0.025 | 0.0010 | 250                                   | 9.8425  | 0.030 | 0.0012 | 40                              | 1.575                | 2.49                         | 0.098 | 7.394             | 16.30 | —                 | —     | 7.484         | 16.50 | 160000                            | 35500 | 208000                                              | 46500 |
| 134W              | —                 | —                      | 170                                   | 6.6929 | 0.025 | 0.0010 | 265                                   | 10.4331 | 0.035 | 0.0014 | 42                              | 1.654                | 2.49                         | 0.098 | 9.049             | 19.95 | —                 | —     | —             | —     | 180000                            | 40000 | 224000                                              | 51000 |
| —                 | —                 | 136WD2N                | 180                                   | 7.0866 | 0.025 | 0.0010 | 280                                   | 11.0236 | 0.035 | 0.0014 | 49                              | 1.929                | 2.49                         | 0.098 | —                 | —     | —                 | —     | 11.004        | 24.26 | 200000                            | 45000 | 245000                                              | 55000 |
| 138W              | —                 | —                      | 190                                   | 7.4803 | 0.03  | 0.0120 | 300                                   | 11.8110 | 0.035 | 0.0014 | 46                              | 1.811 <sup>(2)</sup> | 2.49                         | 0.098 | 12.928            | 28.50 | —                 | —     | —             | —     | 245000                            | 56000 | 285000                                              | 64000 |

(1) Maximum shaft or housing fillet radius that bearing corners will clear.

(2) +.00 mm, -.25 mm (+000", -.010").

(3) 35 mm width.

(4) Width tolerance is +.00 mm, -.20 mm (+.000", -.008").

(5) Based on 10<sup>6</sup> revolutions of calculated fatigue life.

## 7000WN PRODUCT FAMILY

### INTRODUCTION

The high performance 7000WN Angular Contact Product Family is specifically designed to support heavy thrust loads at lower operating temperatures at high speeds. Included in the angular contact series are the following design features:

- Refined bore diameter tolerance
- Increased thrust capacity
- Extended load capacity
- Lower operating temperatures
- Better than ABEC 1 bore diameter tolerances
- High operating contact angle
- Improved ball section ratio
- Low shoulder inner and outer rings improve oil flow

A feature of this series is the refined bore diameter tolerance. The closer bore tolerance in the WN product family reduces the broad range of interference and thus prevents the development of undesirable high preload in mounted duplex pairs. As a result, longer bearing life is achieved and high operating temperatures are avoided.

This product family can support heavy thrust loads by combining high shoulders on the thrust side of both rings with a high operating angle. In addition, uniformity of load per ball under combined loads is more favorable with a high contact angle and results in longer bearing life.

Maximum clearance between the one-piece brass or bronze cage and the land diameters of both rings is achieved in the WN construction. Utilizing low shoulder diameters on the non-thrust sides of inner and outer rings promotes efficient oil passage through the bearing resulting in lower operating temperatures and longer bearing life.

The 7000WN Product Family is divided into several designs. Sizes 7207-7218WN and 7304-7318WN have a 40 degree contact angle and a one-piece, ball-piloted, pressed brass cage. Sizes 7219-7230WN and 7319-7330WN have a 40 degree contact angle and a one-piece, outer ring-piloted, high-strength machined bronze cage. The 7412WN and 7415WN both have a 40 degree contact angle and a one-piece conical, high-strength machined bronze cage.

The 7000WN Product Family is available as single bearings and duplex sets. A single with the suffix "SU" is flush ground on both faces for universal mounting. Such bearings can be used as singles or duplex mounted back-to-back (DB), face-to-face (DF) or tandem (DT), depending on the functional requirements of the design. The mounting of duplex "SU" bearings will result in a preload range of minimum internal clearance to a solid preload.

Bearings without the "SU" designation are not flush ground and are intended to be used as singles. These bearings are used to support thrust from one direction and are often accompanied by a preload spring.

Bearings with the suffix "DU" are flush ground on both faces for universal mounting. A duplex pair of "DU" bearings can be mounted (DB, DF, or DT), depending on the functional requirements of the design. These bearings, after mounting, will result in a range of positive light preload.

### APPLICATIONS

These design features are advantageous in applications such as oil refining pump systems where higher productivity and longer system life is important. Other applications where these features are equally suited are deep well pump motors, vertical and horizontal pumps, worm gear and right angle drives, spindles, live centers and gearboxes. For applications requiring a high degree of axial and radial rigidity, these bearings are suggested in preloaded duplex mountings.

### MOUNTING

Although each 7000WN Product Family bearing is a self-contained unit, the construction is such that they are frequently mounted as two bearings opposed, so that thrust can be carried in either direction.

Unlike the radial type, the angular contact bearing, when mounted alone, requires adjustment and must be installed with care. As the bearing is relatively loose axially before mounting, it is important that the design incorporate some means to move the outer ring axially into its correct position relative to the inner ring. This adjustment should be made when the bearing is mounted. A common method is to place a preload spring or shims at one bearing location.

The correct adjustment of the single bearing is obtained when the initial axial looseness of the assembly is removed. This eliminates the possibility of premature bearing damage due to excessive preloading or looseness through improper adjustment.

Bearings designated "SU" are ground on both surfaces to permit universal mounting. These duplex sets are ideally suited for applications which involve a combination of radial loads from either direction. "SU" bearings are flush ground so that under a specific axial gage load the inner ring will protrude beyond the face of the outer ring. This design results in an internal axial clearance within the bearing pair that helps to minimize build-up of excessive preload within the bearings when mounted on a shaft with maximum interference.

To assure correct mounting of bearings in the 7000WN Product Family, the word THRUST is marked on the thrust face of both the inner and outer rings. This face should abut against the housing shoulder or the end cover, depending on the required direction of "thrust".

### ORDERING INFORMATION

**"SU" Suffix:** All bearings are packaged singly. To obtain a pair of SU flush ground bearings for duplex mounting, specify two bearings. Example: (2) 7210WN SU bearings.

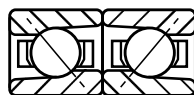
**"DU" Suffix:** All bearings are packaged as a pair in a single box. To obtain a pair of DU flush ground bearings for duplex mounting, specify one pair. Example: one pair-7219WN MBR-DU.

**No Suffix:** All bearings are packaged singly. No other designation is required to obtain

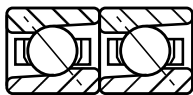
### MOUNTING ARRANGEMENTS



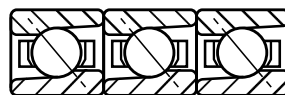
Duplex- DB  
Back-to-Back



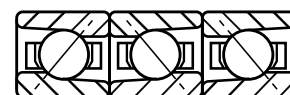
Duplex- DF  
Face-to-Face



Duplex- DT Tandem



Three Bearings in Tandem



Two in Tandem Opposed  
with a Single Bearing

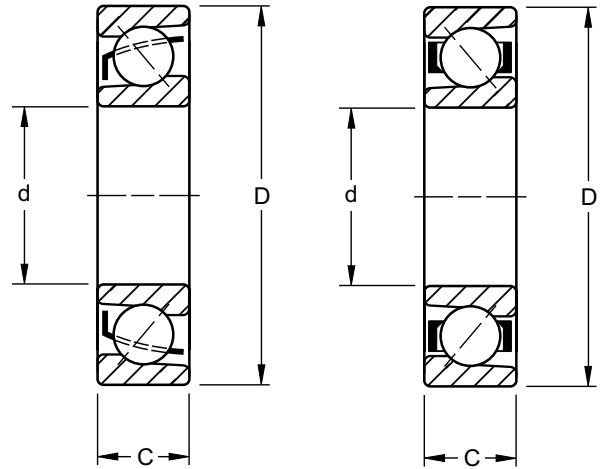




# BALL BEARINGS

## LIGHT 7200WN SERIES

- Dimensionally interchangeable with the radial 200 Series.
- 7000WN Product Family includes a refined bore diameter.
- A single bearing is suggested for applications in which the thrust load is in one direction or, in the case of combined loads, the thrust load is high in relation to the radial load.
- A duplex pair is suggested for applications where thrust is present in both directions or where axial displacement of the shaft must be restricted.
- For exceptionally high thrust loads in one direction, a tandem pair can be used, opposed by a third bearing.
- Sizes 7201K through 7203WN have a 20 degree contact angle and a nylon cage.
- Sizes 7204WN through 7218WN have a 40 degree contact angle and a one-piece, ball-piloted, pressed brass cage.
- Larger sizes 7219WN through 7230WN have a 40 degree contact angle and a one-piece, outer ring piloted high-strength machined bronze cage.



7207-7218WN  
40° Contact Angle

7219-7230WN MBR  
40° Contact Angle

## DIMENSIONS – TOLERANCES

| Bearing Number           | Bore d |        | tolerance<br>+0.000 mm<br>+0.0000" to minus |        | Outside Diameter D |         | tolerance<br>+0.000 mm<br>+0.0000" to minus |         | Width C |        | tolerance<br>+0.000 mm<br>+0.0000" to minus |       | Fillet Radius <sup>(1)</sup> |       | Wt.    |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(4)</sup> |       |
|--------------------------|--------|--------|---------------------------------------------|--------|--------------------|---------|---------------------------------------------|---------|---------|--------|---------------------------------------------|-------|------------------------------|-------|--------|-------|-----------------------------------|-------|------------------------------------------------------------|-------|
|                          | mm     | in.    | mm                                          | in.    | mm                 | in.     | mm                                          | in.     | mm      | in.    | mm                                          | in.   | mm                           | in.   | kg     | lbs.  | N                                 | lbs.  | N                                                          | lbs.  |
| 7201K                    | 12     | 0.4724 | 0.008                                       | 0.0003 | 32                 | 1.2598  | 0.011                                       | 0.00043 | 10      | 0.3937 | 0.12                                        | 0.005 | 0.6                          | 0.024 | 0.036  | 0.08  | 2790                              | 630   | 7100                                                       | 1600  |
| 7202W                    | 15     | 0.5906 | 0.008                                       | 0.0003 | 35                 | 1.3780  | 0.011                                       | 0.00043 | 11      | 0.4331 | 0.12                                        | 0.005 | 0.6                          | 0.024 | 0.045  | 0.10  | 4700                              | 1060  | 10300                                                      | 2320  |
| 7203W                    | 17     | 0.6693 | 0.008                                       | 0.0003 | 40                 | 1.5748  | 0.011                                       | 0.00043 | 12      | 0.4727 | 0.12                                        | 0.005 | 0.6                          | 0.024 | 0.068  | 0.15  | 6930                              | 1560  | 14200                                                      | 3200  |
| 7204WN <sup>(2)(3)</sup> | 20     | 0.7874 | 0.010                                       | 0.0004 | 47                 | 1.8504  | 0.011                                       | 0.00043 | 14      | 0.5512 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.104  | 0.23  | 8100                              | 1830  | 16800                                                      | 3800  |
| 7205WN <sup>(3)</sup>    | 25     | 0.9843 | 0.010                                       | 0.0004 | 52                 | 2.0472  | 0.013                                       | 0.0005  | 15      | 0.5906 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.132  | 0.29  | 9400                              | 2120  | 16600                                                      | 3750  |
| 7206WN                   | 30     | 1.1811 | 0.010                                       | 0.0004 | 62                 | 2.4409  | 0.013                                       | 0.0005  | 16      | 0.6299 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.209  | 0.46  | 13500                             | 3050  | 23000                                                      | 5200  |
| 7207WN                   | 35     | 1.3780 | 0.010                                       | 0.0004 | 72                 | 2.8346  | 0.013                                       | 0.0005  | 17      | 0.6693 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.286  | 0.63  | 18000                             | 4150  | 30800                                                      | 6950  |
| 7208WN                   | 40     | 1.5748 | 0.010                                       | 0.0004 | 80                 | 3.1496  | 0.013                                       | 0.0005  | 18      | 0.7087 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.331  | 0.73  | 23000                             | 5200  | 36000                                                      | 8150  |
| 7209WN                   | 45     | 1.7717 | 0.010                                       | 0.0004 | 85                 | 3.3465  | 0.015                                       | 0.0006  | 19      | 0.7480 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.435  | 0.96  | 25900                             | 5850  | 40500                                                      | 9150  |
| 7210WN                   | 50     | 1.9685 | 0.010                                       | 0.0004 | 90                 | 3.5433  | 0.015                                       | 0.0006  | 20      | 0.7874 | 0.12                                        | 0.005 | 1.0                          | 0.039 | 0.508  | 1.12  | 28400                             | 6400  | 42500                                                      | 9500  |
| 7211WN                   | 55     | 2.1654 | 0.010                                       | 0.0004 | 100                | 3.9370  | 0.015                                       | 0.0006  | 21      | 0.8268 | 0.15                                        | 0.006 | 1.5                          | 0.059 | 0.635  | 1.40  | 36200                             | 8150  | 52000                                                      | 11800 |
| 7212WN                   | 60     | 2.3622 | 0.010                                       | 0.0004 | 110                | 4.3307  | 0.015                                       | 0.0006  | 22      | 0.8661 | 0.15                                        | 0.006 | 1.5                          | 0.059 | 0.835  | 1.84  | 44000                             | 10000 | 63000                                                      | 14300 |
| 7213WN                   | 65     | 2.5591 | 0.010                                       | 0.0004 | 120                | 4.7244  | 0.015                                       | 0.0006  | 23      | 0.9055 | 0.15                                        | 0.006 | 1.5                          | 0.059 | 1.061  | 2.34  | 52400                             | 11800 | 72400                                                      | 16300 |
| 7214WN                   | 70     | 2.7559 | 0.010                                       | 0.0004 | 125                | 4.9213  | 0.018                                       | 0.0007  | 24      | 0.9449 | 0.15                                        | 0.006 | 1.5                          | 0.059 | 1.171  | 2.58  | 57300                             | 12900 | 78000                                                      | 17600 |
| 7215WN                   | 75     | 2.9528 | 0.010                                       | 0.0004 | 130                | 5.1181  | 0.018                                       | 0.0007  | 25      | 0.9843 | 0.15                                        | 0.006 | 1.5                          | 0.059 | 1.271  | 2.80  | 58000                             | 13200 | 78000                                                      | 17600 |
| 7216WN                   | 80     | 3.1496 | 0.010                                       | 0.0004 | 140                | 5.5118  | 0.018                                       | 0.0007  | 26      | 1.0236 | 0.15                                        | 0.006 | 2.0                          | 0.079 | 1.483  | 3.27  | 65500                             | 15600 | 91500                                                      | 20400 |
| 7217WN                   | 85     | 3.3465 | 0.013                                       | 0.0005 | 150                | 5.9055  | 0.018                                       | 0.0007  | 28      | 1.1024 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 2.096  | 4.62  | 76500                             | 18300 | 106000                                                     | 23600 |
| 7218WN                   | 90     | 3.5433 | 0.013                                       | 0.0005 | 160                | 6.2992  | 0.025                                       | 0.0010  | 30      | 1.1811 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 2.567  | 5.66  | 88000                             | 21200 | 119000                                                     | 27000 |
| 7219WN MBR               | 95     | 3.7402 | 0.013                                       | 0.0005 | 170                | 6.6929  | 0.025                                       | 0.0010  | 32      | 1.2600 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 3.025  | 6.67  | 93000                             | 22800 | 133000                                                     | 30000 |
| 7220WN MBR               | 100    | 3.9370 | 0.013                                       | 0.0005 | 180                | 7.0866  | 0.025                                       | 0.0010  | 34      | 1.3390 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 3.460  | 7.62  | 106000                            | 25500 | 146000                                                     | 33500 |
| 7222WN MBR               | 110    | 4.3307 | 0.013                                       | 0.0005 | 200                | 7.8740  | 0.030                                       | 0.0012  | 38      | 1.4960 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 5.162  | 11.38 | 134000                            | 32500 | 173000                                                     | 39000 |
| 7224WN MBR               | 120    | 4.7244 | 0.013                                       | 0.0005 | 215                | 8.4646  | 0.030                                       | 0.0012  | 40      | 1.5750 | 0.20                                        | 0.008 | 2.0                          | 0.079 | 6.354  | 14.01 | 160000                            | 36500 | 188000                                                     | 42500 |
| 7226WN MBR               | 130    | 5.1181 | 0.018                                       | 0.0007 | 230                | 9.0551  | 0.030                                       | 0.0012  | 40      | 1.5750 | 0.25                                        | 0.010 | 2.5                          | 0.098 | 7.543  | 16.63 | 176000                            | 43000 | 211000                                                     | 47500 |
| 7228WN MBR               | 140    | 5.5118 | 0.018                                       | 0.0007 | 250                | 9.8425  | 0.030                                       | 0.0012  | 42      | 1.6540 | 0.25                                        | 0.010 | 2.5                          | 0.098 | 9.634  | 21.24 | 200000                            | 47500 | 224000                                                     | 50000 |
| 7230WN MBR               | 150    | 5.9055 | 0.018                                       | 0.0007 | 270                | 10.6299 | 0.035                                       | 0.0014  | 45      | 1.7720 | 0.25                                        | 0.010 | 2.5                          | 0.098 | 11.731 | 25.84 | 240000                            | 56000 | 248000                                                     | 56000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Also available as W design.

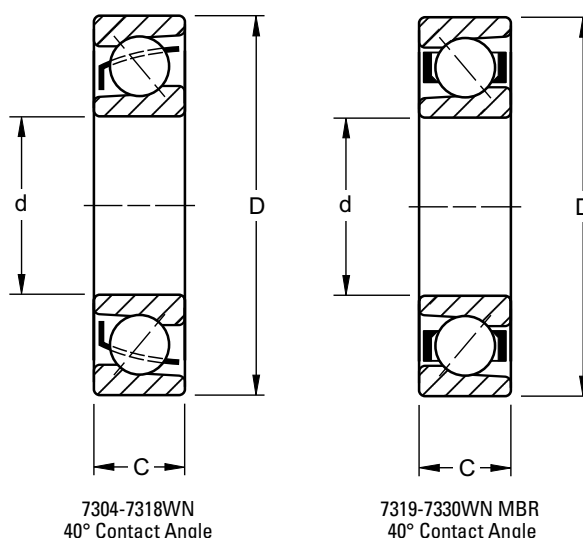
<sup>(3)</sup> Also available with 20° contact angle and nylon cage.

<sup>(4)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

**Note:** 7208WN-7212WN also available with a one-piece, high-strength machined bronze retainer (MBR). This cage can be quoted on the other sizes by request.

## MEDIUM 7300WN SERIES

- Dimensionally interchangeable with the radial 300 Series.
- The 7000WN Product Family includes a refined bore diameter. The 7300WN Series can sustain heavier thrust and combined loads than the 7200WN Series.
- A single bearing is suggested for applications in which the thrust load is in one direction or, in the case of combined loads, the thrust load is high in relation to the radial load.
- A duplex pair is suggested for applications where thrust is present in both directions or where axial displacement of the shaft must be restricted.
- For exceptionally high thrust loads in one direction, a tandem pair can be used, opposed by a third bearing.
- Size 7303W has a 20 degree contact angle and a steel cage.
- Sizes 7304WN through 7318WN have a 40 degree contact angle and a one-piece, ball-piloted, pressed brass cage.
- Larger sizes 7319WN through 7330WN have a 40 degree contact angle and a one-piece, outer ring piloted high-strength machined bronze cage.
- Sizes 7306WN to 7318WN also available with a one-piece, high-strength, machined bronze retainer.



## DIMENSIONS – TOLERANCES

| Bearing Number | Bore d |        |                                       |     | Outside Diameter D |                                       |    |        | Width C                               |     |       |        | Fillet Radius <sup>(1)</sup> |        | Wt.   |        | Static Load Rating C <sub>0</sub> |   | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |  |
|----------------|--------|--------|---------------------------------------|-----|--------------------|---------------------------------------|----|--------|---------------------------------------|-----|-------|--------|------------------------------|--------|-------|--------|-----------------------------------|---|------------------------------------------------------------|--|
|                | mm     | in.    | tolerance +0.000 mm +0.0000" to minus | mm  | in.                | tolerance +0.000 mm +0.0000" to minus | mm | in.    | tolerance +0.000 mm +0.0000" to minus | mm  | in.   | mm     | in.                          | kg     | lbs.  | N      | lbs.                              | N | lbs.                                                       |  |
| 7303W          | 17     | 0.6693 | 0.008 0.0003                          | 47  | 1.8504             | 0.011 0.00045                         | 14 | 0.5512 | 0.12 0.005                            | 1.0 | 0.039 | 0.118  | 0.26                         | 9200   | 2080  | 20200  | 4550                              |   |                                                            |  |
| 7304WN         | 20     | 0.7874 | 0.010 0.0004                          | 52  | 2.0472             | 0.013 0.0005                          | 15 | 0.5906 | 0.12 0.005                            | 1.0 | 0.039 | 0.150  | 0.33                         | 9590   | 2160  | 19500  | 4400                              |   |                                                            |  |
| 7305WN         | 25     | 0.9843 | 0.010 0.0004                          | 62  | 2.4409             | 0.013 0.0005                          | 17 | 0.6693 | 0.12 0.005                            | 1.0 | 0.039 | 0.241  | 0.53                         | 13300  | 3000  | 26500  | 5850                              |   |                                                            |  |
| 7306WN         | 30     | 1.1811 | 0.010 0.0004                          | 72  | 2.8346             | 0.013 0.0005                          | 19 | 0.7480 | 0.12 0.005                            | 1.0 | 0.039 | 0.363  | 0.80                         | 20800  | 4650  | 34600  | 7800                              |   |                                                            |  |
| 7307WN         | 35     | 1.3780 | 0.010 0.0004                          | 80  | 3.1496             | 0.013 0.0005                          | 21 | 0.8268 | 0.12 0.005                            | 1.5 | 0.059 | 0.408  | 0.90                         | 23900  | 5400  | 41300  | 9300                              |   |                                                            |  |
| 7308WN         | 40     | 1.5748 | 0.010 0.0004                          | 90  | 3.5433             | 0.015 0.0006                          | 23 | 0.9055 | 0.12 0.005                            | 1.5 | 0.059 | 0.667  | 1.47                         | 30200  | 6800  | 50600  | 11400                             |   |                                                            |  |
| 7309WN         | 45     | 1.7717 | 0.010 0.0004                          | 100 | 3.9370             | 0.015 0.0006                          | 25 | 0.9843 | 0.12 0.005                            | 1.5 | 0.059 | 0.885  | 1.95                         | 39900  | 9000  | 66600  | 15000                             |   |                                                            |  |
| 7310WN         | 50     | 1.9685 | 0.010 0.0004                          | 110 | 4.3307             | 0.015 0.0006                          | 27 | 1.0630 | 0.12 0.005                            | 2.0 | 0.079 | 1.139  | 2.51                         | 47900  | 10800 | 76800  | 17300                             |   |                                                            |  |
| 7311WN         | 55     | 2.1654 | 0.010 0.0004                          | 120 | 4.7244             | 0.015 0.0006                          | 29 | 1.1417 | 0.15 0.006                            | 2.0 | 0.079 | 1.592  | 3.51                         | 56400  | 12700 | 88800  | 20000                             |   |                                                            |  |
| 7312WN         | 60     | 2.3622 | 0.010 0.0004                          | 130 | 5.1181             | 0.018 0.0007                          | 31 | 1.2205 | 0.15 0.006                            | 2.0 | 0.079 | 1.969  | 4.34                         | 64800  | 14600 | 101000 | 22800                             |   |                                                            |  |
| 7313WN         | 65     | 2.5591 | 0.010 0.0004                          | 140 | 5.5118             | 0.018 0.0007                          | 33 | 1.2992 | 0.15 0.006                            | 2.0 | 0.079 | 2.477  | 5.46                         | 75500  | 17000 | 115000 | 26000                             |   |                                                            |  |
| 7314WN         | 70     | 2.7559 | 0.010 0.0004                          | 150 | 5.9055             | 0.018 0.0007                          | 35 | 1.3780 | 0.15 0.006                            | 2.0 | 0.079 | 2.676  | 5.90                         | 85700  | 19300 | 128000 | 29000                             |   |                                                            |  |
| 7315WN         | 75     | 2.9528 | 0.010 0.0004                          | 160 | 6.2992             | 0.025 0.0010                          | 37 | 1.4567 | 0.15 0.006                            | 2.0 | 0.079 | 3.452  | 7.61                         | 98000  | 22000 | 142000 | 32000                             |   |                                                            |  |
| 7316WN         | 80     | 3.1496 | 0.010 0.0004                          | 170 | 6.6929             | 0.025 0.0010                          | 39 | 1.5354 | 0.15 0.006                            | 2.0 | 0.079 | 4.504  | 9.92                         | 108000 | 24500 | 153000 | 34500                             |   |                                                            |  |
| 7317WN         | 85     | 3.3465 | 0.013 0.0005                          | 180 | 7.0866             | 0.025 0.0010                          | 41 | 1.6124 | 0.20 0.008                            | 2.5 | 0.098 | 4.940  | 10.88                        | 122000 | 27500 | 166000 | 37500                             |   |                                                            |  |
| 7318WN         | 90     | 3.5433 | 0.013 0.0005                          | 190 | 7.4803             | 0.030 0.0012                          | 43 | 1.6929 | 0.20 0.008                            | 2.5 | 0.098 | 6.247  | 13.76                        | 135000 | 30500 | 177000 | 40000                             |   |                                                            |  |
| 7319WN MBR     | 95     | 3.7402 | 0.013 0.0005                          | 200 | 7.8740             | 0.030 0.0012                          | 45 | 1.7717 | 0.20 0.008                            | 2.5 | 0.098 | 6.706  | 14.77                        | 148000 | 33500 | 191000 | 43000                             |   |                                                            |  |
| 7320WN MBR     | 100    | 3.9370 | 0.013 0.0005                          | 215 | 8.4646             | 0.030 0.0012                          | 47 | 1.8504 | 0.20 0.008                            | 2.5 | 0.098 | 8.227  | 18.12                        | 177000 | 40000 | 217000 | 49000                             |   |                                                            |  |
| 7321WN MBR     | 105    | 4.1339 | 0.013 0.0005                          | 225 | 8.8583             | 0.030 0.0012                          | 49 | 1.9291 | 0.20 0.008                            | 2.5 | 0.098 | 9.498  | 20.92                        | 191000 | 43000 | 226000 | 51000                             |   |                                                            |  |
| 7322WN MBR     | 110    | 4.3307 | 0.013 0.0005                          | 240 | 9.4488             | 0.030 0.0012                          | 50 | 1.9685 | 0.20 0.008                            | 2.5 | 0.098 | 10.892 | 23.99                        | 226000 | 51000 | 253000 | 57000                             |   |                                                            |  |
| 7324WN MBR     | 120    | 4.7244 | 0.013 0.0005                          | 260 | 10.2362            | 0.035 0.0014                          | 55 | 2.1654 | 0.20 0.008                            | 2.5 | 0.098 | 14.356 | 31.62                        | 259000 | 58500 | 284000 | 64000                             |   |                                                            |  |
| 7326WN MBR     | 130    | 5.1181 | 0.018 0.0007                          | 280 | 11.0236            | 0.035 0.0014                          | 58 | 2.2835 | 0.25 0.010                            | 3.0 | 0.118 | 17.339 | 38.19                        | 302000 | 68000 | 315000 | 71000                             |   |                                                            |  |
| 7328WN MBR     | 140    | 5.5118 | 0.018 0.0007                          | 300 | 11.8110            | 0.035 0.0014                          | 62 | 2.4409 | 0.25 0.010                            | 3.0 | 0.118 | 20.294 | 44.70                        | 346000 | 78000 | 339000 | 76500                             |   |                                                            |  |
| 7330WN MBR     | 150    | 5.9055 | 0.018 0.0007                          | 320 | 12.5984            | 0.040 0.0016                          | 65 | 2.5591 | 0.25 0.010                            | 3.0 | 0.118 | 24.907 | 54.86                        | 390000 | 88000 | 368000 | 83000                             |   |                                                            |  |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

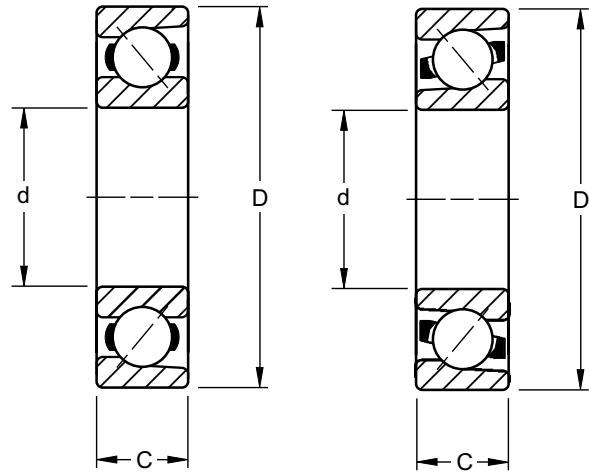




# BALL BEARINGS

## HEAVY 7400 SERIES

- Dimensionally interchangeable with the radial 400 Series.
- Sizes with a “WN” suffix include a refined bore diameter tolerance.
- Can sustain heavier thrust and combined loads than the 7300WN Series.
- A single bearing is suggested for applications in which the thrust load is in one direction or, in the case of combined loads, the thrust load is high in relation to the radial load.
- A duplex pair is suggested for applications where thrust is present in both directions or where axial displacement of the shaft must be restricted.
- For exceptionally high thrust loads in one direction, a tandem pair can be used, opposed by a third bearing.
- Sizes with a suffix “W” have a 20 degree contact angle and a steel retainer.
- Sizes with a suffix “PW” have a 35 degree contact angle and a steel retainer.
- Sizes with a “WN” suffix have a 40 degree contact angle and a one-piece, high-strength machined bronze cage.



7405W-7409W  
20° Contact Angle  
7410PW-7420PW  
35° Contact Angle

7412WN and 7415WN MBR  
40° Contact Angle

## DIMENSIONS – TOLERANCES

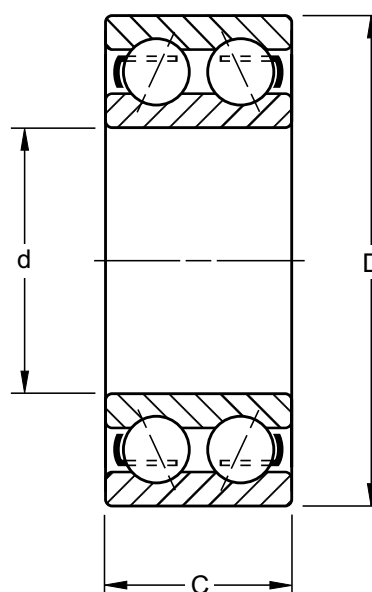
| Bearing Number | Bore d |        | Outside Diameter D |         |     |         | Width C |        |    |        | Fillet Radius <sup>(1)</sup> |       | Wt. |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>E</sub> <sup>(2)</sup> |       |        |       |
|----------------|--------|--------|--------------------|---------|-----|---------|---------|--------|----|--------|------------------------------|-------|-----|-------|-----------------------------------|-------|------------------------------------------------------------|-------|--------|-------|
|                | mm     | in.    | mm                 | in.     | mm  | in.     | mm      | in.    | mm | in.    | mm                           | in.   | kg  | lbs.  | N                                 | lbs.  | N                                                          | lbs.  |        |       |
| 7405W          | 25     | 0.9843 | 0.010              | 0.0004  | 80  | 3.1496  | 0.013   | 0.0005 | 21 | 0.8268 | 0.12                         | 0.005 | 1.5 | 0.060 | 0.925                             | 2.04  | 25900                                                      | 5850  | 53300  | 12000 |
| 7406W          | 30     | 1.1811 | 0.010              | 0.0004  | 90  | 3.5433  | 0.015   | 0.0006 | 23 | 0.9055 | 0.12                         | 0.005 | 1.5 | 0.060 | 0.957                             | 2.11  | 35500                                                      | 8000  | 69000  | 15600 |
| 7407W          | 35     | 1.3780 | 0.012              | 0.00045 | 100 | 3.9370  | 0.015   | 0.0006 | 25 | 0.9843 | 0.12                         | 0.005 | 1.5 | 0.060 | 1.002                             | 2.21  | 42800                                                      | 9650  | 79900  | 18000 |
| 7408W          | 40     | 1.5748 | 0.012              | 0.00045 | 110 | 4.3307  | 0.015   | 0.0006 | 27 | 1.0630 | 0.12                         | 0.005 | 2.0 | 0.080 | 1.311                             | 2.89  | 56400                                                      | 12700 | 99500  | 22400 |
| 7409W          | 45     | 1.7717 | 0.012              | 0.00045 | 120 | 4.7244  | 0.015   | 0.0006 | 29 | 1.1417 | 0.12                         | 0.005 | 2.0 | 0.080 | 1.647                             | 3.63  | 62000                                                      | 14000 | 106000 | 24000 |
| 7410WN         | 50     | 1.9685 | 0.012              | 0.00045 | 130 | 5.1181  | 0.018   | 0.0007 | 31 | 1.2205 | 0.12                         | 0.005 | 2.0 | 0.080 | 2.195                             | 4.84  | 66600                                                      | 15000 | 115000 | 26000 |
| 7411PW         | 55     | 2.1654 | 0.015              | 0.0006  | 140 | 5.5118  | 0.018   | 0.0007 | 33 | 1.2992 | 0.15                         | 0.006 | 2.0 | 0.080 | 2.681                             | 5.91  | 71000                                                      | 16000 | 122000 | 27500 |
| 7412WN         | 60     | 2.3622 | 0.010              | 0.0004  | 150 | 5.9055  | 0.018   | 0.0007 | 35 | 1.3780 | 0.15                         | 0.006 | 2.0 | 0.080 | 3.257                             | 7.18  | 85700                                                      | 19300 | 135000 | 30500 |
| 7413WN         | 65     | 2.5591 | 0.015              | 0.0006  | 160 | 6.2992  | 0.025   | 0.0010 | 37 | 1.4567 | 0.15                         | 0.006 | 2.0 | 0.080 | 3.896                             | 8.59  | 91500                                                      | 20400 | 142000 | 32000 |
| 7414WN         | 70     | 2.7559 | 0.015              | 0.0006  | 180 | 7.0866  | 0.025   | 0.0010 | 42 | 1.6535 | 0.15                         | 0.006 | 2.5 | 0.100 | 5.688                             | 12.54 | 115500                                                     | 26000 | 173000 | 39000 |
| 7415WN         | 75     | 2.9528 | 0.010              | 0.0004  | 190 | 7.4803  | 0.030   | 0.0012 | 45 | 1.7717 | 0.15                         | 0.006 | 2.5 | 0.100 | 6.745                             | 14.87 | 148000                                                     | 33500 | 202000 | 45500 |
| 7416WN         | 80     | 3.1496 | 0.015              | 0.0006  | 200 | 7.8740  | 0.030   | 0.0012 | 48 | 1.8898 | 0.15                         | 0.006 | 2.5 | 0.100 | 7.747                             | 17.08 | 153000                                                     | 34500 | 206000 | 46500 |
| 7418PW         | 90     | 3.5433 | 0.020              | 0.0008  | 225 | 8.8583  | 0.030   | 0.0012 | 54 | 2.1268 | 0.20                         | 0.008 | 3.0 | 0.120 | 11.159                            | 24.60 | 200000                                                     | 45000 | 236000 | 53000 |
| 7420PW         | 100    | 3.9370 | 0.020              | 0.0008  | 265 | 10.4331 | 0.036   | 0.0014 | 60 | 2.3622 | 0.20                         | 0.008 | 3.0 | 0.120 | 18.643                            | 41.10 | 279000                                                     | 63000 | 315000 | 71000 |

<sup>(1)</sup> Maximum shaft or housing fillet radius that bearing corners will clear.

<sup>(2)</sup> Based on 10<sup>6</sup> revolutions of calculated fatigue life.

### LIGHT 5200 SERIES

- Features the same bores and outside diameters as the corresponding bearings in the 200 Series single-row radial type.
- Double-row angular contact ball bearings meet the demand for increased axial and radial rigidity in applications where the design limits space.
- Available in both Conrad and maximum capacity types.
- Suffix "K" denotes Conrad (example: 5203K).
- Suffix "W" or no suffix denotes maximum capacity type (example: 5212W, 5213).
- Please note: these double-row series bearings are not prelubricated.



### DIMENSIONS – TOLERANCES

| Bearing Number       | Bore d |        | tolerance +0.000 mm +0.0000* to minus |         | Outside Diameter D |        | tolerance +0.000 mm +0.0000* to minus |         | Width C |                      |         | Fillet Radius <sup>(1)</sup> |       | Contact Angle | Wt.   |       | Static Load Rating C <sub>0</sub> |       | Extended Dynamic Load Rating C <sub>e</sub> <sup>(6)</sup> |       |
|----------------------|--------|--------|---------------------------------------|---------|--------------------|--------|---------------------------------------|---------|---------|----------------------|---------|------------------------------|-------|---------------|-------|-------|-----------------------------------|-------|------------------------------------------------------------|-------|
|                      | mm     | in.    | mm                                    | in.     | mm                 | in.    | mm                                    | in.     | mm      | in.                  | in.     | mm                           | in.   |               | kg    | lbs.  | N                                 | lbs.  | N                                                          | lbs.  |
| 5200K <sup>(2)</sup> | 10     | 0.3937 | 0.008                                 | 0.0003  | 30                 | 1.1811 | 0.009                                 | 0.00035 | 14.27   | 0.562                | 9/16    | 0.6                          | 0.024 | 20°           | 0.054 | 0.12  | 5060                              | 1140  | 10600                                                      | 2400  |
| 5201K <sup>(2)</sup> | 12     | 0.4724 | 0.008                                 | 0.0003  | 32                 | 1.2598 | 0.012                                 | 0.00045 | 15.88   | 0.625                | 5/8     | 0.6                          | 0.024 | 20°           | 0.068 | 0.15  | 4700                              | 1060  | 9060                                                       | 2040  |
| 5202K <sup>(2)</sup> | 15     | 0.5906 | 0.008                                 | 0.0003  | 35                 | 1.3780 | 0.012                                 | 0.00045 | 15.88   | 0.625                | 5/8     | 0.6                          | 0.024 | 20°           | 0.073 | 0.16  | 7100                              | 1600  | 13500                                                      | 3050  |
| 5203K <sup>(2)</sup> | 17     | 0.6693 | 0.008                                 | 0.0003  | 40                 | 1.5748 | 0.012                                 | 0.00045 | 17.48   | 0.688                | 1 1/16  | 0.6                          | 0.024 | 20°           | 0.104 | 0.23  | 9200                              | 2080  | 16800                                                      | 3800  |
| 5204K <sup>(2)</sup> | 20     | 0.7874 | 0.010                                 | 0.0004  | 47                 | 1.8504 | 0.012                                 | 0.00045 | 20.62   | 0.812                | 1 3/16  | 1.0                          | 0.039 | 20°           | 0.163 | 0.36  | 12600                             | 2850  | 22600                                                      | 5100  |
| 5205K <sup>(2)</sup> | 25     | 0.9843 | 0.010                                 | 0.0004  | 52                 | 2.0472 | 0.013                                 | 0.0005  | 20.62   | 0.812                | 1 3/16  | 1.0                          | 0.039 | 20°           | 0.186 | 0.41  | 15100                             | 3400  | 24800                                                      | 5600  |
| 5206K                | 30     | 1.1811 | 0.010                                 | 0.0004  | 62                 | 2.4409 | 0.013                                 | 0.0005  | 23.83   | 0.938                | 1 5/16  | 1.0                          | 0.039 | 20°           | 0.295 | 0.65  | 21700                             | 4900  | 34600                                                      | 7800  |
| 5206W                | 30     | 1.1811 | 0.010                                 | 0.0004  | 62                 | 2.4409 | 0.013                                 | 0.0005  | 23.83   | 0.938                | 1 5/16  | 1.0                          | 0.039 | 30°           | 0.295 | 0.65  | 27000                             | 6100  | 39000                                                      | 8800  |
| 5207K                | 35     | 1.3780 | 0.012                                 | 0.00047 | 72                 | 2.8346 | 0.013                                 | 0.0005  | 26.97   | 1.062                | 1 1/16  | 1.0                          | 0.039 | 20°           | 0.481 | 1.06  | 29000                             | 6550  | 45000                                                      | 10200 |
| 5207W                | 35     | 1.3780 | 0.012                                 | 0.00047 | 72                 | 2.8346 | 0.013                                 | 0.0005  | 26.97   | 1.062                | 1 1/16  | 1.0                          | 0.039 | 30°           | 0.481 | 1.06  | 36800                             | 8300  | 51500                                                      | 11600 |
| 5208K                | 40     | 1.5748 | 0.012                                 | 0.00047 | 80                 | 3.1496 | 0.013                                 | 0.0005  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 20°           | 0.566 | 1.32  | 33900                             | 7650  | 51500                                                      | 11600 |
| 5208W                | 40     | 1.5748 | 0.012                                 | 0.00047 | 80                 | 3.1496 | 0.013                                 | 0.0005  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 30°           | 0.599 | 1.32  | 47000                             | 10600 | 62000                                                      | 14000 |
| 5209K                | 45     | 1.7717 | 0.012                                 | 0.00047 | 85                 | 3.3456 | 0.015                                 | 0.0006  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 20°           | 0.699 | 1.54  | 39000                             | 8800  | 57000                                                      | 12900 |
| 5209W                | 45     | 1.7717 | 0.012                                 | 0.00047 | 85                 | 3.3456 | 0.015                                 | 0.0006  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 30°           | 0.699 | 1.54  | 51500                             | 11600 | 64800                                                      | 14600 |
| 5210K                | 50     | 1.9685 | 0.012                                 | 0.00047 | 90                 | 3.5433 | 0.015                                 | 0.0006  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 20°           | 0.753 | 1.66  | 44400                             | 10000 | 62000                                                      | 14000 |
| 5210W                | 50     | 1.9685 | 0.012                                 | 0.00047 | 90                 | 3.5433 | 0.015                                 | 0.0006  | 30.17   | 1.188                | 1 3/16  | 1.0                          | 0.039 | 30°           | 0.753 | 1.66  | 56000                             | 12700 | 66600                                                      | 15000 |
| 5211K                | 55     | 2.1654 | 0.015                                 | 0.0006  | 100                | 3.9370 | 0.015                                 | 0.0006  | 33.32   | 1.312 <sup>(4)</sup> | 1 5/16  | 1.5                          | 0.059 | 20°           | 1.039 | 2.29  | 71000                             | 12700 | 76000                                                      | 17300 |
| 5211W                | 55     | 2.1654 | 0.015                                 | 0.0006  | 100                | 3.9370 | 0.015                                 | 0.0006  | 33.32   | 1.312 <sup>(4)</sup> | 1 5/16  | 1.5                          | 0.059 | 30°           | 1.039 | 2.29  | 62000                             | 16000 | 84000                                                      | 19000 |
| 5212K                | 60     | 2.3622 | 0.015                                 | 0.0006  | 110                | 4.3307 | 0.015                                 | 0.0006  | 36.53   | 1.438 <sup>(4)</sup> | 1 7/16  | 1.5                          | 0.059 | 20°           | 1.388 | 3.06  | 88800                             | 14000 | 85000                                                      | 19300 |
| 5212W                | 60     | 2.3622 | 0.015                                 | 0.0006  | 110                | 4.3307 | 0.015                                 | 0.0006  | 36.53   | 1.438 <sup>(4)</sup> | 1 7/16  | 1.5                          | 0.059 | 30°           | 1.388 | 3.06  | 72000                             | 20000 | 103000                                                     | 23800 |
| 5213K                | 65     | 2.5591 | 0.015                                 | 0.0006  | 120                | 4.7244 | 0.015                                 | 0.0006  | 38.10   | 1.500 <sup>(4)</sup> | 1 1/2   | 1.5                          | 0.059 | 20°           | 1.923 | 4.24  | 76800                             | 17300 | 101000                                                     | 22800 |
| 5213 <sup>(3)</sup>  | 65     | 2.5591 | 0.015                                 | 0.0006  | 120                | 4.7244 | 0.015                                 | 0.0006  | 38.10   | 1.500 <sup>(4)</sup> | 1 1/2   | 1.5                          | 0.059 | 30°           | 1.923 | 4.24  | 92000                             | 20800 | 99500                                                      | 22400 |
| 5214K                | 70     | 2.7559 | 0.015                                 | 0.0006  | 125                | 4.9213 | 0.018                                 | 0.0007  | 39.67   | 1.562 <sup>(4)</sup> | 1 9/16  | 1.5                          | 0.059 | 20°           | 2.096 | 4.62  | 84000                             | 19000 | 108000                                                     | 24500 |
| 5214 <sup>(3)</sup>  | 70     | 2.7559 | 0.015                                 | 0.0006  | 125                | 4.9213 | 0.018                                 | 0.0007  | 39.67   | 1.562 <sup>(4)</sup> | 1 9/16  | 1.5                          | 0.059 | 30°           | 2.096 | 4.62  | 126000                            | 28500 | 139000                                                     | 31500 |
| 5215K                | 75     | 2.9528 | 0.015                                 | 0.0006  | 130                | 5.1181 | 0.018                                 | 0.0007  | 41.28   | 1.625 <sup>(4)</sup> | 1 5/8   | 1.5                          | 0.059 | 20°           | 2.336 | 5.15  | 85700                             | 19300 | 108000                                                     | 24500 |
| 5215 <sup>(3)</sup>  | 75     | 2.9528 | 0.015                                 | 0.0006  | 130                | 5.1181 | 0.018                                 | 0.0007  | 41.28   | 1.625 <sup>(4)</sup> | 1 5/8   | 1.5                          | 0.059 | 30°           | 2.336 | 5.15  | 137000                            | 31000 | 144000                                                     | 32500 |
| 5216 <sup>(3)</sup>  | 80     | 3.1496 | 0.015                                 | 0.0006  | 140                | 5.5118 | 0.018                                 | 0.0007  | 44.45   | 1.750 <sup>(4)</sup> | 1 3/4   | 2.0                          | 0.079 | 30°           | 2.867 | 6.32  | 162000                            | 36500 | 168000                                                     | 38000 |
| 5217 <sup>(3)</sup>  | 85     | 3.3465 | 0.020                                 | 0.0008  | 150                | 5.9055 | 0.018                                 | 0.0007  | 49.23   | 1.938 <sup>(5)</sup> | 1 15/16 | 2.0                          | 0.079 | 30°           | 3.629 | 8.00  | 177000                            | 40000 | 188000                                                     | 42500 |
| 5218W                | 90     | 3.5433 | 0.020                                 | 0.0008  | 160                | 6.2992 | 0.025                                 | 0.0010  | 52.37   | 2.062 <sup>(5)</sup> | 2 1/16  | 2.0                          | 0.079 | 20°           | 4.518 | 9.96  | 191000                            | 43000 | 202000                                                     | 45500 |
| 5219 <sup>(3)</sup>  | 95     | 3.7402 | 0.020                                 | 0.0008  | 170                | 6.6929 | 0.025                                 | 0.0010  | 55.58   | 2.188 <sup>(5)</sup> | 2 3/16  | 2.0                          | 0.079 | 30°           | 5.411 | 11.93 | 235000                            | 53000 | 244000                                                     | 55000 |
| 5220W                | 100    | 3.9370 | 0.020                                 | 0.0008  | 180                | 7.0866 | 0.025                                 | 0.0010  | 60.32   | 2.375 <sup>(5)</sup> | 2 3/8   | 2.0                          | 0.079 | 20°           | 6.541 | 14.42 | 253000                            | 57000 | 259000                                                     | 58500 |
| 5221W                | 105    | 4.1339 | 0.020                                 | 0.0008  | 190                | 7.4803 | 0.030                                 | 0.0012  | 65.10   | 2.563 <sup>(5)</sup> | 2 9/16  | 2.0                          | 0.079 | 20°           | 7.537 | 16.60 | 301000                            | 67600 | 300000                                                     | 67500 |
| 5222 <sup>(3)</sup>  | 110    | 4.3307 | 0.020                                 | 0.0008  | 200                | 7.8740 | 0.030                                 | 0.0012  | 69.85   | 2.750 <sup>(5)</sup> | 2 3/4   | 2.0                          | 0.079 | 30°           | 9.503 | 20.95 | 339000                            | 76500 | 326000                                                     | 73500 |

(1) Maximum shaft or housing fillet radius that bearing corners will clear.  
 (2) Sizes have PRB molded nylon retainers.  
 (3) These sizes have contact angle converging inside the bearing.  
 (4) Width tolerance is +.00 mm to -.15 mm (+.000 to -.006").  
 (5) Width tolerance is +.00 mm to -.20 mm (+.000 to -.008").  
 (6) Based on 10<sup>6</sup> revolutions of calculated fatigue life.

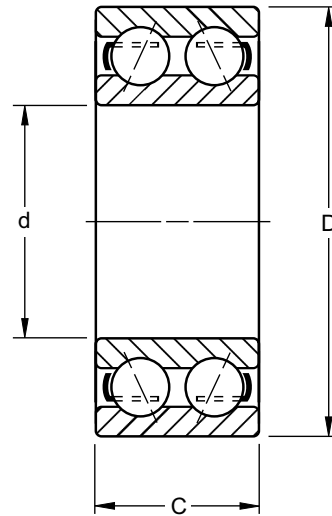
**Note:** See page D45 for Shield and Snap Ring Combinations.



# BALL BEARINGS

## MEDIUM 5300 SERIES

- Features the same bores and outside diameters as corresponding bearings in the 300 Series single-row radial type.
- Double-row angular contact ball bearings meet the demand for increased axial and radial rigidity in applications where design limits space.
- Available in Conrad and maximum capacity types.
- Suffix "K" denotes Conrad type (example: 5303K).
- Suffix "W" or no suffix denotes maximum capacity type (examples: 5312W, 5319).
- Please note that these double-row series bearings are not prelubricated.



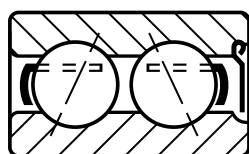
### DIMENSIONS – TOLERANCES

| Bearing Number       | Bore d |        | tolerance +0.000 mm to minus |         | Outside Diameter D |         | tolerance +0.000 mm to minus |         | Width C |                      |         | Fillet Radius <sup>(1)</sup> | Contact Angle | Wt. |        | Static Load Rating C <sub>0</sub> |        | Extended Dynamic Load Rating C <sub>e</sub> <sup>(6)</sup> |        |        |
|----------------------|--------|--------|------------------------------|---------|--------------------|---------|------------------------------|---------|---------|----------------------|---------|------------------------------|---------------|-----|--------|-----------------------------------|--------|------------------------------------------------------------|--------|--------|
|                      | mm     | in.    | mm                           | in.     | mm                 | in.     | mm                           | in.     | mm      | in.                  | in.     |                              |               | kg  | lbs.   | N                                 | lbs.   | N                                                          | lbs.   |        |
| 5302                 | 15     | 0.5906 | 0.008                        | 0.0003  | 42                 | 1.6535  | 0.012                        | 0.00045 | 19.05   | 0.75                 | 3/4     | 1.0                          | 0.039         | 20° | 0.141  | 0.31                              | 9200   | 2080                                                       | 16800  | 3800   |
| 5303K                | 17     | 0.6693 | 0.008                        | 0.0003  | 47                 | 1.8504  | 0.012                        | 0.00045 | 22.22   | 0.875                | 7/8     | 1.0                          | 0.039         | 20° | 0.191  | 0.42                              | 12600  | 2850                                                       | 22600  | 5100   |
| 5304K <sup>(2)</sup> | 20     | 0.7874 | 0.010                        | 0.0004  | 52                 | 2.0472  | 0.013                        | 0.0005  | 22.22   | 0.875                | 7/8     | 1.0                          | 0.039         | 20° | 0.222  | 0.49                              | 15300  | 3450                                                       | 28400  | 6400   |
| 5305K <sup>(2)</sup> | 25     | 0.9843 | 0.010                        | 0.0004  | 62                 | 2.4409  | 0.013                        | 0.0005  | 25.4    | 1.000                | 1       | 1.0                          | 0.039         | 20° | 0.367  | 0.81                              | 21100  | 4750                                                       | 37700  | 8500   |
| 5306K                | 30     | 1.1811 | 0.010                        | 0.0004  | 72                 | 2.8346  | 0.013                        | 0.0005  | 30.17   | 1.188                | 1 1/16  | 1.0                          | 0.039         | 20° | 0.612  | 1.35                              | 29000  | 6550                                                       | 47000  | 10600  |
| 5306W                | 30     | 1.1811 | 0.010                        | 0.0004  | 72                 | 2.8346  | 0.013                        | 0.0005  | 30.17   | 1.188                | 1 1/16  | 1.0                          | 0.039         | 30° | 0.612  | 1.35                              | 41000  | 9300                                                       | 62000  | 14000  |
| 5307K                | 35     | 1.3780 | 0.012                        | 0.00047 | 80                 | 3.1496  | 0.013                        | 0.0005  | 34.93   | 1.375                | 1 3/8   | 1.5                          | 0.059         | 20° | 0.871  | 1.92                              | 36000  | 8300                                                       | 59500  | 13400  |
| 5307W                | 35     | 1.3780 | 0.012                        | 0.00047 | 80                 | 3.1496  | 0.013                        | 0.0005  | 34.93   | 1.375                | 1 3/8   | 1.5                          | 0.059         | 30° | 0.871  | 1.92                              | 47900  | 10800                                                      | 69200  | 15600  |
| 5308K                | 40     | 1.5748 | 0.012                        | 0.00047 | 90                 | 3.5433  | 0.015                        | 0.0006  | 36.53   | 1.438                | 1 7/16  | 1.5                          | 0.059         | 20° | 1.139  | 2.51                              | 46000  | 10400                                                      | 72400  | 16300  |
| 5308W                | 40     | 1.5748 | 0.012                        | 0.00047 | 90                 | 3.5433  | 0.015                        | 0.0006  | 36.53   | 1.438                | 1 7/16  | 1.5                          | 0.059         | 30° | 1.139  | 2.51                              | 66600  | 15000                                                      | 90600  | 20400  |
| 5309K                | 45     | 1.7717 | 0.012                        | 0.00047 | 100                | 3.9370  | 0.015                        | 0.0006  | 39.67   | 1.562                | 1 9/16  | 1.5                          | 0.059         | 20° | 1.433  | 3.16                              | 56400  | 12700                                                      | 87000  | 19600  |
| 5309W                | 45     | 1.7717 | 0.012                        | 0.00047 | 100                | 3.9370  | 0.015                        | 0.0006  | 39.67   | 1.562                | 1 9/16  | 1.5                          | 0.059         | 30° | 1.433  | 3.16                              | 81000  | 18300                                                      | 106000 | 24000  |
| 5310K                | 50     | 1.9685 | 0.012                        | 0.00047 | 110                | 4.3307  | 0.015                        | 0.0006  | 44.45   | 1.750                | 1 3/4   | 2.0                          | 0.079         | 20° | 2.091  | 4.61                              | 73000  | 16600                                                      | 111000 | 25000  |
| 5310W                | 50     | 1.9685 | 0.012                        | 0.00047 | 110                | 4.3307  | 0.015                        | 0.0006  | 44.45   | 1.750                | 1 3/4   | 2.0                          | 0.079         | 30° | 2.091  | 4.61                              | 97000  | 22000                                                      | 126000 | 28500  |
| 5311K                | 55     | 2.1654 | 0.015                        | 0.0006  | 120                | 4.7244  | 0.015                        | 0.0006  | 49.22   | 1.938 <sup>(3)</sup> | 1 15/16 | 2.0                          | 0.079         | 20° | 2.722  | 6.00                              | 86700  | 19500                                                      | 124400 | 28000  |
| 5311W                | 55     | 2.1654 | 0.015                        | 0.0006  | 120                | 4.7244  | 0.015                        | 0.0006  | 49.22   | 1.938 <sup>(3)</sup> | 1 15/16 | 2.0                          | 0.079         | 20° | 2.722  | 6.00                              | 113000 | 25500                                                      | 144000 | 32500  |
| 5312W                | 60     | 2.3622 | 0.015                        | 0.0006  | 130                | 5.1181  | 0.018                        | 0.0007  | 53.98   | 2.125 <sup>(3)</sup> | 2 1/8   | 2.0                          | 0.079         | 20° | 3.423  | 7.54                              | 151000 | 34000                                                      | 191000 | 43000  |
| 5313W                | 65     | 2.5591 | 0.015                        | 0.0006  | 140                | 5.5118  | 0.018                        | 0.0007  | 58.72   | 2.312 <sup>(3)</sup> | 2 5/16  | 2.0                          | 0.079         | 20° | 4.163  | 9.17                              | 173000 | 39000                                                      | 213000 | 48000  |
| 5314W                | 70     | 2.7559 | 0.015                        | 0.0006  | 150                | 5.9055  | 0.018                        | 0.0007  | 63.50   | 2.500 <sup>(3)</sup> | 2 1/2   | 2.0                          | 0.079         | 20° | 5.362  | 11.82                             | 195000 | 44000                                                      | 239000 | 54000  |
| 5315W                | 75     | 2.9528 | 0.015                        | 0.0006  | 160                | 6.2992  | 0.025                        | 0.0010  | 68.30   | 2.689 <sup>(3)</sup> | 2 11/16 | 2.0                          | 0.079         | 20° | 6.428  | 14.17                             | 222000 | 50000                                                      | 266000 | 60000  |
| 5316W                | 80     | 3.1496 | 0.015                        | 0.0006  | 170                | 6.6929  | 0.025                        | 0.0010  | 68.28   | 2.688 <sup>(3)</sup> | 2 11/16 | 2.0                          | 0.079         | 20° | 7.366  | 16.24                             | 248000 | 56000                                                      | 284000 | 64000  |
| 5317W                | 85     | 3.3465 | 0.020                        | 0.0008  | 180                | 7.0866  | 0.025                        | 0.0010  | 73.02   | 2.875 <sup>(4)</sup> | 2 7/8   | 2.5                          | 0.098         | 20° | 8.827  | 19.46                             | 279000 | 63000                                                      | 308000 | 69500  |
| 5318W                | 90     | 3.5433 | 0.020                        | 0.0008  | 190                | 7.4803  | 0.030                        | 0.0012  | 73.02   | 2.875 <sup>(4)</sup> | 2 7/8   | 2.5                          | 0.098         | 20° | 9.616  | 21.20                             | 308000 | 69500                                                      | 333000 | 75000  |
| 5319W                | 95     | 3.7402 | 0.020                        | 0.0008  | 200                | 7.8740  | 0.030                        | 0.0012  | 77.77   | 3.062 <sup>(4)</sup> | 3 1/16  | 2.5                          | 0.098         | 30° | 11.562 | 25.49                             | 319000 | 72000                                                      | 333000 | 75000  |
| 5320W                | 100    | 3.9370 | 0.020                        | 0.0008  | 215                | 8.4646  | 0.030                        | 0.0012  | 82.55   | 3.250 <sup>(4)</sup> | 3 1/4   | 2.5                          | 0.098         | 20° | 14.333 | 31.57                             | 377000 | 85000                                                      | 377000 | 85000  |
| 5322W                | 110    | 4.3307 | 0.020                        | 0.0008  | 240                | 9.4488  | 0.030                        | 0.0012  | 92.08   | 3.625 <sup>(4)</sup> | 3 3/8   | 2.5                          | 0.098         | 20° | 20.153 | 44.43                             | 479000 | 108000                                                     | 453000 | 102000 |
| 5324W                | 120    | 4.7244 | 0.020                        | 0.0008  | 260                | 10.2362 | 0.035                        | 0.0014  | 104.78  | 4.125 <sup>(4)</sup> | 4 1/8   | 2.5                          | 0.098         | 20° | 28.291 | 62.37                             | 555000 | 125000                                                     | 497000 | 112000 |
| 5328W                | 140    | 5.5118 | 0.025                        | 0.0010  | 300                | 11.8110 | 0.035                        | 0.0014  | 114.30  | 4.500 <sup>(5)</sup> | 4 1/2   | 3.0                          | 0.118         | 20° | 38.102 | 84.00                             | 630000 | 140000                                                     | 570000 | 129000 |

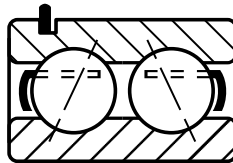
(1) Maximum shaft or housing fillet radius that bearing corners will clear.  
 (2) Sizes have PRB molded nylon retainers.  
 (3) Width tolerance is +.00 mm to -.15 mm (+.000 to -.006").  
 (4) Width tolerance is +.00 mm to -.20 mm (+.000 to -.008").  
 (5) Width tolerance is +.00 mm to -.25 mm (+.000 to -.010").  
 (6) Based on 10<sup>6</sup> revolutions of calculated fatigue life.

**Note:** See opposite page for shield and snap ring combinations.

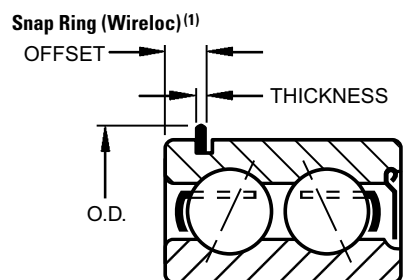
SHIELD AND SNAP RING COMBINATIONS



One Shield D



Open Type G



One Shield DG

5200 SERIES

| Bearing Number        | Width<br>+0.00 mm, -0.12 mm<br>+0.000", -0.005" |                      |                                | Wt.   |      | Bearing Number       | O.D.  |                                 | Snap Ring <sup>(1)</sup> |       | Wt.  |       |       |       |
|-----------------------|-------------------------------------------------|----------------------|--------------------------------|-------|------|----------------------|-------|---------------------------------|--------------------------|-------|------|-------|-------|-------|
|                       | mm                                              | in.                  | in.                            | kg    | lbs. |                      | mm    | in.                             | mm                       | in.   | mm   | in.   | kg    | lbs.  |
| 5200KDD2              | 15.88                                           | 0.625 <sup>(3)</sup> | 5/8                            | 0.054 | 0.12 | —                    | 34.5  | 1 <sup>23</sup> / <sub>64</sub> | 1.07                     | 0.042 | 3.05 | 0.120 | —     | —     |
| 5201KD(DD)            | 15.88                                           | 0.625                | 5/8                            | 0.064 | 0.14 | —                    | 36.5  | 1 <sup>7</sup> / <sub>16</sub>  | 1.07                     | 0.042 | 3.05 | 0.120 | —     | —     |
| —                     | —                                               | —                    | —                              | —     | —    | —                    | 39.3  | 1 <sup>35</sup> / <sub>64</sub> | 1.07                     | 0.042 | 3.05 | 0.120 | —     | —     |
| 5203KD(KDD3)          | 17.48                                           | 0.688                | 1 <sup>1</sup> / <sub>16</sub> | 0.159 | 0.35 | 5203KDG              | 44.4  | 1 <sup>3</sup> / <sub>4</sub>   | 1.07                     | 0.042 | 3.05 | 0.120 | 0.127 | 0.28  |
| 5204KD                | 20.62                                           | 0.812                | 1 <sup>3</sup> / <sub>16</sub> | 0.118 | 0.26 | 5204KG               | 52.4  | 2 <sup>1</sup> / <sub>16</sub>  | 1.07                     | 0.042 | 3.45 | 0.136 | 0.150 | 0.33  |
| 5205KD                | 22.22                                           | 0.875                | 7/8                            | 0.204 | 0.45 | 5205KG               | 57.5  | 2 <sup>17</sup> / <sub>64</sub> | 1.07                     | 0.042 | 3.45 | 0.136 | 0.200 | 0.44  |
| 5206WD                | 26.97                                           | 1.062                | 1 <sup>1</sup> / <sub>16</sub> | 0.336 | 0.74 | 5206WG(KG)           | 67.5  | 2 <sup>21</sup> / <sub>32</sub> | 1.65                     | 0.065 | 4.83 | 0.190 | 0.331 | 0.73  |
| 5207WD                | 30.17                                           | 1.188                | 1 <sup>3</sup> / <sub>16</sub> | 0.546 | 1.21 | 5207KG               | 78.2  | 3 <sup>5</sup> / <sub>64</sub>  | 1.65                     | 0.065 | 4.83 | 0.190 | —     | —     |
| 5208WD                | 30.17                                           | 1.188                | 1 <sup>3</sup> / <sub>16</sub> | 0.662 | 1.46 | —                    | 86.5  | 3 <sup>13</sup> / <sub>32</sub> | 1.65                     | 0.065 | 4.83 | 0.190 | —     | —     |
| 5209WD                | 30.17                                           | 1.188                | 1 <sup>3</sup> / <sub>16</sub> | 0.712 | 1.57 | 5209WG(KG)           | 91.3  | 3 <sup>19</sup> / <sub>32</sub> | 1.65                     | 0.065 | 4.83 | 0.190 | 0.721 | 1.59  |
| 5210WD                | 33.32                                           | 1.312                | 1 <sup>5</sup> / <sub>16</sub> | 0.816 | 1.80 | 5210WG(KG)           | 96.4  | 3 <sup>51</sup> / <sub>64</sub> | 2.41                     | 0.095 | 5.59 | 0.220 | 0.771 | 1.70  |
| 5211WD                | 33.32                                           | 1.312                | 1 <sup>5</sup> / <sub>16</sub> | 1.043 | 2.30 | 5211WG(KG)           | 106.4 | 4 <sup>3</sup> / <sub>16</sub>  | 2.41                     | 0.095 | 5.59 | 0.220 | 1.066 | 2.35  |
| 5212WD                | 39.67                                           | 1.562                | 1 <sup>9</sup> / <sub>16</sub> | 1.497 | 3.30 | 5212WG(KG)           | 116.3 | 4 <sup>37</sup> / <sub>64</sub> | 2.41                     | 0.095 | 5.59 | 0.220 | 1.424 | 3.14  |
| 5213WD                | —                                               | —                    | —                              | —     | —    | —                    | 129.4 | 5 <sup>3</sup> / <sub>32</sub>  | 2.77                     | 0.109 | 6.73 | 0.265 | —     | —     |
| 5214WD <sup>(2)</sup> | 39.67                                           | 1.562                | 1 <sup>9</sup> / <sub>16</sub> | 2.137 | 4.71 | —                    | 134.5 | 5 <sup>19</sup> / <sub>64</sub> | 2.77                     | 0.109 | 6.73 | 0.265 | —     | —     |
| —                     | —                                               | —                    | —                              | —     | —    | 5215G <sup>(2)</sup> | 139.7 | 5 <sup>1</sup> / <sub>2</sub>   | 2.77                     | 0.109 | 6.73 | 0.265 | 2.327 | 5.13  |
| 5216DD <sup>(2)</sup> | 47.62                                           | 1.875                | 1 <sup>7</sup> / <sub>8</sub>  | 3.062 | 6.75 | 5216G <sup>(2)</sup> | 149.6 | 5 <sup>57</sup> / <sub>64</sub> | 2.77                     | 0.109 | 7.54 | 0.297 | 2.962 | 6.53  |
| —                     | —                                               | —                    | —                              | —     | —    | 5217G <sup>(2)</sup> | 159.5 | 6 <sup>3</sup> / <sub>32</sub>  | 2.77                     | 0.109 | 7.54 | 0.297 | 3.724 | 8.21  |
| 5218WD                | 52.37                                           | 2.062                | 2 <sup>1</sup> / <sub>16</sub> | 4.504 | 9.93 | —                    | 169.5 | 6 <sup>43</sup> / <sub>64</sub> | 2.77                     | 0.109 | 7.54 | 0.297 | —     | —     |
| —                     | —                                               | —                    | —                              | —     | —    | 5219G <sup>(2)</sup> | 182.6 | 7 <sup>3</sup> / <sub>16</sub>  | 3.05                     | 0.120 | 8.61 | 0.339 | 5.498 | 12.12 |

5300 SERIES

| Bearing Number       | Width<br>+0.00 mm, -0.12 mm<br>+0.000", -0.005" |       |                                 | Wt.   |       | Bearing <sup>(4)</sup> Number | O.D.  |                                 | Snap Ring <sup>(1)</sup> |       | Wt.  |       |       |       |
|----------------------|-------------------------------------------------|-------|---------------------------------|-------|-------|-------------------------------|-------|---------------------------------|--------------------------|-------|------|-------|-------|-------|
|                      | mm                                              | in.   | in.                             | kg    | lbs.  |                               | mm    | in.                             | mm                       | in.   | mm   | in.   | kg    | lbs.  |
| 5303KDD              | 22.25                                           | 0.875 | 7/8                             | —     | —     | 5303KG                        | 52.4  | 2 <sup>1</sup> / <sub>16</sub>  | 1.07                     | 0.042 | 3.45 | 0.136 | 0.227 | 0.50  |
| 5304KDD              | 22.25                                           | 0.875 | 7/8                             | —     | —     | 5304KG                        | 57.6  | 2 <sup>17</sup> / <sub>64</sub> | 1.07                     | 0.042 | 3.45 | 0.136 | 0.231 | 0.51  |
| 5305KDD2             | 25.4                                            | 1.000 | 1                               | —     | —     | 5305KG                        | 67.5  | 2 <sup>21</sup> / <sub>32</sub> | 1.65                     | 0.065 | 4.83 | 0.190 | 0.376 | 0.83  |
| 5306WD               | 33.32                                           | 1.312 | 1 <sup>5</sup> / <sub>16</sub>  | 0.640 | 1.41  | 5306WG(KG)                    | 78.2  | 3 <sup>5</sup> / <sub>64</sub>  | 1.65                     | 0.065 | 4.83 | 0.190 | 0.608 | 1.34  |
| 5307WD               | 38.10                                           | 1.500 | 1 <sup>1</sup> / <sub>2</sub>   | 0.857 | 1.89  | 5307WG(KG)                    | 86.5  | 3 <sup>13</sup> / <sub>32</sub> | 1.65                     | 0.065 | 4.83 | 0.190 | 0.807 | 1.78  |
| 5308WD               | 39.67                                           | 1.562 | 1 <sup>9</sup> / <sub>16</sub>  | 1.143 | 2.52  | 5308WG(KG)                    | 96.4  | 3 <sup>51</sup> / <sub>64</sub> | 2.41                     | 0.095 | 5.59 | 0.220 | 1.102 | 2.43  |
| 5309WD               | 42.88                                           | 1.688 | 1 <sup>11</sup> / <sub>16</sub> | 1.665 | 3.67  | 5309WG(KG)                    | 106.4 | 4 <sup>3</sup> / <sub>16</sub>  | 2.41                     | 0.095 | 5.59 | 0.220 | 1.461 | 3.22  |
| 5310WD               | 47.62                                           | 1.875 | 1 <sup>7</sup> / <sub>8</sub>   | 2.019 | 4.45  | 5310WG(KG)                    | 116.3 | 4 <sup>37</sup> / <sub>64</sub> | 2.41                     | 0.095 | 5.59 | 0.220 | 1.932 | 4.26  |
| 5311D <sup>(4)</sup> | 52.37                                           | 2.062 | 2 <sup>1</sup> / <sub>16</sub>  | 2.826 | 6.23  | 5311WG(KG)                    | 129.4 | 5 <sup>3</sup> / <sub>32</sub>  | 2.77                     | 0.109 | 6.73 | 0.265 | 2.789 | 6.15  |
| 5312D <sup>(4)</sup> | 57.15                                           | 2.250 | 2 <sup>1</sup> / <sub>4</sub>   | 3.423 | 7.54  | 5312WG(KG)                    | 139.7 | 5 <sup>1</sup> / <sub>2</sub>   | 2.77                     | 0.109 | 6.73 | 0.265 | 3.493 | 7.70  |
| 5313D <sup>(4)</sup> | 61.72                                           | 2.438 | 2 <sup>7</sup> / <sub>16</sub>  | 4.663 | 10.28 | 5313WG(KG)                    | 149.6 | 5 <sup>57</sup> / <sub>64</sub> | 2.77                     | 0.109 | 7.54 | 0.297 | 4.291 | 9.46  |
| —                    | —                                               | —     | —                               | —     | —     | 5314WG(KG)                    | 159.5 | 6 <sup>3</sup> / <sub>32</sub>  | 2.77                     | 0.109 | 7.54 | 0.297 | 5.466 | 12.05 |
| —                    | —                                               | —     | —                               | —     | —     | 5315KG                        | 169.6 | 6 <sup>43</sup> / <sub>64</sub> | 2.77                     | 0.109 | 7.54 | 0.297 | —     | —     |

(1) The snap ring is normally packaged separately in the box with the bearing.  
 (2) These sizes have contact angle converging inside bearing (30°).  
 (3) Inner ring width is 19.05 mm (.7500").  
 (4) Ring widths are different for these parts. Contact a Timken sales engineer to validate size.



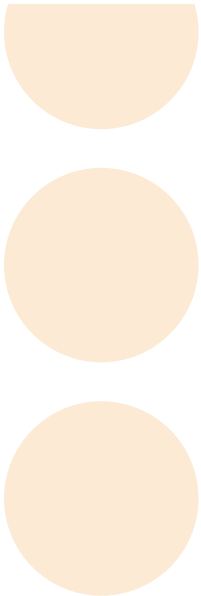
## **BALL BEARINGS**



### **NOTES**

D

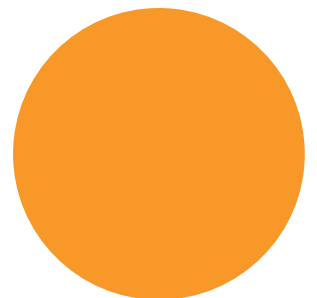
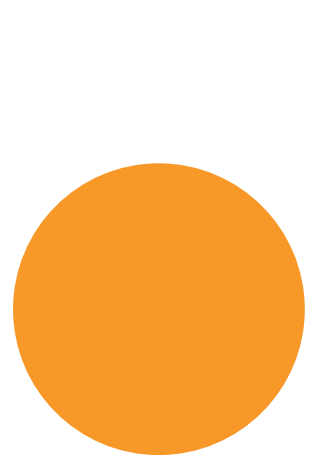




## WIDE INNER RING

**Overview:** Wide inner ring ball bearings consist of a single-row ball bearing and an extended inner ring. They carry radial, axial and combination loads. The extended inner ring slips onto the shaft and secures with a locking mechanism.

- **Sizes:** Standard series: 15 mm - 75 mm shaft (0.59 in. - 2.9528 in.).  
Medium and heavy-duty series go larger.
- **Markets:** Agriculture, fans and blowers, food processing and conveyors.
- **Features:** Available with a variety of shaft locking systems: eccentric locking collars, setscrews and concentric locking collars.
- **Benefits:** Designed for ease of mounting and maximum shaft support.





## Wide Inner Ring Ball Bearings

### Prefixes:

#### Basic Series and Additional Features

|               |                                       |
|---------------|---------------------------------------|
| <b>C</b>      | concentric collar                     |
| <b>E</b>      | metric bore                           |
| <b>G</b>      | relubricatable                        |
| <b>1</b>      | standard series (200 series bearings) |
| <b>L</b>      | light series                          |
| <b>N</b>      | heavy series (300 series bearings)    |
| <b>RA</b>     | extended inner ring, one side only    |
| <b>SM</b>     | standard series (open-type bearings)  |
| <b>SMN</b>    | heavy series (open-type bearings)     |
| <b>ER, YA</b> | setscrew locking device series        |
| <b>M</b>      | medium duty setscrew lock series      |

### Suffixes:

#### Internal Construction

|          |                                    |
|----------|------------------------------------|
| <b>K</b> | Conrad, non-filling slot-type      |
| <b>W</b> | maximum capacity filling slot-type |

**G1**

**103**

**K**

**RRB**

### Numbers:

Last three numbers indicate bore size — first in inches, last two in sixteenths

|            |                     |
|------------|---------------------|
| <b>015</b> | $1\frac{5}{16}$ in. |
| <b>103</b> | $1\frac{3}{16}$ in. |
| <b>203</b> | $2\frac{3}{16}$ in. |
| <b>25</b>  | 25 mm (metric)      |
| <b>40</b>  | 40 mm (metric)      |

### Additional Features

|                         |                                    |
|-------------------------|------------------------------------|
| <b>L</b>                | one Mechani-seal                   |
| <b>LL</b>               | two Mechani-seals                  |
| <b>PP</b>               | two seals                          |
| <b>R</b>                | one land-riding rubber seal        |
| <b>RR</b>               | two land-riding rubber seals       |
| <b>B</b>                | spherical outside diameter         |
| <b>S</b>                | external self-aligning             |
| <b>PP2, 3, 4, etc.,</b> | - Tri-Ply seals (if preceded by K) |
| <b>TDC</b>              | thin dense chrome plate            |
| <b>F</b>                | food grade grease                  |

D



# Wide Inner Ring Ball Bearings

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## BALL BEARINGS

### INTRODUCTION

Wide inner ring bearing design for ball bearings that are easily mounted on straight shafts and positioned without shoulders, locknuts or adapters.

The internal bearing construction is basically the same as the deep race, single row radial type with ability to carry radial, thrust and combined loads, while providing low friction qualities. The inner ring is generally extended on both sides of the race to provide additional shaft support, and is locked to the shaft by specially designed setscrews, an eccentric self-locking collar, or a concentric collar. The wide inner ring bearings are also available with cylindrical or spherical outside diameters. The cylindrical or straight O.D. type is used for mounting in straight-bored housings. The spherical O.D. type must be mounted in a corresponding spherical seat and is used to compensate for shaft or housing misalignments.

### WIDE INNER RING BEARINGS WITH ECCENTRIC LOCKING COLLARS

The following series are available with the cam (self-locking) collar.

#### RR SERIES

These bearings feature the flareout, contact type R-Seal which encloses a synthetic rubber impregnated washer between two metal caps. Most sizes incorporate the Shroud-Seal design. R-Seal wide inner ring bearings are available in the following non-relubricatable variations: KR (one seal, cylindrical O.D.), KRR and KRRB (two seals). Relubricatable versions are: G-KRR, G-KRRB and GN-KRRB (heavy-duty).



RR Series

#### LL SERIES

These bearings are dimensionally interchangeable with the RR Series, but have non-contact labyrinth seals and steel cages for low-torque, high speed and higher temperature service (up to 350° F.)

#### RA-RR SERIES

The RA-RR Series features an extended inner ring and self-locking collar for simple and effective shaft retention in a standard series bearing. The positive contact, land-riding R-Seal provides improved protection against the heavy contamination encountered in many applications. All sizes have a heat stabilized, moisture conditioned 6/6 nylon retainer which has proven effective under conditions of misalignment. RA-RR extended inner ring bearings are available as RA-RR (two-seals, straight O.D.) and RA-RRB (two seals, spherical O.D.). Relubricatable versions are GRA-RR and GRA-RRB.



RA-RR Series

#### TRI-PLY-SEAL SERIES

Tri-Ply Seal bearings are designed for environments where severe conditions and moisture are present. The one-piece Tri-Ply Seals incorporate a highly effective seal design molded to an exterior shroud cap. The shroud cap protects the seal lips from fiber wrap and abrasion while enhancing the overall sealing effectiveness of the unit. All units incorporate the self-locking collar and have a nylon retainer. Tri-Ply Seal bearings are available in both a non-relubricatable (KPPB) and relubricatable version (G-KPPB).



Tri-Ply Seal Series

#### EXTERNAL SELF-ALIGNING SERIES

The construction of this series permits the inner assembly, which contains an open type ball bearing with spherical O.D. to align in the seat of the mating outer ring. The seat of this outer ring is matched with the spherical O.D. of the ball bearing outer ring providing unrestricted self-alignment and allowing the inner assembly to become square and true with the shaft. Self-aligning units are available in both standard SM-S or heavy SMN-S Series.



External Self-Aligning Series

D

### RA-DD SERIES BEARINGS

The RA-DD Series bearings are extended inner ring type with cam locking collars. They incorporate two close fitting non-contact grease shields to effectively retain lubricant and provide protection against harmful contaminants. The non-contact metallic shields provide improved high speed and low-torque performance required for high speed printing press applications. The 6/6 molded nylon retainer has proven effective under conditions of misalignment. These bearings are dimensionally interchangeable and have the same load capacities as the RA-RR Series. (Available in 5/8 in. - 1 1/2 in. shaft sizes.)



RA-DD Series

### WIDE INNER RING BEARINGS WITH SETSCREW LOCKING DEVICE

The following series are available with the setscrew locking device with special setscrews that are resistant to loosening during operation.

#### Y SERIES

Full width inner ring Y Series bearings increase shaft support in HVAC, conveyors and other industrial applications. They feature superfinished raceways, grade 10 balls and anti-backout nylon patch setscrews. Flexible 6/6 nylon retainers and land-riding shroud seals also ensure excellent performance. They are factory prelubricated and relubricatable setscrew mounting feature is ideal for reversing applications.



Y Series

#### YA SERIES

The YA Series relubricatable and non-relubricatable bearings are an extended inner ring type with specially designed setscrews. Positive contact land-riding R-Seals provide protection against harmful contaminants and retain lubricant.

Setscrew series bearings are available in both non-relubricatable version YA and relubricatable version GYA-RRB. Both types have nylon retainers.



YA Series

#### ER SERIES

This series offers industry standard mounting dimensions and standard nomenclature for a large variety of sizes of relubricatable, extended inner ring bearings for through-bored housings. All bearings in this series have nylon retainers and are equipped with snap rings, eliminating the need for machining housing shoulders. ER bearings are designed with a unique setscrew locking device that locks bearing to shaft and is resistant to loosening during operation. Positive contact land-riding R-Seals provide protection against harmful contaminants and retain lubricant. All ER bearings are black oxide coated for corrosion resistance. Ideal for low-starting and running torque applications.



ER Series

### WIDE INNER RING BEARINGS WITH CONCENTRIC COLLARS

#### GC SERIES

The GC Series wide inner ring bearings are relubricatable with spherical outside diameters, nylon retainers and shroud seals. The metal shroud maintains tight seal contact against the inner ring and shields the rubber seals from damage due to dirt or fiber wrap. The concentric collar is locked to the shaft by two setscrews, located 120 degrees apart, mated with threaded holes in the collar and drilled holes in the bearing inner ring.



GC Series

#### YM MEDIUM DUTY SERIES

The Timken Medium Duty Series offers reliable performance and extended life for applications which see heavier loads. This series has been designed with a combination of premium features – such as superfinished raceways and a nylon patch setscrew locking device, as an ideal package for demanding conditions. These superior bearing inserts will operate with reduced levels in noise, vibration and friction and are the choice antifriction component for saw and paper mill applications, as well as fan and blower assemblies, food and grain handling and conveyor systems.



YM Series



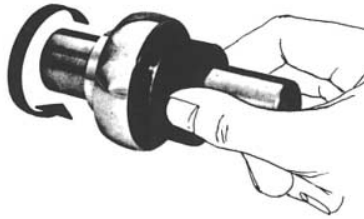


## BALL BEARINGS

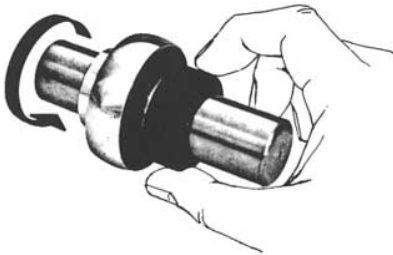
### CAM (SELF-LOCKING) COLLAR



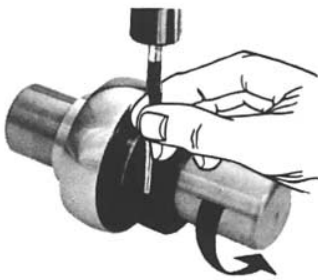
1. Observe cam design of the wide inner ring and self-locking collar.



2. Mate the cam of the collar with the cam of the wide inner ring.

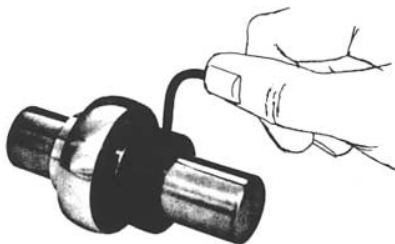


3. Press the locking collar against the wide inner ring and turn in the direction of shaft rotation until tightly engaged.



4. With drift pin in collar hole, strike in direction of shaft rotation to lock.

For stationary shafts and outer ring rotation, turn the collar in opposite direction of rotation.



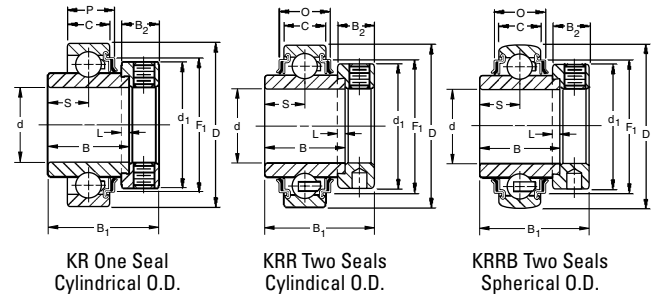
5. Tighten setscrew in collar.

D

## KR, KRR, KRRB INDUSTRIAL SERIES NON-RELUBRICATABLE TYPES

- Designed for extremely dirty or wet conditions.
- Feature R-Seals with flared lips that firmly contact the ground O.D. of the inner ring.
- R-Seals provide a positive seal against dirt and other contaminants while effectively retaining the lubricant.
- Equipped with Shroud-Seals, providing extra effectiveness and protection.
- Extra-wide design provides additional shaft support and extra-large grease capacity.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: 1103KRRB + COL.**

| Bearing Number        | Collar Number    | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D | Ring Widths |                      | S  | L   | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | F <sub>1</sub> | O  | P   | Brg. & Collar Wt. | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>E</sub> |       |
|-----------------------|------------------|-----------------------|-----------------------|--------|-------------|----------------------|----|-----|----------------|----------------|----------------|----------------|----|-----|-------------------|-----------------------------------|---------------------------------------------|-------|
|                       |                  |                       |                       |        | B Inner     | C Outer              |    |     |                |                |                |                |    |     |                   |                                   |                                             |       |
| Spherical O.D.        |                  |                       | mm                    | in.    | mm          | in.                  | mm | in. | mm             | in.            | mm             | in.            | mm | in. | kg                | lbs.                              | N                                           | lbs.  |
| -                     | 1008KRR (KRRB)   | S1008K                | 1/2                   |        |             |                      |    |     |                |                |                |                |    |     | 0.154             | 0.34                              |                                             |       |
| 1010KR                | 1010KRR (KRRB)   | S1010K                | 5/8                   | 40     | 27.78       | 12                   |    |     |                |                |                |                |    |     | 0.145             | 0.32                              | 4700                                        | 10700 |
| -                     | 1011KRR (KRRB)   | S1011K                | 11/16                 | 1.5748 | 1 3/32      | 0.472                |    |     |                |                |                |                |    |     | 0.122             | 0.27                              | 1060                                        | 2400  |
| -                     | E17KRR (KRRB)    | SE17K                 | 17                    |        |             |                      |    |     |                |                |                |                |    |     | 0.122             | 0.27                              |                                             |       |
| 1012KR                | 1012KRR (KRRB)   | S1012K                | 3/4                   | 47     | 34.13       | 14                   |    |     |                |                |                |                |    |     | 0.204             | 0.45                              | 6200                                        | 14300 |
| -                     | E20KRR (KRRB)    | SE20K                 | 20                    | 1.8504 | 1 11/32     | 0.551                |    |     |                |                |                |                |    |     | 0.204             | 0.45                              | 1400                                        | 3200  |
| -                     | 1013KRR (KRRB)   | S1013K                | 13/16                 |        |             |                      |    |     |                |                |                |                |    |     | 0.286             | 0.63                              |                                             |       |
| -                     | 1014KRR (KRRB)   | S1014K                | 7/8                   |        |             |                      |    |     |                |                |                |                |    |     | 0.272             | 0.6                               |                                             |       |
| 1015KR                | 1015KRR (KRRB)   | S1015K                | 15/16                 | 52     | 34.92       | 15                   |    |     |                |                |                |                |    |     | 0.254             | 0.56                              | 7700                                        | 15800 |
| 1100KR                | 1100KRR (KRRB)   | S1100K                | 1                     | 2.0472 | 1 3/8       | 0.591                |    |     |                |                |                |                |    |     | 0.231             | 0.51                              | 1730                                        | 3550  |
| -                     | E25KRR (KRRB)    | SE25K                 | 25                    |        |             |                      |    |     |                |                |                |                |    |     | 0.231             | 0.51                              |                                             |       |
| -                     | 1101 (KRRB)      | S1101K                | 1 1/16                |        |             |                      |    |     |                |                |                |                |    |     | 0.413             | 0.91                              |                                             |       |
| 1102KR                | 1102KRR (KRRB)   | S1102K                | 1 1/8                 | 62     | 36.51       | 16                   |    |     |                |                |                |                |    |     | 0.404             | 0.89                              | 11100                                       | 21200 |
| 1103KR                | 1103KRR (KRRB)   | S1103K                | 1 3/16                | 2.4409 | 1 7/16      | 0.630 <sup>(2)</sup> |    |     |                |                |                |                |    |     | 0.376             | 0.83                              | 2500                                        | 4900  |
| -                     | 1103KRR3 (KRRB3) | S1103K3               | 1 1/4                 |        |             |                      |    |     |                |                |                |                |    |     | 0.349             | 0.77                              |                                             |       |
| -                     | E30KRR (KRRB)    | SE30K                 | 30                    |        |             |                      |    |     |                |                |                |                |    |     | 0.376             | 0.83                              |                                             |       |
| 1104KR                | 1104KRR (KRRB)   | S1104K                | 1 1/4                 |        |             |                      |    |     |                |                |                |                |    |     | 0.653             | 1.44                              |                                             |       |
| -                     | 1105KRR (KRRB)   | S1105K                | 1 9/16                | 72     | 37.70       | 17                   |    |     |                |                |                |                |    |     | 0.603             | 1.33                              | 15100                                       | 28500 |
| -                     | 1106KRR (KRRB)   | S1106K                | 1 3/8                 | 2.8346 | 1 31/64     | 0.669 <sup>(3)</sup> |    |     |                |                |                |                |    |     | 0.572             | 1.26                              | 3400                                        | 6400  |
| 1107KR                | 1107KRR (KRRB)   | S1107K                | 1 7/16                |        |             |                      |    |     |                |                |                |                |    |     | 0.544             | 1.2                               |                                             |       |
| -                     | E35KRR (KRRB)    | SE35K                 | 35                    |        |             |                      |    |     |                |                |                |                |    |     | 0.572             | 1.26                              |                                             |       |
| 1108KR                | 1108KRR (KRRB)   | S1108KT               | 1 1/2                 | 80     | 42.86       | 18                   |    |     |                |                |                |                |    |     | 0.789             | 1.74                              | 19600                                       | 36000 |
| -                     | 1109KRR (KRRB)   | S1109KT               | 1 9/16                | 3.1496 | 1 11/16     | 0.709 <sup>(4)</sup> |    |     |                |                |                |                |    |     | 0.739             | 1.63                              | 4400                                        | 8150  |
| -                     | E40KRR (KRRB)    | SE40K                 | 40                    |        |             |                      |    |     |                |                |                |                |    |     | 0.739             | 1.63                              |                                             |       |
| -                     | 1110KRR (KRRB)   | S1110K                | 1 5/8                 |        |             |                      |    |     |                |                |                |                |    |     | 0.898             | 1.98                              |                                             |       |
| 1111KR                | 1111KRR (KRRB)   | S1111K                | 1 11/16               | 85     | 42.86       | 19                   |    |     |                |                |                |                |    |     | 0.848             | 1.87                              | 20000                                       | 36000 |
| 1112KR                | 1112KRR (KRRB)   | S1112K                | 1 3/4                 | 3.3465 | 1 11/16     | 0.748                |    |     |                |                |                |                |    |     | 0.825             | 1.82                              | 4500                                        | 8150  |
| -                     | E45KRR (KRRB)    | SE45K                 | 45                    |        |             |                      |    |     |                |                |                |                |    |     | 0.825             | 1.82                              |                                             |       |
| -                     | 1114KRR (KRRB)   | S1114K                | 1 7/8                 | 90     | 49.21       | 20 <sup>(5)</sup>    |    |     |                |                |                |                |    |     | 1.057             | 2.33                              | 22709                                       | 39000 |
| 1115KR <sup>(6)</sup> | 1115KRR (KRRB)   | S1115K                | 1 15/16               | 3.5433 | 1 15/16     | 0.787 <sup>(5)</sup> |    |     |                |                |                |                |    |     | 1.000             | 2.18                              | 5100                                        | 8800  |
| -                     | E50KRR (KRRB)    | SE50K                 | 50                    |        |             |                      |    |     |                |                |                |                |    |     | 1.000             | 2.18                              |                                             |       |
| 1200KR                | 1200KRR (KRRB)   | S1200K                | 2                     |        |             |                      |    |     |                |                |                |                |    |     | 1.520             | 3.35                              |                                             |       |
| -                     | 1202KRR (KRRB)   | S1202K                | 2 1/8                 | 100    | 55.56       | 21                   |    |     |                |                |                |                |    |     | 1.356             | 2.99                              | 28500                                       | 48000 |
| 1203KR                | 1203KRR (KRRB)   | S1203K                | 2 3/16                | 3.9370 | 2 3/16      | 0.827                |    |     |                |                |                |                |    |     | 1.306             | 2.88                              | 6400                                        | 10800 |
| -                     | E55KRR (KRRB)    | SE55K                 | 55                    |        |             |                      |    |     |                |                |                |                |    |     | 1.306             | 2.88                              |                                             |       |
| -                     | 1204KRR (KRRB)   | S1204K                | 2 1/4                 | 110    | 61.91       | 22                   |    |     |                |                |                |                |    |     | 1.715             | 3.78                              | 35600                                       | 58500 |
| 1207KR                | 1207KRR (KRRB)   | S1207K                | 2 7/16                | 4.3307 | 2 7/16      | 0.866                |    |     |                |                |                |                |    |     | 1.565             | 3.45                              | 8000                                        | 13200 |
| -                     | E60KRR (KRRB)    | SE60K                 | 60                    |        |             |                      |    |     |                |                |                |                |    |     | 1.615             | 3.56                              |                                             |       |
| -                     | 1215KRR (KRRB)   | S1215K                | 2 15/16               | 130    | 74.61       | 25                   |    |     |                |                |                |                |    |     | 2.640             | 5.82                              | 43600                                       | 69500 |
| -                     | E75KRR (KRRB)    | SE75K                 | 75                    | 5.1181 | 2 15/16     | 0.984                |    |     |                |                |                |                |    |     | 2.640             | 5.82                              | 9800                                        | 15600 |

<sup>(1)</sup> Bore tolerances: 1/2" - 2 3/16" nominal to .013 mm, +.0005; 2 1/4" - 2 15/16" nominal to +.015 mm, +.0006".

<sup>(2)</sup> Spherical O.D. outer ring width is 18 mm, .709".

<sup>(3)</sup> Spherical O.D. outer ring width is 19 mm, .748".

<sup>(4)</sup> Spherical O.D. outer ring width is 21 mm, .827".

<sup>(5)</sup> Spherical O.D. outer ring width is 22 mm, .866".

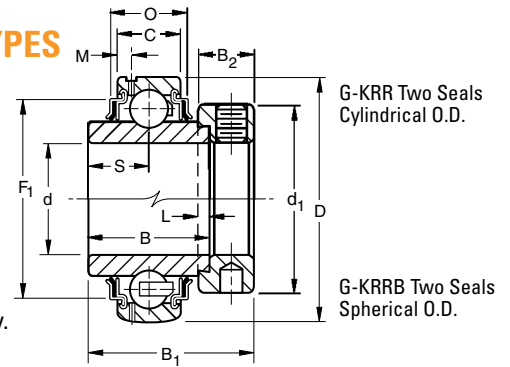
<sup>(6)</sup> Available with spherical O.D. To order, add suffix B. Example 1115KRRB.



# BALL BEARINGS

## G-KRR, G-KRRB INDUSTRIAL SERIES RELUBRICATABLE TYPES

- The G-KRR Series wide inner ring bearings are the same as RR Series and have a provision for relubrication.
- Designed for extremely dirty or wet conditions.
- Includes R-Seals with flared lips that firmly contact the ground O.D. of the inner ring. The inner ring provides a positive seal against dust, dirt and other contaminants and effectively retains the lubricant.
- G-KRR Series bearings are equipped with Shroud-Seals, providing extra effectiveness and protection.
- Extra-wide design provides additional shaft support and extra-large grease capacity.



**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.0013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".

**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: G1010KRRB + COL.**

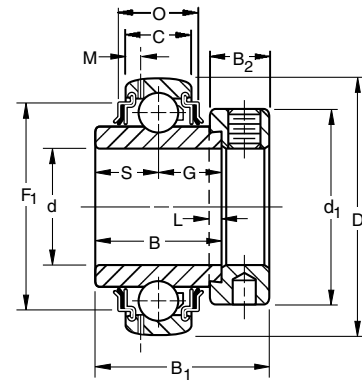
| Cylindrical O.D. | Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |     | O.D. D |     | Ring Widths |         | S     | L    | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | F <sub>1</sub> | O     | P    | Brg. & Collar Wt. |       | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|------------------|----------------|---------------|-----------------------|-----------------------|-----|--------|-----|-------------|---------|-------|------|----------------|----------------|----------------|----------------|-------|------|-------------------|-------|-----------------------------------|---------------------------------------------|
|                  |                |               |                       | mm                    | in. | mm     | in. | B Inner     | C Outer |       |      |                |                |                |                |       |      | mm                | in.   |                                   |                                             |
| —                | G1008KRRB      | S1008K        | 203                   | 1/2                   | 40  | 27.78  | 12  | 13.9        | 4.0     | 28.6  | 13.5 | 2.72           | 37.3           | 34.01          | 16.56          | 0.154 | 0.34 | 4700              | 10700 |                                   |                                             |
| —                | G1009KRRB      | S1009K        | 203                   | 9/16                  | 40  | 27.78  | 12  | 13.9        | 4.0     | 28.6  | 13.5 | 2.72           | 37.3           | 34.01          | 16.56          | 0.141 | 0.31 | 1060              | 2400  |                                   |                                             |
| G1010KRR         | G1010KRRB      | S1010K        | 203                   | 5/8                   | 40  | 27.78  | 12  | 13.9        | 4.0     | 28.6  | 13.5 | 2.72           | 37.3           | 34.01          | 16.56          | 0.141 | 0.31 | 4700              | 10700 |                                   |                                             |
| G1011KRR         | G1011KRRB      | S1011K        | 203                   | 11/16                 | 40  | 27.78  | 12  | 13.9        | 4.0     | 28.6  | 13.5 | 2.72           | 37.3           | 34.01          | 16.56          | 0.118 | 0.26 | 1060              | 2400  |                                   |                                             |
| GE17KRR          | GE17KRRB       | SE17K         | 203                   | 17                    | 17  | 17     | 17  | 17          | 17      | 17    | 17   | 17             | 17             | 17             | 17             | 0.118 | 0.26 | 1060              | 2400  |                                   |                                             |
| G1012KRR         | G1012KRRB      | S1012K        | 204                   | 3/4                   | 47  | 34.13  | 14  | 17.1        | 4.0     | 33.3  | 13.5 | 3.43           | 43.7           | 38.91          | 17.3           | 0.204 | 0.45 | 6200              | 14300 |                                   |                                             |
| GE20KRR          | GE20KRRB       | SE20K         | 204                   | 20                    | 20  | 20     | 20  | 20          | 20      | 20    | 20   | 20             | 20             | 20             | 20             | 0.204 | 0.45 | 1400              | 3200  |                                   |                                             |
| —                | G1013KRRB      | S1013K        | 205                   | 13/16                 | 52  | 34.92  | 15  | 17.5        | 4.0     | 38.1  | 13.5 | 3.86           | 44.4           | 45.19          | 16.66          | 0.286 | 0.63 | 7700              | 15800 |                                   |                                             |
| G1014KRR         | G1014KRRB      | S1014K        | 205                   | 7/8                   | 52  | 34.92  | 15  | 17.5        | 4.0     | 38.1  | 13.5 | 3.86           | 44.4           | 45.19          | 16.66          | 0.263 | 0.58 | 7700              | 15800 |                                   |                                             |
| G1015KRR         | G1015KRRB      | S1015K        | 205                   | 15/16                 | 52  | 34.92  | 15  | 17.5        | 4.0     | 38.1  | 13.5 | 3.86           | 44.4           | 45.19          | 16.66          | 0.240 | 0.53 | 1730              | 3550  |                                   |                                             |
| G1100KRR         | G1100KRRB      | S1100K        | 206                   | 1                     | 62  | 36.51  | 18  | 18.3        | 4.0     | 44.1  | 15.9 | 3.96           | 48.4           | 52.53          | 21.56          | 0.404 | 0.89 | 11100             | 21800 |                                   |                                             |
| GE25KRR          | GE25KRRB       | SE25K         | 206                   | 25                    | 25  | 25     | 25  | 25          | 25      | 25    | 25   | 25             | 25             | 25             | 25             | 0.227 | 0.50 | 2500              | 4900  |                                   |                                             |
| G1101KRR         | G1101KRRB      | S1101K        | 206                   | 1 1/16                | 62  | 36.51  | 18  | 18.3        | 4.0     | 44.1  | 15.9 | 3.96           | 48.4           | 52.53          | 21.56          | 0.404 | 0.89 | 11100             | 21800 |                                   |                                             |
| G1102KRR         | G1102KRRB      | S1102K        | 206                   | 1 1/8                 | 62  | 36.51  | 18  | 18.3        | 4.0     | 44.1  | 15.9 | 3.96           | 48.4           | 52.53          | 21.56          | 0.404 | 0.89 | 11100             | 21800 |                                   |                                             |
| G1103KRR         | G1103KRRB      | S1103K        | 206                   | 1 3/16                | 62  | 36.51  | 18  | 18.3        | 4.0     | 44.1  | 15.9 | 3.96           | 48.4           | 52.53          | 21.56          | 0.376 | 0.83 | 2500              | 4900  |                                   |                                             |
| —                | G1103KRRB3     | S1103K3       | 206                   | 1 1/4                 | 62  | 36.51  | 18  | 18.3        | 4.0     | 44.1  | 15.9 | 3.96           | 48.4           | 52.53          | 21.56          | 0.349 | 0.77 | 2500              | 4900  |                                   |                                             |
| GE30KRR          | GE30KRRB       | SE30K         | 206                   | 30                    | 30  | 30     | 30  | 30          | 30      | 30    | 30   | 30             | 30             | 30             | 30             | 0.376 | 0.83 | 2500              | 4900  |                                   |                                             |
| G1104KRR         | G1104KRRB      | S1104K        | 207                   | 1 1/4                 | 72  | 37.70  | 19  | 18.85       | 4.0     | 54.0  | 17.1 | 3.68           | 51.2           | 60.55          | 21.74          | 0.653 | 1.44 | 15100             | 28500 |                                   |                                             |
| —                | G1105KRRB      | S1105K        | 207                   | 1 5/16                | 72  | 37.70  | 19  | 18.85       | 4.0     | 54.0  | 17.1 | 3.68           | 51.2           | 60.55          | 21.74          | 0.617 | 1.36 | 3400              | 6400  |                                   |                                             |
| G1106KRR         | G1106KRRB      | S1106K        | 207                   | 1 3/8                 | 72  | 37.70  | 19  | 18.85       | 4.0     | 54.0  | 17.1 | 3.68           | 51.2           | 60.55          | 21.74          | 0.585 | 1.29 | 3400              | 6400  |                                   |                                             |
| G1107KRR         | G1107KRRB      | S1107K        | 207                   | 1 7/16                | 72  | 37.70  | 19  | 18.85       | 4.0     | 54.0  | 17.1 | 3.68           | 51.2           | 60.55          | 21.74          | 0.562 | 1.24 | 3400              | 6400  |                                   |                                             |
| GE35KRR          | GE35KRRB       | SE35K         | 207                   | 35                    | 35  | 35     | 35  | 35          | 35      | 35    | 35   | 35             | 35             | 35             | 35             | 0.585 | 1.29 | 3400              | 6400  |                                   |                                             |
| G1108KRR         | G1108KRRB      | S1108KT       | 208                   | 1 1/2                 | 80  | 42.86  | 21  | 21.4        | 4.8     | 60.3  | 18.3 | 4.06           | 56.4           | 67.79          | 23.44          | 0.812 | 1.79 | 19600             | 36000 |                                   |                                             |
| —                | G1109KRRB      | S1109KT       | 208                   | 1 9/16                | 80  | 42.86  | 21  | 21.4        | 4.8     | 60.3  | 18.3 | 4.06           | 56.4           | 67.79          | 23.44          | 0.771 | 1.70 | 4400              | 8150  |                                   |                                             |
| GE40KRR          | GE40KRRB       | SE40K         | 208                   | 40                    | 40  | 40     | 40  | 40          | 40      | 40    | 40   | 40             | 40             | 40             | 40             | 0.771 | 1.70 | 4400              | 8150  |                                   |                                             |
| G1110KRR         | G1110KRRB      | S1110K        | 209                   | 1 5/8                 | 85  | 42.86  | 22  | 21.4        | 4.8     | 63.5  | 18.3 | 4.55           | 56.4           | 73.86          | 27.18          | 0.925 | 2.04 | 20000             | 36000 |                                   |                                             |
| G1111KRR         | G1111KRRB      | S1111K        | 209                   | 1 11/16               | 85  | 42.86  | 22  | 21.4        | 4.8     | 63.5  | 18.3 | 4.55           | 56.4           | 73.86          | 27.18          | 0.880 | 1.94 | 4500              | 8150  |                                   |                                             |
| G1112KRR         | G1112KRRB      | S1112K        | 209                   | 1 3/4                 | 85  | 42.86  | 22  | 21.4        | 4.8     | 63.5  | 18.3 | 4.55           | 56.4           | 73.86          | 27.18          | 0.835 | 1.84 | 4500              | 8150  |                                   |                                             |
| GE45KRR          | GE45KRRB       | SE45K         | 209                   | 45                    | 45  | 45     | 45  | 45          | 45      | 45    | 45   | 45             | 45             | 45             | 45             | 0.835 | 1.84 | 4500              | 8150  |                                   |                                             |
| —                | G1113KRR       | S1113K        | 210                   | 1 13/16               | 90  | 49.21  | 23  | 24.6        | 4.8     | 69.9  | 18.3 | 4.7            | 62.7           | 77.7           | 27.51          | 1.116 | 2.46 | 22700             | 39200 |                                   |                                             |
| —                | G1114KRRB      | S1114K        | 210                   | 1 7/8                 | 90  | 49.21  | 23  | 24.6        | 4.8     | 69.9  | 18.3 | 4.7            | 62.7           | 77.7           | 27.51          | 1.034 | 2.28 | 5100              | 8800  |                                   |                                             |
| G1115KRR         | G1115KRRB      | S1115K        | 210                   | 1 15/16               | 90  | 49.21  | 23  | 24.6        | 4.8     | 69.9  | 18.3 | 4.7            | 62.7           | 77.7           | 27.51          | 1.016 | 2.24 | 5100              | 8800  |                                   |                                             |
| GE50KRR          | GE50KRRB       | SE50K         | 210                   | 50                    | 50  | 50     | 50  | 50          | 50      | 50    | 50   | 50             | 50             | 50             | 50             | 1.016 | 2.24 | 5100              | 8800  |                                   |                                             |
| G1200KRR         | G1200KRRB      | S1200K        | 211                   | 2                     | 100 | 55.56  | 25  | 27.8        | 4.8     | 76.2  | 20.6 | 5.0            | 71.4           | 87.17          | 29.01          | 1.583 | 3.49 | 28500             | 48000 |                                   |                                             |
| —                | G1201KRRB      | S1201K        | 211                   | 2 1/16                | 100 | 55.56  | 25  | 27.8        | 4.8     | 76.2  | 20.6 | 5.0            | 71.4           | 87.17          | 29.01          | 1.470 | 3.24 | 6400              | 10800 |                                   |                                             |
| —                | G1202KRRB      | S1202K        | 211                   | 2 3/8                 | 100 | 55.56  | 25  | 27.8        | 4.8     | 76.2  | 20.6 | 5.0            | 71.4           | 87.17          | 29.01          | 1.406 | 3.10 | 6400              | 10800 |                                   |                                             |
| G1203KRR         | G1203KRRB      | S1203K        | 211                   | 2 3/16                | 100 | 55.56  | 25  | 27.8        | 4.8     | 76.2  | 20.6 | 5.0            | 71.4           | 87.17          | 29.01          | 1.365 | 3.01 | 6400              | 10800 |                                   |                                             |
| GE55KRR          | GE55KRRB       | SE55K         | 211                   | 55                    | 55  | 55     | 55  | 55          | 55      | 55    | 55   | 55             | 55             | 55             | 55             | 1.365 | 3.01 | 6400              | 10800 |                                   |                                             |
| —                | G1204KRRB      | S1204K        | 212                   | 2 1/4                 | 110 | 61.91  | 27  | 31          | 6.4     | 84.1  | 22.2 | 5.13           | 77.8           | 94.89          | 35.03          | 2.041 | 4.50 | 35600             | 58800 |                                   |                                             |
| —                | G1205KRRB      | S1205K        | 212                   | 2 5/16                | 110 | 61.91  | 27  | 31          | 6.4     | 84.1  | 22.2 | 5.13           | 77.8           | 94.89          | 35.03          | 1.923 | 4.24 | 8000              | 13200 |                                   |                                             |
| —                | G1206KRRB      | S1206K        | 212                   | 2 3/8                 | 110 | 61.91  | 27  | 31          | 6.4     | 84.1  | 22.2 | 5.13           | 77.8           | 94.89          | 35.03          | 1.846 | 4.07 | 8000              | 13200 |                                   |                                             |
| G1207KRR         | G1207KRRB      | S1207K        | 212                   | 2 7/16                | 110 | 61.91  | 27  | 31          | 6.4     | 84.1  | 22.2 | 5.13           | 77.8           | 94.89          | 35.03          | 1.778 | 3.92 | 8000              | 13200 |                                   |                                             |
| GE60KRR          | GE60KRRB       | SE60K         | 212                   | 60                    | 60  | 60     | 60  | 60          | 60      | 60    | 60   | 60             | 60             | 60             | 60             | 1.846 | 4.07 | 8000              | 13200 |                                   |                                             |
| —                | G1210KRRB      | S1210K        | 214                   | 2 5/8                 | 125 | 68.26  | 28  | 34.1        | 6.4     | 96.8  | 23.8 | 5.08           | 79.4           | 109.17         | 35.94          | 2.681 | 5.91 | 43000             | 69500 |                                   |                                             |
| —                | G1211KRRB      | S1211K        | 214                   | 2 11/16               | 125 | 68.26  | 28  | 34.1        | 6.4     | 96.8  | 23.8 | 5.08           | 79.4           | 109.17         | 35.94          | 2.585 | 5.70 | 9650              | 15600 |                                   |                                             |
| —                | GE70KRRB       | SE70K         | 214                   | 70                    | 70  | 70     | 70  | 70          | 70      | 70    | 70   | 70             | 70             | 70             | 70             | 2.585 | 5.70 | 9650              | 15600 |                                   |                                             |
| —                | G1212KRRB      | S1212K        | 215                   | 2 3/4                 | 130 | 74.61  | 29  | 37.3        | 6.4     | 101.6 | 23.8 | 5.56           | 92.1           | 113.13         | 38.03          | 3.084 | 6.80 | 43600             | 69500 |                                   |                                             |
| —                | G1213KRRB      | S1213K        | 215                   | 2 13/16               | 130 | 74.61  | 29  | 37.3        | 6.4     | 101.6 | 23.8 | 5.56           | 92.1           | 113.13         | 38.03          | 2.976 | 6.56 | 9800              | 15600 |                                   |                                             |
| —                | G1214KRRB      | S1214K        | 215                   | 2 7/8                 | 130 | 74.61  | 29  | 37.3        | 6.4     | 101.6 | 23.8 | 5.56           | 92.1           | 113.13         | 38.03          | 2.867 | 6.32 | 9800              | 15600 |                                   |                                             |
| —                | G1215KRRB      | S1215K        | 215                   | 2 15/16               | 130 | 74.61  | 29  | 37.3        | 6.4     | 101.6 | 23.8 | 5.56           | 92.1           | 113.13         | 38.03          | 2.753 | 6.07 | 9800              | 15600 |                                   |                                             |
| —                | GE75KRRB       | SE75K         | 215                   | 75                    | 75  | 75     | 75  | 75          | 75      | 75    | 75   | 75             | 75             | 75             | 75             | 2.753 | 6.07 | 9800              | 15600 |                                   |                                             |

<sup>(1)</sup> Bore tolerances: 1/2" - 2 3/16", nominal to .013 mm, +.0005".  
2 1/4" - 2 15/16", nominal to .015 mm, +.0006".

<sup>(2)</sup> Spherical O.D. outer ring width is 22 mm, .866".  
<sup>(3)</sup> Spherical O.D. outer ring width is 24 mm, .945".

### GN-KRRB HEAVY SERIES RELUBRICATABLE TYPE

- The heavy series R-Seal bearings are similar to the standard series and designed to withstand continuous, heavy or shock loads.
- This series has heavier section 300 Series bearings. They include a considerably thicker sealing member in the contact-type diaphragm seal.
- The design of the series assures complete retention of the lubricant and positive exclusion of all contaminants.



**Suggested shaft tolerances:** 1 3/16" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".

**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: GN303KRRB + COL.**

| Bearing Number           | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D        | Ring Widths      |             | S             | G             | L           | d <sub>1</sub>  | B <sub>2</sub> | M             | B <sub>1</sub> | F <sub>1</sub> | O              | Brg. & Collar Wt. |                 | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>E</sub> |
|--------------------------|---------------|-----------------------|-----------------------|---------------|------------------|-------------|---------------|---------------|-------------|-----------------|----------------|---------------|----------------|----------------|----------------|-------------------|-----------------|-----------------------------------|---------------------------------------------|
|                          |               |                       |                       |               | B Inner          | C Outer     |               |               |             |                 |                |               |                |                |                | kg                | lbs.            |                                   |                                             |
|                          |               |                       | in.                   | mm in.        | mm in.           | mm in.      | mm in.        | mm in.        | mm in.      | mm in.          | mm in.         | mm in.        | mm in.         | mm in.         | mm in.         | kg                | lbs.            | N lbs.                            | N lbs.                                      |
| GN103KRRB                | SN103K        | 306                   | 1 3/16                | 72<br>2.8346  | 36.51<br>1 7/16  | 20<br>0.787 | 17.5<br>11/16 | 19.1<br>3/4   | 4<br>5/32   | 49.2<br>1 15/16 | 17.5<br>11/16  | 3.61<br>0.142 | 50<br>1 31/32  | 60.17<br>2.369 | 23.5<br>0.925  | 0.553<br>1.22     | 15600<br>3550   | 33500<br>7500                     |                                             |
| GN104KRRB                | SN104K        | 307                   | 1 1/4                 | 80<br>3.1496  | 38.10<br>1 1/2   | 22<br>0.866 | 18.3<br>23/32 | 19.8<br>25/32 | 4<br>5/32   | 55.6<br>2 3/16  | 17.5<br>11/16  | 3.96<br>0.156 | 51.6<br>2 1/32 | 67.01<br>2.638 | 27<br>1.063    | 0.762<br>1.68     | 20000<br>4500   | 40500<br>9150                     |                                             |
| GN105KRRB                | SN105K        |                       | 1 5/16                |               |                  |             |               |               |             |                 |                |               |                |                |                | 0.744<br>1.64     |                 |                                   |                                             |
| GN106KRRB                | SN106K        |                       | 1 3/8                 |               |                  |             |               |               |             |                 |                |               |                |                |                | 0.726<br>1.6      |                 |                                   |                                             |
| GN107KRRB                | SN107K        | 1 7/16                | 0.708<br>1.56         |               |                  |             |               |               |             |                 |                |               |                |                |                |                   |                 |                                   |                                             |
| GN108KRRB <sup>(2)</sup> | SN108K        | 308                   | 1 1/2                 | 90<br>3.5433  | 41.28<br>1 5/8   | 25<br>0.984 | 19.8<br>23/32 | 21.4<br>27/32 | 4.8<br>3/16 | 63.5<br>2 1/2   | 20.6<br>13/16  | 4.62<br>0.182 | 57.2<br>2 1/4  | 75.06<br>2.955 | 26.67<br>1.05  | 1.152<br>2.54     | 24500<br>5500   | 49000<br>11000                    |                                             |
| GN110KRRB                | SN110K        | 309                   | 1 5/8                 | 100<br>3.9370 | 42.86<br>1 11/16 | 27<br>1.063 | 19.8<br>25/32 | 23<br>29/32   | 4.8<br>3/16 | 69.9<br>2 3/4   | 20.6<br>13/16  | 5<br>0.197    | 58.7<br>2 5/16 | 82.58<br>3.251 | 28.52<br>1.123 | 1.656<br>3.65     | 30000<br>6700   | 58500<br>13200                    |                                             |
| GN111KRRB                | SN111K        |                       | 1 11/16               |               |                  |             |               |               |             |                 |                |               |                |                |                | 1.456<br>3.21     |                 |                                   |                                             |
| GN112KRRB                | SN112K        |                       | 1 3/4                 |               |                  |             |               |               |             |                 |                |               |                |                |                | 1.388<br>2.95     |                 |                                   |                                             |
| GN114KRRB                | SN114K        | 310                   | 1 7/8                 | 110           | 49.21            | 29          | 24.6          | 24.6          | 4.8         | 75.8            | 22.2           | 5.36          | 66.7           | 82.87          | 30.86          | 1.973<br>4.35     | 35500<br>68000  |                                   |                                             |
| GN115KRRB                | SN115K        | 1 15/16               | 4.3307                | 1 15/16       | 1.142            | 31/32       | 31/32         | 3/16          | 2 63/64     | 7/8             | 0.211          | 2 5/8         | 3.654          | 1.215          | 1.905          | 4.2               | 8000            | 15300                             |                                             |
| GN200KRRB                | SN200K        | 311                   | 2                     | 120           | 55.56            | 31          | 27.8          | 27.8          | 4.8         | 82.6            | 22.2           | 5.49          | 73             | 101.78         | 37.47          | 2.132<br>4.7      | 41500<br>80000  |                                   |                                             |
| GN203KRRB                | SN203K        | 2 3/16                | 4.7244                | 2 3/16        | 1.22             | 1 3/32      | 1 3/32        | 3/16          | 3 1/4       | 7/8             | 0.216          | 2 7/8         | 4.007          | 1.475          | 2.368          | 5.22              | 9300            | 18000                             |                                             |
| GN207KRRB                | SN207K        | 312                   | 2 7/16                | 130           | 61.91            | 33          | 31            | 31            | 6.4         | 88.9            | 23.8           | 5.84          | 79.4           | 108.52         | 38.99          | 2.839<br>6.26     | 48000<br>10800  | 90000<br>20400                    |                                             |
| GN211KRRB                | SO211K        | 314                   | 2 11/16               | 150           | 68.26            | 37          | 34.1          | 34.1          | 6.4         | 101.6           | 27             | 6.73          | 88.9           | 126.31         | 44.96          | 4.509<br>9.94     | 63000<br>14300  | 116000<br>26000                   |                                             |
| GN215KRRB                | SN215K        | 315                   | 2 15/16               | 160           | 74.61            | 39          | 37.3          | 37.3          | 6.4         | 112.7           | 31.8           | 6.48          | 100            | 133.02         | 51.13          | 5.634<br>12.42    | 71000<br>16000  | 125000<br>28500                   |                                             |
| GN303KRRB                | SN303K        | 316                   | 3 3/16                | 170           | 80.96            | 41          | 40.5          | 40.5          | 6.4         | 119.1           | 31.8           | 7.26          | 106.4          | 142.82         | 51.05          | 7.126<br>15.71    | 80000<br>18000  | 137000<br>30500                   |                                             |
| GN307KRRB                | SN307K        | 318                   | 3 7/16                | 190           | 87.31            | 45          | 42.1          | 42.1          | 7.9         | 133.4           | 36.5           | 8.18          | 115.9          | 161.37         | 52.63          | 9.19<br>20.26     | 98000<br>22400  | 156000<br>33500                   |                                             |
| GN315KRRB                | SN315K        | 320                   | 3 15/16               | 215           | 100.01           | 49          | 50            | 50            | 7.9         | 146.1           | 36.5           | 7.82          | 129.6          | 182.85         | 59.36          | 12.233<br>26.97   | 132000<br>22900 | 193000<br>43000                   |                                             |

<sup>(1)</sup> Bore tolerances: 1 3/16" - 2 3/16", nominal to .013 mm, +.0005"; 2 1/4" - 3 3/16", nominal to .015 mm, +.0006".

<sup>(2)</sup> Also available with cylindrical O.D. Delete suffix "B". Example: GN108KRR.



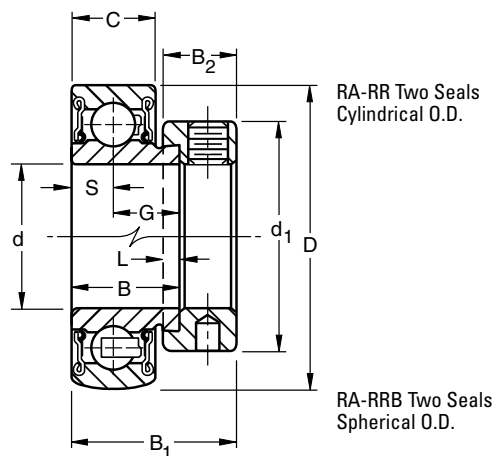


# BALL BEARINGS

## RA-RR, RA-RRB STANDARD SERIES NON-RELUBRICATABLE TYPES

- Bearings are an extended inner ring type with self-locking collar.
- Due to the positive contact, the land-riding R-Seal provides improved protection against harmful contaminants and retains lubricant under severe operating conditions.
- RA-RR Series are factory prelubricated and have cylindrical outside diameters.
- RA-RRB Series have spherical outside diameters for use in housings with corresponding spherical inside surfaces to provide unrestricted initial alignment.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.0013 mm, -.0005";  
2" - 2 3/16", nominal to -.025 mm, -.0010".



TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: RA100RRB + COL.

| Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |        | O.D. D |       | Ring Widths |                      | S     | G     | L    | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | Brg. & Collar Wt. |      | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|----------------|---------------|-----------------------|-----------------------|--------|--------|-------|-------------|----------------------|-------|-------|------|----------------|----------------|----------------|-------------------|------|-----------------------------------|---------------------------------------------|
|                |               |                       | mm                    | in.    | mm     | in.   | B Inner     | C Outer              |       |       |      |                |                |                | mm                | in.  |                                   |                                             |
| RA008RR        | RA008RRB      | S1008K                | 1/2                   |        | 40     |       | 19.05       | 13                   | 6.5   | 12.55 | 4.0  | 28.6           | 13.5           | 28.6           | 0.154             | 0.34 | 4700                              | 10600                                       |
| RA009RR        | RA009RRB      | S1009K                | 9/16                  |        | 40     |       | 19.05       | 13                   | 6.5   | 12.55 | 4.0  | 28.6           | 13.5           | 28.6           | 0.145             | 0.32 | 1060                              | 2360                                        |
| RA010RR        | RA010RRB      | S1010K                | 5/8                   | 1.5748 | 47     | 21.44 | 0.750       | 0.512 <sup>(2)</sup> | 0.256 | 0.494 | 5/32 | 1 1/8          | 17/32          | 1 1/8          | 0.127             | 0.28 | 1060                              | 2360                                        |
| RAE17RR        | RAE17RRB      | SE17K                 | 17                    |        | 47     |       | 21.44       | 15                   | 7.49  | 13.92 | 4.0  | 33.3           | 13.5           | 31             | 0.127             | 0.28 |                                   |                                             |
| RA012RR        | RA012RRB      | S1012K                | 3/4                   | 1.8504 | 52     | 21.44 | 0.844       | 0.591 <sup>(3)</sup> | 0.295 | 0.548 | 5/32 | 1 5/16         | 17/32          | 1 7/32         | 0.132             | 0.29 | 6200                              | 14300                                       |
| RAE20RR        | RAE20RRB      | SE20K                 | 20                    |        | 52     |       | 21.44       | 15                   | 0.295 | 0.548 | 5/32 | 1 5/16         | 17/32          | 1 7/32         | 0.132             | 0.29 | 1400                              | 3200                                        |
| RA013RR        | RA013RRB      | S1013K                | 13/16                 |        | 52     |       | 21.44       | 15                   | 7.49  | 13.92 | 4.0  | 38.1           | 13.5           | 31             | 0.231             | 0.51 | 7700                              | 15800                                       |
| RA014RR        | RA014RRB      | S1014K                | 7/8                   | 2.0472 | 52     | 21.44 | 0.844       | 0.591                | 7.49  | 13.92 | 4.0  | 38.1           | 13.5           | 31             | 0.213             | 0.47 | 1730                              | 3550                                        |
| RA015RR        | RA015RRB      | S1015K                | 15/16                 |        | 52     |       | 21.44       | 15                   | 0.295 | 0.548 | 5/32 | 1 1/2          | 17/32          | 1 7/32         | 0.2               | 0.44 |                                   |                                             |
| RA100RR        | RA100RRB      | S1100K                | 1                     |        | 62     | 23.82 | 0.938       | 0.709                | 0.186 | 0.41  |      |                |                |                | 0.186             | 0.41 |                                   |                                             |
| RAE25RR        | RAE25RRB      | SE25K                 | 25                    |        | 62     |       | 23.82       | 18                   | 0.186 | 0.41  |      |                |                |                | 0.186             | 0.41 |                                   |                                             |
| RA101RR        | RA101RRB      | S1101K                | 1 1/16                |        | 62     | 23.82 | 0.938       | 0.709                | 0.354 | 0.583 | 5/32 | 1 47/64        | 5/8            | 1 13/32        | 0.318             | 0.7  | 2500                              | 4900                                        |
| RA102RR        | RA102RRB      | S1102K                | 1 1/8                 | 2.4409 | 62     | 23.82 | 0.938       | 0.709                | 0.354 | 0.583 | 5/32 | 1 47/64        | 5/8            | 1 13/32        | 0.295             | 0.65 |                                   |                                             |
| RA103RR        | RA103RRB      | S1103K                | 3/4                   |        | 62     | 23.82 | 0.938       | 0.709                | 0.318 | 0.7   |      |                |                |                | 0.318             | 0.7  |                                   |                                             |
| RA103RR2       | RA103RRB2     | S1103K3               | 1 1/4                 |        | 62     | 23.82 | 0.938       | 0.709                | 0.318 | 0.7   |      |                |                |                | 0.318             | 0.7  |                                   |                                             |
| RAE30RR        | RAE30RRB      | SE30K                 | 30                    |        | 62     |       | 23.82       | 18                   | 0.318 | 0.7   |      |                |                |                | 0.318             | 0.7  |                                   |                                             |
| RA104RR        | RA104RRB      | S1104K                | 1 1/4                 |        | 72     | 25.4  | 1.000       | 0.748                | 0.562 | 1.24  |      |                |                |                | 0.562             | 1.24 |                                   |                                             |
| RA105RR        | RA105RRB      | S1105K                | 1 5/16                | 2.8346 | 72     | 25.4  | 1.000       | 0.748                | 0.54  | 1.19  |      |                |                |                | 0.54              | 1.19 | 15100                             | 28500                                       |
| RA106RR        | RA106RRB      | S1106K                | 3/8                   |        | 72     | 25.4  | 1.000       | 0.748                | 0.374 | 0.626 | 5/32 | 2 1/8          | 43/64          | 1 17/32        | 0.513             | 1.13 | 3400                              | 6400                                        |
| RA107RR        | RA107RRB      | S1107K                | 7/16                  |        | 72     | 25.4  | 1.000       | 0.748                | 0.476 | 1.05  |      |                |                |                | 0.476             | 1.05 |                                   |                                             |
| RAE35RR        | RAE35RRB      | SE35K                 | 35                    |        | 72     |       | 25.4        | 19                   | 0.513 | 1.13  |      |                |                |                | 0.513             | 1.13 |                                   |                                             |
| RA108RR        | RA108RRB      | S1108K                | 1 1/2                 | 3.1496 | 80     | 30.18 | 1.188       | 0.866 <sup>(4)</sup> | 11    | 19.18 | 4.8  | 60.3           | 18.3           | 43.7           | 0.694             | 1.53 | 19600                             | 36000                                       |
| RA109RR        | RA109RRB      | S1109K                | 1 9/16                |        | 80     | 30.18 | 1.188       | 0.866                | 0.433 | 0.755 | 3/16 | 2 3/8          | 23/32          | 1 23/32        | 0.649             | 1.43 | 4400                              | 8150                                        |
| RAE40RR        | RAE40RRB      | SE40K                 | 40                    |        | 80     |       | 30.18       | 22                   | 0.649 | 1.43  |      |                |                |                | 0.649             | 1.43 |                                   |                                             |
| RA110RR        | RA110RRB      | S1110K                | 1 5/8                 |        | 85     | 30.18 | 1.188       | 0.866                | 0.78  | 1.72  |      |                |                |                | 0.78              | 1.72 |                                   |                                             |
| RA111RR        | RA111RRB      | S1111K                | 1 11/16               | 3.3465 | 85     | 30.18 | 1.188       | 0.866                | 11    | 19.18 | 4.8  | 63.5           | 18.3           | 43.7           | 0.735             | 1.62 | 20000                             | 36000                                       |
| RA112RR        | RA112RRB      | S1112K                | 3/4                   |        | 85     | 30.18 | 1.188       | 0.866                | 0.433 | 0.755 | 3/16 | 2 1/2          | 23/32          | 1 23/32        | 0.68              | 1.5  | 4500                              | 8150                                        |
| RAE45RR        | RAE45RRB      | SE45K                 | 45                    |        | 85     |       | 30.18       | 22                   | 0.68  | 1.5   |      |                |                |                | 0.68              | 1.5  |                                   |                                             |
| RA113RR        | RA113RRB      | S1113K                | 1 13/16               |        | 90     | 30.18 | 1.188       | 0.866                | 0.88  | 1.94  |      |                |                |                | 0.88              | 1.94 |                                   |                                             |
| RA114RR        | RA114RRB      | S1114K                | 7/8                   | 3.5433 | 90     | 30.18 | 1.188       | 0.866                | 11    | 19.18 | 4.8  | 69.9           | 18.3           | 43.7           | 0.83              | 1.83 | 22700                             | 39200                                       |
| RA115RR        | RA115RRB      | S1115K                | 1 15/16               |        | 90     | 30.18 | 1.188       | 0.866                | 0.433 | 0.755 | 3/16 | 2 3/4          | 23/32          | 1 23/32        | 0.771             | 1.70 | 5100                              | 8800                                        |
| RA115RR2       | RA115RRB2     | S1115K2               | 2                     |        | 90     | 30.18 | 1.188       | 0.866                | 0.717 | 1.58  |      |                |                |                | 0.717             | 1.58 |                                   |                                             |
| RAE50RR        | RAE50RRB      | SE50K                 | 50                    |        | 90     |       | 30.18       | 22                   | 0.771 | 1.79  |      |                |                |                | 0.771             | 1.79 |                                   |                                             |
| RA200RR        | RA200RRB      | S1200K                | 2                     |        | 100    | 32.54 | 1.281       | 0.945                | 0.962 | 2.12  |      |                |                |                | 0.962             | 2.12 |                                   |                                             |
| RA201RR        | RA201RRB      | S1201K                | 2 1/16                | 3.9370 | 100    | 32.54 | 1.281       | 0.945                | 11.99 | 20.55 | 4.8  | 76.2           | 20.6           | 48.4           | 0.898             | 1.98 |                                   |                                             |
| RA202RR        | RA202RRB      | S1202K                | 2 1/8                 |        | 100    | 32.54 | 1.281       | 0.945                | 0.472 | 0.809 | 3/16 | 3              | 13/16          | 1 29/32        | 0.857             | 1.89 | 28500                             | 48000                                       |
| RA203RR        | RA203RRB      | S1203K                | 2 3/16                |        | 100    | 32.54 | 1.281       | 0.945                | 0.807 | 1.78  |      |                |                |                | 0.807             | 1.78 | 6400                              | 10800                                       |
| RAE55RR        | RAE55RRB      | SE55K                 | 55                    |        | 100    |       | 32.54       | 24                   | 0.807 | 1.78  |      |                |                |                | 0.807             | 1.78 |                                   |                                             |

<sup>(1)</sup> Bore tolerance is nominal to .013 mm, +.0005".

<sup>(2)</sup> Spherical O.D. outer ring width is 12 mm, .472".

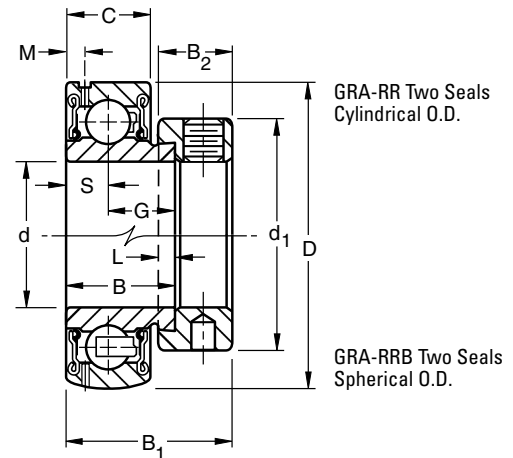
<sup>(3)</sup> Spherical O.D. outer ring width is 14 mm, .551".

<sup>(4)</sup> Spherical O.D. outer ring width is 21 mm, .827".

### GRA-RR, GRA-RRB STANDARD SERIES RELUBRICATABLE TYPES

- GRA-RR Series bearings are the same as the RA-RR Series and have a provision for relubrication.
- GRA-RR Series have cylindrical outside diameters.
- GRA-RRB have spherical outside diameters

Suggested shaft tolerances:  $1/2'' - 1\ 15/16''$ , nominal to  $-0.13\text{ mm}, -.0005''$ ;  
 $2'' - 2\ 15/16''$ , nominal to  $-0.025\text{ mm}, -.0010''$ .



TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: GRA100RRB + COL.

| Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |                | O.D. D  |         | Ring Widths          |        | S     | G    | L       | d <sub>1</sub> | B <sub>2</sub> | M       | B <sub>1</sub> | Brg. & Collar Wt. |        | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|----------------|---------------|-----------------------|-----------------------|----------------|---------|---------|----------------------|--------|-------|------|---------|----------------|----------------|---------|----------------|-------------------|--------|-----------------------------------|---------------------------------------------|
|                |               |                       | Cylindrical O.D.      | Spherical O.D. | B Inner | C Outer | mm in.               | mm in. |       |      |         |                |                |         |                | mm in.            | mm in. |                                   |                                             |
| GRA008RR       | GRA008RRB     | S1008K                |                       | 1/2            |         |         |                      |        |       |      |         |                |                |         |                | 0.154             | 0.34   |                                   |                                             |
| —              | GRA009RRB     | S1009K                |                       | 9/16           | 40      | 19.05   | 13                   | 6.5    | 12.55 | 4.0  | 28.6    | 13.5           | 2.72           | 28.6    | 0.145          | 0.32              | 4700   | 10600                             |                                             |
| GRA010RR       | GRA010RRB     | S1010K                | 203                   | 5/8            | 1.5748  | 0.750   | 0.512 <sup>(2)</sup> | 0.256  | 0.494 | 5/32 | 1 1/8   | 17/32          | 0.107          | 1 1/8   | 0.127          | 0.28              | 1060   | 2360                              |                                             |
| GRAE17RR       | GRAE17RRB     | SE17K                 |                       | 17             |         |         |                      |        |       |      |         |                |                |         | 0.127          | 0.28              |        |                                   |                                             |
| GRA012RR       | GRA012RRB     | S1012K                | 204                   | 3/4            | 47      | 21.44   | 15                   | 7.49   | 13.92 | 4.0  | 33.3    | 13.5           | 3.05           | 31      | 0.132          | 0.29              | 6200   | 14300                             |                                             |
| GRAE20RR       | GRAE20RRB     | SE20K                 |                       | 20             | 1.8504  | 0.844   | 0.591 <sup>(3)</sup> | 0.295  | 0.548 | 5/32 | 1 9/16  | 17/32          | 0.12           | 1 7/32  | 0.132          | 0.29              | 1400   | 3200                              |                                             |
| —              | GRA013RRB     | S1013K                |                       | 13/16          |         |         |                      |        |       |      |         |                |                |         | 0.231          | 0.51              |        |                                   |                                             |
| GRA014RR       | GRA014RRB     | S1014K                | 205                   | 7/8            | 52      | 21.44   | 15                   | 7.49   | 13.92 | 4.0  | 38.1    | 13.5           | 3.61           | 31      | 0.213          | 0.47              | 7700   | 15800                             |                                             |
| —              | GRA015RRB     | S1015K                |                       | 15/16          | 2.0472  | 0.844   | 0.591                | 0.295  | 0.548 | 5/32 | 1 1/2   | 17/32          | 0.142          | 1 7/32  | 0.2            | 0.44              | 1730   | 3550                              |                                             |
| GRA100RR       | GRA100RRB     | S1100K                |                       | 1              |         |         |                      |        |       |      |         |                |                |         | 0.186          | 0.41              |        |                                   |                                             |
| GRAE25RR       | GRAE25RRB     | SE25K                 |                       | 25             |         |         |                      |        |       |      |         |                |                |         | 0.186          | 0.41              |        |                                   |                                             |
| GRA101RR       | GRA101RRB     | S1101K                |                       | 1 1/16         |         |         |                      |        |       |      |         |                |                |         | 0.349          | 0.77              |        |                                   |                                             |
| GRA102RR       | GRA102RRB     | S1102K                |                       | 1 1/8          | 62      | 23.83   | 18                   | 8.99   | 14.81 | 4.0  | 44.1    | 15.9           | 4.17           | 35.7    | 0.327          | 0.72              | 11100  | 21800                             |                                             |
| GRA103RR       | GRA103RRB     | S1103K                | 206                   | 1 3/16         | 2.4409  | 0.938   | 0.709                | 0.354  | 0.583 | 5/32 | 1 47/64 | 5/8            | 0.164          | 1 13/32 | 0.318          | 0.7               | 2500   | 4900                              |                                             |
| GRA103RR2      | GRA103RRB2    | S1103K3               |                       | 1 1/4          |         |         |                      |        |       |      |         |                |                |         | 0.295          | 0.65              |        |                                   |                                             |
| GRAE30RR       | GRAE30RRB     | SE30K                 |                       | 30             |         |         |                      |        |       |      |         |                |                |         | 0.318          | 0.7               |        |                                   |                                             |
| GRA104RR       | GRA104RRB     | S1104K                |                       | 1 1/4          |         |         |                      |        |       |      |         |                |                |         | 0.562          | 1.24              |        |                                   |                                             |
| —              | GRA105RRB     | S1105K                | 207                   | 1 9/16         | 72      | 25.4    | 19                   | 9.5    | 15.9  | 4.0  | 54.0    | 17.1           | 3.68           | 38.9    | 0.54           | 1.19              | 15100  | 28500                             |                                             |
| —              | GRA106RRB     | S1106K                |                       | 1 3/8          | 2.8346  | 1.000   | 0.748                | 0.374  | 0.626 | 5/32 | 2 1/8   | 49/64          | 0.145          | 1 17/32 | 0.513          | 1.13              | 3400   | 6400                              |                                             |
| —              | GRA107RRB     | S1107K                |                       | 1 7/16         |         |         |                      |        |       |      |         |                |                |         | 0.476          | 1.05              |        |                                   |                                             |
| GRAE35RR       | GRAE35RRB     | SE35K                 |                       | 35             |         |         |                      |        |       |      |         |                |                |         | 0.513          | 1.13              |        |                                   |                                             |
| GRA108RR       | GRA108RRB     | S1108K                |                       | 1 1/2          | 80      | 30.18   | 22                   | 11     | 19.18 | 4.8  | 60.3    | 18.3           | 4.17           | 43.7    | 0.694          | 1.53              | 19600  | 36000                             |                                             |
| —              | GRA109RRB     | S1109K                | 208                   | 1 9/16         | 3.1496  | 1.188   | 0.866 <sup>(4)</sup> | 0.433  | 0.755 | 3/16 | 2 3/8   | 23/32          | 0.164          | 1 23/32 | 0.649          | 1.43              | 4400   | 8150                              |                                             |
| GRAE40RR       | GRAE40RRB     | SE40K                 |                       | 40             |         |         |                      |        |       |      |         |                |                |         | 0.649          | 1.43              |        |                                   |                                             |
| —              | GRA110RRB     | S1110K                |                       | 1 5/8          |         |         |                      |        |       |      |         |                |                |         | 0.78           | 1.72              |        |                                   |                                             |
| —              | GRA111RRB     | S1111K                | 209                   | 1 11/16        | 85      | 30.18   | 22                   | 11     | 19.18 | 4.8  | 63.5    | 18.3           | 4.55           | 43.7    | 0.735          | 1.62              | 20500  | 36300                             |                                             |
| —              | GRA112RRB     | S1112K                |                       | 1 3/4          | 3.3465  | 1.188   | 0.866                | 0.433  | 0.755 | 3/16 | 2 1/2   | 23/32          | 0.179          | 1 23/32 | 0.68           | 1.5               | 4600   | 8160                              |                                             |
| —              | GRAE45RRB     | SE45K                 |                       | 45             |         |         |                      |        |       |      |         |                |                |         | 0.68           | 1.5               |        |                                   |                                             |
| —              | GRA113RRB     | S1113K                |                       | 1 13/16        |         |         |                      |        |       |      |         |                |                |         | 0.88           | 1.94              |        |                                   |                                             |
| —              | GRA114RRB     | S1114K                |                       | 1 7/8          | 90      | 30.18   | 22                   | 11     | 19.18 | 4.8  | 69.9    | 18.3           | 4.44           | 43.7    | 0.83           | 1.83              | 22700  | 39200                             |                                             |
| —              | GRA115RRB     | S1115K                | 210                   | 1 15/16        | 3.5433  | 1.188   | 0.866                | 0.433  | 0.755 | 3/16 | 2 3/4   | 23/32          | 0.175          | 1 23/32 | 0.771          | 1.70              | 5100   | 8800                              |                                             |
| —              | GRA115RRB2    | S1115K2               |                       | 2              |         |         |                      |        |       |      |         |                |                |         | 0.717          | 1.58              |        |                                   |                                             |
| —              | GRAE50RRB     | SE50K                 |                       | 50             |         |         |                      |        |       |      |         |                |                |         | 0.771          | 1.79              |        |                                   |                                             |
| —              | GRA200RRB     | S1200K                |                       | 2              |         |         |                      |        |       |      |         |                |                |         | 0.962          | 2.12              |        |                                   |                                             |
| —              | GRA201RRB     | S1201K                |                       | 2 1/16         | 100     | 32.54   | 24                   | 11.99  | 20.55 | 4.8  | 76.2    | 20.6           | 4.9            | 48.4    | 0.898          | 1.98              | 28500  | 48000                             |                                             |
| —              | GRA202RRB     | S1202K                | 211                   | 2 1/8          | 3.9370  | 1.281   | 0.945                | 0.472  | 0.809 | 3/16 | 3       | 13/16          | 0.193          | 1 29/32 | 0.857          | 1.89              | 6400   | 10800                             |                                             |
| —              | GRA203RRB     | S1203K                |                       | 2 3/16         |         |         |                      |        |       |      |         |                |                |         | 0.807          | 1.79              |        |                                   |                                             |
| —              | GRAE55RRB     | SE55K                 |                       | 55             |         |         |                      |        |       |      |         |                |                |         | 0.807          | 1.78              |        |                                   |                                             |

<sup>(1)</sup> Bore tolerance is nominal to .013 mm, +.0005".  
<sup>(2)</sup> Spherical O.D. outer ring width is 12 mm, .472".

<sup>(3)</sup> Spherical O.D. outer ring width is 14 mm, .551".  
<sup>(4)</sup> Spherical O.D. outer ring width is 21 mm, .827".

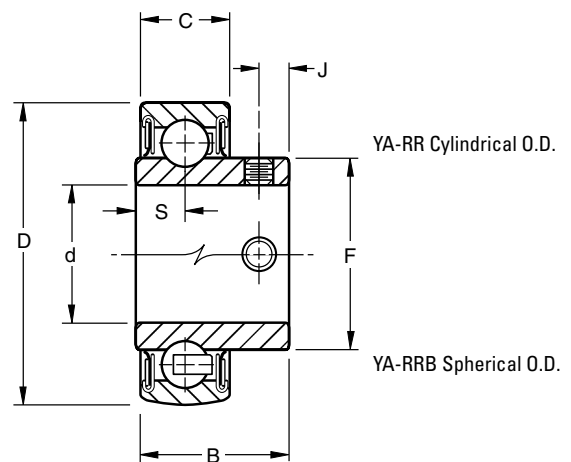




## BALL BEARINGS

### YA-RR, YA-RRB STANDARD SERIES NON-RELUBRICATABLE TYPES

- Bearings are an extended inner ring type and have specially designed setscrews with unique thread form.
- Thread form in both series locks bearing to shaft so they are resistant to loosening during operation.
- A positive contact, land-riding R-Seal provides improved protection against harmful contaminants in both series and retains lubricant under severe operating conditions.
- A 6/6 molded nylon retainer has proved effective under conditions of misalignment.
- YA-RR Series has cylindrical outside diameters.
- YA-RRB Series has spherical outside diameters for use in housings with corresponding spherical inside surfaces. This provides unrestricted initial self-alignment.



**Suggested shaft tolerances:**  $1/2'' - 1\ 15/16''$ , nominal to  $-.013\ \text{mm}$ ,  $-.0005''$ ;  
 $2'' - 2\ 15/16''$ , nominal to  $-.025\ \text{mm}$ ,  $-.0010''$ .

| Cylindrical O.D. | Spherical O.D. | Bearing Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |     | O.D. D |     | Ring Widths |                       | S     | F       | J     | Setscrew Size          | Brg. Wt. | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|------------------|----------------|----------------|-----------------------|-----------------------|-----|--------|-----|-------------|-----------------------|-------|---------|-------|------------------------|----------|-----------------------------------|---------------------------------------------|
|                  |                |                |                       | mm                    | in. | mm     | in. | B Inner     | C Outer               |       |         |       |                        |          |                                   |                                             |
| YA008RR          | YA008RRB       |                |                       | 1/2                   |     | 40     |     | 23.8        | 13                    | 7.95  | 24.6    | 4.75  | M5X.8                  | 0.09     | 4700                              | 10600                                       |
| YA010RR          | YA010RRB       | 203            |                       | 5/8                   |     | 1.5748 |     | 0.938       | 0.512 <sup>(2)</sup>  | 0.313 | 31/32   | 0.187 | 10-32                  | 0.19     | 1060                              | 2360                                        |
| YAE17RR          | YAE17RRB       |                |                       | 17                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA012RR          | YA012RRB       | 204            |                       | 3/4                   |     | 47     |     | 27          | 15                    | 8.86  | 29      | 6.02  | M6X1                   | 0.14     | 6200                              | 14300                                       |
| YAE20RR          | YAE20RRB       |                |                       | 20                    |     | 1.8504 |     | 1.063       | 0.591 <sup>(3)</sup>  | 0.349 | 1 9/64  | 0.237 | 1/4-28                 | 0.3      | 1400                              | 3200                                        |
| YA014RR          | YA014RRB       | 205            |                       | 7/8                   |     | 52     |     | 28.2        | 15                    | 8.84  | 33.7    | 6.35  | M6X1                   | 0.17     | 7700                              | 15800                                       |
| YA015RR          | YA015RRB       |                |                       | 15/16                 |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA100RR          | YA100RRB       |                |                       | 1                     |     | 2.0472 |     | 1.109       | 0.591                 | 0.348 | 1 21/64 | 0.250 | 1/4-28                 | 0.38     | 1730                              | 3550                                        |
| YAE25RR          | YAE25RRB       |                |                       | 25                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA102RR          | YA102RRB       | 206            |                       | 1 1/8                 |     | 62     |     | 32.5        | 18                    | 9.65  | 40.1    | 7.87  | M8X1.25                | 0.26     | 11100                             | 21800                                       |
| YA103RR          | YA103RRB       |                |                       | 1 3/16                |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA103RR2         | YA103RRB2      |                |                       | 1 1/4                 |     | 2.4409 |     | 1.281       | 0.709                 | 0.38  | 1 37/64 | 0.310 | 5/16-24 <sup>(4)</sup> | 0.58     | 2500                              | 4900                                        |
| YAE30RR          | YAE30RRB       |                |                       | 30                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA104RR          | YA104RRB       | 207            |                       | 1 1/4                 |     | 72     |     | 36.5        | 19                    | 10.85 | 46.8    | 7.87  | M8X1.25                | 0.42     | 15100                             | 28500                                       |
| YA106RR          | YA106RRB       |                |                       | 1 3/8                 |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA107RR          | YA107RRB       |                |                       | 1 7/16                |     | 2.8346 |     | 1.444       | 0.748                 | 0.427 | 1 27/32 | 0.310 | 5/16-24                | 0.93     | 3400                              | 6400                                        |
| YAE35RR          | YAE35RRB       |                |                       | 35                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA108RR          | YA108RRB       | 208            |                       | 1 1/2                 |     | 80     |     | 39.3        | 22                    | 11.63 | 52.4    | 7.87  | M8X1.25                | 0.56     | 17600                             | 36000                                       |
| YAE40RR          | YAE40RRB       |                |                       | 40                    |     | 3.1496 |     | 1.538       | 0.8661 <sup>(5)</sup> | 0.458 | 2 1/16  | 0.310 | 5/16-24                | 1.24     | 4000                              | 8150                                        |
| YA110RR          | YA110RRB       | 209            |                       | 1 5/8                 |     | 85     |     | 42          | 22                    | 13.46 | 57.9    | 7.87  | M8X1.25                | 0.54     | 20500                             | 36300                                       |
| YA111RR          | YA111RRB       |                |                       | 1 11/16               |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA112RR          | YA112RRB       |                |                       | 1 3/4                 |     | 3.3465 |     | 1.655       | 0.8861                | 0.53  | 2 9/32  | 0.310 | 5/16-24                | 1.18     | 4500                              | 8160                                        |
| YAE45RR          | YAE45RRB       |                |                       | 45                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA115RR          | YA115RRB       | 210            |                       | 1 15/16               |     | 90     |     | 44.3        | 22                    | 13.46 | 62.7    | 9.02  | M10X1.5                | 0.57     | 22700                             | 39200                                       |
| YA115RR2         | YA115RRB2      |                |                       | 2                     |     | 3.5433 |     | 1.746       | 0.8661                | 0.53  | 2 15/32 | 0.355 | 3/8-24                 | 1.25     | 5100                              | 8800                                        |
| YAE50RR          | YAE50RRB       |                |                       | 50                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |
| YA200RR          | YA200RRB       | 211            |                       | 2                     |     | 100    |     | 46.6        | 24                    | 14.6  | 69.8    | 9.02  | M10X1.5                | 0.58     | 28500                             | 48000                                       |
| YA203RR          | YA203RRB       |                |                       | 2 3/16                |     | 3.9370 |     | 1.833       | 0.9449                | 0.575 | 2 3/4   | 0.355 | 3/8-24                 | 1.27     | 6400                              | 10800                                       |
| YAE55RR          | YAE55RRB       |                |                       | 55                    |     |        |     |             |                       |       |         |       |                        |          |                                   |                                             |

<sup>(1)</sup> Bore tolerance is nominal to  $.013\ \text{mm}$ ,  $+.0005''$ .

<sup>(2)</sup> Spherical O.D. outer ring width is  $12\ \text{mm}$ ,  $.4724''$ .

<sup>(3)</sup> Spherical O.D. outer ring width is  $14\ \text{mm}$ ,  $.5512''$ .

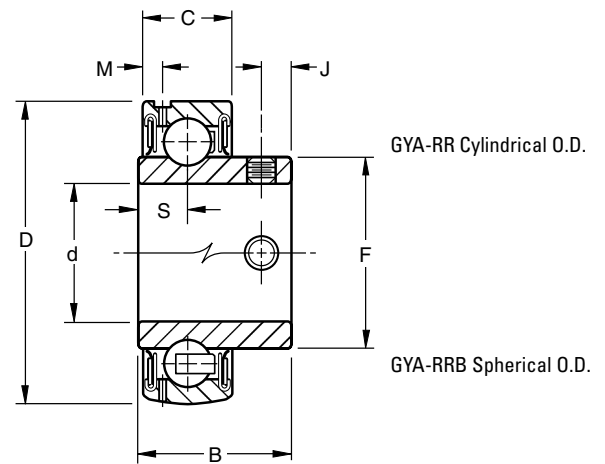
<sup>(4)</sup> YA103RR2 and YA103RRB2 use  $1/4 - 28''$  setscrew.

<sup>(5)</sup> Spherical O.D. outer ring width is  $21\ \text{mm}$ ,  $.8268''$ .

### GYA-RR, GYA-RRB STANDARD SERIES RELUBRICATABLE TYPES

- GYA-RR Series bearings are dimensionally interchangeable with the YA-RR Series.
- Both series have cylindrical outside diameters and can be used in standard cylindrical housings.
- GYA-RRB Series have spherical outside diameters, providing unrestricted initial alignment. This series is used in housings with corresponding spherical inside surfaces.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 2 15/16", nominal to **-.025 mm, -.0010"**.



| Cylindrical O.D. | Bearing Number | Spherical O.D. | Basic Outer Ring Size | Bore <sup>(1)</sup> d |     | O.D. D |     | Ring Widths |         | S     | F       | M     | J     | Setscrew Size          | Brg. Wt. | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|------------------|----------------|----------------|-----------------------|-----------------------|-----|--------|-----|-------------|---------|-------|---------|-------|-------|------------------------|----------|-----------------------------------|---------------------------------------------|
|                  |                |                |                       | mm                    | in. | mm     | in. | B Inner     | C Outer |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA008RR       | GYA008RRB      |                       | 1/2                   |     | 40     |     | 23.8        | 12      | 7.95  | 24.6    | 2.72  | 4.75  | M5X.8                  | 0.09     | 4700                              | 10600                                       |
|                  | GYA010RR       | GYA010RRB      | 203                   | 5/8                   |     | 1.5748 |     | 0.938       | 0.472   | 0.313 | 31/32   | 0.107 | 0.187 | 10-32                  | 0.19     | 1060                              | 2360                                        |
|                  | GYAE17RR       | GYAE17RRB      |                       | 17                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA012RR       | GYA012RRB      | 204                   | 3/4                   |     | 47     |     | 27          | 14      | 8.86  | 29      | 3.05  | 6.02  | M6X1                   | 0.14     | 6200                              | 14300                                       |
|                  | GYAE20RR       | GYAE20RRB      |                       | 20                    |     | 1.8504 |     | 1.063       | 0.551   | 0.349 | 1 9/64  | 0.12  | 0.237 | 1/4-28                 | 0.3      | 1400                              | 3200                                        |
|                  | GYA014RR       | GYA014RRB      | 205                   | 7/8                   |     | 52     |     | 28.2        | 15      | 8.84  | 33.7    | 3.61  | 6.35  | M6X1                   | 0.17     | 7700                              | 15800                                       |
|                  | GYA015RR       | GYA015RRB      |                       | 19/16                 |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA100RR       | GYA100RRB      |                       | 1                     |     | 2.0472 |     | 1.109       | 0.591   | 0.348 | 1 21/64 | 0.142 | 0.250 | 1/4-28                 | 0.38     | 1730                              | 3550                                        |
|                  | GYAE25RR       | GYAE25RRB      |                       | 25                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA102RR       | GYA102RRB      | 206                   | 1 1/8                 |     | 62     |     | 32.5        | 18      | 9.65  | 40.1    | 4.17  | 7.87  | M8X1.25                | 0.26     | 11100                             | 21800                                       |
|                  | GYA103RR       | GYA103RRB      |                       | 1 3/16                |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA103RR2      | GYA103RRB2     |                       | 1 1/4                 |     | 2.4409 |     | 1.281       | 0.709   | 0.38  | 1 37/64 | 0.164 | 0.310 | 5/16-24 <sup>(2)</sup> | 0.58     | 2500                              | 4900                                        |
|                  | GYAE30RR       | GYAE30RRB      |                       | 30                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA104RR       | GYA104RRB      | 207                   | 1 1/4                 |     | 72     |     | 36.5        | 19      | 10.85 | 46.8    | 3.68  | 7.87  | M8X1.25                | 0.42     | 15100                             | 28500                                       |
|                  | GYA106RR       | GYA106RRB      |                       | 1 3/8                 |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA107RR       | GYA107RRB      |                       | 1 7/16                |     | 2.8346 |     | 1.444       | 0.748   | 0.427 | 1 27/32 | 0.145 | 0.310 | 5/16-24                | 0.93     | 3400                              | 6400                                        |
|                  | GYAE35RR       | GYAE35RRB      |                       | 35                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA108RR       | GYA108RRB      | 208                   | 1 1/2                 |     | 80     |     | 39.3        | 22      | 11.63 | 52.4    | 4.17  | 7.87  | M8X1.25                | 0.56     | 17600                             | 36000                                       |
|                  | GYAE40RR       | GYAE40RRB      |                       | 40                    |     | 3.1496 |     | 1.538       | 0.8661  | 0.458 | 2 1/16  | 0.164 | 0.310 | 5/16-24                | 1.24     | 4000                              | 8150                                        |
|                  | GYA110RR       | GYA110RRB      | 209                   | 1 5/8                 |     | 85     |     | 42          | 22      | 13.46 | 57.9    | 4.54  | 7.87  | M8X1.25                | 0.54     | 20000                             | 36000                                       |
|                  | GYA111RR       | GYA111RRB      |                       | 1 11/16               |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA112RR       | GYA112RRB      |                       | 1 3/4                 |     | 3.3465 |     | 1.655       | 0.8661  | 0.53  | 2 9/32  | 0.179 | 0.310 | 5/16-24                | 1.18     | 4500                              | 8150                                        |
|                  | GYAE45RR       | GYAE45RRB      |                       | 45                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA115RR       | GYA115RRB      | 210                   | 1 15/16               |     | 90     |     | 44.3        | 22      | 13.46 | 62.7    | 4.44  | 9.02  | M10X1.5                | 0.57     | 22700                             | 39200                                       |
|                  | GYA115RR2      | GYA115RRB2     |                       | 2                     |     | 3.5433 |     | 1.746       | 0.8661  | 0.53  | 2 15/32 | 0.175 | 0.355 | 3/8-24                 | 1.25     | 5100                              | 8800                                        |
|                  | GYAE50RR       | GYAE50RRB      |                       | 50                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |
|                  | GYA200RR       | GYA200RRB      | 211                   | 2                     |     | 100    |     | 46.6        | 24      | 14.6  | 69.8    | 4.9   | 9.02  | M10X1.5                | 0.58     | 28500                             | 48000                                       |
|                  | GYA203RR       | GYA203RRB      |                       | 2 3/16                |     | 3.9370 |     | 1.833       | 0.9449  | 0.575 | 2 3/4   | 0.193 | 0.355 | 3/8-24                 | 1.27     | 6400                              | 10800                                       |
|                  | GYAE55RR       | GYAE55RRB      |                       | 55                    |     |        |     |             |         |       |         |       |       |                        |          |                                   |                                             |

<sup>(1)</sup> Bore tolerance is nominal to .013 mm, +.0005".  
<sup>(2)</sup> GYA103RR2 and GYA103RRB2 use 1/4 - 28" setscrew.

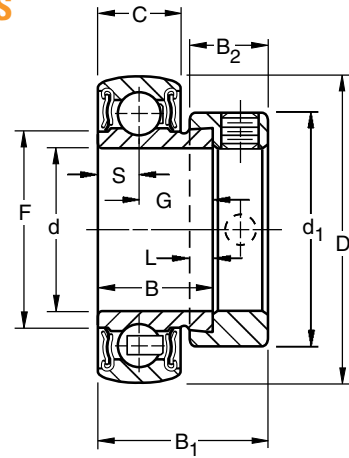


## BALL BEARINGS

### RAL-NPPB STANDARD SERIES NON-RELUBRICATABLE TYPES

- RAL Series are high-quality, compact, low-cost bearings and are intended for use in lightly loaded applications.
- RAL Series are extended inner ring type with self-locking collars.
- Prelubricated RAL Series incorporate the positive contact, land-riding R-Seal. The seal has proved effective in the retention of lubricants and exclusion of foreign matter under extreme service conditions.
- RAL-NPPD Series bearings have spherical outside diameters providing unrestricted initial alignment.
- Used in housings with corresponding spherical inside surfaces.

Suggested shaft tolerances:  $1/2'' - 1 1/4''$ , nominal to  $-.013$  mm,  $-.0005''$ .



TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: RAL100NPPB + COL.

| Bearing Number            | Collar Number | Basic Outer Ring Size | Bore <sup>(2)</sup> d | O.D. D | Ring Widths |         | S      | G      | F      | L      | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | Brg. & Collar Wt. |        | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|---------------------------|---------------|-----------------------|-----------------------|--------|-------------|---------|--------|--------|--------|--------|----------------|----------------|----------------|-------------------|--------|-----------------------------------|---------------------------------------------|
|                           |               |                       |                       |        | B Inner     | C Outer |        |        |        |        |                |                |                | kg                | lbs.   |                                   |                                             |
|                           |               |                       | in.                   | mm in. | mm in.      | mm in.  | mm in. | mm in. | mm in. | mm in. | mm in.         | kg lbs.        | kg lbs.        | N lbs.            | N lbs. |                                   |                                             |
| RAL008NPPB <sup>(1)</sup> | LS008K        |                       | 1/2                   | 35     | 15.88       | 11      | 5.502  | 10.373 | 20.07  | 4      | 25.4           | 11.1           | 23.8           | —                 | —      | 3000                              | 7500                                        |
| RAL009NPPB                | LS009K        | 202                   | 9/16                  | 1.3780 | 5/8         | 0.433   | 0.2116 | 0.4084 | 0.790  | 5/32   | 1              | 7/16           | 15/16          | —                 | —      | 680                               | 1700                                        |
| RAL010NPPB <sup>(1)</sup> | LS010K        |                       | 5/8                   |        |             |         |        |        |        |        |                |                |                | 0.06              | 0.13   |                                   |                                             |
| RAL012NPPB <sup>(1)</sup> | LS012K        | 9104                  | 3/4                   | 42     | 16.67       | 12      | 6      | 10.663 | 25.15  | 3.2    | 29.8           | 11.1           | 24.6           | 0.09              | 0.20   | 4400                              | 10400                                       |
|                           |               |                       |                       | 1.6535 | 2 1/32      | 0.472   | 0.2362 | 0.4198 | 0.990  | 1/8    | 1 11/64        | 7/16           | 3 1/32         |                   |        | 1000                              | 2320                                        |
| RAL013NPPB                | LS013K        |                       | 13/16                 |        |             |         |        |        |        |        |                |                |                | —                 | —      |                                   |                                             |
| RAL014NPPB                | LS014K        | 9105                  | 7/8                   | 47     | 17.46       | 12      | 6      | 11.476 | 29.67  | 4      | 36.1           | 11.9           | 25.4           | 0.11              | 0.24   | 4900                              | 11000                                       |
| RAL015NPPB                | LS015K        |                       | 15/16                 | 1.8504 | 1 1/16      | 0.472   | 0.2362 | 0.4518 | 1.168  | 5/32   | 1 27/64        | 15/32          | 1              | —                 | —      | 1120                              | 2500                                        |
| RAL100NPPB <sup>(1)</sup> | LS100K        |                       | 1                     |        |             |         |        |        |        |        |                |                |                | 0.10              | 0.22   |                                   |                                             |
| RAL101NPPB                | LS101K        |                       | 1 1/16                |        |             |         |        |        |        |        |                |                |                | —                 | —      |                                   |                                             |
| RAL102NPPB                | LS102K        | 9106                  | 1 1/8                 | 55     | 18.27       | 13      | 6.5    | 11.755 | 36.32  | 4      | 42.5           | 11.9           | 26.2           | 0.13              | 0.29   | 6950                              | 14600                                       |
| RAL103NPPB                | LS103K        |                       | 1 3/16                | 2.1654 | 2 3/32      | 0.512   | 0.2559 | 0.4628 | 1.43   | 5/32   | 1 43/64        | 15/32          | 1 1/32         | 0.13              | 0.28   | 1560                              | 3350                                        |
| RAL103NPPB <sup>(1)</sup> | LS103K2       |                       | 1 1/4                 |        |             |         |        |        |        |        |                |                |                | 0.13              | 0.28   |                                   |                                             |

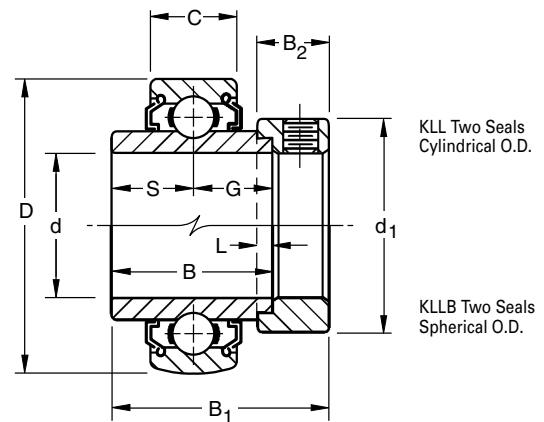
<sup>(1)</sup> Also available with cylindrical O.D. (Delete suffix "B").

<sup>(2)</sup> Bore tolerance is nominal to .013 mm,  $+.0005''$ .

### KL, KLB, KLL, KLLB SPECIAL SERIES NON-RELUBRICATABLE TYPES

- These wide inner ring ball bearings have either one or two Mechani-Seals.
- Types KLB and KLLB have spherical outside diameters permitting self-alignment when mounted in a housing with a corresponding spherical seat.
- All four types are prelubricated at the factory and require no further lubrication.
- Suitable for higher speed and/or higher temperature applications.
- Because they incorporate non-contact seals, these bearings have very low rotational torque.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".



TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: 1100KLL + COL.

| Bearing Number   |                  |                | Collar Number | Basic Outer Ring Size | Bore <sup>(4)</sup><br>d | O.D.<br>D | Ring Widths |                   | S&G    | L      | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | Brg. & Collar Wt. |         | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |        |         |      |        |       |         |       |       |      |       |
|------------------|------------------|----------------|---------------|-----------------------|--------------------------|-----------|-------------|-------------------|--------|--------|----------------|----------------|----------------|-------------------|---------|-----------------------------------|---------------------------------------------|--------|---------|------|--------|-------|---------|-------|-------|------|-------|
| Cylindrical O.D. | Cylindrical O.D. | Spherical O.D. |               |                       |                          |           | B Inner     | C Outer           |        |        |                |                |                | kg                | lbs.    |                                   |                                             | N lbs. | N lbs.  |      |        |       |         |       |       |      |       |
|                  |                  |                |               |                       | in.                      | mm in.    | mm in.      | mm in.            | mm in. | mm in. | mm in.         | mm in.         | kg             | lbs.              | N lbs.  | N lbs.                            |                                             |        |         |      |        |       |         |       |       |      |       |
| 1008KL           | 1008KLL          | (KLLB)         | S1008K        | 203                   | 1/2                      | 40        | 27.78       | 12                | 13.89  | 3.97   | 28.58          | 13.49          | 37.31          | 0.168             | 0.37    | 4700                              | 10700                                       |        |         |      |        |       |         |       |       |      |       |
| —                | 1009KLL          | (KLLB)         | S1009K        |                       | 9/16                     |           |             |                   |        |        |                |                |                | 1.5748            | 1 3/32  |                                   |                                             | 0.4724 | 35/64   | 5/32 | 1 1/8  | 17/32 | 1 15/32 | 0.163 | 0.36  | 1060 | 2400  |
| 1010KL           | 1010KLL          | (KLLB)         | S1010K        |                       | 5/8                      |           |             |                   |        |        |                |                |                | 1.5748            | 1 3/32  |                                   |                                             | 0.4724 | 35/64   | 5/32 | 1 1/8  | 17/32 | 1 15/32 | 0.122 | 0.27  | 1060 | 2400  |
| 1011KL           | 1011KLL          | (KLLB)         | S1011K        | 204                   | 11/16                    | 47        | 34.13       | 14                | 17.06  | 3.97   | 33.34          | 13.5           | 43.7           | 0.209             | 0.46    | 6200                              | 14300                                       |        |         |      |        |       |         |       |       |      |       |
| 1012KL           | 1012KLL          | (KLLB)         | S1012K        |                       | 3/4                      |           |             |                   |        |        |                |                |                | 1.8504            | 1 11/32 |                                   |                                             | 0.5512 | 43/64   | 5/32 | 1 5/16 | 17/32 | 1 23/32 | 0.286 | 0.63  | 1400 | 3200  |
| —                | —                | (KLLB)         | S1013K        |                       | 13/16                    |           |             |                   |        |        |                |                |                | 1.8504            | 1 11/32 |                                   |                                             | 0.5512 | 43/64   | 5/32 | 1 5/16 | 17/32 | 1 23/32 | 0.277 | 0.61  | 1400 | 3200  |
| 1014KL           | 1014KLL          | (KLLB)         | S1014K        | 205                   | 7/8                      | 52        | 34.92       | 15                | 17.46  | 3.97   | 38.1           | 13.49          | 44.45          | 0.277             | 0.61    | 7700                              | 15800                                       |        |         |      |        |       |         |       |       |      |       |
| 1015KL           | 1015KLL          | (KLLB)         | S1015K        |                       | 15/16                    |           |             |                   |        |        |                |                |                | 2.0472            | 1 3/8   |                                   |                                             | 0.5906 | 11/16   | 5/32 | 1 1/2  | 17/32 | 1 41/64 | 0.254 | 0.56  | 1730 | 3550  |
| 1100KL           | (KLB) 1100KLL    | (KLLB)         | S1100K        |                       | 1                        |           |             |                   |        |        |                |                |                | 2.0472            | 1 3/8   |                                   |                                             | 0.5906 | 11/16   | 5/32 | 1 1/2  | 17/32 | 1 41/64 | 0.25  | 0.55  | 1730 | 3550  |
| 1101KL           | —                | (KLLB)         | S1101K        | 206                   | 1 1/16                   | 62        | 36.51       | 16 <sup>(1)</sup> | 18.26  | 3.97   | 44.1           | 15.88          | 48.42          | 0.417             | 0.92    | 11100                             | 21800                                       |        |         |      |        |       |         |       |       |      |       |
| 1102KL           | 1102KLL          | (KLLB)         | S1102K        |                       | 1 1/8                    |           |             |                   |        |        |                |                |                | 2.4409            | 1 7/16  |                                   |                                             | 0.6299 | 23/32   | 5/32 | 1 3/4  | 5/8   | 1 29/32 | 0.413 | 0.91  | 2500 | 4900  |
| 1103KL           | (KLB) 1103KLL    | (KLLB)         | S1103K        |                       | 1 3/16                   |           |             |                   |        |        |                |                |                | 2.4409            | 1 7/16  |                                   |                                             | 0.6299 | 23/32   | 5/32 | 1 3/4  | 5/8   | 1 29/32 | 0.372 | 0.82  | 2500 | 4900  |
| 1103KL3          | 1103KLL3         | (KLLB3)        | S1103K3       | 207                   | 1 1/4                    | 72        | 37.70       | 17 <sup>(2)</sup> | 18.85  | 3.97   | 54.0           | 17.46          | 51.2           | 0.649             | 1.43    | 15100                             | 28500                                       |        |         |      |        |       |         |       |       |      |       |
| 1104KL           | 1104KLL          | (KLLB)         | S1104K        |                       | 1 1/4                    |           |             |                   |        |        |                |                |                | 2.8346            | 1 31/64 |                                   |                                             | 0.6693 | 0.742   | 5/32 | 2 1/8  | 43/64 | 2 1/64  | 0.581 | 1.28  | 3400 | 6400  |
| —                | 1105KLL          | (KLLB)         | S1105K        |                       | 1 5/16                   |           |             |                   |        |        |                |                |                | 2.8346            | 1 31/64 |                                   |                                             | 0.6693 | 0.742   | 5/32 | 2 1/8  | 43/64 | 2 1/64  | 0.544 | 1.2   | 3400 | 6400  |
| 1106KL           | 1106KLL          | (KLLB)         | S1106K        | 208                   | 1 3/8                    | 80        | 42.86       | 18 <sup>(3)</sup> | 21.43  | 4.76   | 60.32          | 18.26          | 56.36          | 0.821             | 1.81    | 17600                             | 36200                                       |        |         |      |        |       |         |       |       |      |       |
| 1107KL           | (KLB) 1107KLL    | (KLLB)         | S1107K        |                       | 1 7/16                   |           |             |                   |        |        |                |                |                | 3.1496            | 1 11/16 |                                   |                                             | 0.7087 | 27/32   | 3/16 | 2 3/8  | 23/32 | 2 7/32  | 0.767 | 1.69  | 4000 | 8130  |
| 1108KL           | (KLB) 1108KLL    | (KLLB)         | S1108K        |                       | 1 1/2                    |           |             |                   |        |        |                |                |                | 3.1496            | 1 11/16 |                                   |                                             | 0.7087 | 27/32   | 3/16 | 2 3/8  | 23/32 | 2 7/32  | 0.767 | 1.69  | 4000 | 8130  |
| —                | 1109KLL          | (KLLB)         | S1109K        | 1 9/16                | 3.1496                   | 1 11/16   | 0.7087      | 27/32             | 3/16   | 2 3/8  | 23/32          | 2 7/32         | 0.767          | 1.69              | 4000    | 8130                              |                                             |        |         |      |        |       |         |       |       |      |       |
| 1110KL           | 1110KLL          | (KLLB)         | S1110K        | 209                   | 1 5/8                    | 85        | 42.86       | 19                | 21.43  | 4.76   | 60.35          | 18.26          | 56.36          | 0.934             | 2.06    | 20000                             | 36300                                       |        |         |      |        |       |         |       |       |      |       |
| 1111KL           | 1111KLL          | (KLLB)         | S1111K        |                       | 1 11/16                  |           |             |                   |        |        |                |                |                | 3.3465            | 1 11/16 |                                   |                                             | 0.7480 | 27/32   | 3/16 | 2 1/2  | 23/32 | 2 7/32  | 0.89  | 1.96  | 4500 | 8160  |
| 1112KL           | (KLB) 1112KLL    | (KLLB)         | S1112K        |                       | 1 3/4                    |           |             |                   |        |        |                |                |                | 3.3465            | 1 11/16 |                                   |                                             | 0.7480 | 27/32   | 3/16 | 2 1/2  | 23/32 | 2 7/32  | 0.844 | 1.86  | 4500 | 8160  |
| 1114KL           | 1114KLL          | (KLLB)         | S1114K        | 210                   | 1 7/8                    | 90        | 49.21       | 20                | 24.61  | 4.76   | 69.9           | 18.26          | 62.71          | 1.075             | 2.37    | 22700                             | 39000                                       |        |         |      |        |       |         |       |       |      |       |
| 1115KL           | (KLB) 1115KLL    | (KLLB)         | S1115K        |                       | 1 15/16                  |           |             |                   |        |        |                |                |                | 3.5433            | 1 15/16 |                                   |                                             | 0.7874 | 31/32   | 3/16 | 2 3/4  | 23/32 | 2 15/32 | 1.021 | 2.25  | 5100 | 8800  |
| 1200KL           | (KLB) 1200KLL    | (KLLB)         | S1200K        |                       | 2                        |           |             |                   |        |        |                |                |                | 3.5433            | 1 15/16 |                                   |                                             | 0.7874 | 31/32   | 3/16 | 2 3/4  | 23/32 | 2 15/32 | 1.021 | 2.25  | 5100 | 8800  |
| —                | 1202KLL          | (KLLB)         | S1202K        | 211                   | 2                        | 100       | 55.56       | 21                | 27.98  | 4.76   | 76.2           | 20.64          | 71.44          | 1.54              | 3.4     | 28500                             | 48000                                       |        |         |      |        |       |         |       |       |      |       |
| 1203KL           | 1203KLL          | (KLLB)         | S1203K        |                       | 2 1/8                    |           |             |                   |        |        |                |                |                | 3.9370            | 2 3/16  |                                   |                                             | 0.8268 | 1 3/32  | 3/16 | 3      | 13/16 | 2 13/16 | 1.406 | 3.1   | 6400 | 10800 |
| —                | 1203KLL          | (KLLB)         | S1203K        |                       | 2 3/16                   |           |             |                   |        |        |                |                |                | 3.9370            | 2 3/16  |                                   |                                             | 0.8268 | 1 3/32  | 3/16 | 3      | 13/16 | 2 13/16 | 1.347 | 2.97  | 6400 | 10800 |
| 1207KL           | —                | (KLLB)         | S1207K        | 212                   | 2 7/16                   | 110       | 61.91       | 22                | 30.96  | 6.35   | 84.14          | 22.22          | 77.79          | 1.66              | 3.66    | 35600                             | 58500                                       |        |         |      |        |       |         |       |       |      |       |
| —                | —                | (KLLB)         | S1207K        |                       | 2 7/16                   |           |             |                   |        |        |                |                |                | 4.3307            | 2 7/16  |                                   |                                             | 0.8661 | 1 7/32  | 1/4  | 3 5/16 | 7/8   | 3 1/16  | 8000  | 13200 |      |       |
| —                | 1215KLL          | (KLLB)         | S1215K        |                       | 2 15/16                  |           |             |                   |        |        |                |                |                | 4.3307            | 2 7/16  |                                   |                                             | 0.8661 | 1 7/32  | 1/4  | 3 5/16 | 7/8   | 3 1/16  | 8000  | 13200 |      |       |
| —                | —                | (KLLB)         | S1215K        | 215                   | 2 15/16                  | 130       | 74.61       | 25                | 37.31  | 6.35   | 101.6          | 23.81          | 91.08          | 2.268             | 5       | 43600                             | 69500                                       |        |         |      |        |       |         |       |       |      |       |
| —                | —                | (KLLB)         | S1215K        |                       | 2 15/16                  |           |             |                   |        |        |                |                |                | 5.1181            | 2 15/16 |                                   |                                             | 0.9843 | 1 15/32 | 1/4  | 4      | 15/16 | 3 5/8   | 9800  | 15600 |      |       |
| —                | —                | (KLLB)         | S1215K        |                       | 2 15/16                  |           |             |                   |        |        |                |                |                | 5.1181            | 2 15/16 |                                   |                                             | 0.9843 | 1 15/32 | 1/4  | 4      | 15/16 | 3 5/8   | 9800  | 15600 |      |       |

(1) Spherical O.D. outer ring width is 18 mm, .7087".  
 (2) Spherical O.D. outer ring width is 19 mm, .7480".  
 (3) Spherical O.D. outer ring width is 21 mm, .8268".  
 (4) Bore tolerance: 1/2" - 2 3/16", nominal to .013 mm, +.0005".  
 2 7/16" - 2 15/16", nominal to .015 mm, +.0006".

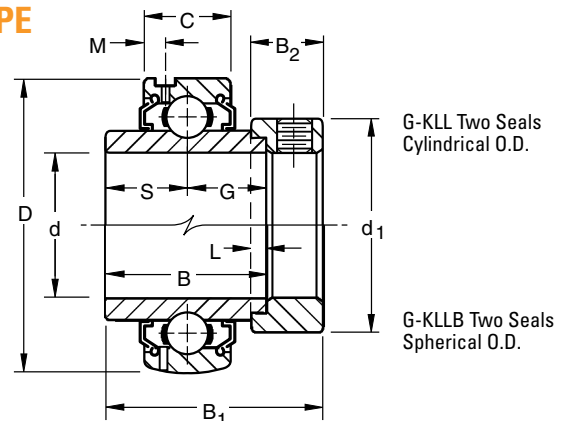


## BALL BEARINGS

### G-KLL, G-KLLB SPECIAL SERIES RELUBRICATABLE TYPE

- These wide inner ring ball bearings have two Mechani-Seals and a provision for relubrication.
- Type G-KLL has a cylindrical outside diameter
- Type G-KLLB has a spherical outside diameter.
- Both are generally suitable for higher speed and/or higher temperature applications.
- Because they incorporate non-contact seals, these bearings have very low rotational torque.
- Consult your Timken representative for suggestions.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: G1015KLL + COL.**

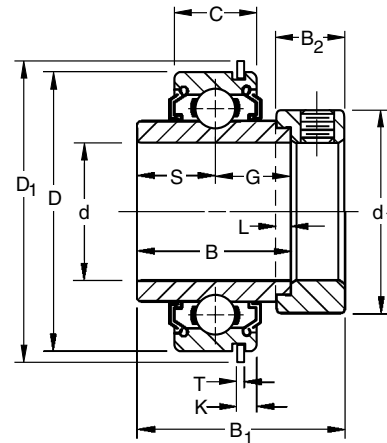
| Bearing Number   |                | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D  | Ring Widths |         | S&G   | L     | d <sub>1</sub> | B <sub>2</sub> | M       | B <sub>1</sub> | Brg. & Collar Wt. |         | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>E</sub> |        |         |        |        |        |       |         |       |      |       |       |
|------------------|----------------|---------------|-----------------------|-----------------------|---------|-------------|---------|-------|-------|----------------|----------------|---------|----------------|-------------------|---------|-----------------------------------|---------------------------------------------|--------|---------|--------|--------|--------|-------|---------|-------|------|-------|-------|
| Cylindrical O.D. | Spherical O.D. |               |                       |                       |         | B Inner     | C Outer |       |       |                |                |         |                | mm in.            | mm in.  |                                   |                                             | kg     | lbs.    | N lbs. | N lbs. |        |       |         |       |      |       |       |
| —                | G1008KLLB      | S1008K        | 203                   | 1/2                   | 40      | 27.78       | 12      | 13.9  | 4.0   | 28.6           | 13.5           | 2.72    | 37.3           | 0.15              | 0.33    | 4700                              | 10700                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1009KLLB      | S1009K        |                       | 9/16                  |         |             |         |       |       |                |                |         |                | 5/8               | 1 3/32  |                                   |                                             | 0.4724 | 35/64   | 5/32   | 1 1/8  | 17/32  | 0.107 | 1 15/32 | 0.136 | 0.3  | 1060  | 2400  |
| G1010KLL         | G1010KLLB      | S1010K        |                       | 11/16                 |         |             |         |       |       |                |                |         |                | 1 1/8             | 1 1/8   |                                   |                                             | 0.4724 | 35/64   | 5/32   | 1 1/8  | 17/32  | 0.107 | 1 15/32 | 0.141 | 0.31 | 1060  | 2400  |
| G1011KLL         | G1011KLLB      | S1011K        |                       | 1 1/16                |         |             |         |       |       |                |                |         |                | 1 1/8             | 1 1/8   |                                   |                                             | 0.4724 | 35/64   | 5/32   | 1 1/8  | 17/32  | 0.107 | 1 15/32 | 0.118 | 0.26 | 1060  | 2400  |
| G1012KLL         | G1012KLLB      | S1012K        | 204                   | 3/4                   | 47      | 34.13       | 14      | 17.1  | 4.0   | 33.3           | 13.5           | 3.43    | 43.7           | 0.2               | 0.44    | 6200                              | 14300                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1013KLLB      | S1013K        |                       | 13/16                 |         |             |         |       |       |                |                |         |                | 1 1/8             | 1 1/8   |                                   |                                             | 0.5512 | 43/64   | 5/32   | 1 5/16 | 17/32  | 0.135 | 1 23/32 | 0.286 | 0.63 | 1400  | 3200  |
| G1014KLL         | G1014KLLB      | S1014K        |                       | 7/8                   |         |             |         |       |       |                |                |         |                | 1 1/8             | 1 1/8   |                                   |                                             | 0.5512 | 43/64   | 5/32   | 1 5/16 | 17/32  | 0.135 | 1 23/32 | 0.263 | 0.58 | 1400  | 3200  |
| G1015KLL         | G1015KLLB      | S1015K        |                       | 15/16                 |         |             |         |       |       |                |                |         |                | 1 1/8             | 1 1/8   |                                   |                                             | 0.5512 | 43/64   | 5/32   | 1 5/16 | 17/32  | 0.135 | 1 23/32 | 0.245 | 0.54 | 1400  | 3200  |
| G1100KLL         | G1100KLLB      | S1100K        | 206                   | 1                     | 62      | 36.51       | 18      | 18.3  | 4.0   | 44.4           | 15.9           | 3.96    | 48.4           | 0.222             | 0.49    | 11100                             | 21800                                       |        |         |        |        |        |       |         |       |      |       |       |
| G1101KLL         | —              | S1101K        |                       | 1 1/16                |         |             |         |       |       |                |                |         |                | 1 7/8             | 1 7/8   |                                   |                                             | 0.7087 | 23/32   | 5/32   | 1 3/4  | 5/8    | 0.156 | 1 29/32 | 0.422 | 0.93 | 2500  | 4900  |
| G1102KLL         | G1102KLLB      | S1102K        |                       | 1 1/8                 |         |             |         |       |       |                |                |         |                | 1 7/8             | 1 7/8   |                                   |                                             | 0.7087 | 23/32   | 5/32   | 1 3/4  | 5/8    | 0.156 | 1 29/32 | 0.413 | 0.91 | 2500  | 4900  |
| G1103KLL         | G1103KLLB      | S1103K        |                       | 1 3/16                |         |             |         |       |       |                |                |         |                | 1 7/8             | 1 7/8   |                                   |                                             | 0.7087 | 23/32   | 5/32   | 1 3/4  | 5/8    | 0.156 | 1 29/32 | 0.395 | 0.87 | 2500  | 4900  |
| —                | G1103KLLB3     | S1103K3       | 1 1/4                 | 1 7/8                 | 1 7/8   | 0.7087      | 23/32   | 5/32  | 1 3/4 | 5/8            | 0.156          | 1 29/32 | 0.34           | 0.75              | 2500    | 4900                              |                                             |        |         |        |        |        |       |         |       |      |       |       |
| G1104KLL         | G1104KLLB      | S1104K        | 207                   | 1 1/4                 | 72      | 37.70       | 19      | 18.85 | 4.0   | 54.0           | 17.46          | 3.43    | 51.2           | 0.649             | 1.43    | 15100                             | 28500                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1105KLLB      | S1105K        |                       | 1 5/16                |         |             |         |       |       |                |                |         |                | 1 3/8             | 1 3/8   |                                   |                                             | 0.7480 | 0.742   | 5/32   | 2 1/8  | 1 1/16 | 0.135 | 2 1/64  | 0.622 | 1.37 | 3400  | 6400  |
| G1106KLL         | G1106KLLB      | S1106K        |                       | 1 3/8                 |         |             |         |       |       |                |                |         |                | 1 3/8             | 1 3/8   |                                   |                                             | 0.7480 | 0.742   | 5/32   | 2 1/8  | 1 1/16 | 0.135 | 2 1/64  | 0.59  | 1.3  | 3400  | 6400  |
| G1107KLL         | G1107KLLB      | S1107K        |                       | 1 7/16                |         |             |         |       |       |                |                |         |                | 1 3/8             | 1 3/8   |                                   |                                             | 0.7480 | 0.742   | 5/32   | 2 1/8  | 1 1/16 | 0.135 | 2 1/64  | 0.549 | 1.21 | 3400  | 6400  |
| G1108KLL         | G1108KLLB      | S1108KT       | 208                   | 1 1/2                 | 80      | 42.86       | 21      | 21.4  | 4.8   | 60.3           | 18.3           | 4.06    | 56.4           | 0.826             | 1.82    | 17600                             | 36200                                       |        |         |        |        |        |       |         |       |      |       |       |
| G1109KLL         | G1109KLLB      | S1109KT       |                       | 1 9/16                |         |             |         |       |       |                |                |         |                | 1 11/16           | 1 11/16 |                                   |                                             | 0.8268 | 27/32   | 3/16   | 2 3/8  | 23/32  | 0.16  | 2 7/32  | 0.785 | 1.73 | 4000  | 8130  |
| G1110KLL         | G1110KLLB      | S1110K        |                       | 1 5/8                 |         |             |         |       |       |                |                |         |                | 1 11/16           | 1 11/16 |                                   |                                             | 0.8661 | 27/32   | 3/16   | 2 1/2  | 23/32  | 4.55  | 2 7/32  | 0.949 | 2.09 | 20000 | 36300 |
| G1111KLL         | G1111KLLB      | S1111K        |                       | 209                   |         |             |         |       |       |                |                |         |                | 1 11/16           | 1 11/16 |                                   |                                             | 0.8661 | 27/32   | 3/16   | 2 1/2  | 23/32  | 4.55  | 2 7/32  | 0.899 | 1.98 | 4500  | 8160  |
| G1112KLL         | G1112KLLB      | S1112K        | 1 3/4                 | 1 11/16               | 1 11/16 | 0.8661      | 27/32   | 3/16  | 2 1/2 | 23/32          | 4.55           | 2 7/32  | 0.853          | 1.88              | 4500    | 8160                              |                                             |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1113KLLB      | S1113K        | 210                   | 1 13/16               | 90      | 49.21       | 23      | 24.6  | 4.8   | 69.9           | 18.3           | 4.7     | 62.7           | 1.148             | 2.53    | 22700                             | 39000                                       |        |         |        |        |        |       |         |       |      |       |       |
| G1114KLL         | G1114KLLB      | S1114K        |                       | 1 7/8                 |         |             |         |       |       |                |                |         |                | 1 15/16           | 1 15/16 |                                   |                                             | 0.9055 | 31/32   | 3/16   | 2 3/4  | 23/32  | 0.185 | 2 15/32 | 1.09  | 2.4  | 5100  | 8800  |
| G1115KLL         | G1115KLLB      | S1115K        |                       | 1 15/16               |         |             |         |       |       |                |                |         |                | 1 15/16           | 1 15/16 |                                   |                                             | 0.9055 | 31/32   | 3/16   | 2 3/4  | 23/32  | 0.185 | 2 15/32 | 1.031 | 2.27 | 5100  | 8800  |
| G1200KLL         | G1200KLLB      | S1200K        |                       | 2                     |         |             |         |       |       |                |                |         |                | 1 15/16           | 1 15/16 |                                   |                                             | 0.9843 | 1 15/32 | 1/4    | 4      | 15/16  | 0.219 | 3 5/8   | 1.593 | 3.51 | 9800  | 15600 |
| —                | G1201KLLB      | S1201K        | 211                   | 2 1/16                | 100     | 55.56       | 24      | 27.8  | 4.8   | 76.2           | 20.6           | 5       | 71.4           | 1.512             | 3.33    | 28500                             | 48000                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1202KLLB      | S1202K        |                       | 2 1/8                 |         |             |         |       |       |                |                |         |                | 2 3/16            | 2 3/16  |                                   |                                             | 0.9450 | 1 3/32  | 3/16   | 3      | 13/16  | 0.197 | 2 13/16 | 1.416 | 3.12 | 6400  | 10800 |
| G1203KLL         | G1203KLLB      | S1203K        |                       | 2 3/16                |         |             |         |       |       |                |                |         |                | 2 3/16            | 2 3/16  |                                   |                                             | 0.9450 | 1 3/32  | 3/16   | 3      | 13/16  | 0.197 | 2 13/16 | 1.285 | 2.83 | 6400  | 10800 |
| G1204KLL         | G1204KLLB      | S1204K        |                       | 212                   |         |             |         |       |       |                |                |         |                | 2 1/4             | 2 1/4   |                                   |                                             | 0.9450 | 1 3/32  | 3/16   | 3      | 13/16  | 0.197 | 2 13/16 | 2.03  | 4.47 | 6400  | 10800 |
| —                | G1205KLLB      | S1205K        | 212                   | 2 5/16                | 110     | 61.91       | 27      | 31    | 6.4   | 84.1           | 22.2           | 5.13    | 77.8           | 1.938             | 4.27    | 35600                             | 58500                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1206KLLB      | S1206K        |                       | 2 3/8                 |         |             |         |       |       |                |                |         |                | 2 7/16            | 2 7/16  |                                   |                                             | 1.0630 | 1 7/32  | 1/4    | 3 5/16 | 7/8    | 0.202 | 3 1/16  | 1.852 | 4.08 | 8000  | 13200 |
| —                | G1207KLLB      | S1207K        |                       | 2 7/16                |         |             |         |       |       |                |                |         |                | 2 7/16            | 2 7/16  |                                   |                                             | 1.0630 | 1 7/32  | 1/4    | 3 5/16 | 7/8    | 0.202 | 3 1/16  | 1.789 | 3.94 | 8000  | 13200 |
| —                | G1215KLLB      | S1215K        |                       | 215                   |         |             |         |       |       |                |                |         |                | 2 15/16           | 2 15/16 |                                   |                                             | 1.0630 | 1 7/32  | 1/4    | 3 5/16 | 7/8    | 0.202 | 3 1/16  | 1.789 | 3.94 | 8000  | 13200 |
| —                | G1215KLLB      | S1215K        | 215                   | 2 15/16               | 130     | 74.61       | 25      | 37.3  | 6.4   | 101.6          | 23.8           | 5.56    | 91.2           | 2.837             | 6.25    | 43600                             | 69500                                       |        |         |        |        |        |       |         |       |      |       |       |
| —                | G1215KLLB      | S1215K        |                       | 2 15/16               |         |             |         |       |       |                |                |         |                | 2 15/16           | 2 15/16 |                                   |                                             | 0.9843 | 1 15/32 | 1/4    | 4      | 15/16  | 0.219 | 3 5/8   | 2.837 | 6.25 | 9800  | 15600 |

<sup>(1)</sup> Bore tolerance: 1/2" - 2 3/16", nominal to .013 mm, +.0005";  
2 1/4" - 2 15/16", nominal to .015 mm, +.0006".

### KLLG SPECIAL SERIES WITH WIRELOC

- KLLG wide inner ring bearings are the same as the KLL Type, except for a snap ring or Wireloc in the outer ring.
- The Wireloc mounting provides a convenient method of positively locating a bearing axially.

Suggested shaft tolerances:  $\frac{1}{2}'' - 1\frac{15}{16}''$ , nominal to  $-.013$  mm,  $-.0005''$ ;  
 $2'' - 2\frac{7}{16}''$ , nominal to  $-.025$  mm,  $-.0010''$ .



TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: 1008KLLG + COL.

| Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D | Ring Widths      |         | S&G             | L              | d <sub>1</sub>  | B <sub>2</sub>  | B <sub>1</sub>   | Snap Wire Dimensions |       |       | Brg. & Collar Wt. |      | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|----------------|---------------|-----------------------|-----------------------|--------|------------------|---------|-----------------|----------------|-----------------|-----------------|------------------|----------------------|-------|-------|-------------------|------|-----------------------------------|---------------------------------------------|
|                |               |                       |                       |        | B Inner          | C Outer |                 |                |                 |                 |                  | D <sub>1</sub>       | T     | K     | kg                | lbs. |                                   |                                             |
| 1008KLLG       | S1008K        | 203                   | $\frac{1}{2}$         | 40     | 27.78            | 12      | 13.9            | 4.0            | 28.6            | 13.5            | 37.3             | 44.45                | 1.07  | 3.05  | 0.173             | 0.38 | 4700                              | 10700                                       |
| 1009KLLG       | S1009K        |                       | $\frac{9}{16}$        | 1.5748 | $1\frac{3}{32}$  | 0.4724  | $\frac{35}{64}$ | $\frac{5}{32}$ | $1\frac{1}{8}$  | $\frac{17}{32}$ | $1\frac{15}{32}$ | $1\frac{3}{4}$       | 0.042 | 0.12  | 0.154             | 0.34 | 1060                              | 2400                                        |
| 1010KLLG       | S1010K        |                       | $\frac{5}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.141             | 0.31 |                                   |                                             |
| 1011KLLG       | S1011K        |                       | $\frac{11}{16}$       |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.132             | 0.29 |                                   |                                             |
| 1012KLLG       | S1012K        | 204                   | $\frac{3}{4}$         | 47     | 34.13            | 14      | 17.1            | 4.0            | 33.3            | 13.5            | 43.7             | 52.39                | 1.07  | 3.45  | 0.204             | 0.45 | 6200                              | 14300                                       |
| 1013KLLG       | S1013K        |                       | $\frac{13}{16}$       | 1.8504 | $1\frac{11}{32}$ | 0.5512  | $\frac{43}{64}$ | $\frac{5}{32}$ | $1\frac{5}{16}$ | $\frac{17}{32}$ | $1\frac{23}{32}$ | $2\frac{1}{16}$      | 0.042 | 0.136 | 0.272             | 0.6  | 1400                              | 3200                                        |
| 1014KLLG       | S1014K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.263             | 0.58 |                                   |                                             |
| 1015KLLG       | S1015K        |                       | $\frac{15}{16}$       |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.245             | 0.54 |                                   |                                             |
| 1100KLLG       | S1100K        | 206                   | 1                     | 52     | 34.92            | 15      | 17.5            | 4.0            | 38.1            | 13.5            | 44.1             | 57.55                | 1.07  | 3.45  | 0.227             | 0.5  | 7700                              | 15800                                       |
| 1101KLLG       | S1101K        |                       | $\frac{1}{16}$        | 2.0472 | $\frac{1}{8}$    | 0.5906  | $\frac{11}{16}$ | $\frac{5}{32}$ | $1\frac{1}{2}$  | $\frac{17}{32}$ | $1\frac{47}{64}$ | $2\frac{17}{64}$     | 0.042 | 0.136 | 0.245             | 0.54 | 1730                              | 3550                                        |
| 1102KLLG       | S1102K        |                       | $\frac{1}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.227             | 0.5  |                                   |                                             |
| 1103KLLG       | S1103K        |                       | $\frac{1}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.427             | 0.94 |                                   |                                             |
| 1104KLLG       | S1104K        | 207                   | $\frac{1}{2}$         | 62     | 36.51            | 16      | 18.3            | 4.0            | 44.4            | 15.9            | 48.4             | 67.47                | 1.65  | 4.83  | 0.427             | 0.94 | 11100                             | 21800                                       |
| 1105KLLG       | S1105K        |                       | $\frac{3}{8}$         | 2.4409 | $1\frac{7}{16}$  | 0.6299  | $\frac{23}{32}$ | $\frac{5}{32}$ | $1\frac{3}{4}$  | $\frac{5}{8}$   | $1\frac{29}{32}$ | $2\frac{21}{32}$     | 0.065 | 0.190 | 0.386             | 0.85 | 2500                              | 4900                                        |
| 1106KLLG       | S1106K        |                       | $\frac{1}{2}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.386             | 0.85 |                                   |                                             |
| 1107KLLG       | S1107K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.645             | 1.42 |                                   |                                             |
| 1108KLLG       | S1108KT       | 208                   | $\frac{1}{2}$         | 72     | 37.70            | 17      | 18.85           | 4.0            | 54.0            | 17.1            | 51.2             | 78.18                | 1.65  | 4.83  | 0.604             | 1.33 | 15100                             | 28500                                       |
| 1109KLLG       | S1109KT       |                       | $\frac{5}{8}$         | 2.8346 | $1\frac{31}{64}$ | 0.6693  | 0.742           | $\frac{5}{32}$ | $2\frac{1}{8}$  | $\frac{43}{64}$ | $2\frac{1}{64}$  | $3\frac{5}{64}$      | 0.065 | 0.190 | 0.577             | 1.27 | 3400                              | 6400                                        |
| 1110KLLG       | S1110K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.54              | 1.19 |                                   |                                             |
| 1111KLLG       | S1111K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.922             | 2.03 |                                   |                                             |
| 1112KLLG       | S1112K        | 209                   | $\frac{1}{2}$         | 80     | 42.86            | 18      | 21.4            | 4.8            | 60.3            | 18.3            | 56.4             | 86.52                | 1.65  | 4.83  | 0.826             | 1.82 | 17600                             | 36200                                       |
| 1113KLLG       | S1113K        |                       | $\frac{5}{8}$         | 3.1496 | $1\frac{11}{16}$ | 0.7087  | $\frac{21}{32}$ | $\frac{3}{16}$ | $2\frac{3}{8}$  | $\frac{23}{32}$ | $2\frac{7}{32}$  | $3\frac{13}{32}$     | 0.065 | 0.190 | 0.785             | 1.73 | 4000                              | 8130                                        |
| 1114KLLG       | S1114K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.881             | 1.94 |                                   |                                             |
| 1115KLLG       | S1115K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.844             | 1.86 |                                   |                                             |
| 1116KLLG       | S1116K        | 210                   | $\frac{1}{2}$         | 85     | 42.86            | 19      | 21.4            | 4.8            | 63.5            | 18.3            | 56.4             | 91.28                | 1.65  | 4.83  | 0.922             | 2.03 | 20000                             | 36300                                       |
| 1117KLLG       | S1117K        |                       | $\frac{5}{8}$         | 3.3465 | $1\frac{11}{16}$ | 0.7480  | $\frac{21}{32}$ | $\frac{3}{16}$ | $2\frac{1}{2}$  | $\frac{23}{32}$ | $2\frac{7}{32}$  | $3\frac{19}{32}$     | 0.065 | 0.190 | 0.881             | 1.94 | 4500                              | 8160                                        |
| 1118KLLG       | S1118K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.844             | 1.86 |                                   |                                             |
| 1119KLLG       | S1119K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.844             | 1.86 |                                   |                                             |
| 1200KLLG       | S1200K        | 211                   | $\frac{1}{2}$         | 90     | 49.21            | 20      | 24.6            | 4.8            | 69.9            | 18.3            | 62.7             | 96.44                | 2.41  | 5.59  | 1.035             | 2.28 | 22700                             | 39000                                       |
| 1201KLLG       | S1201K        |                       | $\frac{5}{8}$         | 3.5433 | $1\frac{15}{16}$ | 0.7874  | $\frac{31}{32}$ | $\frac{3}{16}$ | $2\frac{3}{4}$  | $\frac{23}{32}$ | $2\frac{15}{32}$ | $3\frac{51}{64}$     | 0.095 | 0.22  | 1.003             | 2.21 | 5100                              | 8800                                        |
| 1202KLLG       | S1202K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.971             | 2.14 |                                   |                                             |
| 1203KLLG       | S1203K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 0.971             | 2.14 |                                   |                                             |
| 1204KLLG       | S1204K        | 212                   | $\frac{1}{2}$         | 100    | 55.56            | 21      | 27.8            | 4.8            | 76.2            | 20.6            | 71.4             | 106.36               | 2.41  | 5.59  | 1.475             | 3.25 | 28500                             | 48000                                       |
| 1205KLLG       | S1205K        |                       | $\frac{5}{8}$         | 3.9370 | $2\frac{3}{16}$  | 0.8268  | $1\frac{3}{32}$ | $\frac{3}{16}$ | 3               | $\frac{13}{16}$ | $2\frac{13}{16}$ | $4\frac{3}{16}$      | 0.095 | 0.22  | 1.38              | 3.08 | 6400                              | 10800                                       |
| 1206KLLG       | S1206K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 1.353             | 2.98 |                                   |                                             |
| 1207KLLG       | S1207K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 1.353             | 2.98 |                                   |                                             |
| 1208KLLG       | S1208K        | 213                   | $\frac{1}{2}$         | 110    | 61.91            | 22      | 30.96           | 6.4            | 84.1            | 22.2            | 77.8             | 116.28               | 2.41  | 5.59  | 1.793             | 3.95 | 35600                             | 58500                                       |
| 1209KLLG       | S1209K        |                       | $\frac{5}{8}$         | 4.3307 | $2\frac{7}{16}$  | 0.8661  | $1\frac{7}{32}$ | $\frac{1}{4}$  | $3\frac{3}{16}$ | $\frac{7}{8}$   | $3\frac{1}{16}$  | $4\frac{37}{64}$     | 0.095 | 0.22  | 1.743             | 3.84 | 8000                              | 13200                                       |
| 1210KLLG       | S1210K        |                       | $\frac{3}{4}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 1.711             | 3.77 |                                   |                                             |
| 1211KLLG       | S1211K        |                       | $\frac{7}{8}$         |        |                  |         |                 |                |                 |                 |                  |                      |       |       | 1.711             | 3.77 |                                   |                                             |

<sup>(1)</sup> Bore tolerance:  $\frac{1}{2}'' - 2\frac{3}{16}''$ , nominal to  $.013$  mm,  $+.0005''$ .  
 $2\frac{1}{4}'' - 2\frac{7}{16}''$ , nominal to  $.015$  mm,  $+.0006''$ .



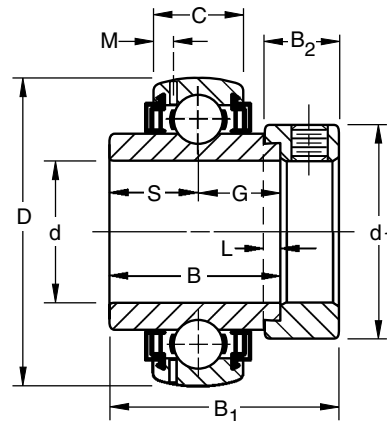


## BALL BEARINGS

### GN-KLLB HEAVY SERIES/SPECIAL DUTY

- The GN-KLLB Series ball bearings are heavy and are similar in design to the standard LL (Mechani-Seal) wide inner ring bearings.
- The GN-KLLB Series have heavier section 300 Series bearings.
- Unlike standard series, the seal in this heavy series is a three-piece construction and includes two fixed inner members and an external rotation slinger.

**Suggested shaft tolerances:**  $1/8'' - 1\ 15/16''$ , nominal to  $-.013\text{ mm}, -.0005''$ ;  
 $2'' - 2\ 15/16''$ , nominal to  $-.025\text{ mm}, -.0010''$ .



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: GN104KLLB + COL.**

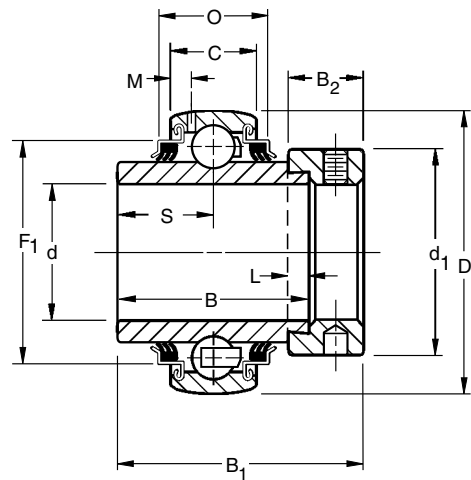
| Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D | Ring Widths |               |                 | S       | G      | L      | d <sub>1</sub> | B <sub>2</sub> | M       | B <sub>1</sub> | Brg. & Collar Wt. |                | Static Load Rating | Extended Dynamic Load |
|----------------|---------------|-----------------------|-----------------------|--------|-------------|---------------|-----------------|---------|--------|--------|----------------|----------------|---------|----------------|-------------------|----------------|--------------------|-----------------------|
|                |               |                       |                       |        | B Inner     | C Outer N-KLL | C Outer GN-KLLB |         |        |        |                |                |         |                | C <sub>o</sub>    | C <sub>e</sub> |                    |                       |
|                |               |                       | in.                   | mm in. | mm in.      | mm in.        | mm in.          | mm in.  | mm in. | mm in. | mm in.         | mm in.         | mm in.  | mm in.         | kg lbs.           | N lbs.         | N lbs.             |                       |
| GN102KLLB      | SN102K        | 306                   | 1 1/8                 | 72     | 36.51       | 19            | 20              | 17.46   | 19.05  | 3.9    | 49.21          | 17.46          | 3.61    | 1.97           | 0.554             | 1.22           | 15800              | 33500                 |
| GN103KLLB      | SN103K        |                       | 1 3/16                | 2.8346 | 1 7/16      | 0.7480        | 0.7874          | 1 1/16  | 3/4    | 5/32   | 1 15/16        | 1 1/16         | 0.142   | 1 31/32        | 0.604             | 1.33           | 3550               | 7500                  |
| GN104KLLB      | SN104K        | 307                   | 1 1/4                 | 80     | 38.10       | 21            | 22              | 18.3    | 19.84  | 3.9    | 55.6           | 17.46          | 3.96    | 51.59          | 0.649             | 1.43           | 21200              | 40500                 |
| GN106KLLB      | SN106K        |                       | 1 3/8                 | 3.1496 | 1 1/2       | 0.8268        | 0.8661          | 23/32   | 25/32  | 5/32   | 2 3/16         | 1 1/16         | 0.156   | 2 1/32         | 0.699             | 1.54           |                    |                       |
| GN107KLLB      | SN107K        |                       | 1 7/16                |        | 0.731       | 1.61          |                 |         |        |        |                |                |         |                |                   |                |                    |                       |
| GN108KLLB      | SN108K        | 308                   | 1 1/2                 | 90     | 41.28       | 23            | 25              | 19.84   | 21.43  | 4.8    | 63.5           | 20.64          | 4.62    | 57.15          | 1.153             | 2.54           | 26100              | 49000                 |
|                |               |                       | 1 5/8                 | 3.5433 | 0.9055      | 0.9843        | 25/32           | 27/32   | 3/16   | 2 1/2  | 13/16          | 0.182          | 2 1/4   | 5850           | 11000             |                |                    |                       |
| GN111KLLB      | SN111K        | 309                   | 1 11/16               | 100    | 42.86       | 25            | 27              | 19.84   | 23.02  | 4.8    | 69.85          | 20.64          | 4.8     | 58.74          | 1.457             | 3.21           | 31600              | 58500                 |
| GN112KLLB      | SN112K        |                       | 1 3/4                 | 3.9370 | 1 11/16     | 0.9843        | 1.063           | 25/32   | 29/32  | 3/16   | 2 3/4          | 13/16          | 0.189   | 2 5/16         | 1.657             | 3.65           | 7100               | 13200                 |
| GN115KLLB      | SN115K        | 310                   | 1 15/16               | 110    | 50          | 27            | 29              | 24.6    | 24.6   | 4.8    | 76.2           | 22.23          | 5.16    | 66.68          | 1.907             | 4.2            | 37900              | 68000                 |
|                |               |                       | 1 31/32               | 4.3307 | 1.063       | 1.1417        | 31/32           | 31/32   | 3/16   | 3      | 7/8            | 0.203          | 2 5/8   | 8500           | 15300             |                |                    |                       |
| GN203KLLB      | SN203K        | 311                   | 2 3/16                | 120    | 55.56       | 29            | 31              | 27.8    | 29.37  | 4.8    | 82.55          | 22.23          | 5.49    | 73.02          | 2.37              | 5.22           | 43600              | 80000                 |
|                |               |                       | 2 1/2                 | 4.7244 | 1.1417      | 1.2205        | 1 3/32          | 1 5/32  | 3/16   | 3 1/4  | 7/8            | 0.216          | 2 7/8   | 9800           | 18000             |                |                    |                       |
| GN207KLLB      | SN207K        | 312                   | 2 7/16                | 130    | 61.91       | 31            | 33              | 30.96   | 30.96  | 6.4    | 88.9           | 23.8           | 5.84    | 79.38          | 2.841             | 6.26           | 51700              | 90000                 |
|                |               |                       | 2 1/2                 | 5.1181 | 1.2205      | 1.2992        | 1 7/32          | 1 7/32  | 1/4    | 3 1/2  | 15/16          | 0.23           | 3 1/8   | 11600          | 20400             |                |                    |                       |
| GN211KLLB      | SN211K        | 314                   | 2 11/16               | 150    | 68.26       | 35            | 37              | 34.13   | 34.13  | 6.4    | 101.6          | 26.99          | 6.73    | 88.9           | 4.512             | 9.94           | 66800              | 116000                |
|                |               |                       | 2 1/2                 | 5.9055 | 1.378       | 1.4567        | 1 11/32         | 1 11/32 | 1/4    | 4      | 1 1/16         | 0.265          | 3 1/2   | 15000          | 26000             |                |                    |                       |
| GN215KLLB      | SN215K        | 315                   | 2 15/16               | 160    | 74.61       | —             | 39              | 37.3    | 37.3   | 6.4    | 112.71         | 31.75          | 6.48    | 100.01         | 5.638             | 12.42          | 75700              | 125000                |
|                |               |                       | 2 15/16               | 6.2992 | —           | 1.5354        | 1 15/32         | 1 15/32 | 1/4    | 4 7/16 | 1 1/4          | 0.255          | 3 15/16 | 17000          | 28500             |                |                    |                       |

<sup>(1)</sup> Bore tolerance:  $1/2'' - 2\ 3/16''$ , nominal to  $.013\text{ mm}, +.0005''$ .  
 $2\ 7/16'' - 2\ 15/16''$ , nominal to  $.015\text{ mm}, +.0006''$ .

### TRI-PLY SEAL INDUSTRIAL SERIES NON-RELUBRICATABLE AND RELUBRICATABLE TYPES

- Tri-Ply Seal bearings are dimensionally interchangeable with KRRB bearings and can be used with standard housings.
- One-piece Tri-Ply Seals incorporate a highly effective seal design molded to an exterior shroud cap. The shroud cap protects the seal lip from fiber wrap and abrasion.
- Supplied with a self-locking collar, the bearings are most effective in environments with severe contamination and moisture.
- Relubricatable Tri-Ply Seal bearings are dimensionally interchangeable with G-KRRB bearings.
- This design can be used with standard housings.

**Suggested shaft tolerances:** a. heavy loads - nominal to **-.025 mm, -.001"**;  
 b. light loads - nominal to **-.050 mm, -.002"**.



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: G1115KPPB3 + COL.**

| Bearing Number      | Basic Outer Ring Size   | Bore <sup>(1)</sup> d | O.D. D | Ring Widths |         | L    | d <sub>1</sub> | B <sub>2</sub> | S      | B <sub>1</sub> | M <sup>(2)</sup> | F <sub>1</sub> | O     | Brg. & Collar Wt. |       | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |  |
|---------------------|-------------------------|-----------------------|--------|-------------|---------|------|----------------|----------------|--------|----------------|------------------|----------------|-------|-------------------|-------|-----------------------------------|---------------------------------------------|--|
|                     |                         |                       |        | B Inner     | C Outer |      |                |                |        |                |                  |                |       | kg                | lbs.  |                                   |                                             |  |
| Relubricatable Type | Non-Relubricatable Type | mm                    | in.    | mm          | in.     | mm   | in.            | mm             | in.    | mm             | in.              | mm             | in.   | mm                | in.   | N                                 | lbs.                                        |  |
| G1013KPPB3          | 1013KPPB3               | 13/16                 |        |             |         |      |                |                |        |                |                  |                |       |                   | 0.286 | 0.63                              |                                             |  |
| G1014KPPB3          | 1014KPPB3               | 7/8                   | 52     | 34.92       | 15      | 3.9  | 38.1           | 13.5           | 17.5   | 44.4           | 3.61             | 45.19          | 16.66 | 0.272             | 0.60  | 7700                              | 15800                                       |  |
| G1015KPPB3          | 1015KPPB3               | 15/16                 | 2.0472 | 1 3/8       | 0.591   | 5/32 | 1 1/2          | 17/32          | 11/16  | 1 3/4          | 0.142            | 1.779          | 0.656 | 0.254             | 0.56  | 1730                              | 3550                                        |  |
| G1100KPPB3          | 1100KPPB3               | 1                     |        |             |         |      |                |                |        |                |                  |                |       | 0.231             | 0.51  |                                   |                                             |  |
| GE25KPPB3           | E25KPPB3                | 25                    |        |             |         |      |                |                |        |                |                  |                |       | 0.231             | 0.51  |                                   |                                             |  |
| G1101KPPB3          | 1101KPPB3               | 1 1/16                |        |             |         |      |                |                |        |                |                  |                |       | 0.413             | 0.91  |                                   |                                             |  |
| G1102KPPB3          | 1102KPPB3               | 1 1/8                 | 62     | 36.51       | 18      | 3.9  | 44.4           | 15.9           | 18.3   | 48.4           | 4.19             | 52.53          | 21.56 | 0.404             | 0.89  | 11100                             | 21800                                       |  |
| G1103KPPB3          | 1103KPPB3               | 1 3/16                | 2.4409 | 1 7/16      | 0.709   | 5/32 | 1 3/4          | 5/8            | 23/32  | 1 29/32        | 0.156            | 2.068          | 0.849 | 0.376             | 0.83  | 2500                              | 4900                                        |  |
| G1103KPPB4          | 1103KPPB4               | 1 1/4                 |        |             |         |      |                |                |        |                |                  |                |       | 0.349             | 0.77  |                                   |                                             |  |
| GE30KPPB3           | E30KPPB3                | 30                    |        |             |         |      |                |                |        |                |                  |                |       | 0.376             | 0.83  |                                   |                                             |  |
| G1104KPPB2          | 1104KPPB2               | 1 1/4                 |        |             |         |      |                |                |        |                |                  |                |       | 0.653             | 1.44  |                                   |                                             |  |
| G1105KPPB2          | 1105KPPB2               | 1 5/16                | 72     | 37.70       | 19      | 3.9  | 54.0           | 17.1           | 18.85  | 51.2           | 3.68             | 60.35          | 25.40 | 0.603             | 1.33  | 15100                             | 28500                                       |  |
| G1106KPPB2          | 1106KPPB2               | 1 3/8                 | 2.8346 | 1 31/64     | 0.748   | 5/32 | 2 1/8          | 43/64          | 0.742  | 2 1/64         | 0.145            | 2.376          | 1.00  | 0.572             | 1.26  | 3400                              | 6400                                        |  |
| G1107KPPB2          | 1107KPPB2               | 1 7/16                |        |             |         |      |                |                |        |                |                  |                |       | 0.544             | 1.20  |                                   |                                             |  |
| GE35KPPB2           | E35KPPB2                | 35                    |        |             |         |      |                |                |        |                |                  |                |       | 0.572             | 1.26  |                                   |                                             |  |
| G1108KPPB3          | 1108KPPB3               | 1 1/2                 | 80     | 42.86       | 21      | 4.8  | 60.3           | 18.3           | 21.4   | 56.4           | 5.66             | 67.79          | 23.44 | 0.789             | 1.74  | 19800                             | 20500                                       |  |
| G1109KPPB3          | 1109KPPB3               | 1 9/16                | 3.1496 | 1 11/16     | 0.827   | 3/16 | 2 3/8          | 23/32          | 27/32  | 2 7/32         | 0.223            | 2.669          | 0.923 | 0.739             | 1.63  | 4460                              | 4600                                        |  |
| GE40KPPB3           | E40KPPB3                | 40                    |        |             |         |      |                |                |        |                |                  |                |       | 0.739             | 1.63  |                                   |                                             |  |
| G1110KPPB4          | 1110KPPB4               | 1 5/8                 |        |             |         |      |                |                |        |                |                  |                |       | 0.898             | 1.98  |                                   |                                             |  |
| G1111KPPB4          | 1111KPPB4               | 1 11/16               | 85     | 42.86       | 22      | 4.8  | 63.5           | 18.3           | 21.4   | 56.4           | 4.55             | 72.44          | 27.48 | 0.848             | 1.87  | 36200                             | 36300                                       |  |
| G1112KPPB4          | 1112KPPB4               | 1 3/4                 | 3.3465 | 1 11/16     | 0.866   | 3/16 | 2 1/2          | 23/32          | 27/32  | 2 7/32         | 0.179            | 2.852          | 1.082 | 0.826             | 1.82  | 8130                              | 8160                                        |  |
| GE45KPPB4           | E45KPPB4                | 45                    |        |             |         |      |                |                |        |                |                  |                |       | 0.826             | 1.82  |                                   |                                             |  |
| G1113KPPB3          | 1113KPPB3               | 1 13/16               |        |             |         |      |                |                |        |                |                  |                |       | 1.116             | 2.46  |                                   |                                             |  |
| G1114KPPB3          | 1114KPPB3               | 1 7/8                 | 90     | 49.21       | 23      | 4.8  | 69.9           | 18.3           | 24.6   | 62.7           | 4.7              | 77.7           | 27.51 | 1.034             | 2.28  | 22700                             | 39200                                       |  |
| G1115KPPB3          | 1115KPPB3               | 1 15/16               | 3.5433 | 1 15/16     | 0.906   | 3/16 | 2 3/4          | 23/32          | 31/32  | 2 15/32        | 0.185            | 3.059          | 1.083 | 1.016             | 2.24  | 5100                              | 8800                                        |  |
| GE50KPPB3           | E50KPPB3                | 50                    |        |             |         |      |                |                |        |                |                  |                |       | 1.016             | 2.24  |                                   |                                             |  |
| G1200KPPB4          | 1200KPPB4               | 2                     |        |             |         |      |                |                |        |                |                  |                |       | 1.583             | 3.49  |                                   |                                             |  |
| G1201KPPB4          | 1201KPPB4               | 2 1/16                | 100    | 55.56       | 24      | 4.8  | 76.2           | 20.6           | 27.8   | 71.4           | 5.41             | 87.17          | 29.01 | 1.47              | 3.24  | 28500                             | 48100                                       |  |
| G1202KPPB4          | 1202KPPB4               | 2 1/8                 | 3.9370 | 2 3/16      | 0.945   | 3/16 | 3              | 13/16          | 1 3/32 | 2 13/16        | 0.213            | 3.432          | 1.142 | 1.406             | 3.10  | 6400                              | 10800                                       |  |
| G1203KPPB4          | 1203KPPB4               | 2 3/16                |        |             |         |      |                |                |        |                |                  |                |       | 1.365             | 3.01  |                                   |                                             |  |
| GE55KPPB4           | E55KPPB4                | 55                    |        |             |         |      |                |                |        |                |                  |                |       | 1.365             | 3.01  |                                   |                                             |  |

<sup>(1)</sup> Bore tolerance: 13/16" - 2 3/16", nominal to .013 mm, +.0005".

<sup>(2)</sup> Applies to relubricatable type only.

**Note:** Suggested max speed - 500 RPM.



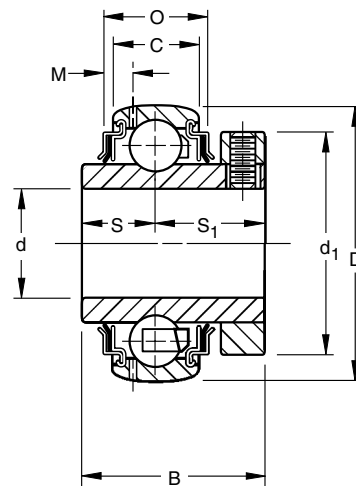


## BALL BEARINGS

### GC-KRRB INDUSTRIAL SERIES CONCENTRIC COLLAR RELUBRICATABLE TYPE

- Relubricatable with spherical outside diameters and shroud seals.
- Metal shroud maintains tight seal contact against the inner ring and shields the rubber seals from damage because of dirt or fiber wrap.
- The concentric collar is locked to the shaft by two setscrews located 120 degrees apart, mated with threaded holes in the collar and drilled holes in the bearing inner ring.
- The extra-wide design provides additional shaft support and extra-large grease capacity.

**Suggested shaft tolerances:**  $1/2'' - 1\ 15/16''$ , nominal to  $-.013\text{ mm}, -.0005''$ ;  
 $2'' - 2\ 15/16''$ , nominal to  $-.025\text{ mm}, -.0010''$ .



**TO ORDER, SPECIFY BEARING NUMBER. Example: GC1103KRRB + COL.**

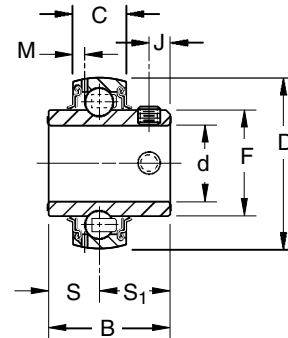
| Bearing Number | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |     | O.D. D | Ring Widths |        | S       | S <sub>1</sub> | d <sub>1</sub> | M     | O     | Setscrew Size | Brg. & Collar Wt. |         | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|----------------|---------------|-----------------------|-----------------------|-----|--------|-------------|--------|---------|----------------|----------------|-------|-------|---------------|-------------------|---------|-----------------------------------|---------------------------------------------|
|                |               |                       | mm                    | in. |        | mm          | in.    |         |                |                |       |       |               | B Inner           | C Outer |                                   |                                             |
| GC1008KRRB     | C203          |                       | 1/2                   |     |        |             |        |         |                |                |       |       |               | 0.154             | 0.34    |                                   |                                             |
| GC1010KRRB     | C203          | 203                   | 5/8                   |     | 40     | 26.59       | 12     | 11.1    | 15.5           | 34.1           | 2.72  | 14.71 | M5x0.8        | 0.145             | 0.32    | 4700                              | 10600                                       |
| GC1011KRRB     | C203          |                       | 11/16                 |     | 1.5748 | 1 3/64      | 0.472  | 7/16    | 39/64          | 11/32          | 0.107 | 0.579 | 10-32         | 0.122             | 0.27    | 1060                              | 2360                                        |
| GCE17KRRB      |               |                       | 17                    |     |        |             |        |         |                |                |       |       |               | 0.122             | 0.27    |                                   |                                             |
| GC1012KRRB     | C204          | 204                   | 3/4                   |     | 47     | 30.96       | 14     | 12.3    | 18.7           | 38.1           | 3.43  | 20.68 | M5x0.8        | 0.204             | 0.45    | 6200                              | 14300                                       |
| GCE20KRRB      |               |                       | 20                    |     | 1.8504 | 1 7/32      | 0.551  | 31/64   | 47/64          | 1 1/2          | 0.135 | 0.814 | 10-32         | 0.204             | 0.45    | 1400                              | 3200                                        |
| GC1014KRRB     | C205          | 205                   | 7/8                   |     |        |             |        |         |                |                |       |       |               | 0.272             | 0.6     |                                   |                                             |
| GC1015KRRB     | C205          |                       | 15/16                 |     | 52     | 34.13       | 15     | 13.9    | 20.2           | 44.4           | 3.61  | 19.74 | M6x1          | 0.254             | 0.56    | 7700                              | 15800                                       |
| GC1100KRRB     | C205          |                       | 1                     |     | 2.0472 | 1 11/32     | 0.5905 | 35/64   | 51/64          | 1 3/4          | 0.142 | 0.777 | 1/4-28        | 0.231             | 0.51    | 1730                              | 3550                                        |
| GCE25KRRB      |               |                       | 25                    |     |        |             |        |         |                |                |       |       |               | 0.231             | 0.51    |                                   |                                             |
| GC1102KRRB     | C206          | 206                   | 1 1/8                 |     |        |             |        |         |                |                |       |       |               | 0.404             | 0.89    |                                   |                                             |
| GC1103KRRB     | C206          |                       | 1 3/16                |     | 62     | 37.31       | 18     | 14.7    | 22.6           | 52.4           | 4.19  | 24.51 | M6x1          | 0.376             | 0.83    | 11100                             | 21800                                       |
| GC1103KRRB3    | C206          |                       | 1 1/4                 |     | 2.4409 | 1 15/32     | 0.709  | 37/64   | 57/64          | 2 1/16         | 0.156 | 0.965 | 1/4-28        | 0.349             | 0.77    | 2500                              | 4900                                        |
| GCE30KRRB      |               |                       | 30                    |     |        |             |        |         |                |                |       |       |               | 0.376             | 0.83    |                                   |                                             |
| GC1104KRRB     | C207          |                       | 1 1/4                 |     |        |             |        |         |                |                |       |       |               | 0.653             | 1.44    |                                   |                                             |
| GC1106KRRB     | C207          | 207                   | 1 3/8                 |     | 72     | 41.28       | 19     | 15.9    | 25.4           | 59.5           | 3.68  | 25.86 | M6x1          | 0.572             | 1.26    | 15100                             | 28500                                       |
| GC1107KRRB     | C207          |                       | 1 7/16                |     | 2.8346 | 1 5/8       | 0.7481 | 5/8     | 1              | 2 11/32        | 0.145 | 1.018 | 1/4-28        | 0.544             | 1.20    | 3400                              | 6400                                        |
| GCE35KRRB      |               |                       | 35                    |     |        |             |        |         |                |                |       |       |               | 0.572             | 1.26    |                                   |                                             |
| GC1108KRRB     | C208          | 208                   | 1 1/2                 |     | 80     | 44.05       | 21     | 16.7    | 27.4           | 68.3           | 5.66  | 28.42 | M8x1.25       | 0.789             | 1.74    | 19800                             | 20500                                       |
| GCE40KRRB      |               |                       | 40                    |     | 3.1496 | 1 47/64     | 0.827  | 21/32   | 1 5/64         | 2 11/16        | 0.223 | 1.119 | 5/16-24       | 0.739             | 1.63    | 4460                              | 4600                                        |
| GC1110KRRB     | C209-2        |                       | 1 5/8                 |     |        |             |        |         |                |                |       |       |               | 0.898             | 1.98    |                                   |                                             |
| GC1111KRRB     | C209          | 209                   | 1 11/16               |     | 85     | 46.83       | 22     | 17.5    | 29.4           | 73             | 4.55  | 32.21 | M8x1.25       | 0.848             | 1.87    | 36200                             | 36300                                       |
| GC1112KRRB     | C209          |                       | 1 3/4                 |     | 3.3465 | 1 27/32     | 0.866  | 1 11/16 | 1 5/32         | 2 7/8          | 0.179 | 1.268 | 5/16-24       | 0.826             | 1.82    | 8130                              | 8160                                        |
| GCE45KRRB      |               |                       | 45                    |     |        |             |        |         |                |                |       |       |               | 0.826             | 1.82    |                                   |                                             |
| GC1115KRRB     | C210          | 210                   | 1 15/16               |     | 90     | 48.42       | 23     | 18.3    | 30.2           | 79.4           | 4.7   | 32.23 | M8x1.25       | 0.990             | 2.18    | 22700                             | 39200                                       |
| GCE50KRRB      |               |                       | 50                    |     | 3.5433 | 1 29/32     | 0.906  | 23/32   | 1 3/16         | 3 1/8          | 0.185 | 1.269 | 5/16-24       | 0.990             | 2.18    | 5100                              | 8800                                        |
| GC1200KRRB     | C211          |                       | 2                     |     | 100    | 53.97       | 24     | 20.6    | 33.3           | 88.9           | 5.41  | 33.73 | M10x1.5       | 1.52              | 3.35    | 28500                             | 48000                                       |
| GC1203KRRB     | C211          | 211                   | 2 3/16                |     | 3.9370 | 2 1/8       | 0.945  | 13/16   | 1 5/16         | 3 1/2          | 0.213 | 1.328 | 3/8-24        | 1.306             | 2.88    | 6400                              | 10800                                       |
| GCE55KRRB      |               |                       | 55                    |     |        |             |        |         |                |                |       |       |               | 1.306             | 2.88    |                                   |                                             |
| GC1207KRRB     | C212          | 212                   | 2 7/16                |     | 110    | 60.32       | 27     | 23.0    | 37.3           | 95.3           | 5.13  | 35.03 | M10x1.5       | 1.565             | 3.45    | 35600                             | 58800                                       |
| GCE60KRRB      |               |                       | 60                    |     | 4.3307 | 2 3/8       | 1.063  | 29/32   | 1 15/32        | 3 3/4          | 0.202 | 1.379 | 3/8-24        | 1.565             | 3.45    | 8000                              | 13200                                       |
| GC1215KRRB     | C215          | 215                   | 2 15/16               |     | 130    | 70.64       | 29     | 27.0    | 43.7           | 114.3          | 5.59  | 38.25 | M10x1.5       | 2.64              | 5.82    | 43600                             | 69500                                       |
| GCE75KRRB      |               |                       | 75                    |     | 5.1181 | 2 25/32     | 1.142  | 1 1/16  | 1 23/32        | 4 1/2          | 0.219 | 1.506 | 3/8-20        | 2.64              | 5.82    | 9800                              | 15600                                       |

<sup>(1)</sup> Bore tolerances:  $1\ 3/16'' - 2\ 3/16''$ , nominal to  $.013\text{ mm}, +.0005''$ .  
 $2\ 1/4'' - 3\ 3/16''$ , nominal to  $.015\text{ mm}, +.0006''$ .

### GY-KRRB SETSCREW INDUSTRIAL SERIES

- The Y-Series setscrew bearing has increased shaft support for HVAC and other industrial applications.
- Featuring superfinished raceways, grade 10 balls and anti-back-out nylon patch setscrews, they are factory prelubricated and are relubricatable.
- Setscrew mounting feature is ideal for reversing load applications.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".



| Bearing Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |     | O.D. D | Ring Widths |         | S     | S <sub>1</sub> | F     | M     | J     | Setscrew Size | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |        |       |        |       |       |       |        |        |         |      |       |  |
|----------------|-----------------------|-----------------------|-----|--------|-------------|---------|-------|----------------|-------|-------|-------|---------------|-----------------------------------|---------------------------------------------|--------|-------|--------|-------|-------|-------|--------|--------|---------|------|-------|--|
|                |                       | mm                    | in. |        | B Inner     | C Outer |       |                |       |       |       |               |                                   |                                             | mm     | in.   | mm     | in.   | mm    | in.   | N lbs. | N lbs. |         |      |       |  |
| GY1008KRRB     | 203                   | 1/2                   |     | 40     | 27.38       | 12      | 11.5  | 15.88          | 22.86 | 2.72  | 4.55  | M5X.8         | 4400                              | 10600                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1009KRRB     |                       | 9/16                  |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 1.5748 | 1.078 | 0.472  | 0.453 | 0.625 | 0.9   | 0.107  | 0.179  | 10-32   | 1000 | 2360  |  |
| GY1010KRRB     |                       | 5/8                   |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1011KRRB     |                       | 11/16                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE15KRRB      |                       | 15                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE17KRRB      | 17                    |                       |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1012KRRB     | 204                   | 3/4                   |     | 47     | 30.96       | 14      | 12.7  | 18.26          | 27.56 | 3.43  | 5.13  | M5X.8         | 6200                              | 14300                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE20KRRB      |                       | 20                    |     | 1.8504 | 1.219       | 0.55    | 0.5   | 0.719          | 1.085 | 0.135 | 0.202 | 10-32         | 1400                              | 3200                                        |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1013KRRB     | 205                   | 13/16                 |     | 52     | 34.11       | 15      | 14.27 | 19.91          | 33.83 | 3.86  | 6.3   | M6X1          | 7700                              | 15800                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1014KRRB     |                       | 7/8                   |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 2.0472 | 1.343 | 0.591  | 0.562 | 0.781 | 1.332 | 0.152  | 0.248  | 1/4-28  | 1730 | 3550  |  |
| GY1015KRRB     |                       | 15/16                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1100KRRB     |                       | 1                     |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE25KRRB      |                       | 25                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1101KRRB     | 206                   | 1 1/16                |     | 62     | 38.1        | 18      | 15.88 | 22.22          | 40.31 | 3.96  | 7.62  | M6X1          | 11000                             | 21600                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1102KRRB     |                       | 1 1/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 2.4409 | 1.500 | 0.709  | 0.625 | 0.875 | 1.587 | 0.156  | 0.300  | 1/4-28  | 2500 | 4800  |  |
| GY1103KRRB     |                       | 1 3/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1103KRRB3    |                       | 1 1/4                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE30KRRB      |                       | 30                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1104KRRB     | 207                   | 1 1/4                 |     | 72     | 42.87       | 19      | 17.48 | 25.4           | 46.18 | 3.68  | 7.82  | M8X1.25       | 15100                             | 28500                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1105KRRB     |                       | 1 5/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 2.8346 | 1.688 | 0.748  | 0.688 | 1     | 1.816 | 0.145  | 0.308  | 5/16-24 | 3400 | 6400  |  |
| GY1106KRRB     |                       | 1 3/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1107KRRB     |                       | 1 7/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE35KRRB      |                       | 35                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1108KRRB     | 208                   | 1 1/2                 |     | 80     | 49.22       | 21      | 19.05 | 30.17          | 52.27 | 4.06  | 8     | M8X1.25       | 19600                             | 36000                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1109KRRB     |                       | 1 9/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 3.1496 | 1.938 | 0.827  | 0.75  | 1.188 | 2.058 | 0.16   | 0.315  | 5/16-24 | 4400 | 8150  |  |
| GYE40KRRB      |                       | 40                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1110KRRB     | 209                   | 1 5/8                 |     | 85     | 49.22       | 22      | 19.05 | 30.17          | 57.92 | 4.55  | 8     | M8X1.25       | 20000                             | 36000                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1111KRRB     |                       | 1 11/16               |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 3.3465 | 1.938 | 0.8661 | 0.75  | 1.188 | 2.28  | 0.179  | 0.315  | 5/16-24 | 4500 | 8150  |  |
| GY1112KRRB     |                       | 1 3/4                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE45KRRB      |                       | 45                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1113KRRB     | 210                   | 1 13/16               |     | 90     | 51.59       | 22      | 19.05 | 32.54          | 62.84 | 4.7   | 10    | M10X1.5       | 22700                             | 39000                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1114KRRB     |                       | 1 7/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 3.5433 | 2.031 | 0.8661 | 0.75  | 1.281 | 2.474 | 0.185  | 0.394  | 3/8-24  | 5100 | 8800  |  |
| GY1115KRRB     |                       | 1 15/16               |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1115KRRB3    |                       | 2                     |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE50KRRB      |                       | 50                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1200KRRB     | 211                   | 2                     |     | 100    | 55.55       | 24      | 22.22 | 33.32          | 69.77 | 5     | 10    | M10X1.5       | 28500                             | 48000                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1201KRRB     |                       | 2 1/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 3.9370 | 2.187 | 0.945  | 0.875 | 1.312 | 2.747 | 0.197  | 0.394  | 3/8-24  | 6400 | 10800 |  |
| GY1202KRRB     |                       | 2 1/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1203KRRB     |                       | 2 3/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE55KRRB      |                       | 55                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1204KRRB     | 212                   | 2 1/4                 |     | 110    | 65.07       | 27      | 25.4  | 39.67          | 76.48 | 5.13  | 10    | M10X1.5       | 35600                             | 58500                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1205KRRB     |                       | 2 5/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 4.3307 | 2.562 | 1.063  | 1     | 1.562 | 3.011 | 0.202  | 0.394  | 3/8-24  | 8000 | 13200 |  |
| GY1206KRRB     |                       | 2 3/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1207KRRB     |                       | 2 7/16                |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE60KRRB      |                       | 60                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1210KRRB     | 214                   | 2 5/8                 |     | 1.25   | 69.85       | 28      | 26.97 | 42.84          | 86.92 | 5.08  | 12    | M12X1.75      | 37500                             | 69500                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1211KRRB     |                       | 2 11/16               |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 4.9213 | 2.75  | 1.102  | 1.062 | 1.687 | 3.422 | 0.2    | 0.472  | 7/16-20 | 8500 | 15600 |  |
| GYE70KRRB      |                       | 70                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1212KRRB     | 215                   | 2 3/4                 |     | 130    | 77.8        | 29      | 33.32 | 44.45          | 91.92 | 5.56  | 12    | M12X1.75      | 43600                             | 69500                                       |        |       |        |       |       |       |        |        |         |      |       |  |
| GY1214KRRB     |                       | 2 7/8                 |     |        |             |         |       |                |       |       |       |               |                                   |                                             | 5.1181 | 3.063 | 1.142  | 1.312 | 1.75  | 3.619 | 0.219  | 0.472  | 7/16-20 | 9800 | 15600 |  |
| GY1215KRRB     |                       | 2 15/16               |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |
| GYE75KRRB      |                       | 75                    |     |        |             |         |       |                |       |       |       |               |                                   |                                             |        |       |        |       |       |       |        |        |         |      |       |  |

<sup>(1)</sup> Bore tolerances: 1/2" - 2 3/16", nominal to .013 mm, +.0005".  
2 1/4" - 3 15/16", nominal to .015 mm, +.0006".

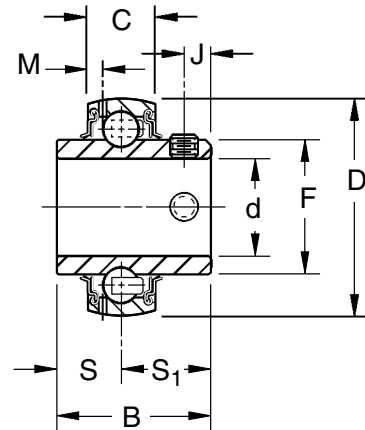


## BALL BEARINGS

### MEDIUM-DUTY GYM-KRRB INSERTS SETSCREW LOCK

- This series is designed to offer extended bearing life despite demanding industrial environments.
- Insert features a full width inner ring, providing extra support along the shaft.
- The extra support feature, coupled with a flexible nylon retainer, allows the inserts to operate for extended periods with undersized shafts or in misalignment conditions.
- Inserts are equipped with a three-piece seal, protecting against corrosion, contamination and fiber wrap.
- Inserts also include nylon patch setscrews, resisting setscrew back-out and providing superior holding power in applications with severe vibration.

**Suggested shaft tolerances:** 1" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 3", nominal to **-.025 mm, -.0010"**.



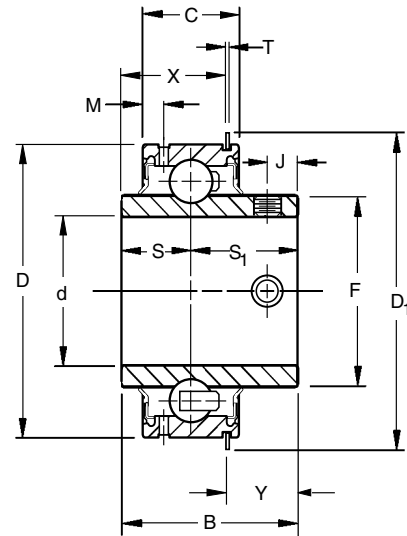
| Bearing Number<br>Spherical<br>O.D. | Basic<br>Outer<br>Ring<br>Size | Bore <sup>(1)</sup><br>d | O.D.<br>D    |                | Ring<br>Widths |                | S              | S <sub>1</sub> | F             | M             | J                     | Setscrew<br>Size     | Bearing<br>Wt.          | Static<br>Load<br>Rating<br>C <sub>0</sub> | Extended<br>Dynamic<br>Load<br>Rating<br>C <sub>E</sub> |
|-------------------------------------|--------------------------------|--------------------------|--------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|-----------------------|----------------------|-------------------------|--------------------------------------------|---------------------------------------------------------|
|                                     |                                |                          | mm<br>in.    | mm<br>in.      | B<br>Inner     | C<br>Outer     |                |                |               |               |                       |                      |                         |                                            |                                                         |
| GYM1100KRRB                         | 206                            | 1                        | 62<br>2.4409 | 38.10<br>1.500 | 18<br>0.709    | 15.88<br>0.625 | 22.22<br>0.875 | 40.31<br>1.587 | 3.96<br>0.156 | 7.62<br>0.300 | M6 x 1<br>1/4 -28     | 0.427<br>0.94        | 11100<br>2500           | 21800<br>4900                              |                                                         |
| GYM1103KRRB                         | 207                            | 1 3/16                   | 72<br>2.8346 | 42.87<br>1.688 | 19<br>0.748    | 17.48<br>0.688 | 25.40<br>1.000 | 46.18<br>1.816 | 3.68<br>0.145 | 7.82<br>0.308 | M8 x 1.25<br>5/16 -24 | 0.704<br>1.55        | 15100<br>3400           | 28500<br>6400                              |                                                         |
| GYM1107KRRB                         | 208                            | 1 7/16                   | 80<br>3.1496 | 49.22<br>1.938 | 21<br>0.827    | 19.05<br>0.750 | 30.17<br>1.188 | 52.27<br>2.058 | 4.06<br>0.160 | 8.00<br>0.315 | M8 x 1.25<br>5/16 -24 | 0.817<br>1.8         | 19600<br>4400           | 36300<br>8150                              |                                                         |
| GYM1108KRRB                         | 209                            | 1 1/2                    | 85<br>3.3465 | 49.22<br>1.938 | 22<br>0.866    | 19.05<br>0.750 | 30.17<br>1.188 | 52.27<br>2.280 | 4.55<br>0.179 | 8.00<br>0.315 | M8 x 1.25<br>5/16 -24 | 0.885<br>1.95        | 20000<br>4500           | 36300<br>8150                              |                                                         |
| GYM1111KRRB                         | 210                            | 1 11/16                  | 90           | 51.59          | 22             | 19.05          | 32.54          | 62.84          | 4.70          | 10.00         | M10 x 1.5             | 1.271                | 22700                   | 39200                                      |                                                         |
| GYM1112KRRB                         |                                | 1 3/4                    | 3.5433       | 2.031          | 0.866          | 0.750          | 1.281          | 2.474          | 0.185         | 0.394         | 3/8 -24               | 2.8<br>1.203<br>2.65 | 5100<br>22700<br>5100   | 8800<br>39200<br>8800                      |                                                         |
| GYM1115KRRB                         | 211                            | 1 15/16                  | 100          | 55.55          | 24             | 22.22          | 33.32          | 69.77          | 5.00          | 10.00         | M10 x 1.5             | 1.634                | 28500                   | 48100                                      |                                                         |
| GY1200KRRB                          |                                | 2                        | 3.9370       | 2.187          | 0.945          | 0.875          | 1.312          | 2.747          | 0.197         | 0.394         | 3/8 -24               | 3.6<br>1.498<br>3.3  | 6400<br>28500<br>6400   | 10800<br>48100<br>10800                    |                                                         |
| GYM1203KRRB                         | 212                            | 2 3/16                   | 110          | 65.07          | 27             | 25.40          | 39.67          | 76.48          | 5.13          | 10.00         | M10 x 1.5             | 2.225                | 35600                   | 58800                                      |                                                         |
| GY1204KRRB                          |                                | 2 1/4                    | 4.3307       | 2.562          | 1.063          | 1.000          | 1.562          | 3.011          | 0.202         | 0.394         | 3/8 -24               | 4.9<br>1.952<br>4.3  | 8000<br>35600<br>8000   | 13200<br>58800<br>13200                    |                                                         |
| GYM1207KRRB                         | 214                            | 2 7/16                   | 125          | 69.85          | 28             | 26.97          | 42.84          | 76.48          | 5.08          | 12.00         | M12 x 1.75            | 2.996                | 43000                   | 69500                                      |                                                         |
| GYM1208KRRB                         |                                | 2 1/2                    | 4.9213       | 2.750          | 1.102          | 1.062          | 1.687          | 3.422          | 0.200         | 0.472         | 7/16 -20              | 6.6<br>2.86<br>6.3   | 9650<br>43000<br>9650   | 15600<br>69500<br>15600                    |                                                         |
| GYM1211KRRB                         | 215                            | 2 11/16                  | 130          | 77.80          | 29             | 33.32          | 44.45          | 91.92          | 5.56          | 12.00         | M12 x 1.75            | 3.042                | 43600                   | 69500                                      |                                                         |
| GYM1215KRRB                         |                                | 2 15/16                  | 5.1181       | 3.063          | 1.142          | 1.312          | 1.750          | 3.619          | 0.219         | 0.472         | 7/16 -20              | 6.7                  | 9800                    | 15600                                      |                                                         |
| GYM1300KRRB                         | 216                            | 3                        | 140          | 77.80          | 29             | 33.32          | 44.45          | 91.92          | 5.56          | 12.00         | M12 x 1.75            | 3.087                | 53400                   | 80200                                      |                                                         |
| GYM1300KRRB                         |                                | 3                        | 5.5118       | 3.063          | 1.142          | 1.312          | 1.750          | 3.619          | 0.219         | 0.472         | 7/16 -20              | 6.8                  | 12000<br>53400<br>12000 | 18000<br>80200<br>18000                    |                                                         |

<sup>(1)</sup> Bore tolerance: 1/2" - 2 3/16", nominal to **.013 mm, +.0005"**;  
2 1/4" - 3 15/16", nominal to **.015 mm, +.0006"**.

## ER INDUSTRIAL SERIES RELUBRICATABLE TYPE

- Designed for use in applications where low starting torque and low running torque are necessary.
- ER-DD Series is for applications where extremely low-torque is required.
- Test results indicate an average of 95 percent reductions in start-up torque when using ER-DD over the standard ER bearing. Running torque is reduced up to 85 - 90 percent.

**Suggested shaft tolerances:**  $\frac{1}{2}'' - 1\frac{15}{16}''$ , nominal to  $-.013$  mm,  $-.0005''$ ;  
 $2'' - 2\frac{15}{16}''$ , nominal to  $-.025$  mm,  $-.0010''$ .



| Bearing Number | Basic Outer Ring | Bore <sup>(1)</sup> d | O.D. D | Ring Widths      |                  | S                | S <sub>1</sub>   | F                | J               | D <sub>1</sub>   | Y ref            | T              | M               | X ref            | Setscrew Size       | Bearing Wt. |      | Cross Reference Number <sup>(2)</sup> |
|----------------|------------------|-----------------------|--------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|------------------|----------------|-----------------|------------------|---------------------|-------------|------|---------------------------------------|
|                |                  |                       |        | B Inner          | C Outer          |                  |                  |                  |                 |                  |                  |                |                 |                  |                     | kg          | lbs. |                                       |
|                |                  | in.                   | mm in. | mm in.           | mm in.           | mm in.           | mm in.           | mm in.           | mm in.          | mm in.           | mm in.           | mm in.         | mm in.          | mm in.           | mm in.              | kg          | lbs. |                                       |
| ER08*          |                  | $\frac{1}{2}$         |        |                  |                  |                  |                  |                  |                 |                  |                  |                |                 |                  |                     | 0.190       | 0.42 |                                       |
| ER10*          | 204              | $\frac{5}{8}$         | 47     | 30.96            | 15.88            | 12.7             | 18.26            | 28.17            | 5.16            | 52.4             | 16.61            | 1.2            | 3.97            | 14.35            | M5X.8               | 0.167       | 0.37 | SM1012K                               |
| ER12*          |                  | $\frac{3}{4}$         | 1.8504 | $1\frac{7}{32}$  | $\frac{5}{8}$    | $\frac{1}{2}$    | $\frac{23}{32}$  | $1\frac{7}{64}$  | $\frac{19}{64}$ | $2\frac{1}{16}$  | $\frac{21}{32}$  | $\frac{3}{64}$ | $\frac{5}{32}$  | $\frac{9}{16}$   | 10 - 32             | 0.141       | 0.31 |                                       |
| ER14*          |                  | $\frac{7}{8}$         |        |                  |                  |                  |                  |                  |                 |                  |                  |                |                 |                  |                     |             |      |                                       |
| ER15           | 205              | $\frac{15}{16}$       | 52     | 34.13            | 19.05            | 14.29            | 19.84            | 33.73            | 6.35            | 57.5             | 16.61            | 1.2            | 3.57            | 17.50            | M6X1                | 0.218       | 0.48 | SM1013K                               |
| ER16*          |                  | 1                     | 2.0472 | $1\frac{11}{32}$ | $\frac{3}{4}$    | $\frac{9}{16}$   | $\frac{25}{32}$  | $1\frac{21}{64}$ | $\frac{1}{4}$   | $2\frac{17}{64}$ | $\frac{21}{32}$  | $\frac{3}{64}$ | $\frac{9}{64}$  | $\frac{11}{16}$  | $\frac{1}{4} - 28$  | 0.195       | 0.43 |                                       |
| ER18           | 206              | $1\frac{1}{8}$        | 62     | 38.1             | 22.23            | 15.87            | 22.22            | 40.48            | 7.54            | 67.5             | 17.93            | 1.6            | 5.56            | 20.17            | M6X1                | 0.340       | 0.75 | SM1101K                               |
| ER19           |                  | $1\frac{3}{16}$       | 2.4409 | $1\frac{1}{2}$   | $\frac{7}{8}$    | $\frac{5}{8}$    | $\frac{7}{8}$    | $1\frac{19}{32}$ | $\frac{19}{64}$ | $2\frac{21}{32}$ | $\frac{45}{64}$  | $\frac{1}{16}$ | $\frac{7}{32}$  | $\frac{51}{64}$  | $\frac{1}{4} - 28$  | 0.313       | 0.69 |                                       |
| ER20*          |                  | $1\frac{1}{4}$        |        |                  |                  |                  |                  |                  |                 |                  |                  |                |                 |                  |                     |             |      |                                       |
| ER22*          | 207              | $1\frac{3}{8}$        | 72     | 42.86            | 23.81            | 17.46            | 25.4             | 46.83            | 7.94            | 78.2             | 19.76            | 1.6            | 5.56            | 23.11            | M8X1.25             | 0.499       | 1.10 | SM1104K                               |
| ER23*          |                  | $1\frac{7}{16}$       | 2.8346 | $1\frac{11}{16}$ | $\frac{15}{16}$  | $\frac{11}{16}$  | 1                | $1\frac{27}{32}$ | $\frac{5}{16}$  | $3\frac{5}{64}$  | $\frac{25}{32}$  | $\frac{1}{16}$ | $\frac{7}{32}$  | $\frac{29}{32}$  | $\frac{5}{16} - 24$ | 0.476       | 1.05 |                                       |
| ER24*          | 208              | $1\frac{1}{2}$        | 80     | 49.21            | 27.78            | 19.05            | 30.16            | 52.38            | 7.94            | 86.5             | 21.16            | 1.6            | 6.35            | 28.07            | M8X1.25             | 0.671       | 1.48 | SM1108K                               |
|                |                  |                       | 3.1496 | $1\frac{15}{16}$ | $1\frac{3}{32}$  | $\frac{3}{4}$    | $1\frac{3}{16}$  | $2\frac{1}{16}$  | $\frac{5}{16}$  | $3\frac{13}{32}$ | $\frac{53}{64}$  | $\frac{1}{16}$ | $\frac{1}{4}$   | $1\frac{7}{64}$  | $\frac{5}{16} - 24$ |             |      |                                       |
| ER27           | 209              | $1\frac{11}{16}$      | 85     | 49.21            | 27.78            | 19.05            | 30.16            | 57.94            | 7.94            | 91.3             | 21.16            | 1.6            | 6.35            | 28.07            | M8X1.25             | 0.735       | 1.62 | SM1110K                               |
| ER28*          |                  | $1\frac{3}{4}$        | 3.3465 | $1\frac{15}{16}$ | $1\frac{3}{32}$  | $\frac{3}{4}$    | $1\frac{3}{16}$  | $2\frac{9}{64}$  | $\frac{5}{16}$  | $3\frac{19}{32}$ | $\frac{53}{64}$  | $\frac{1}{16}$ | $\frac{1}{4}$   | $1\frac{7}{64}$  | $\frac{5}{16} - 24$ | 0.690       | 1.52 |                                       |
| ER30           | 210              | $1\frac{7}{8}$        | 90     | 51.59            | 28.58            | 19.05            | 32.54            | 55.66            | 9.92            | 96.4             | 24.66            | 2.4            | 7.14            | 27.31            | M10X1.5             | 0.853       | 1.88 | SM1113K                               |
| ER31           |                  | $1\frac{15}{16}$      | 3.5433 | $2\frac{1}{32}$  | $1\frac{1}{8}$   | $\frac{3}{4}$    | $1\frac{9}{32}$  | $2\frac{7}{16}$  | $\frac{25}{64}$ | $3\frac{51}{64}$ | $\frac{31}{32}$  | $\frac{3}{32}$ | $\frac{9}{32}$  | $1\frac{5}{64}$  | $\frac{3}{8} - 24$  | 0.834       | 1.84 |                                       |
| ER32*          | 211              | 2                     | 100    | 55.56            | 30.16            | 22.22            | 33.34            | 69.85            | 9.92            | 106.4            | 24.28            | 2.4            | 7.14            | 31.27            | M10X1.5             | 1.300       | 2.87 | SM1200K                               |
| ER35           |                  | $2\frac{3}{16}$       | 3.9370 | $2\frac{3}{16}$  | $1\frac{3}{16}$  | $\frac{7}{8}$    | $1\frac{5}{16}$  | $2\frac{3}{4}$   | $\frac{25}{64}$ | $4\frac{3}{16}$  | $\frac{61}{64}$  | $\frac{3}{32}$ | $\frac{9}{32}$  | $1\frac{15}{64}$ | $\frac{3}{8} - 24$  | 1.084       | 2.39 |                                       |
| ER39*          | 212              | $2\frac{7}{16}$       | 110    | 65.09            | 31.75            | 25.4             | 39.69            | 76.60            | 9.92            | 116.3            | 28.24            | 2.4            | 6.75            | 36.83            | M10X1.5             | 1.450       | 3.20 | SM1204K                               |
|                |                  |                       | 4.3307 | $2\frac{9}{16}$  | $1\frac{1}{4}$   | 1                | $1\frac{9}{16}$  | $3\frac{1}{64}$  | $\frac{25}{64}$ | $4\frac{37}{64}$ | $\frac{17}{64}$  | $\frac{3}{32}$ | $1\frac{7}{64}$ | $1\frac{29}{64}$ | $\frac{3}{8} - 24$  |             |      |                                       |
| ER47           | 215              | $2\frac{5}{16}$       | 130    | 77.79            | 38.1             | 33.33            | 44.45            | 91.68            | 11.91           | 139.7            | 33.02            | 2.8            | 6.35            | 44.78            | M12X1.75            | 2.210       | 4.88 | SM1213K                               |
|                |                  |                       | 5.1180 | $3\frac{1}{16}$  | $1\frac{1}{2}$   | $1\frac{5}{16}$  | $1\frac{3}{4}$   | $3\frac{39}{64}$ | $\frac{15}{32}$ | $5\frac{1}{2}$   | $1\frac{19}{64}$ | $\frac{7}{64}$ | $\frac{1}{4}$   | $1\frac{49}{64}$ | $\frac{7}{16} - 20$ |             |      |                                       |
| ER51           | 216              | $3\frac{3}{16}$       | 140    | 77.79            | 42.86            | 28.58            | 49.21            | 98.43            | 13.49           | 149.6            | 35.32            | 2.8            | 11.11           | 42.47            | M12X1.75            | 3.450       | 7.61 | SM1303K                               |
|                |                  |                       | 5.5110 | $3\frac{1}{16}$  | $1\frac{11}{16}$ | $1\frac{1}{8}$   | $1\frac{15}{16}$ | $3\frac{7}{8}$   | $\frac{17}{32}$ | $5\frac{57}{64}$ | $1\frac{25}{64}$ | $\frac{7}{64}$ | $\frac{7}{16}$  | $1\frac{43}{64}$ | $\frac{7}{16} - 20$ |             |      |                                       |
| ER55           | 217              | $3\frac{7}{16}$       | 150    | 85.72            | 49.21            | 34.16            | 51.57            | 104.84           | 11.91           | 159.5            | 34.53            | 2.8            | 11.02           | 51.21            | M12X1.75            | —           | —    | SM1307K                               |
|                |                  |                       | 5.9051 | $3\frac{3}{8}$   | $1\frac{15}{16}$ | $1\frac{11}{32}$ | $2\frac{1}{32}$  | $4\frac{1}{8}$   | $\frac{7}{16}$  | $6\frac{1}{4}$   | $1\frac{23}{64}$ | $\frac{7}{64}$ | $\frac{7}{16}$  | $2\frac{1}{64}$  | $\frac{7}{16} - 20$ |             |      |                                       |

<sup>(1)</sup> Bore tolerance:  $\frac{1}{2}'' - 2\frac{3}{16}''$ , nominal to  $.013$  mm,  $+.0005''$ .  
 $2\frac{1}{4}'' - 2\frac{15}{16}''$ , nominal to  $.015$  mm,  $+.0006''$ .

<sup>(2)</sup> Use cross reference bearing numbers to locate Load Ratings on page D70.

\*ER-DD low drag/low-torque version available.



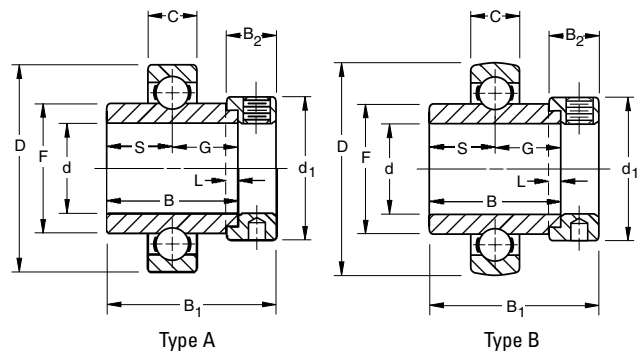
# BALL BEARINGS

## SM INDUSTRIAL SERIES A AND B TYPES/MUA-B INSERTS<sup>(6)</sup>

- Standard SM Series A and B have the same ring tolerances and corner radii as equivalent 200 Series single-row radial ball bearings.
- Type A has cylindrical outside diameters; type B has spherical outside diameters. The letter B appears on the outer ring only.
- Bearings are not prelubricated.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 3 15/16", nominal to **-.025 mm, -.0010"**.

**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL".**  
Example: SM1207KB + COL.



| Bearing Number        | Collar Number              | Basic Outer Ring Size | Bore <sup>(4)</sup> d | O.D. D  | Ring Widths |         | S&G               | F       | L      | d <sub>1</sub> | B <sub>1</sub> | B <sub>2</sub> | Brg. & Collar Wt. |       | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |        |
|-----------------------|----------------------------|-----------------------|-----------------------|---------|-------------|---------|-------------------|---------|--------|----------------|----------------|----------------|-------------------|-------|-----------------------------------|---------------------------------------------|--------|
|                       |                            |                       |                       |         | B Inner     | C Outer |                   |         |        |                |                |                | kg                | lbs.  |                                   |                                             |        |
| A Type <sup>(7)</sup> | B Type                     |                       | in.                   | mm in.  | mm in.      | mm in.  | mm in.            | mm in.  | mm in. | mm in.         | mm in.         | mm in.         |                   |       | N lbs.                            | N lbs.                                      |        |
| SM1008K               | SM1008KB                   | S1008K                | 1/2                   |         |             |         |                   |         |        |                |                |                | 0.145             | 0.32  |                                   |                                             |        |
| SM1009K               | SM1009KB                   | S1009K                | 203                   | 9/16    | 40          | 27.78   | 12                | 13.9    | 22.86  | 4.0            | 28.6           | 13.5           | 37.3              | 0.131 | 0.29                              | 4700                                        | 10600  |
| SM1010K               | SM1010KB                   | S1010K                |                       | 5/8     | 1.5748      | 1 3/32  | 0.4724            | 35/64   | 0.900  | 5/32           | 1 1/8          | 17/32          | 1 15/32           | 0.136 | 0.3                               | 1600                                        | 2360   |
| SM1011K               | SM1011KB                   | S1011K                |                       | 11/16   |             |         |                   |         |        |                |                |                |                   | 0.113 | 0.25                              |                                             |        |
| SM1012K               | SM1012KB                   | S1012K                | 204                   | 3/4     | 47          | 34.13   | 14                | 17.1    | 27.56  | 4.0            | 33.3           | 13.5           | 48.66             | 0.195 | 0.43                              | 6200                                        | 14300  |
|                       |                            |                       |                       |         | 1.8504      | 1 11/32 | 0.5512            | 43/64   | 1.085  | 5/32           | 1 5/16         | 17/32          | 1 23/32           |       |                                   | 1400                                        | 3200   |
| SM1013K               | SM1013KB                   | S1013K                |                       | 13/16   |             |         |                   |         |        |                |                |                |                   | 0.276 | 0.61                              |                                             |        |
| SM1014K               | SM1014KB                   | S1014K                | 205                   | 7/8     | 52          | 34.93   | 15                | 17.5    | 33.83  | 4.0            | 38.1           | 13.5           | 44.45             | 0.254 | 0.56                              | 6950                                        | 15600  |
| SM1015K               | SM1015KB                   | S1015K                |                       | 15/16   | 2.0472      | 1 3/8   | 0.5906            | 11/16   | 1.332  | 5/32           | 1 1/2          | 17/32          | 1 3/4             | 0.236 | 0.52                              | 1730                                        | 3450   |
| SM1100K               | SM1100KB                   | S1100K                |                       | 1       |             |         |                   |         |        |                |                |                |                   | 0.217 | 0.48                              |                                             |        |
| SM1101K               | SM1101KB                   | S1101K                |                       | 1 1/16  | 62          | 36.51   | 16 <sup>(1)</sup> | 18.3    | 40.31  | 4.0            | 44.4           | 15.9           | 48.4              | 0.399 | 0.88                              | 11100                                       | 21600  |
| SM1102K               | SM1102KB                   | S1102K                | 206                   | 1 1/8   | 2.4409      | 1 7/16  | 0.6299            | 23/32   | 1.587  | 5/32           | 1 3/4          | 5/8            | 1 29/32           | 0.367 | 0.81                              | 2500                                        | 4800   |
| SM1103K               | SM1103KB                   | S1103K                |                       | 1 3/16  |             |         |                   |         |        |                |                |                |                   | 0.331 | 0.73                              |                                             |        |
| SM1104K               | SM1104KB                   | S1104K                |                       | 1 1/4   |             |         |                   |         |        |                |                |                |                   | 0.621 | 1.37                              |                                             |        |
| SM1105K               | SM1105KB                   | S1105K                | 207                   | 1 5/16  | 72          | 37.70   | 17 <sup>(2)</sup> | 18.85   | 46.13  | 4.0            | 54.0           | 17.46          | 51.2              | 0.589 | 1.3                               | 15100                                       | 28500  |
| SM1106K               | SM1106KB                   | S1106K                |                       | 1 3/8   | 2.8346      | 1 31/64 | 0.6693            | 0.742   | 1.816  | 5/32           | 2 1/8          | 11/16          | 2 1/64            | 0.562 | 1.24                              | 3400                                        | 6400   |
| SM1107K               | SM1107KB                   | S1107K                |                       | 1 7/16  |             |         |                   |         |        |                |                |                |                   | 0.539 | 1.19                              |                                             |        |
| SM1108KT              | SM1108KB                   | S1108KT               | 208                   | 1 1/2   | 80          | 42.86   | 18 <sup>(3)</sup> | 21.4    | 52.27  | 4.8            | 60.3           | 18.3           | 56.4              | 0.761 | 1.68                              | 19600                                       | 36000  |
| SM1109KT              | SM1109KB                   | S1109KT               |                       | 1 9/16  | 3.1496      | 1 11/16 | 0.7087            | 27/32   | 2.058  | 3/16           | 2 3/8          | 23/32          | 2 7/32            | 0.716 | 1.58                              | 4400                                        | 8150   |
| SM1110K               | SM1110KB                   | S1110K                |                       | 1 5/8   | 85          | 42.86   | 19                | 21.4    | 57.92  | 4.8            | 63.5           | 18.3           | 56.4              | 0.875 | 1.93                              | 20000                                       | 36000  |
| SM1111K               | SM1111KB                   | S1111K                | 209                   | 1 11/16 | 3.3465      | 1 11/16 | 0.7480            | 27/32   | 2.28   | 3/16           | 2 1/2          | 23/32          | 2 7/32            | 0.857 | 1.89                              | 4500                                        | 8150   |
| SM1112K               | SM1112KB                   | S1112K                |                       | 1 3/4   |             |         |                   |         |        |                |                |                |                   | 0.803 | 1.77                              |                                             |        |
| SM1113K               | SM1113KB                   | S1113K                |                       | 1 13/16 | 90          | 49.21   | 20                | 24.6    | 62.84  | 4.8            | 69.9           | 18.3           | 62.7              | 1.075 | 2.37                              | 22700                                       | 39000  |
| SM1114K               | SM1114KB                   | S1114K                | 210                   | 1 7/8   | 3.5433      | 1 15/16 | 0.7874            | 31/32   | 2.474  | 3/16           | 2 3/4          | 23/32          | 2 15/32           | 1.012 | 2.23                              | 5100                                        | 8800   |
| SM1115K               | SM1115KB                   | S1115K                |                       | 1 15/16 |             |         |                   |         |        |                |                |                |                   | 0.962 | 2.12                              |                                             |        |
| SM1200K               | SM1200KB                   | S1200K                |                       | 2       |             |         |                   |         |        |                |                |                |                   | 1.51  | 3.33                              |                                             |        |
| SM1201K               | SM1201KB                   | S1201K                | 211                   | 2 1/16  | 100         | 55.56   | 21                | 27.8    | 69.77  | 4.8            | 76.2           | 20.6           | 71.4              | 1.397 | 3.08                              | 28500                                       | 48000  |
| SM1202K               | SM1202KB                   | S1202K                |                       | 2 1/8   | 3.9370      | 2 9/16  | 0.8268            | 1 3/32  | 2.747  | 3/16           | 3              | 13/16          | 2 13/16           | 1.438 | 3.17                              | 6400                                        | 10800  |
| SM1203K               | SM1203KB                   | S1203K                |                       | 2 3/16  |             |         |                   |         |        |                |                |                |                   | 1.256 | 2.77                              |                                             |        |
| SM1204K               | SM1204KB                   | S1204K                | 212                   | 2 1/4   |             |         |                   |         |        |                |                |                |                   | 1.86  | 4.1                               |                                             |        |
| SM1205K               | SM1205KB                   | S1205K                |                       | 2 5/16  | 110         | 61.91   | 22                | 30.96   | 76.48  | 6.4            | 84.14          | 22.33          | 77.8              | 1.787 | 3.94                              | 35600                                       | 58500  |
| SM1206K               | SM1206KB                   | S1206K                |                       | 2 3/8   | 4.3307      | 2 7/16  | 0.8661            | 1 7/32  | 3.011  | 1/4            | 3 5/16         | 7/8            | 3 1/16            | 1.692 | 3.73                              | 8000                                        | 13200  |
| SM1207K               | SM1207KB                   | S1207K                |                       | 2 7/16  |             |         |                   |         |        |                |                |                |                   | 1.374 | 3.03                              |                                             |        |
| SM1208K               | SM1208KB                   | S1208K                | 213                   | 2 1/2   | 120         | 68.26   | 23                | 34.13   | 84.58  | 6.4            | 96.84          | 23.81          | 85.73             | 2.472 | 5.45                              | 39200                                       | 63000  |
|                       |                            |                       |                       |         | 4.7244      | 2 11/16 | 0.9055            | 1 11/32 | 3.33   | 1/4            | 3 13/16        | 15/16          | 3 3/8             |       |                                   | 8800                                        | 14300  |
| SM1211KT              | SM1211KTB                  | S1211KT               | 214                   | 2 11/16 | 125         | 68.26   | 24                | 34.13   | 86.92  | 6.4            | 96.84          | 23.81          | 85.73             | 2.418 | 5.33                              | 43000                                       | 69500  |
|                       |                            |                       |                       |         | 4.9213      | 2 11/16 | 0.9449            | 1 11/32 | 3.422  | 1/4            | 3 13/16        | 15/16          | 3 3/8             |       |                                   | 9650                                        | 15600  |
| SM1213K               | SM1213KB                   | S1213K                | 215                   | 2 13/16 | 130         | 74.61   | 25                | 37.3    | 91.92  | 6.4            | 101.6          | 23.81          | 92.08             | 2.858 | 6.3                               | 43600                                       | 68000  |
| SM1215K               | SM1215KB                   | S1215K                |                       | 2 15/16 | 5.1181      | 2 15/16 | 0.9843            | 1 15/32 | 3.619  | 1/4            | 4              | 15/16          | 3 5/8             | 2.803 | 6.18                              | 9800                                        | 15300  |
| SM1303K               | SM1303KB                   | S1303K                | 216                   | 3 3/16  | 140         | 80.96   | 26                | 40.48   | 98.4   | 6.4            | 111.13         | 25.4           | 100.01            | 3.452 | 7.61                              | 53400                                       | 80000  |
|                       |                            |                       |                       |         | 5.5118      | 3 3/16  | 1.0236            | 1 19/32 | 3.874  | 1/4            | 4 3/8          | 1              | 3 15/16           |       |                                   | 12000                                       | 18000  |
| SM1307K               | SM1307KB                   | S1307K                | 217                   | 3 7/16  | 150         | 87.31   | 28                | 43.66   | 104.83 | 6.4            | 112.71         | 25.4           | 106.36            | 3.901 | 8.6                               | 61000                                       | 93000  |
|                       |                            |                       |                       |         | 5.9055      | 3 7/16  | 1.1024            | 1 23/32 | 4.127  | 1/4            | 4 7/16         | 1              | 4 3/16            |       |                                   | 13700                                       | 20800  |
| SM1311W-BR            | SM1311WB-BR <sup>(5)</sup> | S1311K                | 219                   | 3 11/16 | 170         | 93.66   | 32                | 46.83   | 118.34 | 6.4            | 127            | 26.99          | 114.3             | 6.078 | 13.4                              | 113600                                      | 150000 |
|                       |                            |                       |                       |         | 6.6929      | 3 11/16 | 1.2598            | 1 27/32 | 4.659  | 1/4            | 5              | 1 1/16         | 4 1/2             |       |                                   | 25500                                       | 34000  |
| SM1315W-BR            | SM1315WB-BR <sup>(5)</sup> | S1315                 | 220                   | 3 15/16 | 180         | 100.01  | 34                | 50      | 123.85 | 6.4            | 139.7          | 31.75          | 125.41            | 7.335 | 16.17                             | 126900                                      | 170000 |
|                       |                            |                       |                       |         | 7.0866      | 3 15/16 | 1.3386            | 1 31/32 | 4.876  | 1/4            | 5 1/2          | 1 1/4          | 4 15/16           |       |                                   | 28500                                       | 38000  |

<sup>(1)</sup> Spherical O.D. outer ring width is 18 mm, .7087".  
<sup>(2)</sup> Spherical O.D. outer ring width is 19 mm, .7480".

<sup>(3)</sup> Spherical O.D. outer ring width is 21 mm, .8268".

<sup>(4)</sup> Bore tolerance: 1/2" - 2 3/16", nominal to .013 mm, +.0005".  
2 1/4" - 3 3/16", nominal to .015 mm, +.0006".  
3 1/4" - 3 15/16", nominal to .018 mm, +.0007".

<sup>(5)</sup> For applications where thrust load exceeds 60% of radial load, consult your Timken representative.

<sup>(6)</sup> See page D140.

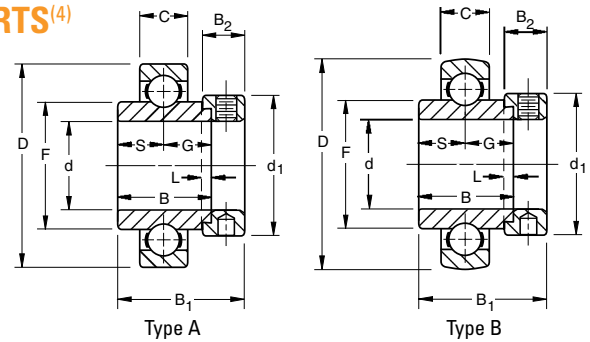
<sup>(7)</sup> Order as MUA assembly suggested.

### SMN HEAVY SERIES A AND B TYPES/MUOA-B INSERTS<sup>(4)</sup>

- SMN Series types A and B have the same ring tolerances and corner radii as equivalent 300 Series single-row radial ball bearings.
- Type A has cylindrical outside diameters; Type B has spherical outside diameters. The letter B appears on the outer ring only.
- Bearings are not prelubricated.

**Suggested shaft tolerances:**  $\frac{5}{8}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.013$  mm,  $-.0005$ ";  
 $2 \frac{3}{16}$ " -  $3 \frac{15}{16}$ ", nominal to  $-.025$  mm,  $-.0010$ ".

**For larger sizes, contact your Timken representative.**



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: SMN102K + COL.**

| Bearing Number            | Collar Number              | Basic Outer Ring Size | Bore <sup>(1)</sup> d | O.D. D          | Ring Widths |                   | S      | G                | F                | L      | d <sub>1</sub> | B <sub>2</sub>    | B <sub>1</sub>  | Brg. & Collar Wt. |        | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |        |
|---------------------------|----------------------------|-----------------------|-----------------------|-----------------|-------------|-------------------|--------|------------------|------------------|--------|----------------|-------------------|-----------------|-------------------|--------|-----------------------------------|---------------------------------------------|--------|
|                           |                            |                       |                       |                 | B Inner     | C Outer           |        |                  |                  |        |                |                   |                 | kg lbs.           | lbs.   |                                   |                                             |        |
| A Type <sup>(3)</sup>     | B Type                     |                       | in.                   | mm in.          | mm in.      | mm in.            | mm in. | mm in.           | mm in.           | mm in. | mm in.         | mm in.            | mm in.          | kg lbs.           | lbs.   | N lbs.                            | N                                           |        |
| SMN010K                   | SMN010KB                   | SN010K                | 303                   | $\frac{5}{8}$   | 47          | 34.13             | 14     | 17.07            | 17.07            | 25.93  | 4.0            | 34.93             | 15.88           | 46.05             | 0.24   | 0.53                              | 6550                                        | 15000  |
| SMN011K                   | SMN011KB                   | SN011K                |                       | $\frac{1}{16}$  | 1.8504      | $1 \frac{11}{32}$ | 0.5512 | $\frac{43}{64}$  | $\frac{43}{64}$  | 1.021  | $\frac{5}{32}$ | $1 \frac{3}{8}$   | $\frac{5}{8}$   | $1 \frac{13}{16}$ | 0.218  | 0.48                              | 1460                                        | 3350   |
| SMN012K                   | SMN012KB                   | SN012K                | 304                   | $\frac{3}{4}$   | 52          | 34.93             | 15     | 15.9             | 19.05            | 29.24  | 4.0            | 36.51             | 15.88           | 46.83             | 0.227  | 0.5                               | 7800                                        | 17600  |
|                           |                            |                       |                       |                 | 2.0472      | $\frac{13}{8}$    | 0.5906 | $\frac{5}{8}$    | $\frac{3}{4}$    | 1.151  | $\frac{5}{32}$ | $1 \frac{7}{16}$  | $\frac{5}{8}$   | $1 \frac{27}{32}$ |        |                                   | 1760                                        | 4000   |
| SMN013K                   | SMN013KB                   | SN013K                |                       | $\frac{13}{16}$ |             |                   |        |                  |                  |        |                |                   |                 | 0.445             | 0.98   |                                   |                                             |        |
| SMN014K                   | SMN014KB                   | SN014K                | 305                   | $\frac{7}{8}$   | 62          | 34.93             | 17     | 16.67            | 18.26            | 36.5   | 4.0            | 42.86             | 15.88           | 46.83             | 0.431  | 0.95                              | 12200                                       | 26000  |
| SMN015K                   | SMN015KB                   | SN015K                |                       | $\frac{15}{16}$ | 2.4409      | $\frac{13}{8}$    | 0.6693 | $\frac{21}{32}$  | $\frac{23}{32}$  | 1.437  | $\frac{5}{32}$ | $1 \frac{11}{16}$ | $\frac{5}{8}$   | $1 \frac{27}{32}$ | 0.413  | 0.91                              | 2750                                        | 5850   |
| SMN100K                   | SMN100KB                   | SN100K                |                       | 1               |             |                   |        |                  |                  |        |                |                   |                 | 0.404             | 0.86   |                                   |                                             |        |
| SMN101K                   | SMN101KB                   | SN101K                |                       | $\frac{1}{16}$  | 72          | 36.51             | 19     | 17.46            | 19.05            | 43.23  | 4.0            | 49.21             | 17.46           | 50                | 0.608  | 1.34                              | 15600                                       | 33500  |
| SMN102K                   | SMN102KB                   | SN102K                | 306                   | $\frac{1}{8}$   | 2.8346      | $1 \frac{7}{16}$  | 0.7480 | $\frac{11}{16}$  | $\frac{3}{4}$    | 1.702  | $\frac{5}{32}$ | $1 \frac{15}{16}$ | $\frac{11}{16}$ | $1 \frac{31}{32}$ | 0.585  | 1.29                              | 3550                                        | 7500   |
| SMN103K                   | SMN103KB                   | SN103K                |                       | $\frac{3}{16}$  |             |                   |        |                  |                  |        |                |                   |                 | 0.567             | 1.25   |                                   |                                             |        |
| SMN104K                   | SMN104KB                   | SN104K                |                       | $\frac{1}{4}$   |             |                   |        |                  |                  |        |                |                   |                 | 0.803             | 1.77   |                                   |                                             |        |
| SMN105K                   | SMN105KB                   | SN105K                | 307                   | $\frac{15}{16}$ | 80          | 38.10             | 21     | 18.26            | 19.84            | 48.95  | 4.0            | 55.6              | 17.46           | 51.59             | 0.757  | 1.67                              | 21200                                       | 40500  |
| SMN106K                   | SMN106KB                   | SN106K                |                       | $\frac{3}{8}$   | 3.1496      | $1 \frac{1}{2}$   | 0.8268 | $\frac{23}{32}$  | $\frac{25}{32}$  | 1.927  | $\frac{5}{32}$ | $2 \frac{3}{16}$  | $\frac{11}{16}$ | $2 \frac{1}{32}$  | 0.726  | 1.6                               | 4750                                        | 9150   |
| SMN107K                   | SMN107KB                   | SN107K                |                       | $\frac{17}{16}$ |             |                   |        |                  |                  |        |                |                   |                 | 0.721             | 1.56   |                                   |                                             |        |
| SMN108K                   | SMN108KB                   | SN108K                | 308                   | $\frac{1}{2}$   | 90          | 41.28             | 23     | 19.84            | 21.43            | 55.5   | 4.8            | 63.5              | 20.64           | 57.15             | 1.089  | 2.4                               | 26100                                       | 49000  |
| SMN109K                   | SMN109KB                   | SN109K                |                       | $\frac{9}{16}$  | 3.5433      | $\frac{15}{8}$    | 0.9055 | $\frac{25}{32}$  | $\frac{27}{32}$  | 2.185  | $\frac{3}{16}$ | $2 \frac{1}{2}$   | $\frac{13}{16}$ | $2 \frac{1}{4}$   | 1.025  | 2.26                              | 5850                                        | 11000  |
| SMN110K                   | SMN110KB                   | SN110K                |                       | $\frac{5}{8}$   | 100         | 42.86             | 25     | 19.84            | 23.02            | 62.05  | 4.8            | 69.9              | 20.64           | 58.74             | 1.433  | 3.16                              | 31600                                       | 58500  |
| SMN111K                   | SMN111KB                   | SN111K                | 309                   | $\frac{11}{16}$ | 3.9370      | $1 \frac{11}{16}$ | 0.9843 | $\frac{25}{32}$  | $\frac{29}{32}$  | 2.443  | $\frac{3}{16}$ | $2 \frac{3}{4}$   | $\frac{13}{16}$ | $\frac{25}{16}$   | 1.361  | 3                                 | 7100                                        | 13200  |
| SMN112K                   | SMN112KB                   | SN112K                |                       | $\frac{3}{4}$   |             |                   |        |                  |                  |        |                |                   |                 | 1.361             | 3      |                                   |                                             |        |
| SMN113K                   | SMN113KB                   | SN113K                |                       | $\frac{13}{16}$ | 110         | 49.21             | 27     | 24.61            | 24.61            | 68.78  | 4.8            | 76.2              | 22.2            | 66.68             | 1.896  | 4.18                              | 37900                                       | 68000  |
| SMN114K                   | SMN114KB                   | SN114K                | 310                   | $\frac{7}{8}$   | 4.3307      | $1 \frac{15}{16}$ | 1.063  | $\frac{31}{32}$  | $\frac{31}{32}$  | 2.708  | $\frac{3}{16}$ | 3                 | $\frac{7}{8}$   | $2 \frac{5}{8}$   | 1.805  | 3.98                              | 8500                                        | 15300  |
| SMN115K                   | SMN115KB                   | SN115K                |                       | $\frac{15}{16}$ |             |                   |        |                  |                  |        |                |                   |                 | 1.737             | 3.83   |                                   |                                             |        |
| SMN200K                   | SMN200KB                   | SN200K                |                       | 2               |             |                   |        |                  |                  |        |                |                   |                 | 2.413             | 5.32   |                                   |                                             |        |
| SMN201K                   | SMN201KB                   | SN201K                | 311                   | $\frac{2}{16}$  | 120         | 55.56             | 29     | 27.78            | 27.78            | 75.01  | 4.8            | 82.55             | 22.2            | 73.03             | 2.395  | 5.28                              | 43600                                       | 80000  |
| SMN202K                   | SMN202KB                   | SN202K                |                       | $\frac{2}{8}$   | 4.7244      | $2 \frac{3}{16}$  | 1.1417 | $\frac{13}{32}$  | $\frac{13}{32}$  | 2.953  | $\frac{3}{16}$ | $3 \frac{1}{4}$   | $\frac{7}{8}$   | $2 \frac{7}{8}$   | 2.331  | 5.14                              | 9800                                        | 18000  |
| SMN203K                   | SMN203KB                   | SN203K                |                       | $\frac{23}{16}$ |             |                   |        |                  |                  |        |                |                   |                 | 2.209             | 4.87   |                                   |                                             |        |
| SMN204K                   | SMN204KB                   | SN204K                | 312W                  | $\frac{2}{4}$   |             |                   |        |                  |                  |        |                |                   |                 | 3.084             | 6.8    |                                   |                                             |        |
| SMN205K                   | SMN205KB                   | SN205K                |                       | $\frac{25}{16}$ | 130         | 61.91             | 31     | 31               | 31               | 81.53  | 6.4            | 88.9              | 23.81           | 79.38             | 3.012  | 6.64                              | 51480                                       | 89800  |
| SMN206K                   | SMN206KB                   | SN206K                |                       | $\frac{29}{8}$  | 5.1181      | $2 \frac{7}{16}$  | 1.2205 | $\frac{17}{32}$  | $\frac{17}{32}$  | 3.21   | $\frac{1}{4}$  | $3 \frac{1}{2}$   | $\frac{15}{16}$ | $3 \frac{1}{8}$   | 2.908  | 6.41                              | 11700                                       | 20400  |
| SMN207K                   | SMN207KB                   | SN207K                |                       | $\frac{27}{16}$ |             |                   |        |                  |                  |        |                |                   |                 | 2.812             | 6.2    |                                   |                                             |        |
| SMN211K                   | SMN211KB                   | SO211K                | 314                   | $\frac{21}{16}$ | 150         | 2.69              | 35     | 34.13            | 34.13            | 94.78  | 6.4            | 101.6             | 26.99           | 92.08             | 4.205  | 9.27                              | 66800                                       | 116000 |
|                           |                            |                       |                       |                 | 5.9055      | $2 \frac{11}{16}$ | 1.378  | $\frac{11}{32}$  | $\frac{11}{32}$  | 3.731  | $\frac{1}{4}$  | 4                 | $\frac{1}{16}$  | $3 \frac{5}{8}$   |        |                                   | 15000                                       | 26000  |
| SMN215K                   | SMN215KB                   | SN215K                | 315                   | $\frac{25}{16}$ | 160         | 74.61             | 37     | 37.31            | 37.31            | 100.38 | 6.4            | 112.71            | 31.75           | 100.01            | 5.856  | 12.91                             | 75700                                       | 125000 |
|                           |                            |                       |                       |                 | 6.2992      | $2 \frac{15}{16}$ | 1.4567 | $\frac{15}{32}$  | $\frac{15}{32}$  | 3.952  | $\frac{1}{4}$  | $4 \frac{7}{16}$  | $\frac{1}{4}$   | $3 \frac{15}{16}$ |        |                                   | 17000                                       | 28500  |
| SMN303K                   | SMN303KB                   | SN303K                | 316                   | $\frac{33}{16}$ | 170         | 80.96             | 39     | 40.48            | 40.48            | 106.91 | 6.4            | 119.06            | 31.75           | 106.36            | 6.704  | 14.78                             | 86000                                       | 137000 |
|                           |                            |                       |                       |                 | 6.6929      | $\frac{33}{16}$   | 1.5354 | $\frac{19}{32}$  | $\frac{19}{32}$  | 4.209  | $\frac{1}{4}$  | $4 \frac{11}{16}$ | $\frac{1}{4}$   | $4 \frac{3}{16}$  |        |                                   | 19300                                       | 30500  |
| SMN307K                   | SMN307KB                   | SN307K                | 318                   | $\frac{37}{16}$ | 190         | 87.31             | 43     | 43.66            | 43.66            | 120.12 | 7.94           | 133.35            | 36.51           | 115.89            | 9.984  | 22.01                             | 106900                                      | 156000 |
|                           |                            |                       |                       |                 | 7.4803      | $\frac{37}{16}$   | 1.6929 | $\frac{23}{32}$  | $\frac{23}{32}$  | 4.729  | $\frac{5}{16}$ | $5 \frac{1}{4}$   | $\frac{17}{16}$ | $4 \frac{9}{16}$  |        |                                   | 24000                                       | 35500  |
| SM0311W-BR <sup>(2)</sup> | SM0311WB-BR <sup>(2)</sup> | SO311K                | 319                   | $\frac{31}{16}$ | 200         | 93.66             | 45     | 38.89            | 54.77            | 126.67 | 7.94           | 139.7             | 36.51           | 122.24            | 11.09  | 24.45                             | 173700                                      | 224000 |
|                           |                            |                       |                       |                 | 7.874       | $3 \frac{11}{16}$ | 1.7717 | $\frac{17}{32}$  | $2 \frac{5}{32}$ | 4.987  | $\frac{5}{16}$ | $5 \frac{1}{2}$   | $\frac{17}{16}$ | $4 \frac{13}{16}$ |        |                                   | 39000                                       | 50000  |
| SMN315K                   | SMN315KB                   | SN315K                | 320                   | $\frac{35}{16}$ | 215         | 100.01            | 47     | 50               | 50               | 134.77 | 7.94           | 146.05            | 36.51           | 128.59            | 13.068 | 28.81                             | 140300                                      | 193000 |
|                           |                            |                       |                       |                 | 8.4646      | $\frac{35}{16}$   | 1.8504 | $\frac{131}{32}$ | $\frac{131}{32}$ | 5.306  | $\frac{5}{16}$ | $5 \frac{3}{4}$   | $\frac{17}{16}$ | $5 \frac{1}{16}$  |        |                                   | 31500                                       | 43000  |
| SMN403W-BR <sup>(2)</sup> | SMN403WB-BR                | SN403K                | 321                   | $\frac{43}{16}$ | 225         | 104.78            | 49     | 48.42            | 56.36            | 141.22 | 7.94           | 157.16            | 42.86           | 139.7             | 15.508 | 34.19                             | 202700                                      | 250000 |
|                           |                            |                       |                       |                 | 8.8583      | $4 \frac{1}{8}$   | 1.9291 | $\frac{29}{32}$  | $2 \frac{7}{32}$ | 5.56   | $\frac{5}{16}$ | $6 \frac{3}{16}$  | $\frac{11}{16}$ | $5 \frac{1}{2}$   |        |                                   | 45500                                       | 56000  |
| SMN407W-BR <sup>(2)</sup> | SMN407WB-BR <sup>(2)</sup> | SN407K                | 322                   | $\frac{47}{16}$ | 240         | 106.36            | 50     | 49.21            | 57.15            | 142.75 | 7.94           | 165.1             | 42.86           | 141.29            | 19.051 | 42                                | 245000                                      | 285100 |
|                           |                            |                       |                       |                 | 9.4488      | $4 \frac{3}{16}$  | 1.9685 | $\frac{15}{16}$  | $2 \frac{1}{4}$  | 5.92   | $\frac{5}{16}$ | $6 \frac{1}{2}$   | $\frac{11}{16}$ | $5 \frac{9}{16}$  |        |                                   | 55000                                       | 64000  |
| SMN415W-BR <sup>(2)</sup> | SMN415WB-BR <sup>(2)</sup> | SN415K                | 326                   | $\frac{45}{16}$ | 280         | 106.36            | 59     | 53.98            | 61.91            | 176.56 | 7.94           | 206.38            | 42.86           | 150.81            | 29.66  | 65.39                             | 327400                                      | 347400 |
|                           |                            |                       |                       |                 | 11.0236     | $4 \frac{3}{16}$  | 2.3228 | $2 \frac{1}{8}$  | $2 \frac{7}{16}$ | 6.951  | $\frac{5}{16}$ | $8 \frac{1}{8}$   | $\frac{11}{16}$ | $5 \frac{15}{16}$ |        |                                   | 73500                                       | 78000  |

<sup>(1)</sup> Bore tolerance:  $\frac{5}{8}$ " -  $2 \frac{3}{16}$ ", nominal to  $+.013$  mm,  $+.0005$ ".  
 $3 \frac{1}{4}$ " -  $4 \frac{3}{16}$ ", nominal to  $.018$  mm,  $+.0007$ ".  
 $4 \frac{7}{16}$ " -  $4 \frac{15}{16}$ ", nominal to  $.020$  mm,  $+.0008$ ".

<sup>(2)</sup> For applications where thrust load exceeds 60% of radial load, consult your Timken representative.

<sup>(3)</sup> Order as MUOA assembly suggested.

<sup>(4)</sup> See page D140.

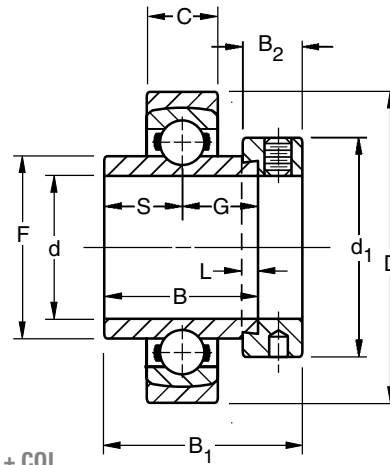


# BALL BEARINGS

## SM-S INDUSTRIAL SERIES

- Standard SM-S Series permits the inner assembly to swivel in the outer aligning ring.
- Unrestricted self-alignment is achieved allowing the inner ring to become square and true with the shaft and assembly.
- The external S-Ring is uniquely ground and closely matched to its respective outer bearing ring. The S-Ring of one bearing will not fit the outer ring of another bearing.
- Bearings are not prelubricated.

**Suggested shaft tolerances:** 1" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: SM1100KS + COL.**

| Bearing Number          | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> |        | Ring Widths |         | S&G     | F      | L    | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | Brg. & Collar Wt. |       | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|-------------------------|---------------|-----------------------|---------------------|--------|-------------|---------|---------|--------|------|----------------|----------------|----------------|-------------------|-------|-----------------------------------|---------------------------------------------|
|                         |               |                       | in.                 | mm     | B Inner     | C Outer |         |        |      |                |                |                | mm                | in.   |                                   |                                             |
| SM1100KS                | S1100K        | 205                   | 1                   | 57     | 34.93       | 15      | 17.46   | 33.83  | 4.0  | 38.1           | 13.5           | 44.1           | 0.263             | 0.58  | 7700                              | 15600                                       |
|                         |               |                       |                     | 2.2441 | 1 3/8       | 0.591   | 1 1/16  | 1.332  | 5/32 | 1 1/2          | 17/32          | 1 47/64        | 1730              | 3450  |                                   |                                             |
| SM1103KS                | S1103K        | 206                   | 1 3/16              | 68     | 36.51       | 16      | 18.3    | 39.12  | 4.0  | 44.4           | 15.9           | 48.4           | 0.418             | 0.92  | 11100                             | 21600                                       |
|                         |               |                       |                     | 2.6772 | 1 7/16      | 0.6300  | 23/32   | 1.54   | 5/32 | 1 3/4          | 5/8            | 1 29/32        | 2500              | 4800  |                                   |                                             |
| SM1104KS                | S1104K        | 207                   | 1 1/4               | 79     | 37.70       | 17      | 18.85   | 46.13  | 4.0  | 54.4           | 17.46          | 51.2           | 0.726             | 1.6   | 11500                             | 28500                                       |
|                         |               |                       |                     | 3.1102 | 1 31/64     | 0.669   | 0.742   | 1.816  | 5/32 | 2 1/8          | 11/16          | 2 1/64         | 3400              | 6400  |                                   |                                             |
| SM1107KS                | S1107K        | 208                   | 1 7/16              | 88     | 42.86       | 18      | 21.4    | 52.27  | 4.8  | 60.3           | 18.3           | 56.4           | 0.903             | 1.99  | 19600                             | 36000                                       |
|                         |               |                       |                     | 3.4646 | 1 11/16     | 0.709   | 27/32   | 2.058  | 3/16 | 2 3/8          | 23/32          | 2 7/32         | 4400              | 8150  |                                   |                                             |
| SM1115KS                | S1115K        | 210                   | 1 15/16             | 100    | 49.21       | 20      | 24.6    | 62.84  | 4.8  | 69.9           | 18.3           | 62.7           | 1.185             | 2.61  | 22700                             | 39000                                       |
|                         |               |                       |                     | 3.9370 | 1 15/16     | 0.7874  | 31/32   | 2.474  | 3/16 | 2 3/4          | 23/32          | 2 15/32        | 5100              | 8800  |                                   |                                             |
| SM1203KS                | S1203K        | 211                   | 2 3/16              | 110    | 55.56       | 21      | 27.8    | 69.77  | 4.8  | 76.2           | 20.6           | 71.4           | 1.748             | 3.85  | 28500                             | 48000                                       |
|                         |               |                       |                     | 4.3307 | 2 3/16      | 0.8268  | 1 3/32  | 2.747  | 3/16 | 3              | 13/16          | 2 13/16        | 6400              | 10800 |                                   |                                             |
| SM1207KS                | S1207K        | 212                   | 2 7/16              | 120    | 61.91       | 22      | 30.96   | 76.48  | 6.4  | 84.14          | 22.2           | 77.8           | 1.907             | 4.2   | 35600                             | 58500                                       |
|                         |               |                       |                     | 4.7244 | 2 7/16      | 0.8661  | 1 7/32  | 3.011  | 1/4  | 3 5/16         | 7/8            | 3 1/16         | 8000              | 13200 |                                   |                                             |
| SM1211KS                | S1211KT       | 214                   | 2 11/16             | 140    | 68.26       | 24      | 34.13   | 86.92  | 6.4  | 96.84          | 23.81          | 79.4           | 2.974             | 6.55  | 43000                             | 69500                                       |
|                         |               |                       |                     | 5.5118 | 2 11/16     | 0.9449  | 1 11/32 | 3.422  | 1/4  | 3 13/16        | 15/16          | 3 3/8          | 9650              | 15600 |                                   |                                             |
| SM1215KS                | S1215K        | 215                   | 2 15/16             | 145    | 74.61       | 25      | 37.3    | 91.92  | 6.4  | 101.6          | 23.81          | 92.08          | 3.541             | 7.8   | 43600                             | 68000                                       |
|                         |               |                       |                     | 5.7087 | 2 15/16     | 0.9843  | 1 15/32 | 3.619  | 1/4  | 4              | 15/16          | 3 5/8          | 9800              | 15300 |                                   |                                             |
| SM1303KS                | S1303K        | 216                   | 3 3/16              | 155    | 80.96       | 26      | 40.48   | 98.4   | 6.4  | 111.13         | 25.4           | 100.01         | 4.15              | 9.14  | 53400                             | 80000                                       |
|                         |               |                       |                     | 6.1024 | 3 3/16      | 1.0236  | 1 19/32 | 3.874  | 1/4  | 4 3/8          | 1              | 3 15/16        | 12000             | 18000 |                                   |                                             |
| SM1307KS                | S1307K        | 217                   | 3 7/16              | 165    | 87.31       | 28      | 43.66   | 104.83 | 6.4  | 112.71         | 25.4           | 106.36         | 4.69              | 10.33 | 61000                             | 93000                                       |
|                         |               |                       |                     | 6.4961 | 3 7/16      | 1.1024  | 1 23/32 | 4.127  | 1/4  | 4 7/16         | 1              | 4 3/16         | 13700             | 20800 |                                   |                                             |
| SM1315WS <sup>(2)</sup> | S1315K        | 220                   | 3 15/16             | 200    | 100.01      | 34      | 50      | 123.85 | 6.4  | 139.7          | 31.75          | 125.41         | 8.939             | 19.69 | 126900                            | 170000                                      |
|                         |               |                       |                     | 7.874  | 3 15/16     | 1.3386  | 1 31/32 | 4.876  | 1/4  | 5 1/2          | 1 1/4          | 4 15/16        | 28500             | 38000 |                                   |                                             |

<sup>(1)</sup> Bore tolerance: 1" - 2 3/16", nominal to .013 mm, +.0005".

2 1/4" - 3 3/16", nominal to .015 mm, +.0006".

3 1/4" - 3 15/16", nominal to .018 mm, +.0007".

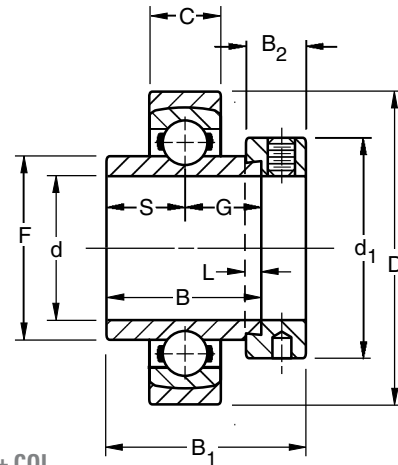
<sup>(2)</sup> For applications where thrust load exceeds 60% of radial load, consult your Timken representative.



### SMN-S HEAVY SERIES

- Construction permits inner assembly to swivel in the outer aligning ring.
- Unrestricted self-alignment is achieved, allowing the inner ring to become square and true with the shaft and assembly.
- The external S-Ring is uniquely ground and closely matched to its respective outer bearing ring so that the S-Ring of one bearing will not fit the outer ring of another bearing.
- Has the basic 300 Series load capacities.
- Bearings are not prelubricated.

**Suggested shaft tolerances:** 1 3/16" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".



**TO ORDER, SPECIFY BEARING NUMBER FOLLOWED BY "+ COL". Example: SMN103KS + COL.**

| Bearing Number             | Collar Number | Basic Outer Ring Size | Bore <sup>(1)</sup> d |         | O.D. D  |        | Ring Widths |         | S     | G     | F       | L       | d <sub>1</sub> | B <sub>2</sub> | B <sub>1</sub> | Brg. & Collar Wt. |       | Static Load Rating C <sub>0</sub> | Extended Dynamic Load Rating C <sub>e</sub> |
|----------------------------|---------------|-----------------------|-----------------------|---------|---------|--------|-------------|---------|-------|-------|---------|---------|----------------|----------------|----------------|-------------------|-------|-----------------------------------|---------------------------------------------|
|                            |               |                       | in.                   | mm in.  | mm in.  | mm in. | B Inner     | C Outer |       |       |         |         |                |                |                | kg                | lbs.  |                                   |                                             |
| SMN103KS                   | SN103K        | 306                   | 1 3/16                | 80      | 36.51   | 19     |             |         | 17.5  | 19.1  | 43.23   | 4.0     | 49.2           | 17.5           | 50.0           | 0.654             | 1.44  | 15600                             | 33500                                       |
|                            |               |                       |                       | 3.1496  | 1 7/16  | 0.748  | 11/16       | 3/4     | 1.702 | 5/32  | 1 15/16 | 11/16   | 1 31/32        |                |                |                   |       |                                   | 3550                                        |
| SMN107KS                   | SN107K        | 307                   | 1 7/16                | 88      | 38.10   | 21     |             |         | 18.30 | 19.8  | 48.95   | 4.0     | 55.6           | 17.5           | 51.6           | 0.849             | 1.87  | 21200                             | 40500                                       |
|                            |               |                       |                       | 3.4646  | 1 1/2   | 0.8268 | 23/32       | 25/32   | 1.927 | 5/32  | 2 3/16  | 11/16   | 2 1/32         |                |                |                   |       | 4750                              | 9150                                        |
| SMN108KS                   | SN108KT       | 308                   | 1 1/2                 | 100     | 41.28   | 23     |             |         | 19.80 | 21.4  | 55.5    | 4.8     | 63.5           | 20.6           | 57.2           | 1.344             | 2.96  | 26100                             | 49000                                       |
|                            |               |                       |                       | 3.9370  | 1 5/8   | 0.9055 | 25/32       | 27/32   | 2.185 | 3/16  | 2 1/2   | 13/16   | 2 1/4          |                |                |                   | 5850  | 11000                             |                                             |
| SMN111KS                   | SN111K        | 309                   | 1 11/16               | 110     | 42.86   | 25     |             |         | 19.80 | 23.0  | 62.05   | 4.8     | 69.9           | 20.6           | 58.7           | 1.693             | 3.73  | 31600                             | 58500                                       |
|                            |               |                       |                       | 4.3307  | 1 11/16 | 0.9843 | 25/32       | 29/32   | 2.443 | 3/16  | 2 3/4   | 13/16   | 2 5/16         |                |                |                   | 7100  | 13200                             |                                             |
| SMN115KS                   | SN115K        | 310                   | 1 15/16               | 120     | 49.21   | 27     |             |         | 24.6  | 24.6  | 68.78   | 4.8     | 76.2           | 22.2           | 66.7           | 2.147             | 4.73  | 37900                             | 68000                                       |
|                            |               |                       |                       | 4.7244  | 1 15/16 | 1.063  | 31/32       | 31/32   | 2.708 | 3/16  | 3       | 7/8     | 2 5/8          |                |                |                   | 8500  | 15300                             |                                             |
| SMN203KS                   | SN203K        | 311                   | 2 3/16                | 130     | 55.56   | 29     |             |         | 27.8  | 27.8  | 75.01   | 4.8     | 82.6           | 22.2           | 73.00          | 2.769             | 6.1   | 43600                             | 80000                                       |
|                            |               |                       |                       | 5.1181  | 2 3/16  | 1.1417 | 1 3/32      | 1 3/32  | 2.953 | 3/16  | 3 1/4   | 7/8     | 2 7/8          |                |                |                   | 9800  | 18000                             |                                             |
| SMN207KS                   | SN207K        | 312                   | 2 7/16                | 145     | 61.91   | 31     |             |         | 31    | 31    | 81.53   | 6.4     | 88.9           | 23.8           | 79.4           | 3.405             | 7.5   | 51700                             | 90000                                       |
|                            |               |                       |                       | 5.7087  | 2 7/16  | 1.2205 | 1 7/32      | 1 7/32  | 3.21  | 1/4   | 3 1/2   | 15/16   | 3 1/8          |                |                |                   | 11600 | 20400                             |                                             |
| SMN211KS                   | SO211K        | 314                   | 2 11/16               | 165     | 68.26   | 35     |             |         | 34.10 | 34.1  | 94.7    | 6.4     | 101.6          | 27.0           | 92.1           | 5.185             | 11.42 | 66800                             | 116000                                      |
|                            |               |                       |                       | 6.4961  | 2 11/16 | 1.378  | 1 11/32     | 1 11/32 | 3.731 | 1/4   | 4       | 1 1/16  | 3 5/8          |                |                |                   | 15000 | 26000                             |                                             |
| SMN215KS                   | SN215K        | 315                   | 2 15/16               | 175     | 74.61   | 37     |             |         | 37.3  | 37.3  | 100.38  | 6.4     | 112.7          | 31.8           | 100.0          | 6.456             | 14.22 | 75700                             | 125000                                      |
|                            |               |                       |                       | 6.8898  | 2 15/16 | 1.4567 | 1 15/32     | 1 15/32 | 3.952 | 1/4   | 4 7/16  | 1 1/4   | 3 15/16        |                |                |                   | 17000 | 28500                             |                                             |
| SMN303KS                   | SN303K        | 316                   | 3 3/16                | 190     | 80.96   | 39     |             |         | 40.5  | 40.5  | 106.91  | 6.4     | 119.10         | 31.8           | 106.4          | 8.04              | 17.71 | 86000                             | 137000                                      |
|                            |               |                       |                       | 7.4803  | 3 3/16  | 1.5354 | 1 19/32     | 1 19/32 | 4.209 | 1/4   | 4 11/16 | 1 1/4   | 4 3/16         |                |                |                   | 19300 | 30500                             |                                             |
| SMN307KS                   | SN307K        | 318                   | 3 7/16                | 210     | 87.31   | 43     |             |         | 43.7  | 43.7  | 120.12  | 7.9     | 133.4          | 36.5           | 115.9          | 1.79              | 25.97 | 106900                            | 156000                                      |
|                            |               |                       |                       | 8.2677  | 3 7/16  | 1.6929 | 1 23/32     | 1 23/32 | 4.729 | 5/16  | 5 1/4   | 1 7/16  | 4 9/16         |                |                |                   | 24000 | 35500                             |                                             |
| SM0311WS-BR                | SO311K        | 319                   | 3 11/16               | 220     | 93.66   | 45     |             |         | 38.89 | 54.77 | 126.53  | 7.94    | 139.7          | 36.51          | 122.24         | 16.3              | 33.0  | 166000                            | 224000                                      |
|                            |               |                       |                       | 8.6608  | 3 11/16 | 1.768  | 1 17/32     | 2 5/32  | 4.982 | 5/16  | 5 1/2   | 1 7/16  | 4 13/16        |                |                |                   | 37500 | 50000                             |                                             |
| SMN315KS                   | SN315K        | 320                   | 3 15/16               | 235     | 100.01  | 47     |             |         | 50    | 50    | 134.77  | 7.9     | 146.0          | 36.5           | 128.6          | 15.822            | 34.85 | 140300                            | 193000                                      |
|                            |               |                       |                       | 9.252   | 3 15/16 | 1.8504 | 1 31/32     | 1 31/32 | 5.306 | 5/16  | 5 3/4   | 1 7/16  | 5 1/16         |                |                |                   | 31500 | 43000                             |                                             |
| SMN407WS-BR <sup>(2)</sup> | SN407K        | 322                   | 4 7/16                | 265     | 106.36  | 50     |             |         | 49.20 | 57.2  | 150.37  | 7.9     | 168.3          | 42.9           | 141.3          | 21.465            | 47.28 | 245000                            | 280000                                      |
|                            |               |                       |                       | 10.4331 | 4 3/16  | 1.9685 | 1 15/16     | 2 1/4   | 5.92  | 5/16  | 6 1/2   | 1 11/16 | 5 9/16         |                |                |                   | 55000 | 63000                             |                                             |
| SMN415WS-BR <sup>(2)</sup> | SN415K        | 326                   | 4 15/16               | 300     | 115.89  | 59     |             |         | 54.0  | 61.9  | 176.56  | 7.9     | 206.4          | 42.9           | 150.8          | 33.773            | 74.39 | 327400                            | 345000                                      |
|                            |               |                       |                       | 11.811  | 4 9/16  | 2.3228 | 2 1/8       | 2 7/16  | 6.951 | 5/16  | 8 1/8   | 1 11/16 | 5 15/16        |                |                |                   | 73500 | 78000                             |                                             |

<sup>(1)</sup> Bore tolerance: 1 5/16" - 2 3/16", nominal to .013 mm, +.0005".  
2 1/4" - 3 3/16", nominal to .015 mm, +.0006".  
3 1/4" - 4 3/16", nominal to .018 mm, +.0007".  
4 7/16" - 4 15/16", nominal to .020 mm, +.0008".

<sup>(2)</sup> For applications where thrust load exceeds 60% of radial load, consult your Timken representative.





## **BALL BEARINGS**



### **NOTES**

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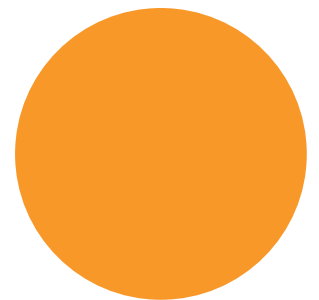
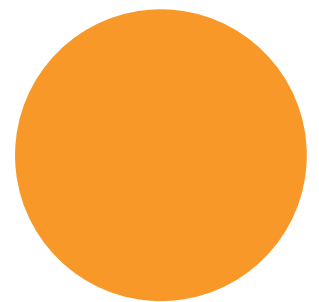
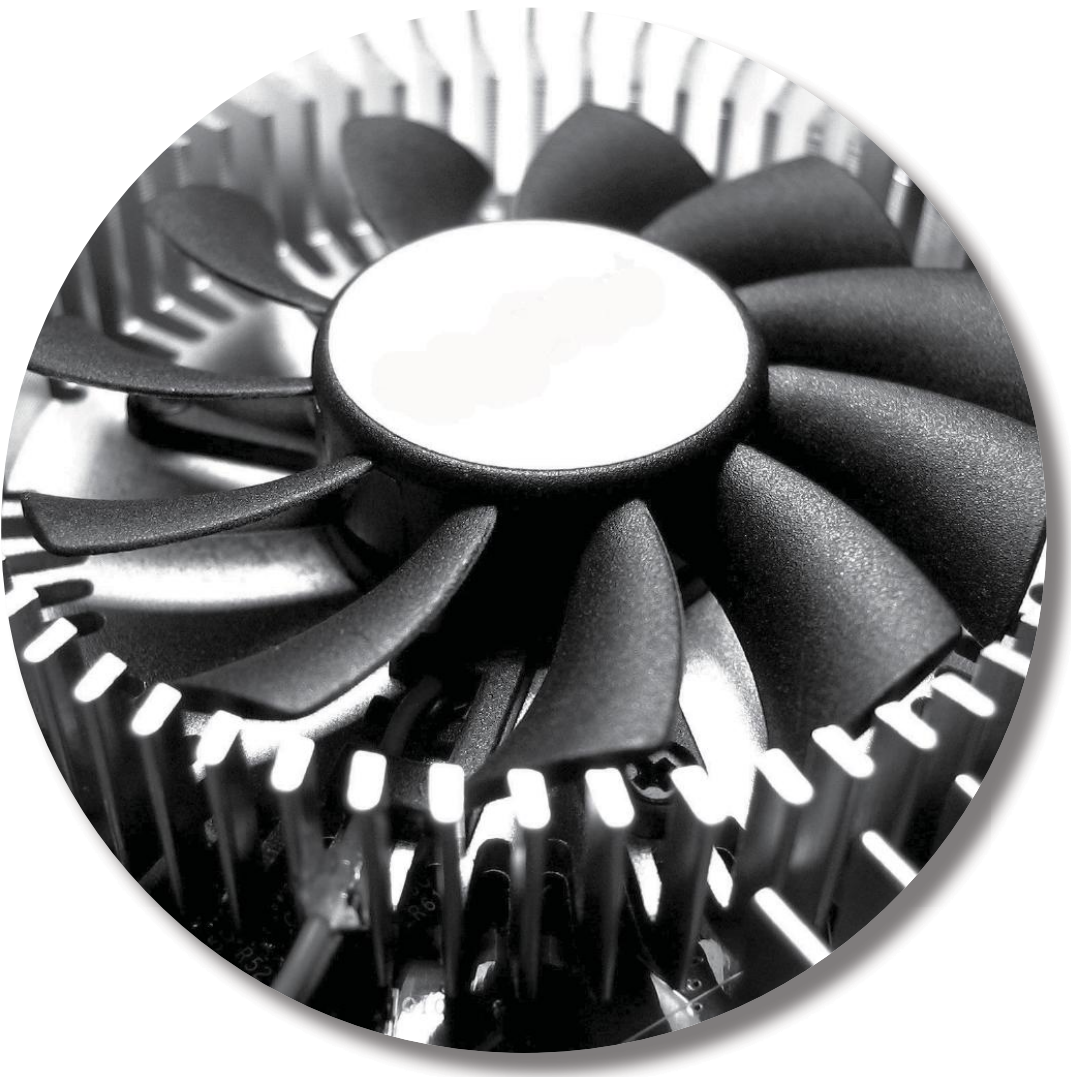




## HOUSED UNITS

**Overview:** Timken housed units are available in a wide variety of types and sizes to accommodate a complete range of operating conditions.

- **Sizes:** 12.7 mm - 75.4 mm shaft size (0.50 in. - 2.968 in.).
- **Markets:** Agriculture, fans and blowers, food processing and conveyors.
- **Features:** Most popular design features cast iron housing. Other material options include malleable iron, polymer, pressed-steel or rubber.
- **Benefits:** Combines bearing, housing, seal and locking system into one device for easy installation. Operates even when the shaft is not perfectly aligned with the mounting surface.

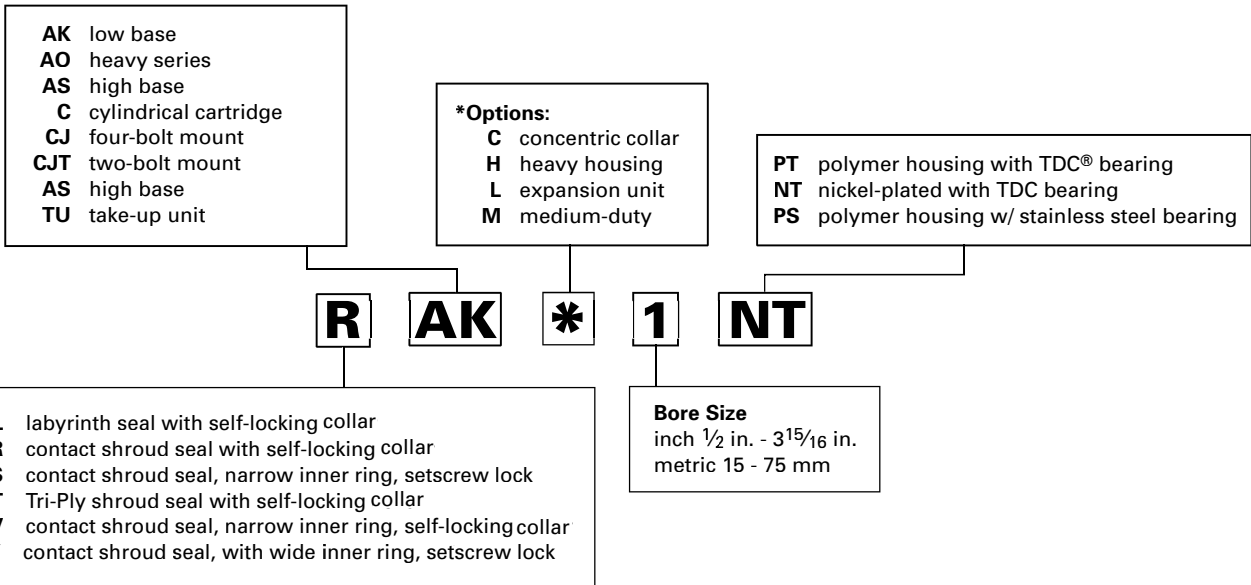


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### Wide Inner Ring Ball Bearings Housed Units



# Wide Inner Ring Ball Bearings Housed Units

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## BALL BEARINGS

### INTRODUCTION

Ball bearing housed units are available in a wide variety of types and sizes to accommodate a complete range of operating conditions.

These units generally have cast iron housings and are designed for mounting on straight shafts with a slip fit. The self-locking collar and the setscrew inner bearing designs provide ease in mounting. Bolt holes in housings take standard bolts for assembling these units to machinery frames. Several series are also available with the concentric locking collar.

Most units are made with a self-aligning feature, and it is unnecessary for the user to refine the design in excess of practical limits. Units incorporating prelubricated wide inner ring bearings may be furnished without grease fittings.

Several basic types of housed units are available: pillow blocks, flanged cartridges, flangette units, cylindrical cartridges and take-up units. The type required is determined by its application and mounting requirements. Within the basic type selected, variations allow for load factors, shaft sizes, mounting surface dimensions, base to shaft centerline heights and lubrication requirements.

### PILLOW BLOCKS

Pillow blocks, the most commonly used type of mounted units, are designed to provide shaft support where the mounting surface is parallel to the shaft axis. The bolt holes are usually slotted for adjustment during mounting.

Pillow blocks are supplied in a variety of configurations. Pressed steel and rubber pillow blocks are also available for light-duty applications.

### FLANGED CARTRIDGES

Flanged cartridges are used where a shaft passes through the machine frame at a right angle. A four-bolt mounting is the most common, however, where the mounting area is restricted, three- and two-bolt versions are available. A piloted flanged cartridge provides additional mounting accuracy and support.

Flanged cartridges are supplied in both standard and heavy-duty series. Iron and rubber flanged cartridges are also available.

A complete line of flangette units, or pressed-steel flanged cartridges, provides an economical solution to light-duty applications. Two-, three- and four-bolt mountings are available along with a relubricable version.

### CYLINDRICAL CARTRIDGES

Cylindrical cartridges, like flanged cartridges, provide shaft support where the shaft axis is perpendicular to and passing through a machined housing which is generally very thick. The outside diameter of the cylindrical cartridges permits mounting with a press fit into a straight, through-bored housing.

Cylindrical cartridges have a machined spherical bearing seat to provide initial shaft alignment in standard-duty applications. Synthetic, conductive rubber cylindrical cartridges are available for applications where low-cost, light-duty, low-noise operation is essential.

### TAKE-UP UNITS

Take-up units are used where shaft adjustment and belt tightening devices are required, such as conveyor applications. Frames for take-up units provide for either side or top mounting.

Take-up units are available in cast iron for standard-duty and pressed steel for economical, light-duty applications.



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## TIMKEN SELF-LOCKING COLLAR INSTALLATION

Most Timken housed units come equipped with the self-locking collar to facilitate the mounting of wide inner ring bearings. This self-locking collar eliminates the need for locknuts, washers, shoulders, sleeves, and adapters.

The locking collar has a counterbored recess made purposely eccentric to the bore. The collar recess and the end of the bearing inner ring with which it engages are both machined so that they act as mating cams when on the shaft.

When the collar is engaged to the inner ring, it grips the shaft tightly with a positive binding action that increases with use. No adjustments of any kind are necessary.



1. Slip the shaft through the pillow block or other Timken housed unit incorporating the wide inner ring bearing. Be certain the bearing is aligned in position along the shaft to eliminate any possibility of cramping loads.



2. Fasten the unit securely to the base using the proper bolt size.



3. Place the self-locking collar on the shaft with its cam adjacent to the cam on the end of the bearing's inner ring. The eccentric recessed cam will slide over and engage the corresponding cam on the bearing inner ring. Turn the collar in the direction of shaft rotation.



4. Using a lightweight hammer and a drift pin inserted in the drift pin hole strike in the direction of shaft rotation to positively engage the collar. The wide inner ring is now locked to the shaft.



5. As a final step, fully tighten the setscrew. It exerts a wedging action to hold the collar always in the engaged position, even under shock load. This design will operate effectively after the cams are tightly locked in most cases with no setscrews at all.

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## CONCENTRIC COLLAR

For simplified installation of Timken housed units equipped with concentric collar bearings, the collar is normally assembled to the wide inner ring for shipment. Slip the complete unit on the shaft following steps 1 and 2 described for the self-locking collar procedure, and tighten both setscrews.

## TIMKEN SETSCREW LOCKING BEARING

Steps 1 and 2 can be repeated from the self-locking collar installation above. To lock the setscrew bearing, simply tighten each inner ring setscrew to the suggested torque listed by shaft size. See chart below.

| Shaft Size (in.) | mm       | SUGGESTED      |            |
|------------------|----------|----------------|------------|
|                  |          | Torque in lbs. | (n • m)    |
| 1/2 - 11/16      | 17 mm    | 35 in lbs.     | 4 (n • m)  |
| 3/4 - 1          | 20-25 mm | 80 in lbs.     | 9 (n • m)  |
| 1 1/16 - 1 3/4   | 30-45 mm | 155 in lbs.    | 18 (n • m) |
| 1 13/16 - 2 3/16 | 50-55 mm | 275 in lbs.    | 31 (n • m) |

It may be necessary to rotate the shaft to provide an easy access of the setscrew wrench to the setscrews. To disassemble, loosen the setscrews.





## BALL BEARINGS

### TIMKEN SURVIVOR™ PT SERIES

Timken's SURVIVOR™ Series housed units have been created to handle stringent food handling requirements and serve in highly corrosive applications. All assembly components have been carefully selected to comply with federal food processing requirements without compromising bearing performance needs.

The patented SURVIVOR PT polymer housed units have been tested to withstand a wide range of highly corrosive chemicals commonly found in food and beverage processing industries. These units are dimensionally stable under load and can operate in continuous temperatures up to 250° F (brief exposure up to 350° F) and the finish will not scrape or flake off during use.

The bearing inserts, given the proprietary Timken thin dense chrome coating, are combined with stainless steel locking collars to provide superior corrosion protection. This coating is a thin, dense chrome coating that will not crack or peel under known application conditions. The bearing housings are available as high-base and low-base pillow blocks, and 2-bolt and 4-bolt flanged cartridges for popular shaft sizes of 3/4 in. through 1 1/2 in. and 20 mm through 40 mm diameters. Bearing inserts are available with the self-locking collar or the setscrew locking device. The SURVIVOR PT assemblies are dimensionally interchangeable with the current line of Timken cast iron housed units.

The SURVIVOR Series provides extraordinary corrosion resistance for food and beverage industries, materials handling operations, dairy and refrigeration applications, as well as HVAC, chemical, maritime and other highly corrosive environments.

All materials used in the SURVIVOR assemblies, including the grease, are approved for USDA and FDA compliant industries.

#### ORDERING INFORMATION

To order complete SURVIVOR polymer assemblies, simply add the "PT" suffix to the current cast iron housed unit designations.

Example:

**YCJT 1 PT or RAK 3/4 PT**

Refer to the corresponding cast iron housing design for dimensional data. Consult your Timken sales representative or an authorized distributor for shaft size availability.

SURVIVOR inserts can be ordered using Timken's standard part number for wide inner ring bearings with a "TDCF" suffix. Example:

**GY1100KRRB TDCF or G1100KRRB + COL TDCF**



#### PT SERIES

| COMPONENT            | MATERIAL         |
|----------------------|------------------|
| Balls                | Stainless Steel  |
| Ball Retainer        | Nylon            |
| Collar               | Stainless Steel  |
| Crush Bushing        | Stainless Steel  |
| Grease               | FDA Approved     |
| Housing              | Polymer          |
| Grease Fitting       | Stainless Steel  |
| Grease Fitting Cover | Nylon            |
| Rings                | TDC plated       |
| Seals                | Synthetic Rubber |
| Seal Caps            | Stainless Steel  |
| Setscrew             | Stainless Steel  |

## TIMKEN SURVIVOR™ NT SERIES

Timken SURVIVOR NT Series is designed to stand up to the demands of the food handling industries and for use in highly corrosive applications. The NT Series provides outstanding protection in combination with thin dense chrome coating ball bearing inserts, collar and the electroless nickel-plated housing.

The SURVIVOR NT Series units are available as high-base and low-base pillow blocks, and 2-bolt and 4-bolt flanged cartridges for popular shaft sizes of 1/2 in. through 2 15/16 in. (and selected metric diameters). Timken also produces a take-up unit in the SURVIVOR NT Series in limited shaft sizes (RTU-NT). The bearing inserts are available with self-locking collars. The SURVIVOR NT Series is dimensionally interchangeable with the current line of Timken cast iron housed units.

The SURVIVOR NT Series provides extraordinary corrosion resistance in a durable package suitable for food and beverage industries, materials handling operations, dairy and refrigeration applications, as well as HVAC, chemical, maritime and other highly corrosive environments.

All materials used in the SURVIVOR assemblies, including the grease, are approved for USDA and FDA compliant industries.

### ORDERING INFORMATION

To order complete SURVIVOR nickel-plated assemblies, simply add the "NT" suffix to the cast iron housed unit designations. Example:

**RCJT 1 NT or RAK 3/4 NT**

Refer to the corresponding cast iron housing design for dimensional data. Consult your Timken sales representative or an authorized distributor for shaft size availability.

SURVIVOR inserts can be ordered using Timken's standard part number for wide inner ring bearings with a "TDCF" suffix. Example:

**G1100KRRB + COL TDCF**

| NT SERIES               |                  |
|-------------------------|------------------|
| COMPONENT               | MATERIAL         |
| Balls                   | Stainless Steel  |
| Ball Retainer           | Nylon            |
| Collar                  | Stainless Steel  |
| Rings                   | TDC plated       |
| Grease                  | FDA Approved     |
| Housing Finish          | Nickel Plating   |
| Grease Fitting          | Stainless Steel  |
| Grease Fitting Cover    | Nylon            |
| Seals                   | Synthetic Rubber |
| Seal Caps               | Stainless Steel  |
| Setscrew <sup>(1)</sup> | Stainless Steel  |

<sup>(1)</sup> Standard SURVIVOR NT units are only available in the "R" series, self-locking collar types. Setscrew lock series ("Y") units are available for minimum quantity orders.



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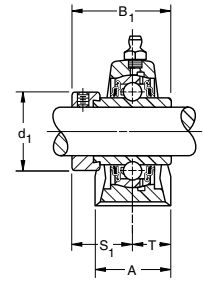
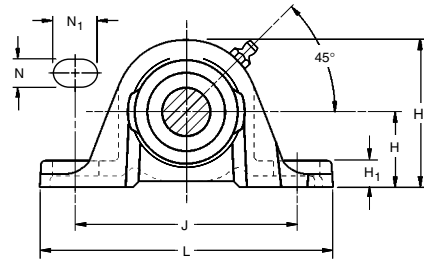


# BALL BEARINGS

## RAK, TAK, LAK INDUSTRIAL SERIES

Timken RAK, TAK and LAK pillow blocks are suggested for industrial applications where normal loads are encountered.

- A compact, one-piece housing that can be mounted in any position.
- Pillow blocks self-align at mounting with the spherical outside diameter of the bearing fitting into corresponding spherical housing seat.
- Units are prelubricated and ready for immediate installation.
- Grease fitting is provided for relubrication.
- Self-locking collars are supplied with all units.
- RAK pillow block is equipped with G-KRRB (R-Seal) wide inner ring bearings, the TAK with G-KPPB (Tri-Ply Seal) wide inner ring bearings and the LAK with the G-KLLB (Mechani-Seal) wide inner ring bearings.
- **Contact a Timken representative to discuss highly corrosive applications (food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**



**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.013$  mm,  $-.0005$ ";  
 $2$ " -  $2 \frac{15}{16}$ ", nominal to  $-.025$  mm,  $-.0010$ ".

### BEARING DATA

| Unit       | Bearing Number | Dimensions and Load Ratings |
|------------|----------------|-----------------------------|
| <b>RAK</b> | <b>G.KRRB</b>  | <b>Page D54</b>             |
| <b>TAK</b> | <b>G.KPPB</b>  | <b>Page D65</b>             |
| <b>LAK</b> | <b>G.KLLB</b>  | <b>Page D62</b>             |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RAK  $1 \frac{7}{16}$ ". POPULAR SIZES ARE IN BOLD.**

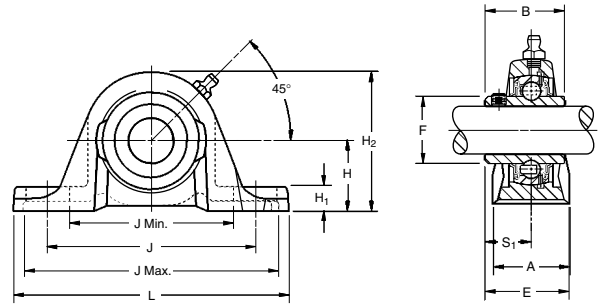
| Unit                 | Shaft Dia.                          | H                                   | H <sub>2</sub>                      | B <sub>1</sub>                      | J                                   | L                                   | A                                   | H <sub>1</sub>                     | N                                 | N <sub>1</sub>                     | d <sub>1</sub>                      | S <sub>1</sub>                      | T                                  | Bolt Size                       | Bearing Number <sup>(1)</sup> |           | Collar Number | Housing Number | Unit Wt. |
|----------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|---------------------------------|-------------------------------|-----------|---------------|----------------|----------|
|                      |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | RAK                           | (TAK/LAK) |               |                |          |
| RAK, LAK             | $\frac{1}{2}$                       | 26.99                               | 53.2                                | 37.3                                | 92.1                                | 123.8                               | 30.2                                | 8.7                                | 11.1                              | 22.2                               | 28.6                                | 23.4                                | 15.1                               | 10                              | G1008KRRB (KLLB)              | S1008K    | T-40238       | 0.454          |          |
| RAK, LAK             | $\frac{3}{8}$                       | <b>1 <math>\frac{1}{16}</math></b>  | <b>2 <math>\frac{3}{32}</math></b>  | <b>1 <math>\frac{15}{32}</math></b> | <b>3 <math>\frac{5}{8}</math></b>   | <b>4 <math>\frac{7}{8}</math></b>   | <b>1 <math>\frac{3}{16}</math></b>  | <b>1 <math>\frac{1}{32}</math></b> | <b><math>\frac{7}{16}</math></b>  | <b><math>\frac{7}{8}</math></b>    | <b>1 <math>\frac{1}{8}</math></b>   | <b><math>\frac{59}{64}</math></b>   | <b><math>\frac{19}{32}</math></b>  | <b><math>\frac{3}{8}</math></b> | G1010KRRB (KLLB)              | S1010K    | (T-30595)     | 1              |          |
| RAK                  | $\frac{11}{16}$                     |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1011KRRB                     | S1011K    |               |                |          |
| RAK                  | 17                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE17KRRB                      | SE17K     |               |                |          |
| <b>RAK, LAK</b>      | <b><math>\frac{3}{4}</math></b>     | 31.75                               | 62.7                                | 43.7                                | 96                                  | 127                                 | 31.8                                | 11.9                               | 11.1                              | 19.8                               | 33.3                                | 26.6                                | 15.9                               | 10                              | G1012KRRB (KLLB)              | S1012K    | T-40239       | 0.635          |          |
| RAK                  | 20                                  | <b>1 <math>\frac{1}{4}</math></b>   | <b>2 <math>\frac{15}{32}</math></b> | <b>1 <math>\frac{23}{32}</math></b> | <b>3 <math>\frac{25}{32}</math></b> | <b>5</b>                            | <b>1 <math>\frac{1}{4}</math></b>   | <b><math>\frac{15}{32}</math></b>  | <b><math>\frac{7}{16}</math></b>  | <b><math>\frac{25}{32}</math></b>  | <b>1 <math>\frac{5}{16}</math></b>  | <b><math>\frac{13}{64}</math></b>   | <b><math>\frac{5}{8}</math></b>    | <b><math>\frac{3}{8}</math></b> | GE20KRRB                      | SE20K     | (T-30555)     | 1.4            |          |
| RAK, TAK             | $\frac{7}{8}$                       |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1014KRRB (KPPB3)             | S1014K    |               |                |          |
| RAK, TAK, LAK        | $\frac{15}{16}$                     | 33.34                               | 68.3                                | 44.4                                | 104.8                               | 139.7                               | 35.7                                | 11.9                               | 11.1                              | 20.6                               | 38.1                                | 27                                  | 17.9                               | 10                              | G1015KRRB (KPPB3/KLLB)        | S1015K    | T-30365       | 0.803          |          |
| <b>RAK, TAK, LAK</b> | <b>1</b>                            | <b><math>\frac{1}{8}</math></b>     | <b><math>2 \frac{11}{16}</math></b> | <b><math>\frac{1}{4}</math></b>     | <b><math>4 \frac{1}{8}</math></b>   | <b><math>5 \frac{1}{2}</math></b>   | <b><math>1 \frac{13}{32}</math></b> | <b><math>\frac{15}{32}</math></b>  | <b><math>\frac{7}{16}</math></b>  | <b><math>\frac{13}{16}</math></b>  | <b><math>1 \frac{1}{2}</math></b>   | <b><math>1 \frac{1}{16}</math></b>  | <b><math>\frac{45}{64}</math></b>  | <b><math>\frac{3}{8}</math></b> | G1100KRRB (KPPB3/KLLB)        | S1100K    |               | 1.77           |          |
| RAK, TAK             | 25                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE25KRRB (KPPB3)              | SE25K     |               |                |          |
| RAK, TAK             | $1 \frac{1}{16}$                    |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1101KRRB (KPPB3)             | S1101K    |               |                |          |
| RAK, TAK, LAK        | $\frac{1}{8}$                       | 39.69                               | 80.2                                | 48.4                                | 117.5                               | 157.2                               | 39.7                                | 13.5                               | 14.3                              | 23.8                               | 44.1                                | 30.2                                | 19.9                               | 12                              | G1102KRRB (KPPB3/KLLB)        | S1102K    | T-40241       | 1.297          |          |
| RAK, TAK, LAK        | $\frac{1}{4}$                       | <b><math>\frac{1}{8}</math></b>     | <b><math>3 \frac{5}{32}</math></b>  | <b><math>1 \frac{23}{32}</math></b> | <b><math>4 \frac{5}{8}</math></b>   | <b><math>6 \frac{3}{16}</math></b>  | <b><math>1 \frac{9}{16}</math></b>  | <b><math>\frac{17}{32}</math></b>  | <b><math>\frac{9}{16}</math></b>  | <b><math>\frac{15}{16}</math></b>  | <b><math>1 \frac{47}{64}</math></b> | <b><math>\frac{1}{8}</math></b>     | <b><math>\frac{25}{32}</math></b>  | <b><math>\frac{1}{2}</math></b> | G1103KRRB (KPPB3/KLLB)        | S1103K    | (T-30300)     | 2.86           |          |
| RAK, TAK             | 30                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE30KRRB (KPPB3)              | SE30K     |               |                |          |
| RAK, TAK, LAK        | $1 \frac{1}{4}$                     |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1104KRRB (KPPB2/KLLB)        | S1104K    |               |                |          |
| RAK, TAK             | $1 \frac{5}{16}$                    | 46.04                               | 92.1                                | 51.2                                | 130.2                               | 166.7                               | 45.2                                | 16.7                               | 14.3                              | 24.6                               | 54                                  | 32.5                                | 22.7                               | 12                              | G1105KRRB (KPPB2)             | S1105K    | T-40242       | 1.674          |          |
| RAK, TAK             | $\frac{3}{8}$                       | <b><math>1 \frac{3}{16}</math></b>  | <b><math>\frac{3}{8}</math></b>     | <b><math>2 \frac{1}{64}</math></b>  | <b><math>5 \frac{1}{8}</math></b>   | <b><math>6 \frac{9}{16}</math></b>  | <b><math>1 \frac{25}{32}</math></b> | <b><math>\frac{21}{32}</math></b>  | <b><math>\frac{9}{16}</math></b>  | <b><math>\frac{31}{32}</math></b>  | <b><math>2 \frac{1}{8}</math></b>   | <b><math>\frac{19}{32}</math></b>   | <b><math>\frac{57}{64}</math></b>  | <b><math>\frac{1}{2}</math></b> | G1106KRRB (KPPB2)             | S1106K    | (T-30410)     | 3.69           |          |
| <b>RAK, TAK, LAK</b> | <b><math>1 \frac{7}{16}</math></b>  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1107KRRB (KPPB2/KLLB)        | S1107K    |               |                |          |
| RAK, TAK             | 35                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE35KRRB (KPPB2)              | SE35K     |               |                |          |
| <b>RAK, TAK, LAK</b> | <b><math>1 \frac{1}{2}</math></b>   | 49.21                               | 100                                 | 56.4                                | 136.5                               | 179.4                               | 47.6                                | 19                                 | 14.3                              | 26.2                               | 60.3                                | 34.9                                | 23.8                               | 12                              | G1108KRRB (KPPB3/KLLB)        | S1108KT   | T-40243       | 2.15           |          |
| RAK, TAK             | $\frac{1}{2}$                       | <b><math>1 \frac{15}{16}</math></b> | <b><math>3 \frac{15}{16}</math></b> | <b><math>2 \frac{7}{32}</math></b>  | <b><math>5 \frac{3}{8}</math></b>   | <b><math>7 \frac{1}{16}</math></b>  | <b><math>1 \frac{7}{8}</math></b>   | <b><math>\frac{3}{4}</math></b>    | <b><math>\frac{9}{16}</math></b>  | <b><math>1 \frac{1}{32}</math></b> | <b><math>2 \frac{3}{8}</math></b>   | <b><math>1 \frac{3}{8}</math></b>   | <b><math>\frac{15}{16}</math></b>  | <b><math>\frac{1}{2}</math></b> | G1109KRRB (KPPB3)             | S1109KT   | (T-30484)     | 4.74           |          |
| RAK, TAK             | 40                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE40KRRB (KPPB3)              | SE40K     |               |                |          |
| RAK, TAK             | $\frac{5}{8}$                       |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1110KRRB (KPPB4)             | S1110K    |               |                |          |
| <b>RAK, TAK, LAK</b> | <b><math>1 \frac{11}{16}</math></b> | 52.39                               | 104.8                               | 56.4                                | 149.2                               | 191.3                               | 50.8                                | 17.5                               | 14.3                              | 28.6                               | 63.5                                | 34.9                                | 25.4                               | 12                              | G1111KRRB (KPPB4/KLLB)        | S1111K    | T-40244       | 2.409          |          |
| RAK, TAK, LAK        | $\frac{3}{4}$                       | <b><math>2 \frac{1}{16}</math></b>  | <b><math>4 \frac{1}{8}</math></b>   | <b><math>2 \frac{7}{32}</math></b>  | <b><math>5 \frac{7}{8}</math></b>   | <b><math>7 \frac{17}{32}</math></b> | <b>2</b>                            | <b><math>\frac{11}{16}</math></b>  | <b><math>\frac{9}{16}</math></b>  | <b><math>1 \frac{1}{8}</math></b>  | <b><math>2 \frac{1}{2}</math></b>   | <b><math>1 \frac{3}{8}</math></b>   | <b>1</b>                           | <b><math>\frac{1}{2}</math></b> | G1112KRRB (KPPB4/KLLB)        | S1112K    | (T-30682)     | 5.31           |          |
| RAK, TAK             | 45                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE45KRRB (KPPB4)              | SE45K     |               |                |          |
| RAK, TAK             | $\frac{1}{2}$                       | 55.56                               | 112.7                               | 62.7                                | 158                                 | 200                                 | 55.6                                | 17.5                               | 17.5                              | 23.8                               | 69.8                                | 38.1                                | 27.8                               | 16                              | G1114KRRB (KPPB3)             | S1114K    | T-40245       | 3.003          |          |
| <b>RAK, TAK, LAK</b> | <b><math>1 \frac{15}{16}</math></b> | <b><math>\frac{3}{16}</math></b>    | <b><math>4 \frac{7}{16}</math></b>  | <b><math>2 \frac{15}{32}</math></b> | <b><math>6 \frac{7}{32}</math></b>  | <b><math>7 \frac{7}{8}</math></b>   | <b><math>2 \frac{3}{16}</math></b>  | <b><math>\frac{11}{16}</math></b>  | <b><math>\frac{11}{16}</math></b> | <b><math>\frac{15}{16}</math></b>  | <b><math>2 \frac{3}{4}</math></b>   | <b><math>1 \frac{1}{2}</math></b>   | <b><math>\frac{1}{3}</math></b>    | <b><math>\frac{5}{8}</math></b> | G1115KRRB (KPPB3/KLLB)        | S1115K    | (T-30706)     | 6.62           |          |
| RAK, TAK             | 50                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE50KRRB (KPPB3)              | SE50K     |               |                |          |
| RAK, TAK             | 2                                   |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1200KRRB (KPPB4)             | S1200K    | T-40246       | 3.901          |          |
| RAK, TAK             | $2 \frac{1}{8}$                     | 61.91                               | 124.6                               | 71.4                                | 176.2                               | 222.3                               | 58.7                                | 19                                 | 18.3                              | 29.4                               | 76.2                                | 43.7                                | 29.4                               | 16                              | G1202KRRB (KPPB4)             | S1202K    | (T-30738)     | 8.6            |          |
| <b>RAK, TAK, LAK</b> | <b><math>2 \frac{3}{16}</math></b>  | <b><math>\frac{2}{16}</math></b>    | <b><math>4 \frac{29}{32}</math></b> | <b><math>2 \frac{13}{16}</math></b> | <b><math>6 \frac{15}{16}</math></b> | <b><math>8 \frac{3}{4}</math></b>   | <b><math>2 \frac{5}{16}</math></b>  | <b><math>\frac{3}{4}</math></b>    | <b><math>\frac{23}{32}</math></b> | <b><math>\frac{1}{32}</math></b>   | <b>3</b>                            | <b><math>1 \frac{29}{32}</math></b> | <b><math>\frac{1}{2}</math></b>    | <b><math>\frac{5}{8}</math></b> | G1203KRRB (KPPB4/KLLB)        | S1203K    |               |                |          |
| RAK, TAK             | 55                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE55KRRB (KPPB4)              | SE55K     |               |                |          |
| RAK                  | $2 \frac{1}{4}$                     |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | G1204KRRB                     | S1204K    | T-40247       | 5.511          |          |
| RAK                  | $2 \frac{3}{8}$                     | 68.26                               | 137.3                               | 77.8                                | 188.1                               | 239.7                               | 60.3                                | 22.2                               | 17.5                              | 29.4                               | 84.1                                | 46.8                                | 30.2                               | 16                              | G1206KRRB                     | S1206K    | (T-31244)     | 12.15          |          |
| <b>RAK, LAK</b>      | <b><math>2 \frac{7}{16}</math></b>  | <b><math>2 \frac{11}{16}</math></b> | <b><math>5 \frac{13}{32}</math></b> | <b><math>3 \frac{1}{16}</math></b>  | <b><math>7 \frac{13}{32}</math></b> | <b><math>9 \frac{7}{16}</math></b>  | <b><math>2 \frac{3}{8}</math></b>   | <b><math>\frac{7}{8}</math></b>    | <b><math>\frac{11}{16}</math></b> | <b><math>\frac{1}{32}</math></b>   | <b><math>3 \frac{5}{16}</math></b>  | <b><math>1 \frac{27}{32}</math></b> | <b><math>\frac{1}{8}</math></b>    | <b><math>\frac{5}{8}</math></b> | G1207KRRB (KLLB)              | S1207K    |               |                |          |
| RAK                  | 60                                  |                                     |                                     |                                     |                                     |                                     |                                     |                                    |                                   |                                    |                                     |                                     |                                    |                                 | GE60KRRB                      | SE60K     |               |                |          |
| RAK                  | $2 \frac{11}{16}$                   | 76.2                                | 154                                 | 85.7                                | 203.2                               | 266.7                               | 73                                  | 33.3                               | 20.6                              | 34.9                               | 96.8                                | 45.2                                | 36.5                               | 20                              | G1211KRRB                     | S1211KT   | T-22503       | 7.92           |          |
| RAK                  | 70                                  | 3                                   | <b><math>6 \frac{1}{16}</math></b>  | <b><math>3 \frac{3}{8}</math></b>   | 8                                   | <b><math>10 \frac{1}{2}</math></b>  | <b><math>2 \frac{7}{8}</math></b>   | <b><math>\frac{1}{2}</math></b>    | <b><math>\frac{13}{16}</math></b> | <b><math>\frac{1}{8}</math></b>    | <b><math>3 \frac{13}{16}</math></b> | <b><math>1 \frac{25}{32}</math></b> | <b><math>1 \frac{7}{16}</math></b> | <b><math>\frac{3}{4}</math></b> | GE70KRRB                      | SE70K     |               | 17.46          |          |
| RAK                  | $2 \frac{15}{16}$                   | 84.14                               | 163.5                               | 92.1                                | 241.3                               | 304.8                               | 82.6                                | 38.1                               | 22.2                              | 31.8                               | 101.6                               | 54.8                                | 41.3                               | 20                              | G1215KRRB                     | S1215K    | T-20134       | 9.026          |          |
| RAK                  | 75                                  | <b><math>\frac{3}{16}</math></b>    | <b><math>6 \frac{7}{16}</math></b>  | <b><math>\frac{3}{8}</math></b>     | <b><math>9 \frac{1}{2}</math></b>   | <b>12</b>                           | <b><math>3 \frac{1}{4}</math></b>   | <b><math>1 \frac{1}{2}</math></b>  | <b><math>\frac{7}{8}</math></b>   | <b><math>1 \frac{1}{4}</math></b>  | <b>4</b>                            | <b><math>2 \frac{3}{32}</math></b>  | <b><math>1 \frac{5}{8}</math></b>  | <b><math>\frac{3}{4}</math></b> | GE75KRRB                      | SE75K     |               | 19.9           |          |

<sup>(1)</sup> Bearing number for RAK is G-KRRB. TAK uses G-KPPB type LAK uses G-KLLB. Note: All units have  $\frac{1}{8}$  pipe thread grease fitting except  $\frac{1}{2}$ - $\frac{11}{16}$  and  $\frac{3}{4}$  units which have  $\frac{1}{4}$ -28 fitting.

**YAK INDUSTRIAL SERIES SETSCREW UNITS**

- Timken Series low-base setscrew pillow blocks feature the GY-KRRB bearing.
- Well-suited for industrial applications with normal loads, due to its full width inner ring setscrew.
- **Contact a Timken representative to discuss highly corrosive applications (food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**

Suggested shaft tolerances:  $\frac{1}{2}'' - 1 \frac{15}{16}''$ , nominal to  $-.013 \text{ mm}, -.0005''$ ;  
 $2'' - 2 \frac{15}{16}''$ , nominal to  $-.025 \text{ mm}, -.0010''$ .



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YAK  | GY-KRRB        | Page D67                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YAK 1  $\frac{7}{16}''$ . POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.                        |        | H                 | H <sub>2</sub>    | B                 | L                 | J                 | J Min.            | J Max.            | A                 | H <sub>1</sub>    | F     | S <sub>1</sub>    | E                 | Bolt Size     | Bearing                  |
|------------|-----------------------------------|--------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------|-------------------|-------------------|---------------|--------------------------|
|            | mm                                | mm in. |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | $\frac{1}{2}$                     |        | 26.99             | 53.2              | 27.4              | 123.8             | 92.1              | 69.8              | 114.4             | 30.2              | 8.7               | 22.86 | 15.9              | 30.95             | 10            | GY1008KRRB               |
| YAK        | $\frac{9}{8}$                     |        | 1 $\frac{1}{16}$  | 2 $\frac{3}{32}$  | 1 $\frac{5}{64}$  | 4 $\frac{7}{8}$   | 3 $\frac{3}{8}$   | 2 $\frac{3}{4}$   | 4 $\frac{1}{2}$   | 1 $\frac{3}{16}$  | 1 $\frac{11}{32}$ | 0.9   | $\frac{5}{8}$     | 1 $\frac{7}{32}$  | $\frac{3}{8}$ | GY1010KRRB<br>GYE17KRRB  |
| YAK        | 17                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| <b>YAK</b> | <b><math>\frac{3}{4}</math></b>   |        | 31.75             | 62.7              | 30.9              | 127               | 96                | 76.2              | 155.8             | 31.8              | 11.9              | 27.56 | 18.3              | 34.13             | 10            | GY1012KRRB               |
| YAK        | 20                                |        | 1 $\frac{1}{4}$   | 2 $\frac{15}{32}$ | 1 $\frac{7}{32}$  | 5                 | 3 $\frac{25}{32}$ | 3                 | 4 $\frac{9}{16}$  | 1 $\frac{1}{4}$   | 1 $\frac{5}{32}$  | 1.085 | 2 $\frac{3}{32}$  | 1 $\frac{11}{32}$ | $\frac{3}{8}$ | GYE20KRRB                |
| YAK        | $\frac{7}{8}$                     |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               | GY1014KRRB               |
| YAK        | $\frac{15}{16}$                   |        | 33.34             | 68.3              | 34.1              | 139.7             | 104.8             | 84.1              | 125.4             | 35.7              | 11.9              | 33.83 | 19.8              | 37.7              | 10            | GY1015KRRB               |
| <b>YAK</b> | <b>1</b>                          |        | 1 $\frac{5}{16}$  | 2 $\frac{11}{16}$ | 1 $\frac{11}{32}$ | 5 $\frac{1}{2}$   | 4 $\frac{1}{8}$   | 3 $\frac{5}{16}$  | 4 $\frac{15}{16}$ | 1 $\frac{13}{32}$ | 1 $\frac{5}{32}$  | 1.332 | 2 $\frac{5}{32}$  | 1 $\frac{31}{64}$ | $\frac{3}{8}$ | GY1100KRRB<br>GYE25KRRB  |
| YAK        | 25                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | $\frac{1}{8}$                     |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               | GY1102KRRB               |
| <b>YAK</b> | <b><math>\frac{1}{16}</math></b>  |        | 39.69             | 80.2              | 38.1              | 157.2             | 117.5             | 93.7              | 141.3             | 39.7              | 13.5              | 40.31 | 22.2              | 42.07             | 12            | GY1103KRRB               |
| YAK        | 1 $\frac{1}{4}$ S                 |        | 1 $\frac{9}{16}$  | 3 $\frac{3}{32}$  | 1 $\frac{1}{2}$   | 6 $\frac{3}{16}$  | 4 $\frac{9}{8}$   | 3 $\frac{11}{16}$ | 5 $\frac{9}{16}$  | 1 $\frac{9}{16}$  | 1 $\frac{7}{32}$  | 1.587 | $\frac{7}{8}$     | 1 $\frac{21}{32}$ | $\frac{1}{2}$ | GY1103KRRB3<br>GYE30KRRB |
| YAK        | 30                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | $\frac{1}{4}$                     |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               | GY1104KRRB               |
| YAK        | $\frac{3}{8}$                     |        | 46.04             | 92.1              | 42.9              | 166.7             | 130.2             | 105.6             | 154.8             | 45.2              | 16.7              | 46.13 | 25.4              | 48.02             | 12            | GY1106KRRB               |
| <b>YAK</b> | <b><math>\frac{1}{2}</math></b>   |        | 1 $\frac{13}{16}$ | 3 $\frac{5}{8}$   | 1 $\frac{11}{16}$ | 6 $\frac{9}{16}$  | 5 $\frac{1}{8}$   | 4 $\frac{5}{32}$  | 6 $\frac{3}{32}$  | 1 $\frac{25}{32}$ | 2 $\frac{1}{32}$  | 1.816 | 1                 | 1 $\frac{57}{64}$ | $\frac{1}{2}$ | GY1107KRRB<br>GYE35KRRB  |
| YAK        | 35                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| <b>YAK</b> | <b><math>\frac{1}{2}</math></b>   |        | 49.21             | 100               | 49.2              | 179.4             | 136.5             | 110.3             | 162.7             | 47.6              | 19                | 52.27 | 30.2              | 53.98             | 12            | GY1108KRRB               |
| YAK        | 40                                |        | 1 $\frac{15}{16}$ | 3 $\frac{15}{16}$ | 1 $\frac{15}{16}$ | 7 $\frac{1}{16}$  | 5 $\frac{3}{8}$   | 4 $\frac{11}{32}$ | 6 $\frac{13}{32}$ | 1 $\frac{7}{8}$   | $\frac{3}{4}$     | 2.058 | 1 $\frac{3}{16}$  | 2 $\frac{1}{8}$   | $\frac{1}{2}$ | GYE40KRRB                |
| YAK        | $\frac{15}{8}$                    |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               | GY1110KRRB               |
| <b>YAK</b> | <b><math>\frac{11}{16}</math></b> |        | 52.39             | 104.8             | 49.2              | 191.3             | 149.2             | 120.7             | 177.8             | 50.8              | 17.5              | 57.92 | 30.2              | 55.56             | 12            | GY1111KRRB               |
| YAK        | 1 $\frac{3}{4}$                   |        | 2 $\frac{1}{16}$  | 4 $\frac{1}{8}$   | 1 $\frac{15}{16}$ | 7 $\frac{11}{32}$ | 5 $\frac{7}{8}$   | 4 $\frac{3}{4}$   | 7                 | 2                 | 1 $\frac{11}{16}$ | 2.28  | 1 $\frac{3}{16}$  | 2 $\frac{3}{16}$  | $\frac{1}{2}$ | GY1112KRRB<br>GYE45KRRB  |
| YAK        | 45                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| <b>YAK</b> | <b><math>\frac{15}{16}</math></b> |        | 55.56             | 112.7             | 51.6              | 200               | 158               | 132.6             | 183.4             | 55.6              | 17.5              | 62.84 | 32.5              | 60.33             | 16            | GY1115KRRB               |
| YAK        | 2 S                               |        | 2 $\frac{3}{16}$  | 4 $\frac{7}{16}$  | 2 $\frac{1}{32}$  | 7 $\frac{7}{8}$   | 6 $\frac{7}{32}$  | 5 $\frac{7}{32}$  | 7 $\frac{7}{32}$  | 2 $\frac{3}{16}$  | 1 $\frac{11}{16}$ | 2.474 | 1 $\frac{9}{32}$  | 2 $\frac{3}{8}$   | $\frac{5}{8}$ | GY1115KRRB3<br>GYE50KRRB |
| YAK        | 50                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | 2                                 |        | 61.91             | 124.6             | 55.6              | 222.3             | 176.2             | 146.9             | 205.6             | 58.7              | 19                | 69.77 | 33.3              | 61.91             | 16            | GY1200KRRB               |
| <b>YAK</b> | <b><math>\frac{3}{16}</math></b>  |        | 2 $\frac{7}{16}$  | 4 $\frac{29}{32}$ | 2 $\frac{3}{16}$  | 8 $\frac{3}{4}$   | 6 $\frac{15}{16}$ | 5 $\frac{25}{32}$ | 8 $\frac{3}{32}$  | 2 $\frac{5}{16}$  | $\frac{3}{4}$     | 2.747 | 1 $\frac{5}{16}$  | 2 $\frac{7}{16}$  | $\frac{5}{8}$ | GY1203KRRB<br>GYE55KRRB  |
| YAK        | 55                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | $\frac{2}{4}$                     |        | 68.26             | 137.3             | 65.1              | 239.7             | 188.1             | 158.8             | 217.5             | 60.3              | 22.2              | 76.48 | 39.1              | 69.85             | 16            | GY1204KRRB               |
| <b>YAK</b> | <b><math>\frac{2}{16}</math></b>  |        | 2 $\frac{11}{16}$ | 5 $\frac{13}{32}$ | 2 $\frac{9}{16}$  | 9 $\frac{7}{16}$  | 7 $\frac{13}{32}$ | 6 $\frac{1}{4}$   | 8 $\frac{9}{16}$  | 2 $\frac{3}{8}$   | $\frac{7}{8}$     | 3.011 | 1 $\frac{9}{16}$  | 2 $\frac{3}{4}$   | $\frac{5}{8}$ | GY1207KRRB<br>GYE60KRRB  |
| YAK        | 60                                |        |                   |                   |                   |                   |                   |                   |                   |                   |                   |       |                   |                   |               |                          |
| YAK        | $\frac{21}{16}$                   |        | 76.2              | 154               | 69.9              | 266.7             | 203.2             | 168.3             | 238.1             | 73                | 33.3              | 86.92 | 42.9              | 79.4              | 20            | GY1211KRRB               |
| YAK        | 70                                |        | 3                 | 6 $\frac{1}{16}$  | 2 $\frac{3}{4}$   | 10 $\frac{1}{2}$  | 8                 | 6 $\frac{5}{8}$   | 9 $\frac{3}{8}$   | 2 $\frac{7}{8}$   | 1 $\frac{5}{16}$  | 3.422 | 1 $\frac{11}{16}$ | 3 $\frac{1}{8}$   | $\frac{3}{4}$ | GYE70KRRB                |
| YAK        | $\frac{215}{16}$                  |        | 84.14             | 163.5             | 77.8              | 304.8             | 241.3             | 209.5             | 223.1             | 82.5              | 38.1              | 91.92 | 44.4              | 85.73             | 20            | GY1215KRRB               |
| YAK        | 75                                |        | 3 $\frac{5}{16}$  | 6 $\frac{7}{16}$  | 3 $\frac{1}{16}$  | 12                | 9 $\frac{1}{2}$   | 8 $\frac{1}{4}$   | 10 $\frac{3}{4}$  | 3 $\frac{1}{4}$   | 1 $\frac{1}{2}$   | 3.619 | 1 $\frac{3}{4}$   | 3 $\frac{3}{8}$   | $\frac{3}{4}$ | GYE75KRRB                |

Shaft diameter with an S = smaller housing.

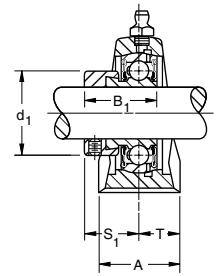
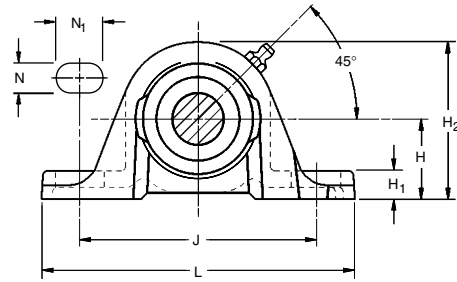


# BALL BEARINGS

## VAK STANDARD SERIES

- The streamlined and rugged VAK pillow block unit combines engineered housing and RA-RR extended inner ring bearing.
- RA-RR bearing employs a positive contact land-riding seal and a Timken originating self-locking collar. Collar assures positive shaft retention.
- Pillow block can be mounted to operate in any position.
- Bearing housed units are factory prelubricated, but a grease fitting is provided to allow for relubrication if required.

**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.013$  mm,  $-.0005$ ";  
 $2$ " -  $2 \frac{3}{16}$ ", nominal to  $-.025$  mm,  $-.0010$ ".



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| VAK  | GRA-KRRB       | Page D57                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VAK  $1 \frac{7}{16}$ ". POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.                          | H                 | H <sub>2</sub>    | B <sub>1</sub>    | J                 | L                 | A                 | H <sub>1</sub>  | N               | N <sub>1</sub>   | d <sub>1</sub>    | S <sub>1</sub>   | T                | Bolt Size     | Bearing Number | Collar Number | Housing Number | Unit Wt.   |
|------------|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|-------------------|------------------|------------------|---------------|----------------|---------------|----------------|------------|
|            | mm<br>in.                           | mm<br>in.         | mm<br>in.         | mm<br>in.         | mm<br>in.         | mm<br>in.         | mm<br>in.         | mm<br>in.       | mm<br>in.       | mm<br>in.        | mm<br>in.         | mm<br>in.        | mm<br>in.        | mm<br>in.     |                |               | new<br>(old)   | kg<br>lbs. |
| VAK        | $\frac{1}{2}$                       | 26.99             | 53.2              | 28.6              | 92.1              | 123.8             | 30.2              | 8.7             | 11.1            | 22.2             | 28.6              | 22.2             | 15.1             | 10            | GRA008RRB      | S1008K        | T-40238        | 0.454      |
| VAK        | $\frac{5}{8}$                       | $1 \frac{1}{16}$  | $2 \frac{3}{32}$  | $1 \frac{1}{8}$   | $3 \frac{5}{8}$   | 47.8              | $1 \frac{3}{16}$  | $\frac{11}{32}$ | $\frac{7}{16}$  | $\frac{7}{8}$    | $1 \frac{1}{8}$   | $\frac{7}{8}$    | $\frac{19}{32}$  | $\frac{3}{8}$ | GRA010RRB      | S1010K        | (T-30595)      | 1          |
| VAK        | 17                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE17RRB      | SE17K         |                |            |
| <b>VAK</b> | <b><math>\frac{3}{4}</math></b>     | 31.75             | 62.7              | 31                | 96                | 127               | 31.8              | 11.9            | 11.1            | 19.8             | 33.3              | 23.4             | 15.9             | 10            | GRA012RRB      | S1012K        | T-40239        | 0.563      |
| VAK        | 20                                  | $1 \frac{1}{4}$   | $2 \frac{15}{32}$ | $1 \frac{7}{32}$  | $3 \frac{25}{32}$ | 5                 | $1 \frac{1}{4}$   | $\frac{15}{32}$ | $\frac{7}{16}$  | $\frac{25}{32}$  | $1 \frac{5}{16}$  | $\frac{59}{64}$  | $\frac{5}{8}$    | $\frac{3}{8}$ | GRAE20RRB      | SE20K         | (T-30555)      | 1.24       |
| VAK        | $\frac{7}{8}$                       |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA014RRB      | S1014K        |                |            |
| VAK        | $\frac{15}{16}$                     | 33.34             | 68.3              | 31                | 104.8             | 139.7             | 35.7              | 11.9            | 11.1            | 20.6             | 38.1              | 23.4             | 17.9             | 10            | GRA015RRB      | S1015K        | T-30365        | 0.758      |
| <b>VAK</b> | <b>1</b>                            | $1 \frac{5}{16}$  | $2 \frac{11}{16}$ | $1 \frac{7}{32}$  | $4 \frac{1}{8}$   | $5 \frac{1}{2}$   | $1 \frac{13}{32}$ | $\frac{15}{32}$ | $\frac{7}{16}$  | $\frac{13}{16}$  | $1 \frac{1}{2}$   | $\frac{59}{64}$  | $\frac{45}{64}$  | $\frac{3}{8}$ | GRA100RRB      | S1100K        |                | 1.67       |
| VAK        | 25                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE25RRB      | SE25K         |                |            |
| VAK        | $1 \frac{1}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA102RRB      | S1102K        |                |            |
| <b>VAK</b> | <b><math>1 \frac{3}{16}</math></b>  | 39.69             | 80.2              | 35.7              | 117.5             | 157.2             | 39.7              | 13.5            | 14.3            | 23.8             | 44.1              | 27               | 19.9             | 12            | GRA103RRB      | S1103K        | T-40241        | 1.235      |
| VAK        | $1 \frac{1}{4}$ S                   | $1 \frac{9}{16}$  | $3 \frac{5}{32}$  | $1 \frac{13}{32}$ | $4 \frac{5}{8}$   | $6 \frac{3}{16}$  | $1 \frac{9}{16}$  | $\frac{17}{32}$ | $\frac{9}{16}$  | $\frac{15}{16}$  | $1 \frac{47}{64}$ | $1 \frac{1}{16}$ | $\frac{25}{32}$  | $\frac{1}{2}$ | GRA103RRB2     | S1103K3       | (T-30300)      | 2.72       |
| VAK        | 30                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE30RRB      | SE30K         |                |            |
| VAK        | $1 \frac{1}{4}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA104RRB      | S1104K        |                |            |
| VAK        | $1 \frac{3}{8}$                     | 46.04             | 92.1              | 38.9              | 130.2             | 166.7             | 45.2              | 16.7            | 14.3            | 24.6             | 54                | 29.4             | 22.7             | 12            | GRA106RRB      | S1106K        | T-40242        | 1.594      |
| <b>VAK</b> | <b><math>1 \frac{7}{16}</math></b>  | $1 \frac{13}{16}$ | $3 \frac{9}{8}$   | $1 \frac{17}{32}$ | $5 \frac{1}{8}$   | $6 \frac{9}{16}$  | $1 \frac{25}{32}$ | $\frac{21}{32}$ | $\frac{9}{16}$  | $\frac{31}{32}$  | $2 \frac{1}{8}$   | $1 \frac{5}{32}$ | $\frac{57}{64}$  | $\frac{1}{2}$ | GRA107RRB      | S1107K        | (T-30410)      | 3.51       |
| VAK        | 35                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE35RRB      | SE35K         |                |            |
| <b>VAK</b> | <b><math>1 \frac{1}{2}</math></b>   | 49.21             | 100               | 43.7              | 136.5             | 179.4             | 47.6              | 19              | 14.3            | 26.2             | 60.3              | 32.5             | 23.8             | 12            | GRA108RRB      | S1108KT       | T-40243        | 2.034      |
| VAK        | $1 \frac{9}{16}$                    | $1 \frac{15}{16}$ | $3 \frac{15}{16}$ | $1 \frac{23}{32}$ | $5 \frac{3}{8}$   | $7 \frac{1}{16}$  | $1 \frac{7}{8}$   | $\frac{3}{4}$   | $\frac{9}{16}$  | $1 \frac{1}{32}$ | $2 \frac{3}{8}$   | $1 \frac{9}{32}$ | $\frac{15}{16}$  | $\frac{1}{2}$ | GRA109RRB      | S1109KT       | (T-30484)      | 4.48       |
| VAK        | 40                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE40RRB      | SE40K         |                |            |
| VAK        | $1 \frac{5}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA110RRB      | S1110K        |                |            |
| <b>VAK</b> | <b><math>1 \frac{11}{16}</math></b> | 52.39             | 104.8             | 43.7              | 149.2             | 191.3             | 50.8              | 17.5            | 14.3            | 28.6             | 63.5              | 32.5             | 25.4             | 12            | GRA111RRB      | S1111K        | T-40244        | 2.261      |
| VAK        | $1 \frac{3}{4}$                     | $2 \frac{1}{16}$  | $4 \frac{1}{8}$   | $1 \frac{23}{32}$ | $5 \frac{7}{8}$   | $7 \frac{17}{32}$ | 2                 | $\frac{11}{16}$ | $\frac{9}{16}$  | $1 \frac{1}{8}$  | $2 \frac{1}{2}$   | $1 \frac{9}{32}$ | 1                | $\frac{1}{2}$ | GRA112RRB      | S1112K        | (T-30682)      | 4.98       |
| VAK        | 45                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE45RRB      | SE45K         |                |            |
| VAK        | $1 \frac{7}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA114RRB      | S1114K        |                |            |
| <b>VAK</b> | <b><math>1 \frac{15}{16}</math></b> | 55.56             | 112.7             | 43.7              | 158               | 200               | 55.6              | 17.5            | 17.5            | 23.8             | 69.8              | 32.5             | 27.8             | 16            | GRA115RRB      | S1115K        | T-40245        | 2.774      |
| VAK        | 2 S                                 | $2 \frac{3}{16}$  | $4 \frac{7}{16}$  | $1 \frac{23}{32}$ | $6 \frac{7}{32}$  | $7 \frac{7}{8}$   | $2 \frac{3}{16}$  | $\frac{11}{16}$ | $\frac{11}{16}$ | $\frac{15}{16}$  | $2 \frac{3}{4}$   | $1 \frac{9}{32}$ | $1 \frac{3}{32}$ | $\frac{5}{8}$ | GRA115RRB2     | S1115K2       | (T-30706)      | 6.11       |
| VAK        | 50                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE50RRB      | SE50K         |                |            |
| VAK        | 2                                   | 61.91             | 124.6             | 48.4              | 176.2             | 222.3             | 58.7              | 19              | 18.3            | 29.4             | 76.2              | 36.5             | 29.4             | 16            | GRA200RRB      | S1200K        | T-40246        | 3.328      |
| <b>VAK</b> | <b><math>2 \frac{3}{16}</math></b>  | $2 \frac{7}{16}$  | $4 \frac{29}{32}$ | $1 \frac{29}{32}$ | $6 \frac{15}{16}$ | $8 \frac{3}{4}$   | $2 \frac{5}{16}$  | $\frac{3}{4}$   | $\frac{23}{32}$ | $1 \frac{5}{32}$ | 3                 | $1 \frac{7}{16}$ | $1 \frac{5}{32}$ | $\frac{5}{8}$ | GRA203RRB      | S1203K        | (T-30738)      | 7.33       |
| VAK        | 55                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE55RRB      | SE55K         |                |            |

**Note:** All units have  $\frac{1}{8}$  pipe thread grease fitting except  $\frac{1}{2}$ - $1 \frac{11}{16}$  and  $\frac{3}{4}$  units which have  $\frac{1}{4}$ -28 fitting. Shaft diameter with an S = smaller housing.



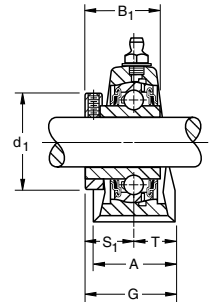
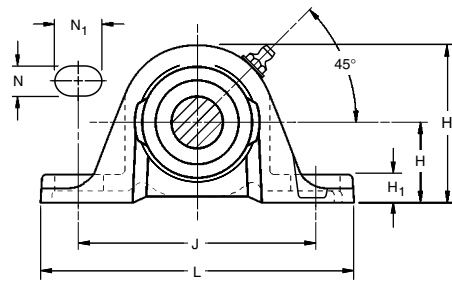


# BALL BEARINGS

## RASC INDUSTRIAL SERIES CONCENTRIC COLLAR

- All RASC pillow blocks are equipped with GC-KRRB (R-Seal) wide inner ring bearings with concentric collars.
- Pillow blocks self-align at mounting with the spherical outside diameter of the bearing fitting into a corresponding spherical housing seat.
- Units are prelubricated and ready for immediate installation.
- Grease fitting provides for relubrication if required.
- Concentric collars are supplied with all units.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 2 15/16", nominal to **-.025 mm, -.0010"**.



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RASC | GC-KRRB        | Page D66                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RASC 1".

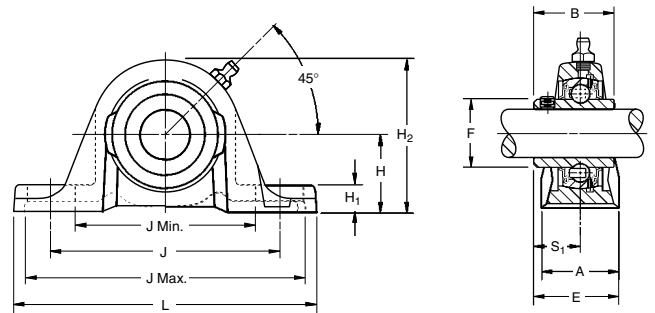
| Unit | Shaft Dia. | H                | H <sub>2</sub>   | B <sub>1</sub>  | J                | L                | A               | H <sub>1</sub> | N             | N <sub>1</sub> | d <sub>1</sub>  | S <sub>1</sub>  | T              | G               | Bolt Size | Bearing Number | Collar Number | Housing Number       | Unit Wt.       |
|------|------------|------------------|------------------|-----------------|------------------|------------------|-----------------|----------------|---------------|----------------|-----------------|-----------------|----------------|-----------------|-----------|----------------|---------------|----------------------|----------------|
|      |            | mm in.           | mm in.           | mm in.          | mm in.           | mm in.           | mm in.          | mm in.         | mm in.        | mm in.         | mm in.          | mm in.          | mm in.         | mm in.          |           |                |               |                      |                |
| RASC | 5/8        | 30.16<br>1 3/16  | 56.4<br>2 7/32   | 26.6<br>1 3/64  | 92.1<br>3 5/8    | 123.8<br>4 7/8   | 30.2<br>1 3/16  | 11.9<br>15/32  | 11.1<br>7/16  | 22.2<br>7/8    | 34.1<br>1 11/32 | 15.5<br>39/64   | 15.5<br>39/64  | 31<br>1 7/32    | 10        | GC1010KRRB     | C203          | T-40238<br>(T-30595) | 0.454<br>1     |
| RASC | 3/4        | 33.34<br>1 5/16  | 64.3<br>2 17/32  | 31<br>1 7/32    | 96<br>3 25/32    | 127<br>5         | 31.8<br>1 1/4   | 13.5<br>17/32  | 11.1<br>7/16  | 19.8<br>25/32  | 38.1<br>1 1/2   | 18.7<br>47/64   | 17.1<br>43/64  | 35.7<br>1 13/32 | 10        | GC1012KRRB     | C204          | T-40239<br>(T-30555) | 0.635<br>1.40  |
| RASC | 1          | 36.51<br>1 7/16  | 71.4<br>2 13/16  | 34.1<br>1 11/32 | 104.8<br>4 1/8   | 139.7<br>5 1/2   | 35.7<br>1 13/32 | 15.1<br>19/32  | 11.1<br>7/16  | 20.2<br>13/16  | 44.4<br>1 3/4   | 20.2<br>51/64   | 17.9<br>45/64  | 38.1<br>1 1/2   | 10        | GC1100KRRB     | C205          | T-30365              | 0.803<br>1.77  |
| RASC | 1 1/8      | 42.86<br>1 11/16 | 83.3<br>3 9/32   | 37.3<br>1 15/32 | 117.5<br>4 5/8   | 157.2<br>6 3/16  | 39.7<br>1 9/16  | 16.7<br>21/32  | 14.3<br>9/16  | 23.8<br>15/16  | 52.4<br>2 1/16  | 22.6<br>57/64   | 22.2<br>7/8    | 44.8<br>1 49/64 | 12        | GC1102KRRB     | C206          | T-40241<br>(T-30300) | 1.297<br>2.86  |
| RASC | 1 3/16     |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1103KRRB     |               |                      |                |
| RASC | 1 1/4 S    |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1103KRRB3    |               |                      |                |
| RASC | 1 1/4      | 47.62<br>1 7/8   | 93.7<br>3 11/16  | 41.3<br>1 5/8   | 130.2<br>5 1/8   | 166.7<br>6 9/16  | 45.2<br>1 25/32 | 18.3<br>23/32  | 14.3<br>9/16  | 24.6<br>31/32  | 59.5<br>2 11/32 | 25.4<br>1       | 22.2<br>7/8    | 49.2<br>1 15/16 | 12        | GC1104KRRB     | C207          | T-40242<br>(T-30410) | 1.674<br>3.69  |
| RASC | 1 3/8      |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1106KRRB     |               |                      |                |
| RASC | 1 7/16     |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1107KRRB     |               |                      |                |
| RASC | 1 1/2      | 49.21<br>1 15/16 | 100<br>3 15/16   | 44.1<br>1 47/64 | 136.5<br>5 3/8   | 179.4<br>7 1/16  | 47.6<br>1 7/8   | 19<br>3/4      | 14.3<br>9/16  | 26.2<br>1 1/32 | 68.3<br>2 11/16 | 27.4<br>1 5/64  | 24.6<br>31/32  | 52<br>2 3/64    | 12        | GC1108KRRB     | C208          | T-40243<br>(T-30484) | 2.150<br>4.74  |
| RASC | 1 11/16    | 53.98<br>2 1/8   | 106.3<br>4 3/16  | 46.8<br>1 27/32 | 149.2<br>5 7/8   | 191.3<br>7 17/32 | 50.8<br>2       | 19<br>3/4      | 14.3<br>9/16  | 23<br>29/32    | 73<br>2 7/8     | 29.4<br>1 5/32  | 25.4<br>1      | 54.8<br>2 5/32  | 12        | GC1111KRRB     | C209          | T-40244<br>(T-30682) | 2.409<br>5.31  |
| RASC | 1 3/4      |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1112KRRB     |               |                      |                |
| RASC | 1 5/16     | 57.15<br>2 1/4   | 114.3<br>4 1/2   | 48.4<br>1 29/32 | 158<br>6 7/32    | 200<br>7 7/8     | 55.6<br>2 3/16  | 19<br>3/4      | 17.5<br>11/16 | 23.8<br>15/16  | 79.4<br>3 1/8   | 30.2<br>1 3/16  | 27.8<br>1 3/32 | 57.9<br>2 9/32  | 16        | GC1115KRRB     | C210          | T-40245<br>(T-30706) | 3.003<br>6.62  |
| RASC | 2          | 63.5<br>2 1/2    | 126.2<br>4 31/32 | 54<br>2 1/8     | 176.2<br>6 15/16 | 222.3<br>8 3/4   | 58.7<br>2 5/16  | 20.6<br>13/16  | 18.3<br>23/32 | 29.4<br>1 5/32 | 88.9<br>3 1/2   | 33.3<br>1 5/16  | 29.4<br>1 5/32 | 62.7<br>2 15/32 | 16        | GC1200KRRB     | C211          | T-40246<br>(T-30738) | 3.901<br>8.60  |
| RASC | 2 3/16     |                  |                  |                 |                  |                  |                 |                |               |                |                 |                 |                |                 |           | GC1203KRRG     |               |                      |                |
| RASC | 2 7/16     | 69.85<br>2 3/4   | 138.9<br>5 15/32 | 60.3<br>2 3/8   | 188.1<br>7 13/32 | 239.7<br>9 7/16  | 60.3<br>2 3/8   | 23.8<br>15/16  | 18.3<br>23/32 | 29.4<br>1 5/32 | 95.2<br>3 3/4   | 37.3<br>1 15/32 | 31.8<br>1 1/4  | 69.1<br>2 23/32 | 16        | GC1207KRRB     | C212          | T 40247<br>(T 31244) | 5.511<br>12.15 |
| RASC | 2 15/16    | 82.55<br>3 1/4   | 164.3<br>6 15/32 | 70.6<br>2 25/32 | 215.9<br>8 1/2   | 269.9<br>10 5/8  | 69.9<br>2 3/4   | 25.4<br>1      | 22.2<br>7/8   | 31.8<br>1 1/4  | 114.3<br>4 1/2  | 43.7<br>1 23/32 | 34.9<br>1 3/8  | 78.6<br>3 3/32  | 20        | GC1215KRRB     | C215          | T 23423              | 9.06<br>19.91  |

Note: All units have 1/8 pipe thread grease fitting except RASC 1/2-1 1/16 and 3/4 units which have 1/4-28 fitting.

### YAS INDUSTRIAL SERIES SETSCREW UNITS

- Timken YAS Series high-base, setscrew, pillow blocks feature the GY-KRRB bearing.
- This full-width inner ring setscrew is well-suited for industrial applications involving wet or dirty environments.
- Housing is designed for two-bolt mounting in any position.
- **Contact your Timken representative to discuss highly corrosive applications (food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**

**Suggested shaft tolerances:** 1/2" to 1 15/16", nominal to **-.013 mm, -.0005"**;  
 2" - 2 15/16", nominal to **-.025 mm, -.0010"**.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YAS  | GY-KRRB        | Page D67                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YAS 1 7/16". POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.     | H            | H <sub>2</sub> | B            | L            | J            | J Min.       | J Max.       | A            | H <sub>1</sub> | F            | S <sub>1</sub> | E            | Bolt Size  | Bearing           |
|------------|----------------|--------------|----------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|--------------|----------------|--------------|------------|-------------------|
|            | mm<br>in.      | mm<br>in.    | mm<br>in.      | mm<br>in.    | mm<br>in.    | mm<br>in.    | mm<br>in.    | mm<br>in.    | mm<br>in.    | mm<br>in.      | mm<br>in.    | mm<br>in.      | mm<br>in.    | mm<br>in.  |                   |
| YAS        | 1/2            | 30.16        | 56.4           | 27.4         | 123.8        | 92.1         | 69.8         | 114.3        | 30.2         | 11.9           | 22.86        | 15.9           | 30.95        | 10         | GY1008KRRB        |
| YAS        | 5/8            | 38.1         | 76.2           | 35.1         | 152.4        | 114.3        | 91.4         | 141.3        | 38.1         | 15.2           | 29.27        | 20.8           | 38.1         | 10         | GY1010KRRB        |
| YAS        | 17             | 42.5         | 85.1           | 39.7         | 157.8        | 119.4        | 96.5         | 146.0        | 42.5         | 15.7           | 30.18        | 21.1           | 42.5         | 10         | GYE17KRRB         |
| <b>YAS</b> | <b>3/4</b>     | <b>33.34</b> | <b>64.3</b>    | <b>30.9</b>  | <b>127</b>   | <b>96</b>    | <b>76.2</b>  | <b>155.8</b> | <b>31.8</b>  | <b>13.5</b>    | <b>27.56</b> | <b>18.3</b>    | <b>34.13</b> | <b>10</b>  | <b>GY1012KRRB</b> |
| YAS        | 20             | 41.3         | 82.6           | 36.5         | 154.9        | 116.8        | 93.8         | 144.1        | 41.3         | 15.5           | 30.68        | 20.3           | 41.3         | 10         | GYE20KRRB         |
| YAS        | 7/8            | 45.7         | 91.4           | 40.6         | 160.0        | 121.9        | 97.8         | 150.8        | 45.7         | 16.0           | 32.54        | 21.1           | 45.7         | 10         | GY1014KRRB        |
| YAS        | 1 5/16         | 50.8         | 101.6          | 45.7         | 171.4        | 127.0        | 101.6        | 157.8        | 50.8         | 16.5           | 33.81        | 21.8           | 50.8         | 10         | GY1015KRRB        |
| <b>YAS</b> | <b>1</b>       | <b>50.8</b>  | <b>101.6</b>   | <b>45.7</b>  | <b>171.4</b> | <b>127.0</b> | <b>101.6</b> | <b>157.8</b> | <b>50.8</b>  | <b>16.5</b>    | <b>33.81</b> | <b>21.8</b>    | <b>50.8</b>  | <b>10</b>  | <b>GY1100KRRB</b> |
| YAS        | 25             | 57.1         | 114.3          | 50.8         | 190.5        | 141.3        | 111.8        | 167.6        | 57.1         | 17.1           | 34.94        | 22.5           | 57.1         | 10         | GYE25KRRB         |
| YAS        | 1 1/8          | 63.5         | 127.0          | 56.6         | 203.2        | 149.5        | 119.4        | 175.8        | 63.5         | 17.5           | 35.68        | 23.1           | 63.5         | 10         | GY1102KRRB        |
| <b>YAS</b> | <b>1 3/16</b>  | <b>63.5</b>  | <b>127.0</b>   | <b>56.6</b>  | <b>203.2</b> | <b>149.5</b> | <b>119.4</b> | <b>175.8</b> | <b>63.5</b>  | <b>17.5</b>    | <b>35.68</b> | <b>23.1</b>    | <b>63.5</b>  | <b>12</b>  | <b>GY1103KRRB</b> |
| YAS        | 1 1/4 S        | 76.2         | 152.4          | 68.3         | 241.3        | 182.7        | 146.0        | 213.0        | 76.2         | 18.8           | 42.16        | 25.4           | 76.2         | 1/2        | GY1103KRRB3       |
| YAS        | 30             | 82.6         | 165.2          | 73.7         | 254.0        | 193.0        | 152.4        | 221.4        | 82.6         | 19.3           | 43.18        | 26.2           | 82.6         | 1/2        | GYE30KRRB         |
| YAS        | 1 1/4          | 88.9         | 177.8          | 76.2         | 266.7        | 203.2        | 157.8        | 231.8        | 88.9         | 19.8           | 44.14        | 26.8           | 88.9         | 12         | GY1104KRRB        |
| YAS        | 1 3/8          | 95.3         | 190.6          | 81.3         | 281.3        | 213.0        | 165.1        | 241.3        | 95.3         | 20.3           | 45.16        | 27.4           | 95.3         | 12         | GY1106KRRB        |
| <b>YAS</b> | <b>1 7/16</b>  | <b>95.3</b>  | <b>190.6</b>   | <b>81.3</b>  | <b>281.3</b> | <b>213.0</b> | <b>165.1</b> | <b>241.3</b> | <b>95.3</b>  | <b>20.3</b>    | <b>45.16</b> | <b>27.4</b>    | <b>95.3</b>  | <b>1/2</b> | <b>GY1107KRRB</b> |
| YAS        | 35             | 101.6        | 203.2          | 86.4         | 294.0        | 223.8        | 172.7        | 251.4        | 101.6        | 20.8           | 46.16        | 28.0           | 101.6        | 1/2        | GYE35KRRB         |
| <b>YAS</b> | <b>1 1/2</b>   | <b>101.6</b> | <b>203.2</b>   | <b>86.4</b>  | <b>294.0</b> | <b>223.8</b> | <b>172.7</b> | <b>251.4</b> | <b>101.6</b> | <b>20.8</b>    | <b>46.16</b> | <b>28.0</b>    | <b>101.6</b> | <b>12</b>  | <b>GY1108KRRB</b> |
| YAS        | 40             | 107.9        | 215.8          | 91.4         | 307.0        | 235.1        | 182.7        | 263.7        | 107.9        | 21.3           | 47.18        | 28.6           | 107.9        | 1/2        | GYE40KRRB         |
| YAS        | 1 1/2 H        | 114.3        | 228.6          | 96.5         | 319.7        | 246.1        | 193.0        | 275.1        | 114.3        | 21.8           | 48.16        | 29.2           | 114.3        | 1/2        | GY1108KRRB        |
| YAS        | 1 5/8          | 120.7        | 241.3          | 101.6        | 332.0        | 257.5        | 203.2        | 286.5        | 120.7        | 22.3           | 49.16        | 29.8           | 120.7        | 12         | GY1110KRRB        |
| <b>YAS</b> | <b>1 11/16</b> | <b>120.7</b> | <b>241.3</b>   | <b>101.6</b> | <b>332.0</b> | <b>257.5</b> | <b>203.2</b> | <b>286.5</b> | <b>120.7</b> | <b>22.3</b>    | <b>49.16</b> | <b>29.8</b>    | <b>120.7</b> | <b>12</b>  | <b>GY1111KRRB</b> |
| YAS        | 1 3/4          | 127.0        | 254.0          | 106.7        | 344.5        | 268.9        | 213.0        | 297.9        | 127.0        | 22.8           | 50.16        | 30.4           | 127.0        | 1/2        | GY1112KRRB        |
| YAS        | 45             | 133.4        | 266.8          | 111.8        | 356.8        | 280.3        | 223.8        | 309.3        | 133.4        | 23.3           | 51.16        | 31.0           | 133.4        | 1/2        | GYE45KRRB         |
| <b>YAS</b> | <b>1 15/16</b> | <b>133.4</b> | <b>266.8</b>   | <b>111.8</b> | <b>356.8</b> | <b>280.3</b> | <b>223.8</b> | <b>309.3</b> | <b>133.4</b> | <b>23.3</b>    | <b>51.16</b> | <b>31.0</b>    | <b>133.4</b> | <b>16</b>  | <b>GY1115KRRB</b> |
| YAS        | 2 S            | 139.7        | 279.4          | 117.1        | 369.1        | 291.7        | 233.8        | 320.7        | 139.7        | 23.8           | 52.16        | 31.6           | 139.7        | 5/8        | GY1115KRRB3       |
| YAS        | 50             | 146.0        | 292.0          | 122.4        | 381.4        | 303.1        | 243.8        | 332.1        | 146.0        | 24.3           | 53.16        | 32.2           | 146.0        | 5/8        | GYE50KRRB         |
| YAS        | 2              | 152.4        | 304.8          | 127.0        | 393.7        | 314.5        | 253.8        | 343.5        | 152.4        | 24.8           | 54.16        | 32.8           | 152.4        | 16         | GY1200KRRB        |
| <b>YAS</b> | <b>2 3/16</b>  | <b>152.4</b> | <b>304.8</b>   | <b>127.0</b> | <b>393.7</b> | <b>314.5</b> | <b>253.8</b> | <b>343.5</b> | <b>152.4</b> | <b>24.8</b>    | <b>54.16</b> | <b>32.8</b>    | <b>152.4</b> | <b>5/8</b> | <b>GY1203KRRB</b> |
| YAS        | 55             | 158.8        | 317.6          | 132.4        | 406.0        | 325.9        | 263.8        | 354.9        | 158.8        | 25.3           | 55.16        | 33.4           | 158.8        | 16         | GYE55KRRB         |
| YAS        | 2 1/4          | 165.1        | 330.2          | 137.5        | 418.3        | 337.3        | 273.8        | 366.3        | 165.1        | 25.8           | 56.16        | 34.0           | 165.1        | 16         | GY1204KRRB        |
| <b>YAS</b> | <b>2 7/16</b>  | <b>165.1</b> | <b>330.2</b>   | <b>137.5</b> | <b>418.3</b> | <b>337.3</b> | <b>273.8</b> | <b>366.3</b> | <b>165.1</b> | <b>25.8</b>    | <b>56.16</b> | <b>34.0</b>    | <b>165.1</b> | <b>5/8</b> | <b>GY1207KRRB</b> |
| YAS        | 60             | 171.4        | 342.8          | 142.6        | 430.6        | 348.7        | 283.8        | 377.7        | 171.4        | 26.3           | 57.16        | 34.6           | 171.4        | 16         | GYE60KRRB         |
| YAS        | 2 5/8          | 177.8        | 355.6          | 147.6        | 442.9        | 360.1        | 293.8        | 389.1        | 177.8        | 26.8           | 58.16        | 35.2           | 177.8        | 20         | GY1215KRRB        |
| YAS        | 75             | 184.1        | 368.2          | 152.7        | 455.2        | 371.5        | 303.8        | 400.5        | 184.1        | 27.3           | 59.16        | 35.8           | 184.1        | 20         | GYE75KRRB         |
| YAS        | 2 15/16 H      | 190.5        | 381.0          | 157.8        | 467.5        | 382.9        | 313.8        | 411.9        | 190.5        | 27.8           | 60.16        | 36.4           | 190.5        | 20         | GY1215KRRB        |
|            |                | 317.6        | 7              | 317.6        | 13           | 9            | 7            | 11           | 317.6        | 1 1/4          | 3.619        | 1 3/4          | 317.6        | 3/4        |                   |

Shaft diameter with an S = Smaller housing; Shaft diameter with an H = heavier housing.

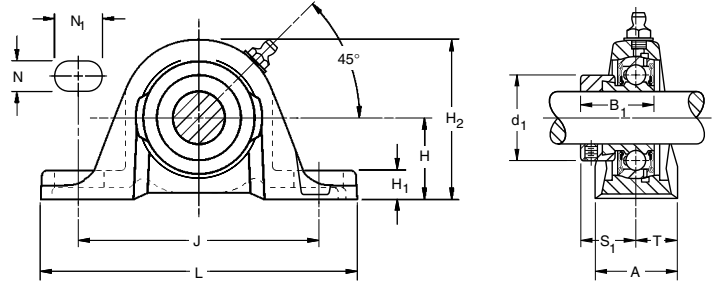


# BALL BEARINGS

## VAS STANDARD SERIES

- Timken pillow blocks are similar in design and features, and equal in load-carrying capacity to the VAK Series.
- Slightly different base-to-center height dimension make them interchangeable with certain other competitive designs.
- Units are prelubricated and ready for immediate installation.
- Grease fitting provides for relubrication if required.

**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.013$  mm,  $-.0005$ ";  
 2" -  $2 \frac{3}{16}$ ", nominal to  $-.025$  mm,  $-.0010$ ".



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| VAS  | GRA-RRB        | Page D57                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VAS  $1 \frac{3}{16}$ ". POPULAR SIZES ARE IN BOLD.

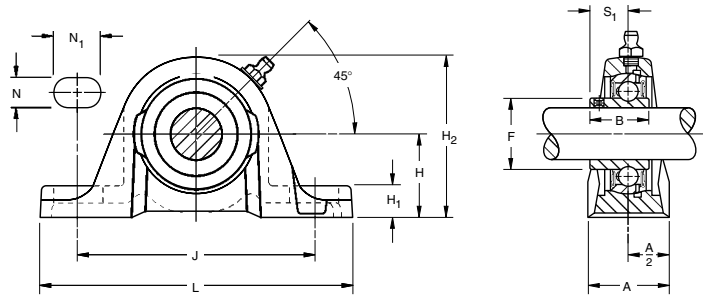
| Unit       | Shaft Dia.                          | H                 | H <sub>2</sub>    | B <sub>1</sub>    | J                 | L                 | A                 | H <sub>1</sub>  | N               | N <sub>1</sub>   | d <sub>1</sub>    | S <sub>1</sub>   | T                | Bolt Size     | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|------------|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|-----------------|------------------|-------------------|------------------|------------------|---------------|----------------|---------------|----------------|----------|
|            |                                     | mm in.            | mm in.            | mm in.            | mm in.            | mm in.            | mm in.            | mm in.          | mm in.          | mm in.           | mm in.            | mm in.           | mm in.           |               |                |               |                |          |
| VAS        | $\frac{1}{2}$                       | 30.16             | 56.4              | 28.6              | 92.1              | 123.8             | 30.2              | 11.9            | 11.1            | 22.2             | 28.6              | 22.2             | 15.1             | 10            | GRA008RRB      | S1008K        | T-40238        | 0.454    |
| VAS        | $\frac{9}{8}$                       | $1 \frac{3}{16}$  | $2 \frac{7}{32}$  | $1 \frac{1}{8}$   | $3 \frac{5}{8}$   | $4 \frac{7}{8}$   | $1 \frac{3}{16}$  | $\frac{15}{32}$ | $\frac{7}{16}$  | $\frac{7}{8}$    | $1 \frac{1}{8}$   | $\frac{7}{8}$    | $\frac{19}{32}$  | $\frac{3}{8}$ | GRA010RRB      | S1010K        | (T-30595)      | 1        |
| VAS        | 17                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE17RRB      | SE17K         |                |          |
| <b>VAS</b> | <b><math>\frac{3}{4}</math></b>     | 33.34             | 64.3              | 31                | 96                | 127               | 31.8              | 13.5            | 11.1            | 19.8             | 33.3              | 23.4             | 15.9             | 10            | GRA012RRB      | S1012K        | T-40239        | 0.563    |
| VAS        | 20                                  | $1 \frac{5}{16}$  | $2 \frac{17}{32}$ | $1 \frac{7}{32}$  | $3 \frac{25}{32}$ | 5                 | $1 \frac{1}{4}$   | $\frac{17}{32}$ | $\frac{7}{16}$  | $\frac{25}{32}$  | $1 \frac{5}{16}$  | $\frac{59}{64}$  | $\frac{5}{8}$    | $\frac{3}{8}$ | GRAE20RRB      | SE20K         | (T-30555)      | 1.24     |
| VAS        | $\frac{7}{8}$                       |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA013RRB      | S1013K        |                |          |
| VAS        | $\frac{15}{16}$                     | 36.51             | 71.4              | 31                | 104.8             | 139.7             | 35.7              | 15.1            | 11.1            | 20.6             | 38.1              | 23.4             | 17.9             | 10            | GRA015RRB      | S1015K        |                | 0.758    |
| <b>VAS</b> | <b>1</b>                            | $\frac{17}{16}$   | $2 \frac{13}{16}$ | $1 \frac{7}{32}$  | $4 \frac{1}{8}$   | $5 \frac{1}{2}$   | $1 \frac{13}{32}$ | $\frac{19}{32}$ | $\frac{7}{16}$  | $\frac{13}{16}$  | $1 \frac{1}{2}$   | $\frac{59}{64}$  | $\frac{45}{64}$  | $\frac{3}{8}$ | GRA100RRB      | S1100K        | T-30365        | 1.67     |
| VAS        | 25                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE25RRB      | SE25K         |                |          |
| VAS        | $1 \frac{1}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA102RRB      | S1102K        |                |          |
| <b>VAS</b> | <b><math>1 \frac{3}{16}</math></b>  | 42.86             | 83.3              | 35.7              | 117.5             | 157.2             | 39.7              | 16.7            | 14.3            | 23.8             | 44.1              | 27               | 19.9             | 12            | GRA103RRB      | S1103K        | T-40241        | 1.235    |
| VAS        | $1 \frac{1}{4}$ S                   | $1 \frac{11}{16}$ | $3 \frac{9}{32}$  | $1 \frac{13}{32}$ | $4 \frac{5}{8}$   | $6 \frac{3}{16}$  | $1 \frac{9}{16}$  | $\frac{21}{32}$ | $\frac{9}{16}$  | $\frac{15}{16}$  | $1 \frac{47}{64}$ | $1 \frac{1}{16}$ | $\frac{25}{32}$  | $\frac{1}{2}$ | GRA103RRB2     | S1103K3       | (T-30300)      | 2.72     |
| VAS        | 30                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE30RRB      | SE30K         |                |          |
| VAS        | $1 \frac{1}{4}$                     | 47.62             | 93.7              | 38.9              | 130.2             | 166.7             | 45.2              | 18.3            | 14.3            | 24.6             | 54                | 29.4             | 22.7             | 12            | GRA104RRB      | S1104K        |                |          |
| VAS        | $1 \frac{3}{8}$                     | $1 \frac{7}{8}$   | $3 \frac{11}{16}$ | $1 \frac{17}{32}$ | $5 \frac{1}{8}$   | $6 \frac{9}{16}$  | $1 \frac{25}{32}$ | $\frac{23}{32}$ | $\frac{9}{16}$  | $\frac{31}{32}$  | $2 \frac{1}{8}$   | $1 \frac{5}{32}$ | $\frac{57}{64}$  | $\frac{1}{2}$ | GRA106RRB      | S1106K        | T-40242        | 1.594    |
| <b>VAS</b> | <b><math>1 \frac{7}{16}</math></b>  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA107RRB      | S1107K        | (T-30410)      | 3.51     |
| VAS        | 35                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE35RRB      | SE35K         |                |          |
| <b>VAS</b> | <b><math>1 \frac{1}{2}</math></b>   | 49.21             | 100.0             | 43.7              | 136.5             | 179.4             | 47.6              | 19.0            | 14.3            | 26.2             | 60.3              | 32.5             | 23.8             | 12            | GRA108RRB      | S1108K        | T-40243        | 2.034    |
| VAS        | 40                                  | $1 \frac{15}{16}$ | $3 \frac{15}{16}$ | $1 \frac{23}{32}$ | $5 \frac{3}{8}$   | $7 \frac{1}{16}$  | $1 \frac{7}{8}$   | $\frac{3}{4}$   | $\frac{9}{16}$  | $1 \frac{1}{2}$  | $2 \frac{3}{8}$   | $1 \frac{9}{32}$ | $\frac{15}{16}$  | $\frac{1}{2}$ | GRAE40RRB      | SE40K         | (T-30484)      | 4.48     |
| VAS        | $1 \frac{5}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA110RRB      | S1110K        |                |          |
| <b>VAS</b> | <b><math>1 \frac{11}{16}</math></b> | 53.98             | 106.4             | 43.7              | 149.2             | 191.3             | 50.8              | 19.0            | 14.3            | 28.6             | 63.5              | 32.5             | 25.4             | 12            | GRA111RRB      | S1111K        | T-40244        | 2.261    |
| VAS        | $1 \frac{3}{4}$                     | $2 \frac{1}{8}$   | $4 \frac{3}{16}$  | $1 \frac{23}{32}$ | $5 \frac{7}{8}$   | $7 \frac{17}{32}$ | 2                 | $\frac{3}{4}$   | $\frac{9}{16}$  | $1 \frac{1}{8}$  | $2 \frac{1}{2}$   | $1 \frac{9}{32}$ | 1                | $\frac{1}{2}$ | GRA112RRB      | S1112K        | (T-30682)      | 4.98     |
| VAS        | 45                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE45RRB      | SE45K         |                |          |
| VAS        | $1 \frac{7}{8}$                     |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRA114RRB      | S1114K        |                |          |
| <b>VAS</b> | <b><math>1 \frac{15}{16}</math></b> | 57.15             | 114.3             | 43.7              | 158               | 200               | 55.6              | 19.0            | 18.3            | 29.4             | 69.8              | 32.5             | 27.8             | 16            | GRA115RRB      | S1115K        | T-40245        | 2.774    |
| VAS        | 2 S                                 | $2 \frac{1}{4}$   | $4 \frac{1}{2}$   | $1 \frac{23}{32}$ | $6 \frac{7}{32}$  | $7 \frac{7}{8}$   | $2 \frac{3}{16}$  | $\frac{3}{4}$   | $\frac{23}{32}$ | $1 \frac{5}{32}$ | $2 \frac{3}{4}$   | $1 \frac{9}{32}$ | $1 \frac{3}{32}$ | $\frac{5}{8}$ | GRA115RRB2     | S1115K2       | (T-30706)      | 6.11     |
| VAS        | 50                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE50RRB      | SE50K         |                |          |
| VAS        | 2                                   | 63.5              | 126.2             | 48.4              | 176.2             | 222.3             | 58.7              | 20.6            | 18.3            | 29.4             | 76.2              | 36.5             | 29.4             | 16            | GRA200RRB      | S1200K        | T-40246        | 3.328    |
| <b>VAS</b> | <b><math>2 \frac{3}{16}</math></b>  | $2 \frac{1}{2}$   | $4 \frac{31}{32}$ | $1 \frac{23}{32}$ | $6 \frac{15}{16}$ | $8 \frac{3}{4}$   | $2 \frac{5}{16}$  | $\frac{13}{16}$ | $\frac{23}{32}$ | $1 \frac{5}{32}$ | 3                 | $1 \frac{7}{16}$ | $1 \frac{5}{32}$ | $\frac{5}{8}$ | GRA203RRB      | S1203K        | (T-30738)      | 7.33     |
| VAS        | 55                                  |                   |                   |                   |                   |                   |                   |                 |                 |                  |                   |                  |                  |               | GRAE55RRB      | SE55K         |                |          |

Note: All units have  $\frac{1}{8}$  pipe thread grease fitting except  $\frac{1}{2}$ - $1 \frac{11}{16}$  and  $\frac{3}{4}$  units which have  $\frac{1}{4}$ -28 fitting.



**SAS STANDARD SERIES**

- The SAS is a streamlined and a rugged one-piece pillow block unit that combines the Timken engineered housing and GYA-RRB setscrew bearing.
- GYA-RRB bearing employs a positive contact land-riding seal and specially designed setscrews.
- SAS pillow block can be mounted in and will operate in any position.
- Bearing housed units are factory prelubricated, but a grease fitting is provided to allow for relubrication if required.



**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, *-.0005"***;  
2" - 2 3/16", nominal to **-.025 mm, *-.0010"***.

**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| SAS  | GYA-KRRB       | Page D59                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: SAS 1". POPULAR SIZES ARE IN BOLD.**

| Unit       | Shaft Dia.     |         | H       | H <sub>2</sub> | S <sub>1</sub> | J       | L       | A      | H <sub>1</sub> | N      | N <sub>1</sub> | F       | B   | Bolt Size  | Bearing Number | Housing Number | Unit Wt. |
|------------|----------------|---------|---------|----------------|----------------|---------|---------|--------|----------------|--------|----------------|---------|-----|------------|----------------|----------------|----------|
|            | mm             | in.     |         |                |                |         |         |        |                |        |                |         |     |            |                |                |          |
| SAS        | 1/2            | 30.16   | 56.4    | 15.9           | 92.1           | 123.8   | 30.2    | 11.9   | 11.1           | 22.2   | 24.6           | 23.8    | 10  | GYA008RRB  | T-40238        | 0.42           |          |
| SAS        | 5/8            | 1 3/16  | 2 7/32  | 5/8            | 3 5/8          | 4 7/8   | 1 3/16  | 1 5/32 | 7/16           | 7/8    | 3 1/32         | 1 5/16  | 3/8 | GYA010RRB  | (T-30595)      | 0.92           |          |
| SAS        | 17             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE17RRB  |                |                |          |
| <b>SAS</b> | <b>3/4</b>     | 33.34   | 64.3    | 18.3           | 96             | 127     | 31.8    | 13.5   | 11.1           | 19.8   | 29             | 27      | 10  | GYA012RRB  | T-40239        | 0.57           |          |
| SAS        | 20             | 1 5/16  | 2 17/32 | 23/32          | 3 25/32        | 5       | 1 1/4   | 17/32  | 7/16           | 25/32  | 1 9/64         | 1 1/16  | 3/8 | GYAE20RRB  | (T-30555)      | 1.25           |          |
| SAS        | 7/8            |         |         |                |                |         |         |        |                |        |                |         |     | GYA014RRB  |                |                |          |
| SAS        | 1 5/16         | 36.51   | 71.4    | 19.4           | 104.8          | 139.7   | 35.7    | 15.1   | 11.1           | 20.6   | 33.7           | 28.2    | 10  | GYA015RRB  | T-30365        | 0.75           |          |
| <b>SAS</b> | <b>1</b>       | 1 7/16  | 2 13/16 | 49/64          | 4 1/8          | 5 1/2   | 1 13/32 | 19/32  | 7/16           | 13/16  | 1 21/64        | 1 7/64  | 3/8 | GYA100RRB  |                | 1.67           |          |
| SAS        | 25             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE25RRB  |                |                |          |
| SAS        | 1 1/8          |         |         |                |                |         |         |        |                |        |                |         |     | GYA102RRB  |                |                |          |
| <b>SAS</b> | <b>1 3/16</b>  | 42.86   | 83.3    | 23             | 117.5          | 157.2   | 39.7    | 16.7   | 14.3           | 23.8   | 40.1           | 32.5    | 12  | GYA103RRB  | T-40241        | 1.14           |          |
| SAS        | 1 1/4 S        | 1 11/16 | 3 9/32  | 29/32          | 4 5/8          | 6 3/16  | 1 9/16  | 2 1/32 | 9/16           | 15/16  | 1 37/64        | 1 9/32  | 1/2 | GYA103RRB2 | (T-30300)      | 2.52           |          |
| SAS        | 30             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE30RRB  |                |                |          |
| SAS        | 1 1/4          |         |         |                |                |         |         |        |                |        |                |         |     | GYA104RRB  |                |                |          |
| SAS        | 1 3/8          | 47.62   | 93.6    | 25.8           | 130.2          | 166.7   | 45.2    | 18.3   | 14.3           | 24.6   | 46.8           | 36.5    | 12  | GYA106RRB  | T-40242        | 1.52           |          |
| <b>SAS</b> | <b>1 7/16</b>  | 1 7/8   | 3 11/16 | 1 1/64         | 5 1/8          | 6 9/16  | 1 25/32 | 23/32  | 9/16           | 3 1/32 | 1 21/32        | 1 7/16  | 1/2 | GYA107RRB  | (T-30410)      | 3.35           |          |
| SAS        | 35             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE35RRB  |                |                |          |
| <b>SAS</b> | <b>1 1/2</b>   | 49.21   | 100     | 27.8           | 136.5          | 179.4   | 47.6    | 19     | 14.3           | 26.2   | 52.4           | 39.3    | 12  | GYA108RRB  | T-40243        | 1.85           |          |
| SAS        | 40             | 1 15/16 | 3 15/16 | 1 3/32         | 5 3/8          | 7 1/16  | 1 7/8   | 3/4    | 9/16           | 1 1/32 | 2 1/16         | 1 35/64 | 1/2 | GYAE40RRB  | (T-30484)      | 4.08           |          |
| <b>SAS</b> | <b>1 1/2 H</b> | 53.90   | 100     | 27.8           | 136.5          | 179.4   | 47.6    | 19     | 14.3           | 26.2   | 52.4           | 39.3    | 12  | GYA108RRB  | T-39528        | 1.85           |          |
| SAS        | 50             | 2 1/8   | 3 15/16 | 1 3/32         | 5 3/8          | 7 1/16  | 1 7/8   | 3/4    | 9/16           | 1 1/32 | 2 1/16         | 1 35/64 | 1/2 | GYAE50RRB  |                | 4.08           |          |
| SAS        | 1 5/8          |         |         |                |                |         |         |        |                |        |                |         |     | GYA110RRB  |                |                |          |
| <b>SAS</b> | <b>1 11/16</b> | 53.9    | 106.3   | 28.6           | 149.2          | 191.3   | 51.0    | 19     | 14.3           | 28.6   | 57.9           | 42.1    | 12  | GYA111RRB  | T-40244        | 2.06           |          |
| SAS        | 1 3/4          | 2 1/8   | 4 3/16  | 1 1/8          | 5 7/8          | 7 17/32 | 2       | 3/4    | 9/16           | 1 1/8  | 2 9/32         | 1 21/32 | 1/2 | GYA112RRB  | (T-30682)      | 4.55           |          |
| SAS        | 45             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE45RRB  |                |                |          |
| <b>SAS</b> | <b>1 15/16</b> | 57.2    | 114.3   | 30.9           | 158            | 200     | 55.6    | 19     | 17.5           | 23.8   | 62.7           | 44.4    | 16  | GYA115RRB  | T-40245        | 2.54           |          |
| SAS        | 2 S            | 2 1/4   | 4 1/2   | 1 7/32         | 6 7/32         | 7 7/8   | 2 3/16  | 3/4    | 1 1/16         | 15/16  | 2 15/32        | 1 3/4   | 5/8 | GYA115RRB2 | (T-30706)      | 5.6            |          |
| SAS        | 50             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE50RRB  |                |                |          |
| SAS        | 2              | 63.5    | 126.2   | 31.7           | 176.2          | 222.3   | 58.7    | 20.6   | 18.3           | 29.4   | 69.8           | 46.4    | 16  | GYA200RRB  | T-40246        | 3.02           |          |
| <b>SAS</b> | <b>2 3/16</b>  | 2 1/2   | 4 31/32 | 1 1/4          | 6 15/16        | 8 3/4   | 2 5/16  | 13/16  | 23/32          | 1 5/32 | 2 3/4          | 1 53/64 | 5/8 | GYA203RRB  | (T-30738)      | 6.66           |          |
| SAS        | 55             |         |         |                |                |         |         |        |                |        |                |         |     | GYAE55RRB  |                |                |          |

**Note:** All units have 1/8 pipe thread grease fitting except 1/2-1 1/16 and 3/4 units which have 1/4-28 fitting. Shaft diameter with an S = smaller housing; Shaft diameter with an H = heavier housing.

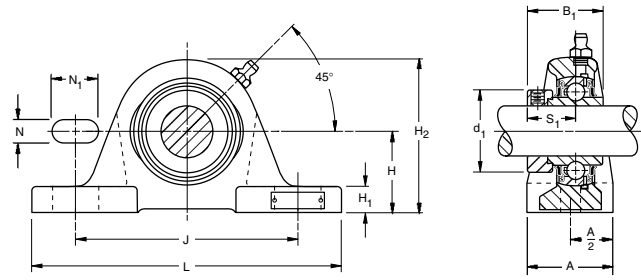




# BALL BEARINGS

## RAKH INDUSTRIAL SERIES

- Timken pillow blocks are similar in design to other standard series, but have slightly different dimensions to allow interchangeability with competitive designs.
- May be used independently or in connection with RAKHL expansion unit shown below. Used in this capacity, the RAKH pillow blocks provide fixed shaft location while the RAKHL expansion units allows for axial movement. Maximum operating temperature for the RAKH units is 250° F (121° C).
- Units are supplied with self-locking collars.
- **Contact your Timken representative to discuss highly corrosive applications (food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RAKH | G-KRRB         | Page D54                    |

Suggested shaft tolerances:  $1\frac{3}{16}'' - 1\frac{15}{16}''$ , nominal to  $-.013$  mm,  $-.0005''$ ;  
 $2'' - 2\frac{15}{16}''$ , nominal to  $-.025$  mm,  $-.0010''$ .

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RAKH 1  $\frac{7}{16}''$ .

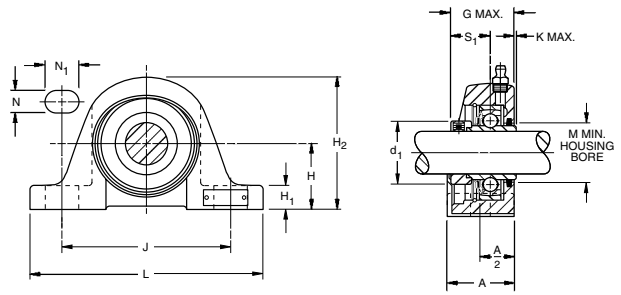
| Unit <sup>(1)</sup> | Shaft Dia.       | H                | H <sub>2</sub>    | B <sub>1</sub>    | J                 | L                | A               | H <sub>1</sub>   | N               | N <sub>1</sub>   | d <sub>1</sub>    | S <sub>1</sub>    | Bolt Size     | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|---------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|-----------------|------------------|-----------------|------------------|-------------------|-------------------|---------------|----------------|---------------|----------------|----------|
|                     |                  | mm               | mm                | mm                | mm                | mm               | mm              | mm               | mm              | mm               | mm                | mm                |               |                |               |                |          |
| RAKH                | 1                | 44.45            | 82.6              | 44.4              | 119.1             | 158.8            | 50.8            | 15.9             | 14.3            | 25.4             | 38.1              | 27                | 9.5           | G1100KRRB      | S1100K        | T-22295        | 1.689    |
|                     |                  | 1 $\frac{3}{4}$  | 3 $\frac{1}{4}$   | 1 $\frac{3}{4}$   | 4 $\frac{11}{16}$ | 6 $\frac{1}{4}$  | 2               | $\frac{5}{8}$    | $\frac{9}{16}$  | 1                | 1 $\frac{1}{2}$   | 1 $\frac{1}{16}$  | $\frac{3}{8}$ |                |               |                | 3.72     |
| RAKH                | $\frac{13}{16}$  | 47.63            | 90.5              | 48.4              | 127               | 174.6            | 57.2            | 17.5             | 14.3            | 25.4             | 44.1              | 30.2              | 12.7          | G1103KRRB      | S1103K        | T-22216        | 2.184    |
|                     |                  | 1 $\frac{7}{8}$  | 3 $\frac{9}{16}$  | 1 $\frac{29}{32}$ | 5                 | 6 $\frac{7}{8}$  | 2 $\frac{1}{4}$ | $\frac{11}{16}$  | $\frac{9}{16}$  | 1                | 1 $\frac{47}{64}$ | 1 $\frac{3}{16}$  | $\frac{1}{2}$ |                |               |                | 4.81     |
| RAKH                | $\frac{11}{4}$   | 53.98            | 101.6             | 51.2              | 144.5             | 203.2            | 57.2            | 19               | 14.3            | 30.2             | 54                | 32.5              | 12.7          | G1104KRRB      | S1104K        | T-22212        | 2.915    |
| RAKH                | $\frac{17}{16}$  | 2 $\frac{1}{8}$  | 4                 | 2 $\frac{1}{64}$  | 5 $\frac{11}{16}$ | 8                | 2 $\frac{1}{4}$ | $\frac{3}{4}$    | $\frac{9}{16}$  | 1 $\frac{3}{16}$ | 2 $\frac{1}{8}$   | 1 $\frac{9}{32}$  | $\frac{1}{2}$ | G1107KRRB      | S1107K        |                | 6.42     |
| RAKH                | $\frac{11}{2}$   | 58.74            | 111.1             | 56.4              | 155.6             | 222.2            | 66.7            | 20.6             | 17.5            | 31.8             | 60.3              | 34.9              | 12.7          | G1108KRRB      | S1108KT       |                | 4.004    |
|                     |                  | 2 $\frac{5}{16}$ | 4 $\frac{3}{8}$   | 2 $\frac{7}{32}$  | 6 $\frac{1}{8}$   | 8 $\frac{3}{4}$  | 2 $\frac{5}{8}$ | $\frac{13}{16}$  | $\frac{11}{16}$ | 1 $\frac{1}{4}$  | 2 $\frac{3}{8}$   | 1 $\frac{3}{8}$   | $\frac{1}{2}$ |                |               | T-22291        | 8.82     |
| RAKH                | $\frac{111}{16}$ | 58.74            | 114.3             | 56.4              | 155.6             | 222.2            | 66.7            | 20.6             | 17.5            | 33.3             | 63.5              | 34.9              | 12.7          | G1111KRRB      | S1111K        | T-22293        | 4.032    |
| RAKH                | $\frac{13}{4}$   | 2 $\frac{5}{16}$ | 4 $\frac{1}{2}$   | 2 $\frac{7}{32}$  | 6 $\frac{1}{8}$   | 8 $\frac{3}{4}$  | 2 $\frac{5}{8}$ | $\frac{13}{16}$  | $\frac{11}{16}$ | 1 $\frac{5}{16}$ | 2 $\frac{1}{2}$   | 1 $\frac{3}{8}$   | $\frac{1}{2}$ | G1112KRRB      | S1112K        |                | 8.88     |
| RAKH                | $\frac{115}{16}$ | 63.5             | 122.2             | 62.7              | 171.4             | 241.3            | 73              | 22.2             | 17.5            | 36.5             | 69.8              | 38.1              | 12.7          | G1115KRRB      | S1115K        | T-22214        | 5.098    |
|                     |                  | 2 $\frac{1}{2}$  | 4 $\frac{13}{16}$ | 2 $\frac{15}{32}$ | 6 $\frac{3}{4}$   | 9 $\frac{1}{2}$  | 2 $\frac{7}{8}$ | $\frac{7}{8}$    | $\frac{11}{16}$ | 1 $\frac{7}{16}$ | 2 $\frac{3}{4}$   | 1 $\frac{1}{2}$   | $\frac{1}{2}$ |                |               |                | 11.23    |
| RAKH                | $\frac{23}{16}$  | 69.85            | 136.5             | 71.4              | 184.2             | 260.4            | 79.4            | 27               | 20.6            | 36.5             | 76.2              | 43.7              | 15.9          | G1203KRRB      | S1203K        | T-22297        | 6.728    |
| RAKH                | 55               | 2 $\frac{3}{4}$  | 5 $\frac{3}{8}$   | 2 $\frac{13}{16}$ | 7 $\frac{1}{4}$   | 10 $\frac{1}{4}$ | 3 $\frac{1}{8}$ | 1 $\frac{1}{16}$ | $\frac{13}{16}$ | 1 $\frac{7}{16}$ | 3                 | 1 $\frac{23}{32}$ | $\frac{5}{8}$ | GE55KRRB       | SE55K         |                | 14.82    |
| RAKH                | $\frac{27}{16}$  | 76.2             | 150.8             | 77.8              | 203.2             | 285.8            | 82.6            | 27               | 20.6            | 41.3             | 84.1              | 46.8              | 15.9          | G1207KRRB      | S1207K        |                |          |
|                     |                  | 3                | 5 $\frac{15}{16}$ | 3 $\frac{1}{16}$  | 8                 | 11 $\frac{1}{4}$ | 3 $\frac{1}{4}$ | 1 $\frac{1}{16}$ | $\frac{13}{16}$ | 1 $\frac{5}{8}$  | 3 $\frac{5}{16}$  | 1 $\frac{27}{32}$ | $\frac{5}{8}$ |                |               | T-22299        | 8.217    |
| RAKH                | $\frac{211}{16}$ | 88.9             | 171.4             | 85.7              | 228.6             | 330.2            | 88.9            | 28.6             | 23.8            | 50.8             | 96.8              | 45.2              | 19            | G1211KRRB      | S1211K        | T-22303        | 11.495   |
|                     |                  | 3 $\frac{1}{2}$  | 6 $\frac{3}{4}$   | 3 $\frac{3}{8}$   | 9                 | 13               | 3 $\frac{1}{2}$ | 1 $\frac{1}{8}$  | $\frac{15}{16}$ | 2                | 3 $\frac{13}{16}$ | 1 $\frac{25}{32}$ | $\frac{3}{4}$ |                |               |                | 25.32    |
| RAKH                | $\frac{215}{16}$ | 88.9             | 177.8             | 92.1              | 228.6             | 330.2            | 88.9            | 31.8             | 23.8            | 50.8             | 101.6             | 54.8              | 19            | G1215KRRB      | S1215K        |                | 11.795   |
|                     |                  | 3 $\frac{1}{2}$  | 7                 | 3 $\frac{5}{8}$   | 9                 | 13               | 3 $\frac{1}{2}$ | 1 $\frac{1}{4}$  | $\frac{15}{16}$ | 2                | 4                 | 2 $\frac{5}{32}$  | $\frac{3}{4}$ |                |               | T-22305        | 25.98    |

<sup>(1)</sup> When used with the expansion unit, specify both units, shaft diameter and suffix.

### RAKHL EXPANSION SERIES

- Designed to allow axial shaft expansion caused by elevated temperatures or other conditions that lead to shaft movement.
- Designed for use with the RAKH pillow blocks.
- RAKH units provide axial shaft location and the RAKHL allows shaft floatation.
- Due to limitations of the lubricant and seal material, the maximum operating temperature for the RAKHL units is 250° F (121° C).
- Units are supplied with self-locking collars.
- Steel “S” ring assures axial expansion.

**Suggested shaft tolerances:** 1 3/16" - 1 15/16", nominal to **-0.013 mm, -0.0005"**;  
2" - 2 15/16", nominal to **-0.025 mm, -0.0010"**.



BEARING DATA

| Unit  | Bearing Number | Dimensions and Load Ratings |
|-------|----------------|-----------------------------|
| RAKHL | KRS            | Page D53                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RAKHL 2 7/16".

| Unit                 | Shaft Dia. | Total Float | H              | H <sub>2</sub>  | G                | J                | L                | A              | H <sub>1</sub> | N             | N <sub>1</sub> | K            | d <sub>1</sub> | S <sub>1</sub>  | M                | Bolt Size   | Bearing Number     | Collar Number    | Housing Number | Unit Wt.        |
|----------------------|------------|-------------|----------------|-----------------|------------------|------------------|------------------|----------------|----------------|---------------|----------------|--------------|----------------|-----------------|------------------|-------------|--------------------|------------------|----------------|-----------------|
|                      | in.        | mm in.      | mm in.         | mm in.          | mm in.           | mm in.           | mm in.           | mm in.         | mm in.         | mm in.        | mm in.         | mm in.       | mm in.         | mm in.          | mm in.           | mm in.      |                    |                  | new            | kg lbs.         |
| RAKHL                | 1 3/16     | 3.2<br>1/8  | 47.63<br>1 7/8 | 96.8<br>3 13/16 | 49.2<br>1 15/16  | 127<br>5         | 174.6<br>6 7/8   | 50.8<br>2      | 17.5<br>11/16  | 14.3<br>9/16  | 25.4<br>1      | 2.4<br>3/32  | 44.5<br>1 3/4  | 30.2<br>1 3/16  | 41.7<br>1 41/64  | 12.7<br>1/2 | 1103KRS            | S1103K           | A11414         | 2.182<br>4.81   |
| RAKHL                | 1 7/16     | 4.8<br>3/16 | 53.98<br>2 1/8 | 106.4<br>4 3/16 | 55.2<br>2 11/64  | 144.5<br>5 11/16 | 201.6<br>7 15/16 | 51.6<br>2 1/32 | 19<br>3/4      | 14.3<br>9/16  | 30.2<br>1 3/16 | 3.2<br>1/8   | 54<br>2 1/8    | 32.5<br>1 9/32  | 48.02<br>1 57/64 | 12.7<br>1/2 | 1106KRS<br>1107KRS | S1106K<br>S1107K | A11199         | 2.912<br>6.42   |
| RAKHL                | 1 15/16    | 6.4<br>1/4  | 63.5<br>2 1/2  | 129.4<br>5 3/32 | 65.1<br>2 9/16   | 171.4<br>6 3/4   | 241.3<br>9 1/2   | 63.5<br>2 1/2  | 22.2<br>7/8    | 17.5<br>11/16 | 36.5<br>1 7/16 | 4<br>5/32    | 69.8<br>2 3/4  | 38.1<br>1 1/2   | 63.9<br>2 33/64  | 12.7<br>1/2 | 1115KRS            | S1115K           | A11357         | 5.094<br>11.23  |
| RAKHL                | 2 3/16     | 6.4<br>1/4  | 69.85<br>2 3/4 | 142.9<br>5 5/8  | 73.4<br>2 57/64  | 184.2<br>7 1/4   | 260.4<br>10 1/4  | 76.2<br>3      | 27<br>1 1/16   | 20.6<br>13/16 | 36.5<br>1 7/16 | 4.4<br>11/64 | 76.2<br>3      | 43.7<br>1 23/32 | 71<br>2 51/64    | 15.9<br>5/8 | 1203KRS            | S1203K           | A11358         | 6.722<br>14.82  |
| RAKHL <sup>(1)</sup> | 2 7/16     | 6.4<br>1/4  | 76.2<br>3      | 158.8<br>6 1/4  | 78.6<br>3 3/32   | 203.2<br>8       | 285.8<br>11 1/4  | 82.6<br>3 1/4  | 27<br>1 1/16   | 20.6<br>13/16 | 41.3<br>1 5/8  | 4.8<br>3/16  | 84.1<br>3 5/16 | 46.8<br>1 27/32 | 78.2<br>3 5/64   | 15.9<br>5/8 | 1207KRS            | S1207K           | —              | 8.210<br>18.1   |
| RAKHL                | 2 15/16    | 6.4<br>1/4  | 88.9<br>3 1/2  | 181<br>7 1/4    | 113.5<br>3 15/32 | 228.6<br>9       | 330.2<br>13      | 88.9<br>3 1/2  | 31.8<br>1 1/4  | 23.8<br>15/16 | 50.8<br>2      | 8.7<br>11/32 | 101.6<br>4     | 54.8<br>2 5/32  | 118.7<br>3 43/64 | 19<br>3/4   | 1215KRS            | S1215K           | T-28261        | 11.785<br>25.98 |

<sup>(1)</sup> Special order.

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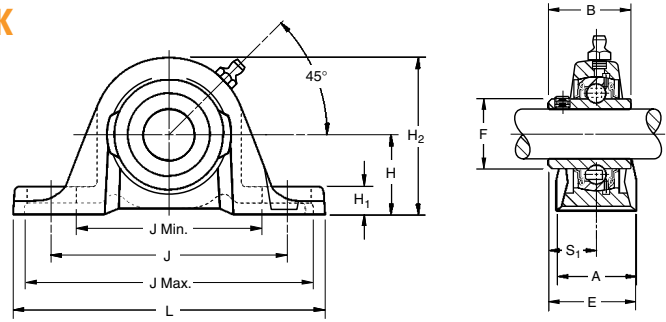


# BALL BEARINGS

## YASM MEDIUM DUTY SERIES SETSCREW LOCK

- Timken YASM medium-duty pillow blocks feature the GYM-KRRB bearing inserts.
- Ideal for conveyor, fan and blower, sawmill, and feed and grain handling applications.
- Cast iron housings are durable, powder-paint coated and maintain an excellent finish while resisting corrosion, chemicals and weather exposure.
- Incorporates premium features designed to extend bearing life.

**Suggested shaft tolerances:** 1" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3", nominal to -.025 mm, -.0010".



BEARING DATA

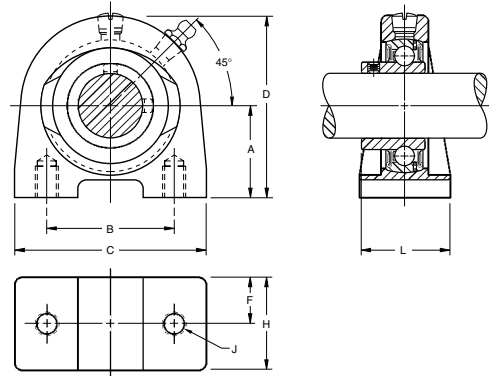
| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YASM | GYM-KRRB       | Page D68                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YASM 1 7/16".

| Unit | Shaft Dia. | H                | H <sub>2</sub>  | B                | L                | J              | J Min.           | J Max.           | A               | H <sub>1</sub> | F              | S <sub>1</sub> | E                | Bolt Size | Bearing Number |
|------|------------|------------------|-----------------|------------------|------------------|----------------|------------------|------------------|-----------------|----------------|----------------|----------------|------------------|-----------|----------------|
|      | in.        | mm in.           | mm in.          | mm in.           | mm in.           | mm in.         | mm in.           | mm in.           | mm in.          | mm in.         | mm in.         | mm in.         | mm in.           | mm in.    |                |
| YASM | 1          | 42.86<br>1 11/16 | 83.3<br>3 9/32  | 38.1<br>1 1/2    | 157.2<br>6 3/16  | 117.5<br>4 5/8 | 93.7<br>3 11/16  | 141.3<br>5 9/16  | 39.7<br>1 9/16  | 16.7<br>21/32  | 40.31<br>1.587 | 22.2<br>7/8    | 42.07<br>1 21/32 | 12<br>1/2 | GYM1100KRRB    |
| YASM | 1 3/16     | 47.62<br>1 7/8   | 93.6<br>3 11/16 | 42.9<br>1 11/16  | 166.7<br>6 9/16  | 130.2<br>5 1/8 | 105.6<br>4 5/32  | 154.8<br>6 3/32  | 45.2<br>1 25/32 | 18.3<br>23/32  | 48.84<br>1.844 | 25.4<br>1      | 48.02<br>1 57/64 | 12<br>1/2 | GYM1103KRRB    |
| YASM | 1 7/16     | 53.98<br>2 1/8   | 104.8<br>4 1/8  | 49.2<br>1 15/16  | 179.4<br>7 1/16  | 136.5<br>5 3/8 | 110.3<br>4 11/32 | 162.7<br>6 13/16 | 47.6<br>1 7/8   | 23<br>29/32    | 52.27<br>2.058 | 30.2<br>1 3/16 | 53.98<br>2 1/8   | 12<br>1/2 | GYM1107KRRB    |
| YASM | 1 1/2      | 53.98<br>2 1/8   | 106.3<br>4 3/16 | 49.2<br>1 15/16  | 191.3<br>7 11/32 | 149.2<br>5 7/8 | 120.7<br>4 3/4   | 177.8<br>7       | 50.8<br>2       | 19.1<br>3/4    | 57.92<br>2.28  | 30.2<br>1 3/16 | 55.56<br>2 3/16  | 12<br>1/2 | GYM1108KRRB    |
| YASM | 1 11/16    | 57.15            | 114.3           | 51.6             | 200              | 157.9          | 134.1            | 183.4            | 55.6            | 19.1           | 62.84          | 32.5           | 60.33            | 16        | GYM1111KRRB    |
| YASM | 1 3/4      | 2 1/4            | 4 1/2           | 2 1/32           | 7 7/8            | 6 7/32         | 5 9/32           | 7 5/32           | 2 3/16          | 3/4            | 2.474          | 1 9/32         | 2 3/8            | 5/8       | GYM1112KRRB    |
| YASM | 1 15/16    | 63.5             | 126.2           | 55.6             | 222.3            | 176.2          | 146.9            | 205.6            | 54.8            | 20.6           | 69.77          | 33.3           | 61.91            | 16        | GYM1115KRRB    |
| YASM | 2          | 2 1/2            | 4 31/32         | 2 3/16           | 8 3/4            | 6 15/16        | 5 25/32          | 8 3/32           | 2 5/32          | 13/16          | 2.747          | 1 5/16         | 2 7/16           | 5/8       | GYM1200KRRB    |
| YASM | 2 3/16     | 69.85            | 138.9           | 65.1             | 239.7            | 188.1          | 158.8            | 217.5            | 60.3            | 23.8           | 76.48          | 39.1           | 69.85            | 16        | GYM1203KRRB    |
| YASM | 2 1/4      | 2 3/4            | 5 15/32         | 2 9/16           | 9 7/16           | 7 13/32        | 6 1/4            | 8 9/16           | 2 3/8           | 15/16          | 3.011          | 1 9/16         | 2 3/4            | 5/8       | GYM1204KRRB    |
| YASM | 2 7/16     | 76.2             | 153.99          | 77.78            | 266.7            | 203.2          | 168.28           | 238.13           | 73.02           | 33.34          | 86.92          | 42.86          | 79.375           | 20        | GYM1207KRRB    |
| YASM | 2 1/2      | 3                | 6 1/16          | 3 1/16           | 10 1/2           | 8              | 6 5/8            | 9 3/8            | 2 7/8           | 1 5/16         | 3.422          | 1 11/16        | 3 1/8            | 3/4       | GYM1208KRRB    |
| YASM | 2 11/16    | 88.9<br>3 1/2    | 177.8<br>7      | 93.66<br>3 11/16 | 330.2<br>13      | 228.6<br>9     | 177.8<br>7       | 279.4<br>11      | 88.90<br>3 1/2  | 31.75<br>1 1/4 | 91.90<br>3.618 | 44.45<br>1 3/4 | 93.66<br>3 11/16 | 20<br>3/4 | GYM1211KRRB    |
| YASM | 2 15/16    | 88.9             | 177.8           | 93.66            | 330.2            | 228.6          | 177.8            | 279.4            | 88.90           | 31.75          | 91.90          | 44.45          | 93.66            | 20        | GYM1215KRRB    |
| YASM | 3          | 3 1/2            | 7               | 3 11/16          | 13               | 9              | 7                | 11               | 3 1/2           | 1 1/4          | 3.618          | 1 3/4          | 3 11/16          | 3/4       | GYM1300KRRB    |

### STB SERIES

- STB two-bolt housed units come assembled and ready for mounting.
- Ideal for applications where space is limited, bolt screws are accessed from the bottom of the unit, loads are not severe and reversing moments are not encountered.
- Units are assembled with GYA-RRB bearings with positive contact land-riding seals and setscrew locking.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| STB  | GYA-RRB        | Page D59                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: STB 1".

| Unit | Shaft Dia. |         | A       | B     | C      | D       | F      | H      | J       | L       | Bearing Number | Housing Number |
|------|------------|---------|---------|-------|--------|---------|--------|--------|---------|---------|----------------|----------------|
|      | mm         | in.     |         |       |        |         |        |        |         |         |                |                |
| STB  |            | 3/4     | 32.3    | 50.8  | 73.03  | 71.12   | 18.3   | 36.5   | 3/8-16  | 36.5    | GYA012RRB      | T-90001        |
| STB  | 20         |         | 1 5/16  | 2     | 2 7/8  | 2 13/32 | 2 3/32 | 1 7/16 |         | 1 7/16  | GYAE20RRB      |                |
| STB  |            | 7/8     |         |       |        |         |        |        |         |         | GYA014RRB      |                |
| STB  |            | 15/16   | 36.5    | 50.8  | 76.2   | 71.44   | 18.3   | 36.5   | 3/8-16  | 37.7    | GYA015RRB      | T-39343        |
| STB  | 1          |         | 1 7/16  | 2     | 3      | 2 13/16 | 2 3/32 | 1 7/16 |         | 1 31/64 | GYA100RRB      |                |
| STB  | 25         |         |         |       |        |         |        |        |         |         | GYAE25RRB      |                |
| STB  |            | 1 1/8   |         |       |        |         |        |        |         |         | GYA102RRB      | T-90003        |
| STB  |            | 1 3/16  | 42.9    | 76.2  | 101.6  | 82.6    | 19.05  | 38.1   | 7/16-14 | 42.07   | GYA103RRB      |                |
| STB  |            | 1 1/4 S | 1 11/16 | 3     | 4      | 3 1/4   | 3/4    | 1 1/2  |         | 1 21/32 | GYA103RRB2     |                |
| STB  | 30         |         |         |       |        |         |        |        |         |         | GYAE30RRB      |                |
| STB  |            | 1 1/4   |         |       |        |         |        |        |         |         | GYA104RRB      |                |
| STB  |            | 1 3/8   | 47.6    | 82.6  | 107.95 | 93.66   | 22.23  | 44.45  | 1/2-13  | 48.02   | GYA106RRB      | T-40256        |
| STB  |            | 1 7/16  | 1 7/8   | 3 1/4 | 4 1/4  | 3 11/16 | 7/8    | 1 3/4  |         | 1 57/64 | GYA107RRB3     |                |
| STB  | 35         |         |         |       |        |         |        |        |         |         | GYAE35RRB      |                |
| STB  |            | 1 1/2   | 49.2    | 88.9  | 117.48 | 100.01  | 23.81  | 47.63  | 1/2-13  | 51.2    | GYA108RRB      | T-90005        |
| STB  | 40         |         | 1 15/16 | 3 1/2 | 4 5/8  | 3 15/16 | 1 5/16 | 1 7/8  |         | 2 1/64  | GYAE40RRB      |                |
| STB  |            | 1 5/8   |         |       |        |         |        |        |         |         | GYA110RRB      |                |
| STB  |            | 1 11/16 | 54      | 95.25 | 127    | 107.95  | 25.4   | 50.8   | 1/2-13  | 53.98   | GYA111RRB      | T-90008        |
| STB  |            | 1 3/4   | 2 1/8   | 3 3/4 | 5      | 4 1/4   | 1      | 2      |         | 2 1/8   | GYA112RRB      |                |
| STB  | 45         |         |         |       |        |         |        |        |         |         | GYAE45RRB      |                |
| STB  |            | 1 15/16 | 57.2    | 101.6 | 139.7  | 114.3   | 25.4   | 50.8   | 5/8-11  | 56.36   | GYA115RRB      | T-90010        |
| STB  |            | 2       | 2 1/4   | 4     | 5 1/2  | 4 1/2   | 1      | 2      |         | 2 7/32  | GYA200RRB      |                |
| STB  | 50         |         |         |       |        |         |        |        |         |         | GYAE50RRB      |                |

Shaft diameter with an S = smaller housing.

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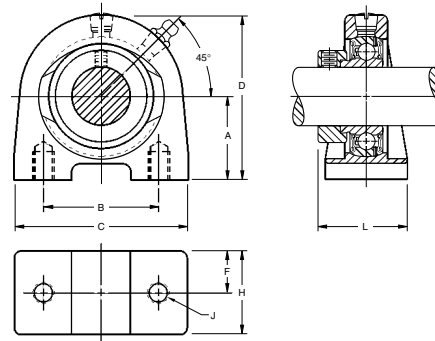




# BALL BEARINGS

## VTB SERIES

- VTB two-bolt housed units are nearly identical to the STB unit, except they are assembled with the GRA-RRB bearings and positive contact R-Seals and locking collar.



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| VTB  | GRA-RRB        | Page D57                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VTB 1".

| Unit | Shaft Dia. | A         | B         | C         | D         | F         | H         | J         | L         | Bearing Number | Collar Number | Housing Number |
|------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|---------------|----------------|
|      | mm<br>in.  | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. |                |               |                |
| VTB  | 3/4        | 32.3      | 50.8      | 73.03     | 71.12     | 18.3      | 36.5      | 3/8-16    | 41.67     | GRA012RRB      | S1012K        | T-90001        |
| VTB  | 20         | 1 5/16    | 2         | 2 7/8     | 2 13/32   | 23/32     | 1 7/16    |           | 1 41/64   | GRAE20RRB      | SE20K         |                |
| VTB  | 7/8        |           |           |           |           |           |           |           |           | GRA014RRB      | S1014K        |                |
| VTB  | 15/16      | 36.5      | 50.8      | 76.2      | 71.44     | 18.3      | 36.5      | 3/8-16    | 41.67     | GRA015RRB      | S1015K        | T-39343        |
| VTB  | 1          | 1 7/16    | 2         | 3         | 2 13/16   | 23/32     | 1 7/16    |           | 1 41/64   | GRA100RRB      | S1100K C2     |                |
| VTB  | 25         |           |           |           |           |           |           |           |           | GRAE25RRB      | SE25K         |                |
| VTB  | 1 1/8      |           |           |           |           |           |           |           |           | GRA102RRB      | S1102K        |                |
| VTB  | 1 3/16     | 42.9      | 76.2      | 101.6     | 82.6      | 19.05     | 38.1      | 7/16-14   | 45.64     | GRA103RRB      | S1103K        | T-90003        |
| VTB  | 1 1/4 S    | 1 11/16   | 3         | 4         | 3 1/4     | 3/4       | 1 1/2     |           | 1 51/64   | GRA103RRB2     | S1103K3       |                |
| VTB  | 30         |           |           |           |           |           |           |           |           | GRAE30RRB      | SE30K         |                |
| VTB  | 1 1/4      |           |           |           |           |           |           |           |           | GRA104RRB      | S1104K C1     |                |
| VTB  | 1 3/8      | 47.6      | 82.6      | 107.95    | 93.66     | 22.23     | 44.45     | 1/2-13    | 51.6      | GRA106RRB      | S1106K C1     | T-40256        |
| VTB  | 1 7/16     | 1 7/8     | 3 1/4     | 4 1/4     | 3 11/16   | 7/8       | 1 3/4     |           | 2 1/32    | GRA107RRB3     | S1107K C1     |                |
| VTB  | 35         |           |           |           |           |           |           |           |           | GRAE35RRB      | SE35K         |                |
| VTB  | 1 1/2      | 49.2      | 88.9      | 117.48    | 100.01    | 23.81     | 47.63     | 1/2-13    | 56.36     | GRA108RRB      | S1108KT       | T-90005        |
| VTB  | 40         | 1 15/16   | 3 1/2     | 4 5/8     | 3 15/16   | 15/16     | 1 7/8     |           | 2 7/32    | GRAE40RRB      | SE40K         |                |
| VTB  | 1 5/8      |           |           |           |           |           |           |           |           | GRA110RRB      | S1110K        |                |
| VTB  | 1 11/16    | 54        | 95.25     | 127       | 107.95    | 25.4      | 50.8      | 1/2-13    | 57.94     | GRA111RRB      | S1111K        | T-90008        |
| VTB  | 1 3/4      | 2 1/8     | 3 3/4     | 5         | 4 1/4     | 1         | 2         |           | 2 9/32    | GRA112RRB      | S1112K        |                |
| VTB  | 45         |           |           |           |           |           |           |           |           | GRAE45RRB      | SE45K         |                |
| VTB  | 1 15/16    | 57.2      | 101.6     | 139.7     | 114.3     | 25.4      | 50.8      | 5/8-11    | 57.94     | GRA115RRB      | S1115K        | T-90010        |
| VTB  | 2 S        | 2 1/4     | 4         | 5 1/2     | 4 1/2     | 1         | 2         |           | 2 9/32    | GRA200RRB      | S1115K2       |                |
| VTB  | 50         |           |           |           |           |           |           |           |           | GRAE50RRB      | SE50K         |                |

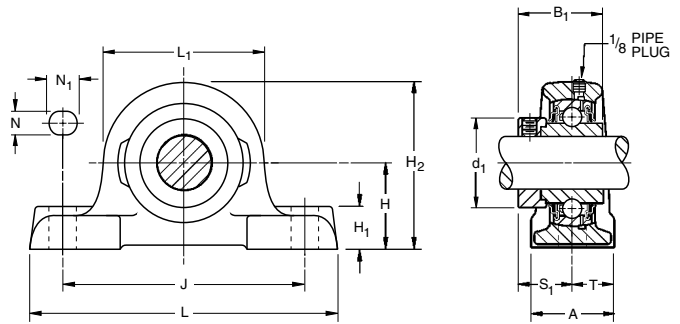
Shaft diameter with an S = smaller housing.

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### RAO, LAO HEAVY SERIES

- Compact, economic, heavy-duty ball bearing housed unit.
- Incorporates the tested and proven features of the Timken standard RAK Series pillow block.
- RAO Series bearings are equipped to handle heavy capacity.
- LAO Series bearings are equipped with heavy series GN-KLLB wide inner ring bearings.
- Units are supplied with a self-locking collar that eliminate shaft shoulders, machining adapters and sleeves, and locknuts that provide easy mounting.

**Suggested shaft tolerances:**     **1 3/16" - 1 15/16", nominal to -.013 mm, -.0005";**  
**2" - 2 15/16", nominal to -.025 mm, -.0010".**



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RAO  | GN-KRRB        | Page D55                    |
| LAO  | GN-KLLB        | Page D64                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RAO 1 7/16".**

| Unit <sup>(1)</sup> | Shaft Dia. | H                | H <sub>2</sub>   | B <sub>1</sub> | L <sub>1</sub>   | J               | L                | A               | H <sub>1</sub> | N           | N <sub>1</sub> | d <sub>1</sub>  | S <sub>1</sub>  | T               | Bolt Size   | Bearing Number | Collar Number | Housing Number | Unit Wt.        |
|---------------------|------------|------------------|------------------|----------------|------------------|-----------------|------------------|-----------------|----------------|-------------|----------------|-----------------|-----------------|-----------------|-------------|----------------|---------------|----------------|-----------------|
|                     | in.        | mm in.           | mm in.           | mm in.         | mm in.           | mm in.          | mm in.           | mm in.          | mm in.         | mm in.      | mm in.         | mm in.          | mm in.          | mm in.          | mm in.      |                |               | new            | kg lbs.         |
| RAO                 | 1 3/16     | 47.63<br>1 7/8   | 93.7<br>3 11/16  | 50<br>1 31/32  | 90.5<br>3 9/16   | 136.5<br>5 3/8  | 173<br>6 13/16   | 49.2<br>1 15/16 | 22.2<br>7/8    | 15.9<br>5/8 | 19<br>3/4      | 49.2<br>1 15/16 | 32.5<br>1 9/32  | 24.6<br>31/32   | 12.7<br>1/2 | GN103KRRB      | SN103K        | T-18798        | 1.898<br>4.18   |
| RAO                 | 1 7/16     | 53.98<br>2 1/8   | 104<br>4 3/32    | 51.6<br>2 1/32 | 101.6<br>4       | 152.4<br>6      | 192.1<br>7 9/16  | 54<br>2 1/8     | 23.8<br>15/16  | 15.9<br>5/8 | 19<br>3/4      | 55.6<br>2 3/16  | 33.3<br>1 5/16  | 27<br>1 1/16    | 12.7<br>1/2 | GN107KRRB      | SN107K        | T-18626        | 2.406<br>5.30   |
| RAO                 | 1 1/2      | 60.33<br>2 3/8   | 117.5<br>4 5/8   | 57.2<br>2 1/4  | 114.3<br>4 1/2   | 171.4<br>6 3/4  | 215.9<br>8 1/2   | 60.3<br>2 3/8   | 27<br>1 1/16   | 19<br>3/4   | 25.4<br>1      | 63.5<br>2 1/2   | 37.3<br>1 15/32 | 30.2<br>1 3/16  | 15.9<br>5/8 | GN108KRRB      | SN108K        | T-18800        | 3.755<br>8.27   |
| RAO                 | 1 11/16    | 66.68<br>2 5/8   | 130.2<br>5 1/8   | 58.7<br>2 5/16 | 127<br>5         | 190.5<br>7 1/2  | 239.7<br>9 7/16  | 66.7<br>2 5/8   | 30.2<br>1 3/16 | 19<br>3/4   | 25.4<br>1      | 69.8<br>2 3/4   | 38.9<br>1 17/32 | 33.3<br>1 5/16  | 15.9<br>5/8 | GN111KRRB      | SN111K        | T-18802        | 5.03<br>11.08   |
| RAO                 | 1 15/16    | 71.44<br>2 13/16 | 141.3<br>5 9/16  | 66.7<br>2 9/8  | 138.1<br>5 7/16  | 209.6<br>8 1/4  | 265.1<br>10 7/16 | 73<br>2 7/8     | 33.3<br>1 5/16 | 19<br>3/4   | 25.4<br>1      | 76.2<br>3       | 42.1<br>1 21/32 | 36.5<br>1 7/16  | 15.9<br>5/8 | GN115KRRB      | SN115K        | T-18804        | 6.265<br>13.80  |
| RAO                 | 2 3/16     | 77.79<br>3 1/16  | 153.2<br>6 1/32  | 73<br>2 7/8    | 150.8<br>5 15/16 | 228.6<br>9      | 287.3<br>11 5/16 | 79.4<br>3 1/8   | 36.5<br>1 7/16 | 22.2<br>7/8 | 28.6<br>1 1/8  | 82.6<br>3 1/4   | 45.2<br>1 25/32 | 39.7<br>1 9/16  | 19<br>3/4   | GN203KRRB      | SN203K        | T-18806        | 7.94<br>17.49   |
| RAO                 | 2 7/16     | 84.14<br>3 5/16  | 165.9<br>6 17/32 | 79.4<br>3 1/8  | 163.5<br>6 7/16  | 247.6<br>9 3/4  | 312.7<br>12 5/16 | 84.1<br>3 5/16  | 38.1<br>1 1/2  | 22.2<br>7/8 | 28.6<br>1 1/8  | 88.9<br>3 1/2   | 48.4<br>1 29/32 | 42.1<br>1 21/32 | 19<br>3/4   | GN207KRRB      | SN207K        | T-18808        | 9.761<br>21.50  |
| RAO                 | 2 11/16    | 96.84<br>3 13/16 | 192.1<br>7 9/16  | 88.9<br>3 1/2  | 188.9<br>7 7/16  | 285.8<br>11 1/4 | 360.4<br>14 3/16 | 96<br>3 13/16   | 44.4<br>1 3/4  | 25.4<br>1   | 33.3<br>1 5/16 | 101.6<br>4      | 54.8<br>2 5/32  | 48.4<br>1 29/32 | 22.2<br>7/8 | GN211KRRB      | SO211K        | T-18810        | 15.322<br>33.75 |
| RAO                 | 2 15/16    | 104.78<br>4 1/8  | 204.8<br>8 1/16  | 100<br>3 15/16 | 201.6<br>7 15/16 | 304.8<br>12     | 384.2<br>15 1/8  | 103.2<br>4 1/16 | 47.6<br>1 7/8  | 25.4<br>1   | 33.3<br>1 5/16 | 112.7<br>4 7/16 | 62.7<br>2 15/32 | 51.6<br>2 1/32  | 22.2<br>7/8 | GN215KRRB      | SN215K        | T-18601        | 18.205<br>40.10 |

<sup>(1)</sup> LAO assembled with GN-KLLB bearing.



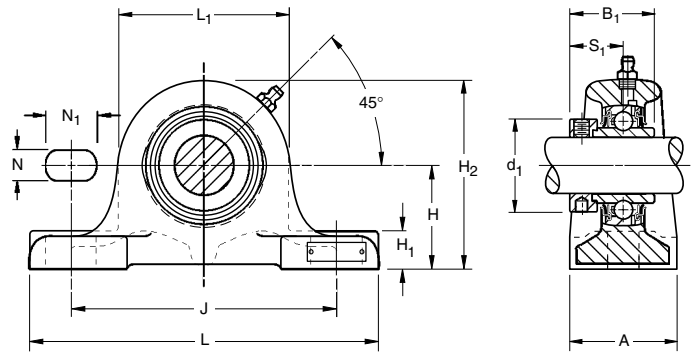


# BALL BEARINGS

## RSA, LSA INDUSTRIAL SERIES

- RSA Series are equipped with G-KRRB wide inner ring ball bearings.
- LSA Series are equipped with G-KLLB wide inner ring bearings.
- Pillow blocks are prelubricated and ready for immediate use.
- Grease fitting is provided for relubrication if required.
- All units are supplied with a self-locking collar.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RSA  | G-KRRB         | Page D54                    |
| LSA  | G-KLLB         | Page D62                    |

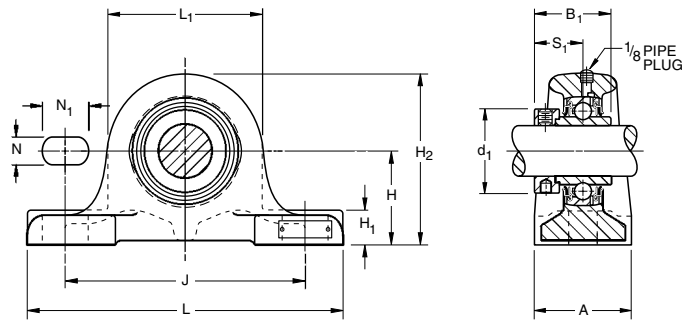
TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RSA 1 7/16". POPULAR SIZES ARE IN BOLD.

| Unit            | Shaft Dia.     | H      | H <sub>2</sub> | B <sub>1</sub> | L <sub>1</sub> | J       | L       | A      | H <sub>1</sub> | N      | N <sub>1</sub> | d <sub>1</sub> | S <sub>1</sub> | Bolt Size | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|-----------------|----------------|--------|----------------|----------------|----------------|---------|---------|--------|----------------|--------|----------------|----------------|----------------|-----------|----------------|---------------|----------------|----------|
|                 |                | mm in. | mm in.         | mm in.         | mm in.         | mm in.  | mm in.  | mm in. | mm in.         | mm in. | mm in.         | mm in.         | mm in.         |           |                |               |                |          |
| RSA             | 1/2            |        |                |                |                |         |         |        |                |        |                |                |                |           | G1008KRRB      | S1008K        |                |          |
| RSA             | 5/8            | 31.75  | 58.7           | 37.3           | 54             | 96.8    | 122.2   | 31.8   | 12.7           | 11.1   | 14.3           | 30.2           | 23.4           | 9.5       | G1010KRRB      | S1010K        | T-22784        | 0.681    |
| RSA             | 11/16          | 1 1/4  | 2 5/16         | 1 15/32        | 2 1/8          | 3 13/16 | 4 13/16 | 1 1/4  | 1/2            | 7/16   | 9/16           | 1 3/16         | 59/64          | 3/8       | G1011KRRB      | S1011K        |                | 1.50     |
| RSA             | 17             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE17KRRB       | SE17K         |                |          |
| <b>RSA</b>      | <b>3/4</b>     | 44.45  | 76.2           | 43.7           | 63.5           | 127.0   | 165.1   | 50.8   | 14.3           | 14.3   | 19             | 33.3           | 26.6           | 12.7      | G1012KRRB      | S1012K        | T-22741        | 1.226    |
| RSA             | 20             | 1 3/4  | 3              | 1 23/32        | 2 1/2          | 5       | 6 1/2   | 2      | 9/16           | 9/16   | 3/4            | 1 5/16         | 1 3/64         | 1/2       | GE20KRRB       | SE20K         |                | 2.70     |
| RSA             | 7/8            |        |                |                |                |         |         |        |                |        |                |                |                |           | G1014KRRB      | S1014K        |                |          |
| RSA             | 15/16          | 50.80  | 85.7           | 44.4           | 69.8           | 139.7   | 177.8   | 54     | 15.9           | 14.3   | 19             | 38.1           | 27             | 12.7      | G1015KRRB      | S1015K        | T-22716        | 1.521    |
| <b>RSA</b>      | <b>1</b>       | 2      | 3 3/8          | 1 3/4          | 2 3/4          | 5 1/2   | 7       | 2 1/8  | 5/8            | 9/16   | 3/4            | 1 1/2          | 1 1/16         | 1/2       | G1100KRRB      | S1100K        |                | 3.35     |
| RSA             | 25             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE25KRRB       | SE25K         |                |          |
| RSA             | 1 1/16         |        |                |                |                |         |         |        |                |        |                |                |                |           | G1101KRRB      | S1101K        |                |          |
| RSA             | 1 1/8          | 50.80  | 91.3           | 48.4           | 81             | 139.7   | 177.8   | 54     | 17.5           | 15.9   | 20.6           | 44.1           | 30.2           | 12.7      | G1102KRRB      | S1102K        | T-22725        | 1.789    |
| <b>RSA, LSA</b> | <b>1 3/16</b>  | 2      | 3 19/32        | 1 29/32        | 3 3/16         | 5 1/2   | 7       | 2 1/8  | 1 1/16         | 9/8    | 1 3/16         | 1 47/64        | 1 3/16         | 1/2       | G1103KRRB      | S1103K        |                | 3.94     |
| RSA             | 30             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE30KRRB       | SE30K         |                |          |
| RSA, LSA        | 1 1/4          |        |                |                |                |         |         |        |                |        |                |                |                |           | G1104KRRB      | S1104K        |                |          |
| RSA             | 1 5/16         | 60.33  | 111.1          | 51.2           | 101.6          | 158.8   | 209.6   | 66.7   | 22.2           | 19     | 31.8           | 54             | 32.5           | 15.9      | G1105KRRB      | S1105K        | T-22382        | 3.260    |
| RSA             | 1 3/8          | 2 3/8  | 4 3/8          | 2 1/64         | 4              | 6 1/4   | 8 1/4   | 2 5/8  | 7/8            | 3/4    | 1 1/4          | 2 1/8          | 1 9/32         | 5/8       | G1106KRRB      | S1106K        |                | 7.18     |
| <b>RSA, LSA</b> | <b>1 7/16</b>  |        |                |                |                |         |         |        |                |        |                |                |                |           | G1107KRRB      | S1107K        |                |          |
| RSA             | 35             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE35KRRB       | SE35K         |                |          |
| <b>RSA</b>      | <b>1 1/2</b>   | 60.33  | 111.1          | 56.4           | 101.6          | 168.3   | 209.6   | 60.3   | 19             | 19     | 22.2           | 60.3           | 34.9           | 15.9      | G1108KRRB      | S1108KT       | T-22752        | 2.928    |
| RSA             | 1 9/16         | 2 3/8  | 4 3/8          | 2 7/32         | 4              | 6 5/8   | 8 1/4   | 2 3/8  | 3/4            | 3/4    | 7/8            | 2 3/8          | 1 3/8          | 5/8       | G1109KRRB      | S1109KT       |                | 6.45     |
| RSA             | 40             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE40KRRB       | SE40K         |                |          |
| RSA             | 1 5/8          |        |                |                |                |         |         |        |                |        |                |                |                |           | G1110KRRB      | S1110K        |                |          |
| <b>RSA, LSA</b> | <b>1 11/16</b> | 60.33  | 114.3          | 56.4           | 108            | 168.3   | 209.6   | 60.3   | 20.6           | 19     | 23.8           | 63.5           | 34.9           | 15.9      | G1111KRRB      | S1111K        | T-22701        | 3.064    |
| RSA             | 1 3/4          | 2 3/8  | 4 1/2          | 2 7/32         | 4 1/4          | 6 5/8   | 8 1/4   | 2 3/8  | 1 3/16         | 3/4    | 1 5/16         | 2 1/2          | 1 3/8          | 5/8       | G1112KRRB      | S1112K        |                | 6.75     |
| RSA             | 45             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE45KRRB       | SE45K         |                |          |
| RSA             | 1 7/8          | 69.85  | 130.2          | 62.7           | 120.6          | 209.6   | 269.9   | 69.8   | 26.2           | 19     | 34.9           | 69.8           | 38.1           | 15.9      | G1114KRRB      | S1114K        | T-22384        | 4.885    |
| <b>RSA, LSA</b> | <b>1 15/16</b> | 2 3/4  | 5 1/8          | 2 15/32        | 4 3/4          | 8 1/4   | 10 5/8  | 2 3/4  | 1 1/32         | 3/4    | 1 3/8          | 2 3/4          | 1 1/2          | 5/8       | G1115KRRB      | S1115K        |                | 10.76    |
| RSA             | 50             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE50KRRB       | SE50K         |                |          |
| RSA             | 2              |        |                |                |                |         |         |        |                |        |                |                |                |           | G1200KRRB      | S1200K        |                |          |
| RSA             | 2 1/8          | 79.38  | 142.1          | 71.4           | 125.4          | 228.6   | 288.9   | 79.4   | 25.4           | 19     | 33.3           | 76.2           | 43.7           | 15.9      | G1202KRRB      | S1202K        | T-22696        | 6.022    |
| <b>RSA, LSA</b> | <b>2 3/16</b>  | 3 1/8  | 5 19/32        | 2 13/16        | 4 15/16        | 9       | 11 3/8  | 3 1/8  | 1              | 3/4    | 1 3/16         | 3              | 1 29/32        | 5/8       | G1203KRRB      | S1203K        |                | 13.22    |
| RSA             | 55             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE55KRRB       | SE55K         |                |          |
| RSA             | 2 1/4          |        |                |                |                |         |         |        |                |        |                |                |                |           | G1204KRRB      | S1204K        |                |          |
| RSA             | 2 3/8          | 79.38  | 149.2          | 77.8           | 139.7          | 228.6   | 288.9   | 79.4   | 28.6           | 22.2   | 28.6           | 84.1           | 46.8           | 19        | G1206KRRB      | S1206K        | T-22743        | 6.901    |
| <b>RSA, LSA</b> | <b>2 7/16</b>  | 3 1/8  | 5 7/8          | 3 1/16         | 5 1/2          | 9       | 11 3/8  | 3 1/8  | 1 1/8          | 7/8    | 1 1/8          | 3 5/16         | 1 27/32        | 3/4       | G1207KRRB      | S1207K        |                | 15.20    |
| RSA             | 60             |        |                |                |                |         |         |        |                |        |                |                |                |           | GE60KRRB       | SE60K         |                |          |
| RSA             | 2 11/16        | 95.25  | 173            | 82.6           | 155.6          | 260.4   | 320.7   | 88.9   | 33.3           | 22.2   | 34.9           | 96.8           | 45.2           | 19        | G1211KRRB      | S1211KT       | T-22748        | 9.997    |
| RSA             | 70             | 3 3/4  | 6 13/16        | 3 1/4          | 6 1/8          | 10 1/4  | 12 5/8  | 3 1/2  | 1 5/16         | 7/8    | 1 3/8          | 3 13/16        | 1 25/32        | 3/4       | GE70KRRB       | SE70K         |                | 22.02    |
| RSA             | 2 15/16        | 95.25  | 177.8          | 92.1           | 196.1          | 206.4   | 320.7   | 88.9   | 38.1           | 22.2   | 31.8           | 101.6          | 54.8           | 19        | G1215KRRB      | S1215K        | T-22386        | 10.683   |
| RSA             | 75             | 3 3/4  | 7              | 3 5/8          | 7 23/32        | 10 1/4  | 12 5/8  | 3 1/2  | 1 1/2          | 7/8    | 1 1/4          | 4              | 2 5/32         | 3/4       | GE75KRRB       | SE75K         |                | 23.53    |

**RSAO, LSAO HEAVY SERIES**

- RSAO pillow blocks are equipped with GN-KRRB wide inner ring ball bearings.
- LSAO pillow blocks are equipped with GN-KLLB wide inner ring ball bearings.
- Suited for installations where the load is heavy in proportion to the shaft diameter or where considerable shock loads exist.
- For use in wet or extremely dirty conditions.
- Pre-lubricated and ready for immediate use and a grease fitting is provided for relubrication if required.
- All units are supplied with a self-locking collar.

**Suggested shaft tolerances:** 1 1/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".



BEARING DATA

| Unit        | Bearing Number | Dimensions and Load Ratings |
|-------------|----------------|-----------------------------|
| <b>RSAO</b> | <b>GN-KRRB</b> | <b>Page D55</b>             |
| <b>LSAO</b> | <b>GN-KLLB</b> | <b>Page D64</b>             |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RSAO 1 7/16".**

| Unit       | Shaft Dia. | H       | H <sub>2</sub> | B <sub>1</sub> | L <sub>1</sub> | J      | L       | A     | H <sub>1</sub> | N     | N <sub>1</sub> | d <sub>1</sub> | S <sub>1</sub> | Bolt Size | Bearing Number   | Collar Number | Housing Number | Unit Wt. |
|------------|------------|---------|----------------|----------------|----------------|--------|---------|-------|----------------|-------|----------------|----------------|----------------|-----------|------------------|---------------|----------------|----------|
|            |            | ±.010"  | ref.           | mm             | mm             | mm     | mm      | mm    | mm             | mm    | ±.010"         | ±.010"         | ±.005"         | ref.      | RSAO             | LSAO          | new            | kg lbs.  |
| RSAO, LSAO | 1 3/16     | 60.33   | 108            | 50             | 95.2           | 168.3  | 209.6   | 60.3  | 22.2           | 15.9  | 25.4           | 48.7           | 32.5           | 12.7      | GN103KRRB (KLLB) | SN103K        | T-22678        | 2.937    |
|            |            | 2 3/8   | 4 1/4          | 1 31/32        | 3 3/4          | 6 5/8  | 8 1/4   | 2 3/8 | 7/8            | 5/8   | 1              | 1.918          | 1.280          | 1/2       |                  |               |                | 6.47     |
| RSAO, LSAO | 1 7/16     | 69.85   | 122.2          | 51.6           | 104.8          | 209.6  | 269.9   | 69.8  | 23.8           | 19    | 28.6           | 55.1           | 33.3           | 15.9      | GN107KRRB (KLLB) | SN107K        | T-22496        | 4.154    |
|            |            | 2 3/4   | 4 13/16        | 2 1/32         | 4 1/8          | 8 1/4  | 10 5/8  | 2 3/4 | 1 5/16         | 3/4   | 1 1/8          | 2.168          | 1 5/16         | 5/8       |                  |               |                | 9.15     |
| RSAO, LSAO | 1 1/2      | 79.38   | 136.6          | 57.2           | 114.3          | 228.6  | 288.9   | 79.4  | 27             | 19    | 28.6           | 63.0           | 37.3           | 15.9      | GN108KRRB (KLLB) | SN108K        | T-22672        | 5.857    |
|            |            | 3 1/8   | 5 3/8          | 2 1/4          | 4 1/2          | 9      | 11 3/8  | 3 1/8 | 1 1/16         | 3/4   | 1 1/8          | 2.480          | 1 15/32        | 5/8       |                  |               |                | 12.90    |
| RSAO, LSAO | 1 11/16    | 79.38   | 142.9          | 58.7           | 127.0          | 228.6  | 288.9   | 79.4  | 30.2           | 19    | 28.6           | 69.3           | 38.9           | 15.9      | GN111KRRB (KLLB) | SN111K        | T-22498        | 6.56     |
|            |            | 3 1/8   | 5 5/8          | 2 5/16         | 5              | 9      | 11 3/8  | 3 1/8 | 1 3/16         | 3/4   | 1 1/8          | 2.730          | 1 17/32        | 5/8       | GN112KRRB        | SN112K        |                | 14.45    |
| RSAO, LSAO | 1 5/8      | 79.38   | 148.4          | 66.7           | 138.1          | 228.6  | 288.9   | 79.4  | 33.3           | 19    | 28.6           | 75.7           | 42.1           | 15.9      | GN115KRRB (KLLB) | SN115K        | T-22502        | 7.246    |
|            |            | 3 1/8   | 5 27/32        | 2 5/8          | 5 7/16         | 9      | 11 3/8  | 3 1/8 | 1 5/16         | 3/4   | 1 1/8          | 2.980          | 1 21/32        | 5/8       |                  |               |                | 15.96    |
| RSAO       | 2          | 95.25   | 170.7          | 73             | 150.8          | 260.4  | 320.7   | 88.9  | 36.5           | 22.2  | 34.9           | 82.0           | 45.2           | 19        | GN200KRRB        | SN200K        | T-22500        | 10.192   |
| RSAO, LSAO | 2 3/16     | 3 3/4   | 6 23/32        | 2 7/8          | 5 15/16        | 10 1/4 | 12 5/8  | 3 1/2 | 1 7/16         | 7/8   | 1 3/8          | 3.230          | 1 25/32        | 3/4       | GN203KRRB (KLLB) | SN203K        |                | 22.45    |
| RSAO, LSAO | 2 7/16     | 104.78  | 186.5          | 79.4           | 163.5          | 285.8  | 349.2   | 101.6 | 38.1           | 22.2  | 34.9           | 88.4           | 48.4           | 19        | GN207KRRB (KLLB) | SN207K        | T-22494        | 16.144   |
|            |            | 4 1/8   | 7 11/32        | 3 1/8          | 6 7/16         | 11 1/4 | 13 3/4  | 4     | 1 1/2          | 7/8   | 1 3/8          | 3.480          | 1 29/32        | 3/4       |                  |               |                | 35.56    |
| RSAO, LSAO | 2 11/16    | 115.89  | 210.3          | 88.9           | 188.9          | 304.8  | 390.5   | 111.1 | 44.4           | 25.4  | 34.9           | 101.1          | 54.8           | 22.2      | GN211KRRB (KLLB) | SO211K        | T-22492        | 19.295   |
|            |            | 4 9/16  | 8 9/32         | 3 1/2          | 7 7/16         | 12     | 15 3/8  | 4 3/8 | 1 3/4          | 1     | 1 3/8          | 3.980          | 2 5/32         | 7/8       |                  |               |                | 42.50    |
| RSAO, LSAO | 2 15/16    | 115.89  | 217.5          | 100            | 203.2          | 314.3  | 390.5   | 111.1 | 47.6           | 25.4  | 34.9           | 112.2          | 62.7           | 22.2      | GN215KRRB (KLLB) | SN215K        | T-22490        | 20.09    |
|            |            | 4 9/16  | 8 9/16         | 3 15/16        | 8              | 12 3/8 | 15 3/8  | 4 3/8 | 1 7/8          | 1     | 1 3/8          | 4.418          | 2 15/32        | 7/8       |                  |               |                | 44.25    |
| RSAO       | 3 3/16     | 115.89  | 223            | 106.4          | 214.3          | 314.3  | 390.5   | 111.1 | 49.2           | 25.4  | 44.4           | 119.1          | 65.9           | 22.2      | GN303KRRB        | SN303K        | T-22444        | 22.814   |
|            |            | 4 9/16  | 8 25/32        | 4 3/16         | 8 7/16         | 12 3/8 | 15 3/8  | 4 3/8 | 1 15/16        | 1     | 1 3/4          | 4.688          | 2 19/32        | 7/8       |                  |               |                | 50.25    |
| RSAO       | 3 7/16     | 130.18  | 250.8          | 115.9          | 241.3          | 339.7  | 409.6   | 120.6 | 57.2           | 28.6  | 54             | 133.4          | 73.8           | 25.4      | GN307KRRB        | SN307K        | T-22446        | 30.986   |
|            |            | 5 1/8   | 9 7/8          | 4 9/16         | 9 1/2          | 13 3/8 | 16 1/8  | 4 3/4 | 2 1/4          | 1 1/8 | 2 1/8          | 5.250          | 2 29/32        | 1         |                  |               |                | 68.25    |
| RSAO       | 3 15/16    | 144.46  | 281            | 128.6          | 273            | 374.6  | 439.7   | 130.2 | 65.1           | 28.6  | 44.4           | 146            | 78.6           | 25.4      | GN315KRRB        | SN315K        | T-22448        | 40.633   |
|            |            | 5 11/16 | 11 1/16        | 5 1/16         | 10 3/4         | 14 3/4 | 17 5/16 | 5 1/8 | 2 9/16         | 1 1/8 | 1 3/4          | 5.750          | 3 3/32         | 1         |                  |               |                | 89.50    |



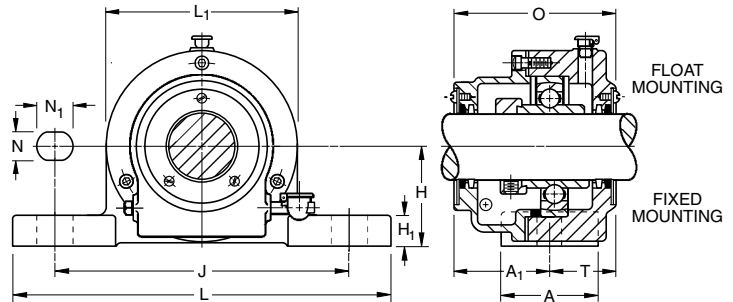




# BALL BEARINGS

## SAL INDUSTRIAL SERIES FIXED & FLOATING TYPES

- Designed for applications where normal to high temperatures are encountered and applications where one or more floating bearing units are required.
- The floating unit allows the bearing to move axially as the shaft expands due to rising temperatures. The fixed unit maintains shaft location.
- Bearings have loose internal fit.
- SAL unit is equipped with a self-aligning SM wide inner ring bearing and a self-locking collar.
- External aligning ring is fitted to the spherical surface of the outer ring.
- Equipped with oil-tight seals. Normally fitted for oil lubrication, but can be equipped for grease lubrication when specified.
- **Before installation, lubricate with high-grade automotive oil, turbine oil, or ball bearing grease.**
- Units are assembled with a spacer ring (fixed type). By removing spacer ring, the assembly becomes a floating unit.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| SAL  | SM-KS          | Page D72                    |

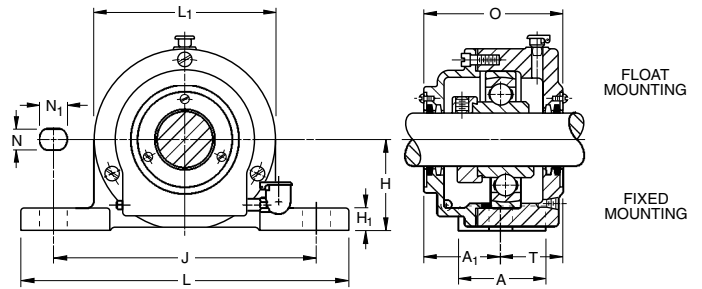
Suggested shaft tolerances: 1 3/16", - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 15/16", nominal to -.025 mm, -.0010".

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER AND WHETHER FIXED OR FLOATING. Example: SAL 1 7/16" (one fixed, one floating).

| Unit | Shaft Dia. | Total Float  | H                | O                | L <sub>1</sub>  | A              | J               | L               | N           | N <sub>1</sub> | H <sub>1</sub> | A <sub>1</sub>   | T               | Bolt Size   | Bearing Number | Collar Number | Housing Number | Unit Wt.        |
|------|------------|--------------|------------------|------------------|-----------------|----------------|-----------------|-----------------|-------------|----------------|----------------|------------------|-----------------|-------------|----------------|---------------|----------------|-----------------|
|      | in.        | mm in.       | mm in.           | mm in.           | mm in.          | mm in.         | mm in.          | mm in.          | mm in.      | mm in.         | mm in.         | mm in.           | mm in.          | mm in.      |                |               | new            | kg lbs.         |
| SAL  | 1 3/16     | 6.4<br>1/4   | 50.8<br>2        | 97.6<br>3 27/32  | 96.8<br>3 13/16 | 54<br>2 1/8    | 139.7<br>5 1/2  | 177.8<br>7      | 15.9<br>5/8 | 19<br>3/4      | 17.5<br>1 1/16 | 56.4<br>2 1/32   | 41.3<br>1 5/8   | 12.7<br>1/2 | SM1103KS       | S1103K        | T-12127        | 3.768<br>8.30   |
| SAL  | 1 1/4      | 6.4<br>1/4   | 60.33<br>2 3/8   | 104.8<br>4 1/8   | 108<br>4 1/4    | 60.3<br>2 3/8  | 158.8<br>6 1/4  | 210<br>8 1/4    | 19<br>3/4   | 25.4<br>1      | 19<br>3/4      | 62.7<br>2 15/32  | 42.1<br>1 21/32 | 15.9<br>5/8 | SM1104KS       | S1104K        | T-13108        | 5.239<br>11.54  |
| SAL  | 1 7/16     | 6.4<br>1/4   | 60.33<br>2 3/8   | 104.8<br>4 1/8   | 108<br>4 1/4    | 60.3<br>2 3/8  | 158.8<br>6 1/4  | 210<br>8 1/4    | 19<br>3/4   | 25.4<br>1      | 19<br>3/4      | 62.7<br>2 15/32  | 42.1<br>1 21/32 | 15.9<br>5/8 | SM1107KS       | S1107K        | T-13108        | 5.239<br>11.54  |
| SAL  | 1 1/2      | 7.9<br>5/16  | 60.33<br>2 3/8   | 108<br>4 1/4     | 120.6<br>4 3/4  | 60.3<br>2 3/8  | 168.3<br>6 5/8  | 210<br>8 1/4    | 19<br>3/4   | 25.4<br>1      | 19<br>3/4      | 63.5<br>2 1/2    | 44.4<br>1 3/4   | 15.9<br>5/8 | SM1108KTS      | S1108KT       | T-12121        | 6.143<br>13.53  |
| SAL  | 1 11/16    | 7.9<br>5/16  | 60.33<br>2 3/8   | 110.3<br>4 11/32 | 120.6<br>4 3/4  | 60.3<br>2 3/8  | 168.3<br>6 5/8  | 210<br>8 1/4    | 19<br>3/4   | 25.4<br>1      | 19<br>3/4      | 65.9<br>2 19/32  | 44.4<br>1 3/4   | 15.9<br>5/8 | SM1111KS       | S1111K        | T-12121        | 5.866<br>12.92  |
| SAL  | 1 15/16    | 7.9<br>5/16  | 69.85<br>2 3/4   | 116.7<br>4 19/32 | 133.4<br>5 1/4  | 69.8<br>2 3/4  | 210<br>8 1/4    | 269.9<br>10 5/8 | 19<br>3/4   | 25.4<br>1      | 22.2<br>7/8    | 69.1<br>2 23/32  | 47.6<br>1 7/8   | 15.9<br>5/8 | SM1115KS       | S1115K        | T-12313        | 8.113<br>17.87  |
| SAL  | 2 3/16     | 7.9<br>5/16  | 79.38<br>3 1/8   | 137.3<br>5 13/32 | 146<br>5 3/4    | 79.4<br>3 1/8  | 228.6<br>9      | 288.9<br>11 3/8 | 19<br>3/4   | 25.4<br>1      | 22.2<br>7/8    | 79.4<br>3 1/8    | 57.9<br>2 9/32  | 15.9<br>5/8 | SM1203KS       | S1203K        | A-5845         | 10.978<br>24.18 |
| SAL  | 2 7/16     | 9.5<br>3/8   | 79.38<br>3 1/8   | 150<br>5 29/32   | 158.8<br>6 1/4  | 79.4<br>3 1/8  | 228.6<br>9      | 288.9<br>11 3/8 | 19<br>3/4   | 25.4<br>1      | 22.2<br>7/8    | 88.9<br>3 1/2    | 61.1<br>2 13/32 | 15.9<br>5/8 | SM1207KS       | S1207K        | A-5083         | 12.894<br>28.40 |
| SAL  | 2 11/16    | 7.1<br>9/32  | 95.25<br>3 3/4   | 156.4<br>6 5/32  | 171.4<br>6 3/4  | 88.9<br>3 1/2  | 259.7<br>10 1/4 | 320.7<br>12 5/8 | 22.2<br>7/8 | 28.6<br>1 1/8  | 27<br>1 1/16   | 92.1<br>3 5/8    | 64.3<br>2 17/32 | 19<br>3/4   | SM1211KTS      | S1211K        | T-18940        | 15.889<br>35.02 |
| SAL  | 2 15/16    | 9.9<br>25/64 | 95.25<br>3 3/4   | 173.8<br>6 27/32 | 190.5<br>7 1/2  | 88.9<br>3 1/2  | 259.7<br>10 1/4 | 320.7<br>12 5/8 | 22.2<br>7/8 | 28.6<br>1 1/8  | 27<br>1 1/16   | 100.8<br>3 31/32 | 73<br>2 7/8     | 19<br>3/4   | SM1215KS       | S1215K        | A-5088         | 20.203<br>44.50 |
| SAL  | 3 7/16     | 9.5<br>3/8   | 115.89<br>4 9/16 | 186.5<br>7 11/32 | 212.7<br>8 3/8  | 111.1<br>4 3/8 | 314.3<br>12 3/8 | 390.6<br>15 3/8 | 25.4<br>1   | 31.8<br>1 1/4  | 31.8<br>1 1/4  | 107.2<br>4 7/32  | 79.4<br>3 1/8   | 19<br>3/4   | SM1307KS       | S1307K        | A-5206         | 33.482<br>73.75 |

### SAOL HEAVY SERIES FIXED & FLOATING TYPES

- Designed for applications with higher than usual temperatures or where one or more floating bearing units are required.
- Floating unit allows the bearing to move axially as the shaft expands due to temperature rise. The fixed unit maintains shaft locations.
- Bearings have loose internal fit.
- SAOL unit is equipped with a self-aligning SMN wide inner ring bearing and a self-locking collar.
- External aligning ring is fitted to the spherical surface of the outer ring.
- Equipped with oil-type seals. Normally fitted for oil lubrication, but can be equipped for grease lubrication when specified.
- **Before installation, lubricate with high-grade automotive oil, turbine oil, or ball bearing grease.**
- Units are assembled with a spacer ring (fixed type). By removing the spacer ring, the assembly becomes a floating unit.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| SAOL | SMN-KS         | Page D73                    |

**Suggested shaft tolerances:** 1 3/16" - 1 15/16", nominal to -.013 mm, -.0005";  
 2" - 3 15/16", nominal to -.025 mm, -.0010".  
 Larger sizes, consult your Timken representative.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER AND WHETHER FIXED OR FLOATING. Example: SAOL 1 7/16" (one fixed, one floating).

| Unit | Shaft Dia. | Total Float     | H                | O                | L <sub>1</sub>  | A                | J                 | L                 | N             | N <sub>1</sub> | H <sub>1</sub> | A <sub>1</sub>  | T               | J <sub>1</sub> <sup>(1)</sup> | Bolt No. | Bolt Size     | Bearing Number | Collar Number | Housing Number | Unit Wt.        |
|------|------------|-----------------|------------------|------------------|-----------------|------------------|-------------------|-------------------|---------------|----------------|----------------|-----------------|-----------------|-------------------------------|----------|---------------|----------------|---------------|----------------|-----------------|
|      | in.        | mm in.          | mm in.           | mm in.           | mm in.          | mm in.           | mm in.            | mm in.            | mm in.        | mm in.         | mm in.         | mm in.          | mm in.          | mm in.                        |          | mm in.        |                |               | new            | kg lbs.         |
| SAOL | 1 3/16     | 7.9<br>5/16     | 60.33<br>2 3/8   | 103.2<br>4 1/16  | 111.1<br>4 3/8  | 60.3<br>2 3/8    | 168.3<br>6 5/8    | 210<br>8 1/4      | 15.9<br>5/8   | 22.2<br>7/8    | 17.5<br>11/16  | 60.3<br>2 3/8   | 42.9<br>1 11/16 | —                             | 2        | 12.7<br>1/2   | SMN103KS       | SN103K        | T-12389        | 5.521<br>12.16  |
| SAOL | 1 7/16     | 9.1<br>23/64    | 69.8<br>2 3/4    | 111.1<br>4 3/8   | 120.6<br>4 3/4  | 69.8<br>2 3/4    | 209.6<br>8 1/4    | 269.9<br>10 5/8   | 19<br>3/4     | 25.4<br>1      | 20.6<br>13/16  | 69.1<br>2 23/32 | 42.1<br>1 21/32 | —                             | 2        | 12.9<br>5/8   | SMN107KS       | SN107K        | A-4779         | 7.037<br>15.5   |
| SAOL | 1 1/2      | 9.5<br>3/8      | 79.4<br>3 1/8    | 123.8<br>4 7/8   | 146<br>5 3/4    | 79.4<br>3 1/8    | 228.6<br>9        | 288.9<br>11 3/8   | 19<br>3/4     | 25.4<br>1      | 20.6<br>13/16  | 74.6<br>2 15/16 | 49.2<br>1 15/16 | —                             | 2        | 12.9<br>5/8   | SMN108KS       | SN108K        | A-4778A        | 11.35<br>25     |
| SAOL | 1 11/16    | 9.5<br>3/8      | 79.4<br>3 1/8    | 123.8<br>4 7/8   | 146<br>5 3/4    | 79.4<br>3 1/8    | 228.6<br>9        | 288.9<br>11 3/8   | 19<br>3/4     | 25.4<br>1      | 20.6<br>13/16  | 74.6<br>2 15/16 | 49.2<br>1 15/16 | —                             | 2        | 12.9<br>5/8   | SMN111KS       | SN111K        | A-4778         | 11.15<br>24.56  |
| SAOL | 1 15/16    | 9.5<br>3/8      | 79.4<br>3 1/8    | 122.2<br>4 13/16 | 158.8<br>6 1/4  | 79.4<br>3 1/8    | 228.6<br>9        | 288.9<br>11 3/8   | 19<br>3/4     | 25.4<br>1      | 20.6<br>13/16  | 73.8<br>2 29/32 | 48.4<br>1 29/32 | —                             | 2        | 12.9<br>5/8   | SMN115KS       | SN115K        | A-3818         | 12.462<br>27.45 |
| SAOL | 2 3/16     | 9.1<br>23/64    | 95.25<br>3 3/4   | 139.7<br>5 1/2   | 171.4<br>6 3/4  | 88.9<br>3 1/2    | 259.7<br>10 1/4   | 320.7<br>12 5/8   | 22.2<br>7/8   | 31.8<br>1 1/4  | 27<br>1 1/16   | 82.6<br>3 1/4   | 57.2<br>2 1/4   | —                             | 2        | 19<br>3/4     | SMN203KS       | SN203K        | A-4755         | 15.409<br>33.94 |
| SAOL | 2 7/16     | 8.7<br>11/32    | 104.8<br>4 1/8   | 150<br>5 29/32   | 190.5<br>7 1/2  | 101.6<br>4       | 285.8<br>11 1/4   | 349.2<br>13 3/4   | 22.2<br>7/8   | 31.8<br>1 1/4  | 27<br>1 1/16   | 91.3<br>3 19/32 | 58.7<br>2 5/16  | —                             | 2        | 19<br>3/4     | SMN207KS       | SN207K        | A-3819         | 18.841<br>41.5  |
| SAOL | 2 11/16    | 9.5<br>3/8      | 115.89<br>4 9/16 | 174.6<br>6 7/8   | 215.9<br>8 1/2  | 111.1<br>4 3/8   | 304.8<br>12       | 390.6<br>15 3/8   | 25.4<br>1     | 31.8<br>1 1/4  | 31.8<br>1 1/4  | 109.5<br>4 5/16 | 65.1<br>2 9/16  | —                             | 2        | 22.2<br>7/8   | SMN211KS       | SO211K        | A-4709         | 26.332<br>58    |
| SAOL | 2 15/16    | 12.7<br>1/2     | 115.89<br>4 9/16 | 177.8<br>7       | 225.4<br>8 7/8  | 111.1<br>4 3/8   | 314.3<br>12 3/8   | 390.6<br>15 3/8   | 25.4<br>1     | 31.8<br>1 1/4  | 31.8<br>1 1/4  | 104.8<br>4 1/8  | 73<br>2 7/8     | —                             | 2        | 22.2<br>7/8   | SMN215KS       | SN215K        | A-4798         | 33.823<br>74.5  |
| SAOL | 3 3/16     | 13.1<br>33/64   | 115.89<br>4 9/16 | 184.2<br>7 1/4   | 241.3<br>9 1/2  | 111.1<br>4 3/8   | 314.3<br>12 3/8   | 390.6<br>15 3/8   | 25.4<br>1     | 31.8<br>1 1/4  | 31.8<br>1 1/4  | 108<br>4 1/4    | 76.2<br>3       | 57.2<br>2 1/4                 | 4        | 22.2<br>7/8   | SMN303KS       | SN303K        | A-4780         | 35.298<br>77.75 |
| SAOL | 3 7/16     | 13.5<br>17/32   | 130.2<br>5 1/8   | 190.5<br>7 1/2   | 260.4<br>10 1/4 | 120.6<br>4 3/4   | 339.7<br>13 3/8   | 409.6<br>16 1/8   | 25.4<br>1     | 31.8<br>1 1/4  | 31.8<br>1 1/4  | 111.1<br>4 3/8  | 79.4<br>3 1/8   | 76.2<br>3                     | 4        | 22.2<br>7/8   | SMN307KS       | SN307K        | A-4155         | 48.805<br>107.5 |
| SAOL | 3 11/16    | 12.7<br>1/2     | 144.5<br>5 11/16 | 213.5<br>8 13/32 | 279.4<br>11     | 125.4<br>4 15/16 | 374.6<br>14 3/4   | 439.7<br>17 5/16  | 28.6<br>1 1/8 | 38.1<br>1 1/2  | 31.8<br>1 1/4  | 133.4<br>5 1/4  | 80.2<br>3 5/32  | —                             | 2        | 25.4<br>1     | SMD0311WS      | SO311K        | A-4156         | 54.48<br>120    |
| SAOL | 3 15/16    | 17.5<br>11/16   | 152.4<br>6       | 219.9<br>8 21/32 | 298.4<br>11 3/4 | 133.4<br>5 1/4   | 393.1<br>15 1/2   | 469.9<br>18 1/2   | 28.6<br>1 1/8 | 38.1<br>1 1/2  | 34.9<br>1 3/8  | 127<br>5        | 92.9<br>3 21/32 | 82.6<br>3 1/4                 | 4        | 25.4<br>1     | SMN315KS       | SN315K        | A-4795         | 70.824<br>156   |
| SAOL | 4 3/16     | 15.9<br>5/8     | 165.1<br>6 1/2   | 225.4<br>8 7/8   | 317.5<br>12 1/2 | 158.8<br>6 1/4   | 449.3<br>17 11/16 | 539.8<br>21 1/4   | 28.6<br>1 1/8 | 38.1<br>1 1/2  | 38.1<br>1 1/2  | 134.1<br>5 9/32 | 91.3<br>3 19/32 | 101.6<br>4                    | 4        | 25.4<br>1     | SMN403WS       | SN403K        | T-14342        | 88.076<br>194   |
| SAOL | 4 7/16     | 14.3<br>9/16    | 177.8<br>7       | 228.6<br>9       | 327<br>12 7/8   | 171.4<br>6 3/4   | 449.3<br>17 11/16 | 539.8<br>21 1/4   | 31.8<br>1 1/4 | 44.4<br>1 3/4  | 44.4<br>1 3/4  | 134.9<br>5 5/16 | 93.6<br>3 11/16 | 108<br>4 1/4                  | 4        | 28.6<br>1 1/8 | SMN407WS       | SN407K        | T-11469        | 95.34<br>210    |
| SAOL | 4 15/16    | 31.4<br>1 15/64 | 209.6<br>8 1/4   | 261.9<br>10 5/16 | 381<br>15       | 184.2<br>7 1/4   | 514.4<br>20 1/4   | 630.2<br>24 13/16 | 31.8<br>1 1/4 | 44.4<br>1 3/4  | 50.8<br>2      | 152.4<br>6      | 109.5<br>4 5/16 | 120.6<br>4 3/4                | 4        | 28.6<br>1 1/8 | SMN415WS       | SN415K        | T-11783        | 160.262<br>353  |

<sup>(1)</sup> When four bolts are used, dimension J<sub>1</sub> is distance between centers, and A<sub>1</sub> and T are measured from center of base.

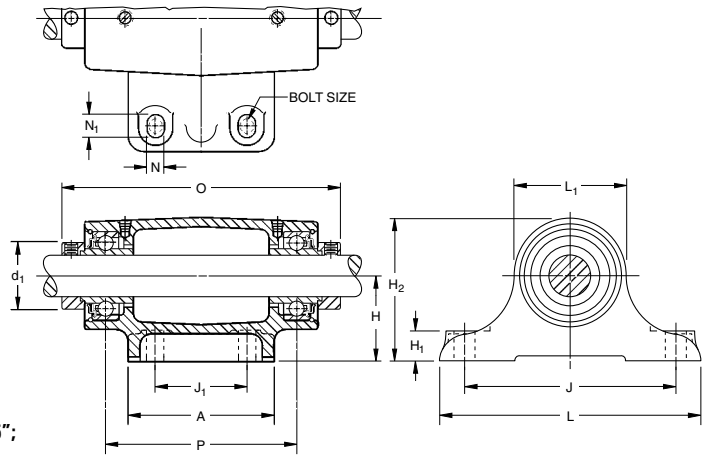


# BALL BEARINGS

## DRNR INDUSTRIAL SERIES

- This rigid double pillow block is designed to provide a sturdy two-bearing mounting for fans and blowers, bench grinders, buffers, vertical shafts and similar heavy-duty applications.
- Compact, one-piece housing is equipped with two wide inner ring bearings with integral R-Seals and self-locking collar.
- Individual grease chambers provided for each bearing.
- Close clearance baffles allow excess grease to work into the center chamber of the housing.
- Grease fittings that take the place of standard pipe plugs provide the means of relubrication.
- Can be mounted in any position, with ample radial and thrust capacity assured at all times.

Suggested shaft tolerances:  $1\frac{5}{16}'' - 1\frac{15}{16}''$ , nominal to  $-.013$  mm,  $-.0005''$ ;  
 $2'' - 2\frac{3}{16}''$ , nominal to  $-.025$  mm,  $-.0010''$ .



BEARING DATA

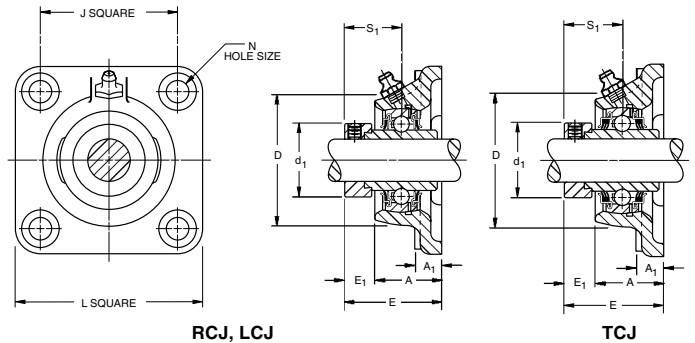
| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| DRNR | KR             | Page D53                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: DRNR 1  $\frac{7}{16}''$ .

| Unit | Shaft Dia.      | H                       | H <sub>2</sub>            | O                         | L <sub>1</sub>            | J                        | L                        | A                        | H <sub>1</sub>          | N                       | N <sub>1</sub>          | J <sub>1</sub>           | d <sub>1</sub>            | P                          | Bolt (4 req'd)        | Bearing Number (2 req'd) | Collar Number | Housing Number | Unit Wt.        |         |
|------|-----------------|-------------------------|---------------------------|---------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|---------------------------|----------------------------|-----------------------|--------------------------|---------------|----------------|-----------------|---------|
|      | in.             | mm in.                  | mm in.                    | mm in.                    | mm in.                    | mm in.                   | mm in.                   | mm in.                   | mm in.                  | mm in.                  | mm in.                  | mm in.                   | mm in.                    | mm in.                     | mm in.                |                          |               |                | new             | kg lbs. |
| DRNR | $\frac{15}{16}$ | 63.5<br>2 $\frac{1}{2}$ | 99.2<br>3 $\frac{29}{32}$ | 200<br>7 $\frac{7}{8}$    | 71.4<br>2 $\frac{13}{16}$ | 158.8<br>6 $\frac{1}{4}$ | 196.8<br>7 $\frac{3}{4}$ | 108<br>4 $\frac{1}{4}$   | 19                      | 12.7<br>$\frac{1}{2}$   | 15.9<br>$\frac{5}{8}$   | 69.8<br>2 $\frac{3}{4}$  | 38.1<br>1 $\frac{1}{2}$   | 146<br>5 $\frac{3}{4}$     | 9.5<br>$\frac{3}{8}$  | 1015KR                   | S1015K        | T-19189        | 4.812<br>10.60  |         |
| DRNR | $\frac{13}{16}$ | 63.5<br>2 $\frac{1}{2}$ | 105.6<br>4 $\frac{9}{32}$ | 203.2<br>8                | 84.1<br>3 $\frac{5}{16}$  | 158.8<br>6 $\frac{1}{4}$ | 196.8<br>7 $\frac{3}{4}$ | 108<br>4 $\frac{1}{4}$   | 22.2<br>$\frac{7}{8}$   | 12.7<br>$\frac{1}{2}$   | 15.9<br>$\frac{5}{8}$   | 69.8<br>2 $\frac{3}{4}$  | 44.1<br>1 $\frac{47}{64}$ | 142.9<br>5 $\frac{5}{8}$   | 9.5<br>$\frac{3}{8}$  | 1103KR                   | S1103K        | T-19191        | 5.167<br>11.38  |         |
| DRNR | $\frac{17}{16}$ | 76.2<br>3               | 123.8<br>4 $\frac{7}{8}$  | 276.2<br>10 $\frac{7}{8}$ | 95.2<br>3 $\frac{3}{4}$   | 203.2<br>8               | 254<br>10                | 139.7<br>5 $\frac{1}{2}$ | 25.4<br>1               | 15.9<br>$\frac{5}{8}$   | 22.2<br>$\frac{7}{8}$   | 88.9<br>3 $\frac{1}{2}$  | 54<br>2 $\frac{1}{8}$     | 211.5<br>8 $\frac{21}{64}$ | 12.7<br>$\frac{1}{2}$ | 1107KR                   | S1107K        | T-19193        | 9.625<br>21.20  |         |
| DRNR | $\frac{11}{16}$ | 76.2<br>3               | 133.4<br>5 $\frac{1}{4}$  | 279.4<br>11               | 114.3<br>4 $\frac{1}{2}$  | 203.2<br>8               | 254<br>10                | 139.7<br>5 $\frac{1}{2}$ | 25.4<br>1               | 15.9<br>$\frac{5}{8}$   | 22.2<br>$\frac{7}{8}$   | 88.9<br>3 $\frac{1}{2}$  | 63.5<br>2 $\frac{1}{2}$   | 209.6<br>8 $\frac{1}{4}$   | 12.7<br>$\frac{1}{2}$ | 1111KR                   | S1111K        | T-19197        | 11.69<br>25.75  |         |
| DRNR | $\frac{15}{16}$ | 88.9<br>3 $\frac{1}{2}$ | 150.8<br>5 $\frac{5}{16}$ | 352.4<br>13 $\frac{7}{8}$ | 123.8<br>4 $\frac{7}{8}$  | 241.3<br>9 $\frac{1}{2}$ | 304.8<br>12              | 177.8<br>7               | 28.5<br>1 $\frac{1}{8}$ | 17.5<br>$\frac{11}{16}$ | 28.5<br>1 $\frac{1}{8}$ | 114.3<br>4 $\frac{1}{2}$ | 69.8<br>2 $\frac{3}{4}$   | 276.2<br>10 $\frac{7}{8}$  | 15.9<br>$\frac{5}{8}$ | 1115KR                   | S1115K        | T-19195        | 18.841<br>41.50 |         |
| DRNR | $\frac{23}{16}$ | 88.9<br>3 $\frac{1}{2}$ | 158.8<br>6 $\frac{1}{4}$  | 355.6<br>14               | 133.4<br>5 $\frac{1}{4}$  | 241.3<br>9 $\frac{1}{2}$ | 304.8<br>12              | 177.8<br>7               | 31.8<br>1 $\frac{1}{4}$ | 17.5<br>$\frac{11}{16}$ | 28.5<br>1 $\frac{1}{8}$ | 114.3<br>4 $\frac{1}{2}$ | 76.2<br>3                 | 268.3<br>10 $\frac{9}{16}$ | 15.9<br>$\frac{5}{8}$ | 1203KR                   | S1203K        | A-9598         | 23.608<br>52.00 |         |

**RCJ, TCJ, LCJ INDUSTRIAL SERIES**

- Timken cartridges are used in applications where a minimum amount of machining is to be done.
- Each unit comes assembled and ready for mounting, with bolts through the flange.
- Wide inner ring bearings, self-aligning B-types, which compensate for shaft misalignment.
- RCJ flange cartridge is equipped with G-KRRB (R-Seal) wide inner ring bearings. The TCJ is equipped with G-KPPB (Tri-Ply Seal) wide inner ring bearings. The LCJ is equipped with the G-KLLB (Mechani-Seal) wide inner ring bearings.
- TCJ flange cartridges are identical to RCJ units, except they use the Tri-Ply seal bearing. Tri-Ply units offer the best protection in dirty environments.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required. Units are supplied with self-locking collars.
- **Contact a Timken representative to discuss highly corrosive applications (food processing, chemical exposure) where Timken thin dense chrome coated bearings can be used.**
- Safety end caps are available for selected sizes.



**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RCJ  | G-KRRB         | Page D54                    |
| TCJ  | G-KPPB         | Page D65                    |
| LCJ  | G-KLLB         | Page D62                    |

Suggested shaft tolerances: **1 13/15" - 1 15/16", nominal to -.013 mm, -.0005";**  
**2" - 3 15/16", nominal to -.025 mm, -.0010".**  
 Larger sizes, consult your Timken representative.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCJ 1 3/16". POPULAR SIZES ARE IN BOLD.

| Unit <sup>(2)</sup> | Shaft Dia.     | L ref. | J ref. | A <sub>1</sub> ref. | A ±.015" | E max. | N     | E <sub>1</sub> | S <sub>1</sub> ref. | D ref. | d <sub>1</sub> ±.005" | Bearing Number <sup>(1)</sup> |         | Collar Number | Housing Number | Unit Wt. |
|---------------------|----------------|--------|--------|---------------------|----------|--------|-------|----------------|---------------------|--------|-----------------------|-------------------------------|---------|---------------|----------------|----------|
|                     |                |        |        |                     |          |        |       |                |                     |        |                       | RCJ                           | (TCJ)   |               |                |          |
| RCJ                 | 1/2            |        |        |                     |          |        |       |                |                     |        |                       | G1008KRRB                     | S1008K  |               |                |          |
| RCJ                 | 5/8            | 76.2   | 54     | 9.5                 | 23.6     | 40.6   | 10.7  | 13.9           | 23.4                | 52.4   | 28.1                  | G1010KRRB                     | S1010K  | T-40278       | 0.526          |          |
| RCJ                 | 11/16          | 3      | 2 1/8  | 13/32               | 0.929    | 1.599  | 27/64 | 35/64          | 59/64               | 2 1/16 | 1.105                 | G1011KRRB                     | S1011K  | (T-16659)     | 1.16           |          |
| RCJ                 | 17             |        |        |                     |          |        |       |                |                     |        |                       | GE17KRRB                      | SE17K   |               |                |          |
| <b>RCJ</b>          | <b>3/4</b>     | 85.7   | 63.5   | 11.1                | 27.8     | 46.4   | 10.7  | 16.3           | 26.6                | 60.3   | 32.8                  | G1012KRRB                     | S1012K  | T-40267       | 0.726          |          |
| RCJ                 | 20             | 3 3/8  | 2 1/2  | 7/16                | 1.094    | 1.828  | 27/64 | 41/64          | 1 3/64              | 2 3/8  | 1.292                 | GE20KRRB                      | SE20K   | (T-16661)     | 1.6            |          |
| RCJ, TCJ            | 7/8            |        |        |                     |          |        |       |                |                     |        |                       | G1014KRRB                     | (KPPB3) | S1014K        |                |          |
| RCJ, TCJ            | 15/16          | 95.2   | 69.8   | 12.7                | 27.9     | 46.6   | 11.5  | 15.9           | 27                  | 65.1   | 37.6                  | G1015KRRB                     | (KPPB3) | S1015K        | T-40262        | 0.939    |
| <b>RCJ, TCJ</b>     | <b>1</b>       | 3 3/4  | 2 3/4  | 1/2                 | 1.100    | 1.834  | 29/64 | 5/8            | 1 1/16              | 2 9/16 | 1.480                 | G1100KRRB                     | (KPPB3) | S1100K        | (T-16663)      | 2.07     |
| RCJ, TCJ            | 25             |        |        |                     |          |        |       |                |                     |        |                       | GE25KRRB                      | (KPPB3) | SE25K         |                |          |
| RCJ, TCJ            | 1 1/16         |        |        |                     |          |        |       |                |                     |        |                       | G1101KRRB                     | (KPPB3) | S1101K        |                |          |
| RCJ, TCJ            | 1 1/8          | 107.9  | 82.6   | 13.5                | 29.9     | 50.5   | 11.5  | 17.5           | 30.2                | 76.2   | 43.9                  | G1102KRRB                     | (KPPB3) | S1102K        | T-40266        | 1.302    |
| <b>RCJ, TCJ</b>     | <b>1 3/16</b>  | 4 1/4  | 3 1/4  | 17/32               | 1.178    | 1.990  | 29/64 | 11/16          | 1 3/16              | 3      | 1.730                 | G1103KRRB                     | (KPPB3) | S1103K        | (T-16664)      | 2.87     |
| RCJ, TCJ            | 30             |        |        |                     |          |        |       |                |                     |        |                       | GE30KRRB                      | (KPPB3) | SE30K         |                |          |
| RCJ, TCJ            | 1 1/4          |        |        |                     |          |        |       |                |                     |        |                       | G1104KRRB                     | (KPPB2) | S1104K        |                |          |
| RCJ, TCJ            | 1 5/16         | 117.5  | 92.1   | 13.5                | 31.8     | 53.5   | 13.1  | 19             | 32.5                | 88.9   | 53.6                  | G1105KRRB                     | (KPPB2) | S1105K        | T-40253        | 1.787    |
| RCJ, TCJ            | 1 3/8          | 4 5/8  | 3 5/8  | 17/32               | 1.254    | 2.106  | 33/64 | 3/4            | 1 9/32              | 3 1/2  | 2.112                 | G1106KRRB                     | (KPPB2) | S1106K        | (T-16617)      | 3.94     |
| <b>RCJ, TCJ</b>     | <b>1 7/16</b>  |        |        |                     |          |        |       |                |                     |        |                       | G1107KRRB                     | (KPPB2) | S1107K        |                |          |
| RCJ, TCJ            | 35             |        |        |                     |          |        |       |                |                     |        |                       | GE35KRRB                      | (KPPB2) | SE35K         |                |          |
| <b>RCJ, TCJ</b>     | <b>1 1/2</b>   | 130.2  | 101.6  | 14.3                | 38.1     | 59.3   | 13.1  | 20.6           | 34.9                | 98.4   | 58.2                  | G1108KRRB                     | (KPPB3) | S1108KT       | T-40263        | 2.291    |
| RCJ, TCJ            | 1 9/16         | 5 1/8  | 4      | 9/16                | 1.500    | 2.334  | 33/64 | 13/16          | 1 3/8               | 3 7/8  | 2.292                 | G1109KRRB                     | (KPPB3) | S1109KT       | (T-16666)      | 5.05     |
| RCJ, TCJ            | 40             |        |        |                     |          |        |       |                |                     |        |                       | GE40KRRB                      | (KPPB3) | SE40K         |                |          |
| RCJ, TCJ            | 1 5/8          |        |        |                     |          |        |       |                |                     |        |                       | G1110KRRB                     | (KPPB4) | S1110K        |                |          |
| <b>RCJ, TCJ</b>     | <b>1 11/16</b> | 136.5  | 104.8  | 14.3                | 38.9     | 59.3   | 13.1  | 19.8           | 34.9                | 104.8  | 63.0                  | G1111KRRB                     | (KPPB4) | S1111K        | T-40264        | 2.585    |
| RCJ, TCJ            | 1 3/4          | 5 3/8  | 4 1/8  | 9/16                | 1.531    | 2.334  | 33/64 | 25/32          | 1 3/8               | 4 1/8  | 2.480                 | G1112KRRB                     | (KPPB4) | S1112K        | (T-16667)      | 5.7      |
| RCJ, TCJ            | 45             |        |        |                     |          |        |       |                |                     |        |                       | GE45KRRB                      | (KPPB4) | SE45K         |                |          |
| RCJ, TCJ            | 1 7/8          | 142.9  | 111.1  | 14.3                | 42.9     | 66.4   | 17.1  | 23             | 38.1                | 112.7  | 69.3                  | G1114KRRB                     | (KPPB3) | S1114K        | T-40265        | 3.016    |
| <b>RCJ, TCJ</b>     | <b>1 15/16</b> | 5 5/8  | 4 3/8  | 9/16                | 1.688    | 2.615  | 43/64 | 29/32          | 1 1/2               | 4 7/16 | 2.730                 | G1115KRRB                     | (KPPB3) | S1115K        | (T-16668)      | 6.65     |
| RCJ, TCJ            | 50             |        |        |                     |          |        |       |                |                     |        |                       | GE50KRRB                      | (KPPB3) | SE50K         |                |          |
| RCJ, TCJ            | 2              |        |        |                     |          |        |       |                |                     |        |                       | G1200KRRB                     | (KPPB4) | S1200K        |                |          |
| RCJ, TCJ            | 2 1/8          | 161.9  | 130.2  | 16.7                | 46.8     | 75.1   | 17.1  | 27.8           | 43.7                | 120.6  | 75.7                  | G1202KRRB                     | (KPPB4) | S1202K        | T-40268        | 3.842    |
| <b>RCJ, TCJ</b>     | <b>2 3/16</b>  | 6 3/8  | 5 1/8  | 21/32               | 1.844    | 2.958  | 43/64 | 1 3/32         | 1 23/32             | 4 3/4  | 2.980                 | G1203KRRB                     | (KPPB4) | S1203K        | (T-16683)      | 8.47     |
| RCJ, TCJ            | 55             |        |        |                     |          |        |       |                |                     |        |                       | GE55KRRB                      | (KPPB4) | SE55K         |                |          |
| RCJ                 | 2 1/4          |        |        |                     |          |        |       |                |                     |        |                       | G1204KRRB                     |         | S1204K        |                |          |
| RCJ                 | 2 3/8          | 174.6  | 142.9  | 17.5                | 49.2     | 81.6   | 17.1  | 31.8           | 46.8                | 136.5  | 83.6                  | G1206KRRB                     |         | S1206K        | T-40269        | 5.048    |
| <b>RCJ</b>          | <b>2 7/16</b>  | 6 7/8  | 5 5/8  | 11/16               | 1.937    | 3.214  | 43/64 | 1 1/4          | 1 27/32             | 5 3/8  | 3.292                 | G1207KRRB                     |         | S1207K        | (T-17648)      | 11.13    |
| RCJ                 | 60             |        |        |                     |          |        |       |                |                     |        |                       | GE60KRRB                      |         | SE60K         |                |          |
| RCJ                 | 2 11/16        | 187.3  | 149.2  | 19.1                | 63.5     | 90.3   | 16.3  | 25.4           | 45.2                | 152.4  | 96.3                  | G1211KRRB                     |         | S1211K        | T-22530        | 6.885    |
| RCJ                 | 70             | 7 3/8  | 5 7/8  | 3/4                 | 2.500    | 3.557  | 41/64 | 1              | 1 25/32             | 6      | 3.792                 | GE70KRRB                      |         | SE70K         | (T-22270)      | 15.18    |
| RCJ                 | 2 15/16        | 196.8  | 152.4  | 22.2                | 66.7     | 96.7   | 19.8  | 26.2           | 54.8                | 161.9  | 101.1                 | G1215KRRB                     |         | S1215K        | T-21620        | 8.21     |
| RCJ                 | 75             | 7 3/4  | 6      | 7/8                 | 2.625    | 3.807  | 25/32 | 1 1/32         | 2 5/32              | 6 3/8  | 3.980                 | GE75KRRB                      |         | SE75K         | (T-21620)      | 18.1     |

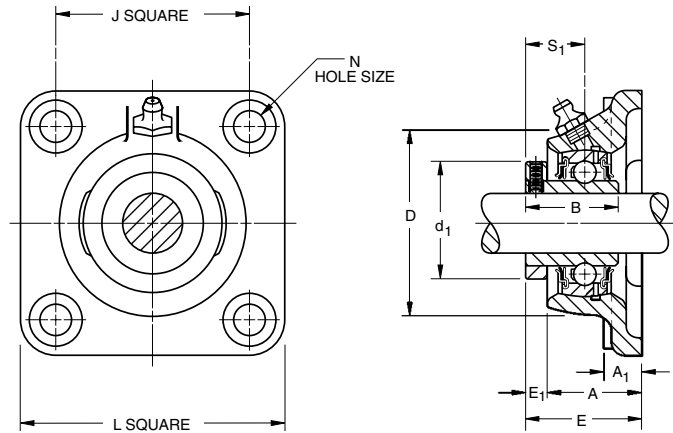
(1) Bearing number for RCJ is G-KRRB. TCJ uses G-KPPB.  
 (2) Type LCJ uses G-KLLB.



# BALL BEARINGS

## RCJC INDUSTRIAL SERIES CONCENTRIC COLLAR

- The same basic design as the RCJ Series, except a concentric collar is used as the shaft locking device instead of a self-locking cam collar.
- All RCJC units are equipped with GC-KRRB wide inner ring, concentric collar bearings.
- Spherical outside diameter of the bearings mounted in corresponding machined housing seats provides the initial self-alignment.
- Bolt hole spacing dimensions are interchangeable with the RCJ Series and most competitive units.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.
- Concentric collars are supplied with all units.
- Safety end caps are available for selected sizes.



**Suggested shaft tolerances:**  $\frac{1}{2}'' - 1 \frac{15}{16}''$ , nominal to  $-.013 \text{ mm}, -.0005''$ ;  
 $2'' - 2 \frac{15}{16}''$ , nominal to  $-.025 \text{ mm}, -.0010''$ .

### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RCJC | GC-KRRB        | Page D66                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCJC 1 3/16''.**

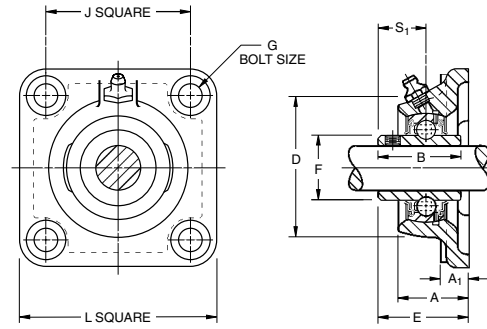
| Unit | Shaft Dia. | L              | J               | A <sub>1</sub> | A               | E               | N             | E <sub>1</sub> | B               | D               | d <sub>1</sub>  | S <sub>1</sub>  | Bearing Number | Collar Number | Housing Number | Unit Wt.       |
|------|------------|----------------|-----------------|----------------|-----------------|-----------------|---------------|----------------|-----------------|-----------------|-----------------|-----------------|----------------|---------------|----------------|----------------|
|      | in.        | mm in.         | mm in.          | mm in.         | mm in.          | mm in.          | mm in.        | mm in.         | mm in.          | mm in.          | mm in.          | mm in.          |                |               |                | kg lbs.        |
| RCJC | 5/8        | 76.2<br>3      | 53.98<br>2 1/8  | 11.1<br>7/16   | 22.2<br>7/8     | 30.2<br>1 3/16  | 9.9<br>25/64  | 7.9<br>5/16    | 26.6<br>1 3/64  | 52.4<br>2 1/16  | 34.1<br>1 11/32 | 15.5<br>39/64   | GC1010KRRB     | C203          | T-27113        | 0.486<br>1.07  |
| RCJC | 3/4        | 85.7<br>3 3/8  | 63.5<br>2 1/2   | 11.1<br>7/16   | 25.8<br>1 1/64  | 32.5<br>1 9/32  | 9.9<br>25/64  | 6.7<br>17/64   | 31<br>1 7/32    | 60.3<br>2 3/8   | 38.1<br>1 1/2   | 18.7<br>47/64   | GC1012KRRB     | C204          | T-26605        | 0.645<br>1.42  |
| RCJC | 1          | 95.2<br>3 3/4  | 69.85<br>2 3/4  | 11.1<br>7/16   | 28.6<br>1 1/8   | 36.1<br>1 27/64 | 11.5<br>29/64 | 7.5<br>19/64   | 34.1<br>1 11/32 | 65.1<br>2 9/16  | 44.4<br>1 3/4   | 20.2<br>51/64   | GC1100KRRB     | C205          | T-26614        | 0.781<br>1.72  |
| RCJC | 1 1/8      | 107.9          | 82.55           | 12.7           | 30.2            | 39.3            | 11.5          | 9.1            | 37.3            | 76.2            | 52.4            | 22.6            | GC1102KRRB     | C206          | T-26630        | 1.135          |
| RCJC | 1 3/16     | 4 1/4          | 3 1/4           | 1/2            | 1 3/16          | 1 35/64         | 29/64         | 23/64          | 1 15/32         | 3               | 2 1/16          | 57/64           | GC1103KRRB     |               |                | 2.5            |
| RCJC | 1 1/4      | 117.5          | 92.08           | 14.3           | 34.1            | 44.4            | 13.1          | 10.3           | 41.3            | 88.9            | 59.5            | 25.4            | GC1104KRRB     | C207          | T-26665        | 1.707          |
| RCJC | 1 3/8      | 4 5/8          | 3 5/8           | 9/16           | 1 11/32         | 1 3/4           | 33/64         | 13/32          | 1 5/8           | 3 1/2           | 2 11/32         | 1               | GC1106KRRB     |               |                | 3.76           |
| RCJC | 1 7/16     |                |                 |                |                 |                 |               |                |                 |                 |                 |                 | GC1107KRRB     |               |                |                |
| RCJC | 1 1/2      | 130.2<br>5 1/8 | 101.6<br>4      | 17.5<br>11/16  | 40.5<br>1 19/32 | 51.2<br>2 1/64  | 13.1<br>33/64 | 10.7<br>27/64  | 44.1<br>1 47/64 | 98.4<br>3 7/8   | 68.3<br>2 11/16 | 27.4<br>1 5/64  | GC1108KRRB     | C208          | T-16666A       | 2.238<br>4.93  |
| RCJC | 1 11/16    | 136.5          | 104.78          | 17.5           | 41.3            | 53.2            | 13.1          | 11.9           | 46.8            | 104.8           | 73              | 29.4            | GC1111KRRB     | C209          | T-16667A       | 2.538          |
| RCJC | 1 3/4      | 5 3/8          | 4 1/8           | 11/16          | 1 5/8           | 2 3/32          | 33/64         | 15/32          | 1 27/32         | 4 1/8           | 2 7/8           | 1 5/32          | GC1112KRRB     |               |                | 5.59           |
| RCJC | 1 15/16    | 142.9<br>5 5/8 | 111.12<br>4 3/8 | 15.9<br>5/8    | 42.1<br>1 21/32 | 54.8<br>2 5/32  | 17.1<br>43/64 | 12.7<br>1/2    | 48.4<br>1 29/32 | 112.7<br>4 7/16 | 79.4<br>3 1/8   | 30.2<br>1 3/16  | GC1115KRRB     | C210          | T-26700        | 2.797<br>6.16  |
| RCJC | 2          | 161.9          | 130.18          | 19             | 44.4            | 58.7            | 17.1          | 14.3           | 54              | 120.6           | 88.9            | 33.33           | GC1200KRRB     | C211          | T-26712        | 4.036          |
| RCJC | 2 3/16     | 6 3/8          | 5 1/8           | 3/4            | 1 3/4           | 2 5/16          | 43/64         | 9/16           | 2 1/8           | 4 3/4           | 3 1/2           | 1 5/16          | GC1203KRRB     |               |                | 8.89           |
| RCJC | 2 7/16     | 174.6<br>6 7/8 | 142.88<br>5 5/8 | 19<br>3/4      | 47.6<br>1 7/8   | 65.9<br>2 19/32 | 16.3<br>41/64 | 18.3<br>23/32  | 60.3<br>2 3/8   | 136.5<br>5 3/8  | 95.2<br>3 3/4   | 37.3<br>1 15/32 | GC1207KRRB     | C212          | T-26726        | 4.926<br>10.85 |
| RCJC | 2 15/16    | 196.8<br>7 3/4 | 152.4<br>6      | 22.2<br>7/8    | 54<br>2 1/8     | 75.4<br>2 31/32 | 19.8<br>25/32 | 21.4<br>27/32  | 70.6<br>2 25/32 | 161.9<br>6 3/8  | 114.3<br>4 1/2  | 43.7<br>1 23/32 | GC1215KRRB     | C215          | T-27128        | 7.473<br>16.46 |

Shaft diameter with an S = smaller housing.

### YCJ INDUSTRIAL SETSCREW SERIES

- The same basic design as the RCJ Series, except specially designed setscrews are used as the locking device instead of an eccentric collar.
- All units are equipped with GY-KRRB wide inner ring, setscrew bearings.
- Spherical outside diameter of the bearings mounted in the corresponding machined housing seats provides the initial self-alignment.
- Bolt hole spacing dimensions are interchangeable with the RCJ Series and most competitive units.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.
- Safety end caps are available for selected sizes.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 2 15/16", nominal to -.025 mm, -.0010".



**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YCJ  | GY-KRRB        | Page D67                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YCJ 1 7/16".**

| Unit | Shaft Dia. |     | L ref. | J ref.  | A1 ref. | A ±.015 | E max. | B       | D ref. | F ±.001 | S1 ref. | G Bolt Size | Bearing Number |
|------|------------|-----|--------|---------|---------|---------|--------|---------|--------|---------|---------|-------------|----------------|
|      | mm         | in. |        |         |         |         |        |         |        |         |         |             |                |
| YCJ  | 1/2        |     | 76.2   | 54      | 10.3    | 23.6    | 32.5   | 27.4    | 52.4   | 23.90   | 15.9    | 10          | GY1008KRRB     |
| YCJ  | 5/8        |     | 3      | 2 1/8   | 13/32   | 0.929   | 1.296  | 1 5/64  | 2 1/16 | 0.941   | 5/8     | 3/8         | GY1010KRRB     |
| YCJ  | 17         |     |        |         |         |         |        |         |        |         |         |             | GYE17KRRB      |
| YCJ  | 3/4        |     | 85.7   | 63.5    | 11.1    | 27.8    | 37.7   | 31.0    | 60.3   | 27.56   | 18.3    | 10          | GY1012KRRB     |
| YCJ  | 20         |     | 3 3/8  | 2 1/2   | 7/16    | 1.094   | 1.484  | 1 7/32  | 2 3/8  | 1.085   | 23/32   | 3/8         | GYE20KRRB      |
| YCJ  | 7/8        |     |        |         |         |         |        |         |        |         |         |             | GY1014KRRB     |
| YCJ  | 15/16      |     | 95.2   | 69.8    | 12.7    | 27.9    | 39.3   | 34.1    | 65.1   | 33.88   | 19.8    | 10          | GY1015KRRB     |
| YCJ  | 1          |     | 3 3/4  | 2 49/64 | 1/2     | 1.100   | 1.546  | 1 11/32 | 2 9/16 | 1.331   | 25/32   | 3/8         | GY1100KRRB     |
| YCJ  | 25         |     |        |         |         |         |        |         |        |         |         |             | GYE25KRRB      |
| YCJ  | 1 1/8      |     |        |         |         |         |        |         |        |         |         |             | GY1102KRRB     |
| YCJ  | 1 3/16     |     | 107.9  | 82.6    | 13.5    | 29.9    | 42.4   | 38.1    | 76.2   | 40.31   | 22.2    | 10          | GY1103KRRB     |
| YCJ  | 1 1/4 S    |     | 4 1/4  | 3 1/4   | 17/32   | 1.178   | 1.671  | 1 1/2   | 3      | 1.587   | 7/8     | 3/8         | GY1103KRRB3    |
| YCJ  | 30         |     |        |         |         |         |        |         |        |         |         |             | GYE30KRRB      |
| YCJ  | 1 1/4      |     |        |         |         |         |        |         |        |         |         |             | GY1104KRRB     |
| YCJ  | 1 3/8      |     | 117.5  | 92.1    | 13.5    | 31.8    | 46.4   | 42.9    | 88.9   | 46.81   | 25.4    | 12          | GY1106KRRB     |
| YCJ  | 1 7/16     |     | 4 5/8  | 3 5/8   | 17/32   | 1.254   | 1.827  | 1 11/16 | 3 1/2  | 1.843   | 1       | 1/2         | GY1107KRRB     |
| YCJ  | 35         |     |        |         |         |         |        |         |        |         |         |             | GYE35KRRB      |
| YCJ  | 1 1/2      |     | 130.2  | 101.6   | 14.3    | 38.1    | 54.4   | 49.2    | 98.4   | 52.27   | 30.2    | 12          | GY1108KRRB     |
| YCJ  | 40         |     | 5 1/8  | 4       | 9/16    | 1.500   | 2.141  | 1 15/16 | 3 7/8  | 2.057   | 1 3/16  | 1/2         | GYE40KRRB      |
| YCJ  | 1 5/8      |     |        |         |         |         |        |         |        |         |         |             | GY1110KRRB     |
| YCJ  | 1 11/16    |     | 136.5  | 104.8   | 14.3    | 38.9    | 54.4   | 49.2    | 104.8  | 57.92   | 30.2    | 12          | GY1111KRRB     |
| YCJ  | 1 3/4      |     | 5 3/8  | 4 1/8   | 9/16    | 1.531   | 2.141  | 1 15/16 | 4 1/8  | 2.279   | 1 3/16  | 1/2         | GY1112KRRB     |
| YCJ  | 45         |     |        |         |         |         |        |         |        |         |         |             | GYE45KRRB      |
| YCJ  | 1 15/16    |     | 142.9  | 111.1   | 14.3    | 42.9    | 60.7   | 51.6    | 112.7  | 62.84   | 32.5    | 16          | GY1115KRRB     |
| YCJ  | 2 S        |     |        |         |         |         |        |         |        |         |         |             | GY1115KRRB3    |
| YCJ  | 50         |     | 5 5/8  | 4 3/8   | 9/16    | 1.688   | 2.390  | 2 1/32  | 4 7/16 | 2.473   | 1 9/32  | 5/8         | GYE50KRRB      |
| YCJ  | 2          |     | 161.9  | 130.2   | 16.7    | 46.8    | 64.7   | 55.6    | 120.7  | 69.77   | 33.3    | 16          | GY1200KRRB     |
| YCJ  | 2 3/16     |     | 6 3/8  | 5 1/8   | 21/32   | 1.844   | 2.546  | 2 3/16  | 4 3/4  | 2.747   | 1 5/16  | 5/8         | GY1203KRRB     |
| YCJ  | 55         |     |        |         |         |         |        |         |        |         |         |             | GYE55KRRB      |
| YCJ  | 2 7/16     |     | 174.6  | 142.9   | 17.5    | 49.2    | 74.2   | 65.1    | 136.5  | 76.48   | 39.1    | 16          | GY1207KRRB     |
| YCJ  | 60         |     | 6 7/8  | 5 5/8   | 11/16   | 1.937   | 2.921  | 2 9/16  | 5 3/8  | 3.011   | 1 9/16  | 5/8         | GYE60KRRB      |
| YCJ  | 2 11/16    |     | 187.3  | 149.2   | 19      | 63.5    | 81.4   | 69.9    | 152.4  | 86.92   | 42.9    | 16          | GY1211KRRB     |
| YCJ  | 70         |     | 7 3/8  | 5 7/8   | 3/4     | 2.500   | 3.204  | 2 3/4   | 6      | 3.422   | 1 11/16 | 5/8         | GYE70KRRB      |
| YCJ  | 2 15/16    |     | 196.8  | 152.4   | 23.8    | 66.7    | 86.2   | 77.8    | 161.9  | 91.92   | 44.4    | 20          | GY1215KRRB     |
| YCJ  | 75         |     | 7 3/4  | 6       | 15/16   | 2.625   | 3.392  | 3 1/16  | 6 3/8  | 3.619   | 1 3/4   | 3/4         | GYE75KRRB      |

Shaft diameter with an S = smaller housing.

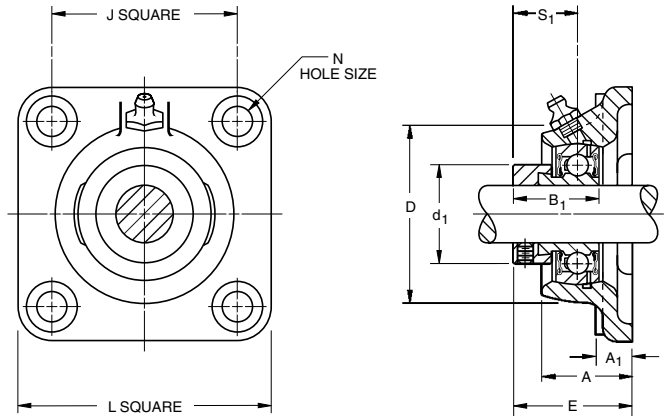


# BALL BEARINGS

## VCJ STANDARD SERIES

- Flange cartridges come assembled and ready for mounting by using four bolts through the flange.
- VCJ Series flange cartridges are ideal for applications where minimum machining is to be done.
- Units are assembled with GRA-RRB bearings with positive contact land-riding seals and self-locking collars.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.
- Safety end caps are available for selected sizes.

**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.013$  mm,  $-.0005$ ";  
 $2$ " -  $2 \frac{3}{16}$ ", nominal to  $.025$  mm,  $-.0010$ ".



### BEARING DATA

| Unit       | Bearing Number | Dimensions and Load Ratings |
|------------|----------------|-----------------------------|
| <b>VCJ</b> | <b>GRA-RRB</b> | <b>Page D57</b>             |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VCJ 1". POPULAR SIZES ARE IN BOLD.

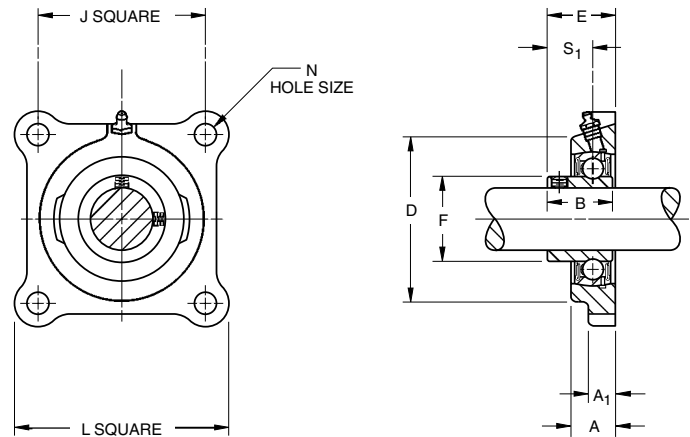
| Unit       | Shaft Dia.                          |     | L ref.          | J ref.          | A <sub>1</sub> ref. | A ±.015" | E max. | N               | B <sub>1</sub>    | D ref.           | d <sub>1</sub> ±.005 | S <sub>1</sub> ref. | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|------------|-------------------------------------|-----|-----------------|-----------------|---------------------|----------|--------|-----------------|-------------------|------------------|----------------------|---------------------|----------------|---------------|----------------|----------|
|            | mm                                  | in. |                 |                 |                     |          |        |                 |                   |                  |                      |                     |                |               |                |          |
| VCJ        | $\frac{1}{2}$                       |     | 76.2            | 53.98           | 10.3                | 23.6     | 39.3   | 10.7            | 28.6              | 52.4             | 28.1                 | 22.2                | GRA008RRB      | S1008K        | T-40278        | 0.527    |
| VCJ        | $\frac{5}{8}$                       |     | 3               | 2 $\frac{1}{8}$ | 1 $\frac{3}{32}$    | 0.929    | 1.548  | $\frac{27}{64}$ | 1 $\frac{1}{8}$   | 2 $\frac{1}{16}$ | 1.105                | $\frac{7}{8}$       | GRA010RRB      | S1010K        | (T-16659)      | 1.16     |
| VCJ        | 17                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE17RRB      | SE17K         |                |          |
| <b>VCJ</b> | <b><math>\frac{3}{4}</math></b>     |     | 85.7            | 63.5            | 11.1                | 27.8     | 43.3   | 10.7            | 31                | 60.3             | 32.8                 | 23.4                | GRA012RRB      | S1012K        | T-40267        | 0.654    |
| VCJ        | 20                                  |     | 3 $\frac{3}{8}$ | 2 $\frac{1}{2}$ | $\frac{7}{16}$      | 1.094    | 1.706  | $\frac{27}{64}$ | 1 $\frac{7}{32}$  | 2 $\frac{3}{8}$  | 1.292                | $\frac{59}{64}$     | GRAE20RRB      | SE20K         | (T-16661A)     | 1.44     |
| VCJ        | $\frac{7}{8}$                       |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRA014RRB      | S1014K        |                |          |
| VCJ        | $\frac{15}{16}$                     |     | 95.2            | 69.85           | 12.7                | 27.9     | 43.1   | 11.5            | 31                | 65.1             | 37.6                 | 23.4                | GRA015RRB      | S1015K        | T-40262        | 0.894    |
| <b>VCJ</b> | <b>1</b>                            |     | 3 $\frac{3}{4}$ | 2 $\frac{3}{4}$ | $\frac{1}{2}$       | 1.100    | 1.696  | $\frac{29}{64}$ | 1 $\frac{7}{32}$  | 2 $\frac{9}{16}$ | 1.480                | $\frac{59}{64}$     | GRA100RRB      | S1100K        | (T-16663A)     | 1.97     |
| VCJ        | 25                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE25RRB      | SE25K         |                |          |
| VCJ        | $1 \frac{1}{8}$                     |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRA102RRB      | S1102K        |                |          |
| <b>VCJ</b> | <b>1 <math>\frac{3}{16}</math></b>  |     | 107.9           | 82.55           | 13.5                | 29.9     | 47.1   | 11.5            | 35.7              | 76.2             | 43.9                 | 27                  | GRA103RRB      | S1103K        | T-40266        | 1.239    |
| VCJ        | 1 $\frac{1}{4}$ S                   |     | 4 $\frac{1}{4}$ | 3 $\frac{1}{4}$ | $\frac{17}{32}$     | 1.178    | 1.856  | $\frac{29}{64}$ | 1 $\frac{13}{32}$ | 3                | 1.730                | 1 $\frac{1}{16}$    | GRA103RRB2     | S1103K3       | (T-16664A)     | 2.73     |
| VCJ        | 30                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE30RRB      | SE30K         |                |          |
| VCJ        | $1 \frac{1}{4}$                     |     | 117.5           | 92.08           | 13.5                | 31.8     | 50.5   | 13.1            | 38.9              | 88.9             | 53.6                 | 29.4                | GRA104RRB      | S1104K        | T-40253        | 1.707    |
| VCJ        | $1 \frac{3}{8}$                     |     | 4 $\frac{5}{8}$ | 3 $\frac{5}{8}$ | $\frac{17}{32}$     | 1.254    | 1.989  | $\frac{33}{64}$ | 1 $\frac{17}{32}$ | 3 $\frac{1}{2}$  | 2.112                | 1 $\frac{5}{32}$    | GRA106RRB      | S1106K        | (T-16617A)     | 3.76     |
| <b>VCJ</b> | <b>1 <math>\frac{7}{16}</math></b>  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRA107RRB      | S1107K        |                |          |
| VCJ        | 35                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE35RRB      | SE35K         |                |          |
| VCJ        | $1 \frac{1}{2}$                     |     | 130.2           | 101.6           | 14.3                | 38.1     | 58.3   | 13.1            | 43.7              | 98.4             | 58.2                 | 32.5                | GRA108RRB      | S1108KT       | T-40263        | 2.175    |
| VCJ        | 40                                  |     | 5 $\frac{1}{8}$ | 4               | $\frac{9}{16}$      | 1.500    | 2.297  | $\frac{33}{64}$ | 1 $\frac{23}{32}$ | 3 $\frac{7}{8}$  | 2.292                | 1 $\frac{9}{32}$    | GRAE40RRB      | SE40K         | (T-16666A)     | 4.79     |
| VCJ        | $1 \frac{5}{8}$                     |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRA110RRB      | S1110K        |                |          |
| <b>VCJ</b> | <b>1 <math>\frac{11}{16}</math></b> |     | 136.5           | 104.78          | 14.3                | 38.9     | 57.0   | 13.1            | 43.7              | 104.8            | 63.0                 | 32.5                | GRA111RRB      | S1111K        | T-40264        | 2.438    |
| VCJ        | $1 \frac{3}{4}$                     |     | 5 $\frac{3}{8}$ | 4 $\frac{1}{8}$ | $\frac{9}{16}$      | 1.531    | 2.244  | $\frac{33}{64}$ | 1 $\frac{23}{32}$ | 4 $\frac{1}{8}$  | 2.480                | 1 $\frac{9}{32}$    | GRA112RRB      | S1112K        | (T-16667A)     | 5.37     |
| VCJ        | 45                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE45RRB      | SE45K         |                |          |
| VCJ        | $1 \frac{7}{8}$                     |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRA114RRB      | S1114K        |                |          |
| <b>VCJ</b> | <b>1 <math>\frac{15}{16}</math></b> |     | 142.9           | 111.12          | 14.3                | 42.9     | 61.0   | 17.1            | 43.7              | 112.7            | 69.3                 | 32.5                | GRA115RRB      | S1115K        | T-40265        | 2.788    |
| VCJ        | 2 S                                 |     | 5 $\frac{5}{8}$ | 4 $\frac{3}{8}$ | $\frac{9}{16}$      | 1.688    | 2.400  | $\frac{43}{64}$ | 1 $\frac{23}{32}$ | 4 $\frac{7}{16}$ | 2.730                | 1 $\frac{9}{32}$    | GRA115RRB2     | S1115K2       | (T-16668A)     | 6.14     |
| VCJ        | 50                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE50RRB      | SE50K         |                |          |
| VCJ        | 2                                   |     | 161.9           | 130.18          | 16.7                | 46.8     | 67.9   | 17.1            | 48.4              | 120.6            | 75.7                 | 36.5                | GRA200RRB      | S1200K        | T-40236        | 3.269    |
| <b>VCJ</b> | <b>2 <math>\frac{3}{16}</math></b>  |     | 6 $\frac{3}{8}$ | 5 $\frac{1}{8}$ | $\frac{21}{32}$     | 1.844    | 2.672  | $\frac{43}{64}$ | 1 $\frac{29}{32}$ | 4 $\frac{3}{4}$  | 2.980                | 1 $\frac{7}{16}$    | GRA203RRB      | S1203K        | (T-16683A)     | 7.2      |
| VCJ        | 55                                  |     |                 |                 |                     |          |        |                 |                   |                  |                      |                     | GRAE55RRB      | SE55K         |                |          |

Shaft diameter with an S = smaller housing.



### SCJ STANDARD SERIES

- Flange cartridges come assembled and ready for mounting by using four bolts through the flange.
- Ideal for applications where minimum shaft length is required.
- Units are assembled with GYA-RRB bearings with positive contact land-riding seals and setscrew locking.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.
- Safety end caps available for selected sizes.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| SCJ  | GYA-RRB        | Page D59                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: SCJ 1". POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.     | L      | J      | A <sub>1</sub> | A      | E       | N      | B       | D      | F       | S <sub>1</sub> | Bearing Number | Housing Number | Unit Wt. |
|------------|----------------|--------|--------|----------------|--------|---------|--------|---------|--------|---------|----------------|----------------|----------------|----------|
|            |                | mm in. | mm in. | mm in.         | mm in. | mm in.  | mm in. | mm in.  | mm in. | mm in.  | mm in.         |                |                |          |
| SCJ        | 1/2            | 76.2   | 53.98  | 11.1           | 17.9   | 25.4    | 13.1   | 23.8    | 52.4   | 24.6    | 15.9           | GYA008RRB      | T-40124        | 0.47     |
| SCJ        | 5/8            | 3      | 2 1/8  | 7/16           | 45/64  | 1       | 33/64  | 15/16   | 2 1/16 | 31/32   | 5/8            | GYA010RRB      |                | 1.03     |
| SCJ        | 17             |        |        |                |        |         |        |         |        |         |                | GYAE17RRB      |                |          |
| <b>SCJ</b> | <b>3/4</b>     | 85.7   | 63.5   | 11.1           | 19     | 28.6    | 10.7   | 27      | 60.3   | 29      | 18.3           | GYA012RRB      | T-40126        | 0.52     |
| SCJ        | 20             | 3 3/8  | 2 1/2  | 7/16           | 3/4    | 1 1/8   | 27/64  | 1 1/16  | 2 3/8  | 1 9/64  | 23/32          | GYAE20RRB      |                | 1.14     |
| SCJ        | 7/8            |        |        |                |        |         |        |         |        |         |                | GYA014RRB      |                |          |
| SCJ        | 15/16          | 95.2   | 69.85  | 13.5           | 19.8   | 29.8    | 11.5   | 28.2    | 65.1   | 33.7    | 19.4           | GYA015RRB      | T-40128        | 0.68     |
| <b>SCJ</b> | <b>1</b>       | 3 3/4  | 2 3/4  | 17/32          | 25/32  | 1 11/64 | 29/64  | 1 7/64  | 2 9/16 | 1 21/64 | 49/64          | GYA100RRB      |                | 1.5      |
| SCJ        | 25             |        |        |                |        |         |        |         |        |         |                | GYAE25RRB      |                |          |
| SCJ        | 1 1/8          |        |        |                |        |         |        |         |        |         |                | GYA102RRB      |                |          |
| <b>SCJ</b> | <b>1 3/16</b>  | 107.9  | 82.55  | 14.3           | 21.4   | 34.1    | 11.5   | 32.5    | 76.2   | 40.1    | 23             | GYA103RRB      | T-40130        | 1.19     |
| SCJ        | 1 1/4 S        | 4 1/4  | 3 1/4  | 9/16           | 27/32  | 1 11/32 | 29/64  | 1 9/32  | 3      | 1 37/64 | 29/32          | GYA103RRB2     |                | 2.62     |
| SCJ        | 30             |        |        |                |        |         |        |         |        |         |                | GYAE30RRB      |                |          |
| SCJ        | 1 1/4          |        |        |                |        |         |        |         |        |         |                | GYA104RRB      |                |          |
| SCJ        | 1 3/8          | 117.5  | 92.08  | 15.1           | 24.6   | 38.1    | 13.1   | 36.5    | 88.9   | 46.8    | 25.8           | GYA106RRB      | T-40132        | 1.35     |
| <b>SCJ</b> | <b>1 7/16</b>  | 4 5/8  | 3 5/8  | 19/32          | 31/32  | 1 1/2   | 33/64  | 1 7/16  | 3 1/2  | 1 27/32 | 1 1/64         | GYA107RRB      |                | 2.98     |
| SCJ        | 35             |        |        |                |        |         |        |         |        |         |                | GYAE35RRB      |                |          |
| SCJ        | 1 1/2          | 130.2  | 101.6  | 15.9           | 26.2   | 40.9    | 13.1   | 39.3    | 98.4   | 52.4    | 27.8           | GYA108RRB      | T-40134        | 2.1      |
| SCJ        | 40             | 5 1/8  | 4      | 9/8            | 1 1/32 | 1 39/64 | 33/64  | 1 39/64 | 3 7/8  | 2 1/16  | 1 3/32         | GYAE40RRB      |                | 4.63     |
| SCJ        | 1 5/8          |        |        |                |        |         |        |         |        |         |                | GYA110RRB      |                |          |
| <b>SCJ</b> | <b>1 11/16</b> | 136.5  | 104.78 | 15.9           | 28.6   | 43.6    | 13.1   | 42.1    | 104.8  | 57.9    | 28.6           | GYA111RRB      | T-40164        | 2.24     |
| SCJ        | 1 3/4          | 5 3/8  | 4 1/8  | 5/8            | 1 1/8  | 1 23/32 | 33/64  | 1 21/32 | 4 1/8  | 2 9/32  | 1 1/8          | GYA112RRB      |                | 4.94     |
| SCJ        | 45             |        |        |                |        |         |        |         |        |         |                | GYAE45RRB      |                |          |
| <b>SCJ</b> | <b>1 15/16</b> | 142.9  | 111.12 | 16.7           | 28.6   | 46      | 17.1   | 44.4    | 112.7  | 62.6    | 30.9           | GYA115RRB      | T-40166        | 2.55     |
| SCJ        | 2 S            | 5 5/8  | 4 3/8  | 21/32          | 1 1/8  | 1 13/16 | 43/64  | 1 3/4   | 4 7/16 | 2 15/32 | 1 7/32         | GYA115RRB2     |                | 5.63     |
| SCJ        | 50             |        |        |                |        |         |        |         |        |         |                | GYAE50RRB      |                |          |
| SCJ        | 2              | 161.9  | 130.18 | 18.2           | 30.9   | 48      | 17.1   | 46.4    | 120.6  | 69.8    | 31.7           | GYA200RRB      | T-40168        | 2.96     |
| <b>SCJ</b> | <b>2 3/16</b>  | 6 3/8  | 5 1/8  | 23/32          | 1 7/32 | 1 57/64 | 43/64  | 1 53/64 | 4 3/4  | 2 3/4   | 1 1/4          | GYA203RRB      |                | 6.53     |
| SCJ        | 55             |        |        |                |        |         |        |         |        |         |                | GYAE55RRB      |                |          |

Shaft diameter with an S = smaller housing.





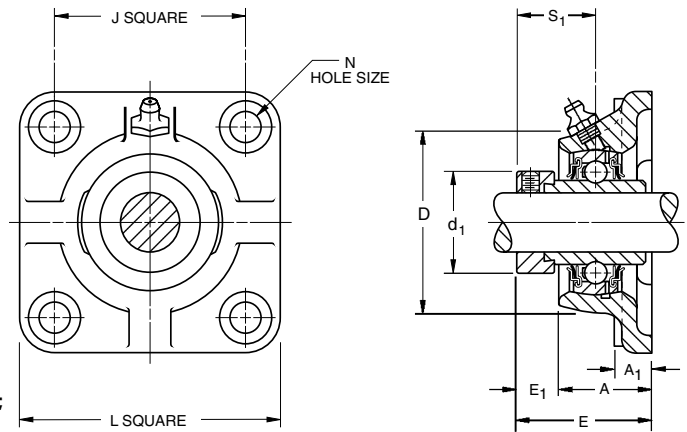


# BALL BEARINGS

## RCJO, LCJO HEAVY SERIES

- Flange cartridges are similar in design to the standard series.
- Ideal for applications where minimum machining is to be done.
- Units come assembled and ready for mounting by using four bolts through the flange.
- RCJO units are assembled with GN-KRRB (R-Seal) wide inner ring bearings. LCJO units are equipped with GN-KLLB (L-Seal) wide inner ring bearings.
- Units are factory prelubricated, but a grease fitting is provided for relubrication if required.
- Units are supplied with self-locking collars and are dimensionally interchangeable.

**Suggested shaft tolerances:** 1 3/16" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 3 15/16", nominal to **-.025 mm, -.0010"**.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RCJO | GN-KRRB        | Page D55                    |
| LCJO | GN-KLLB        | Page D64                    |

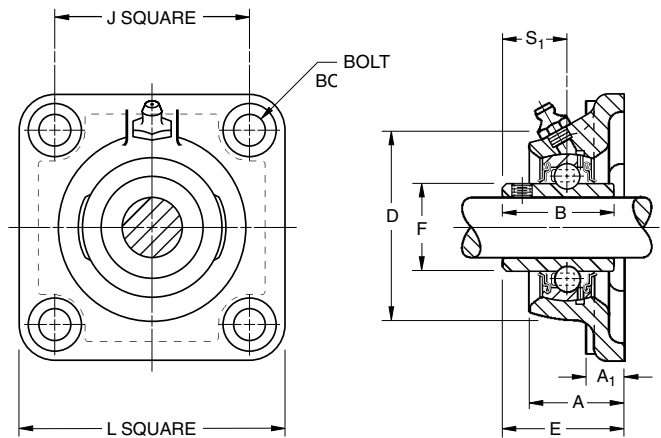
**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCJO 1 7/16", LCJO 1 11/16".**

| Unit       | Shaft Dia. | L ref. | J ref. | A <sub>1</sub> ref. | A ±.010" | E max. | N      | E <sub>1</sub> ref. | S <sub>1</sub> ref. | D ref.  | d <sub>1</sub> ±.005" | Bolt Size | Bearing Number   |        | Collar Number | Housing Number | Unit Wt. |
|------------|------------|--------|--------|---------------------|----------|--------|--------|---------------------|---------------------|---------|-----------------------|-----------|------------------|--------|---------------|----------------|----------|
|            |            |        |        |                     |          |        |        |                     |                     |         |                       |           | RCJO             | LCJO   |               |                |          |
| RCJO, LCJO | 1 3/16     | 120.6  | 92.1   | 14.3                | 38.1     | 53.7   | 14.3   | 15.1                | 32.5                | 96.8    | 48.7                  | 12.7      | GN103KRRB (KLLB) | SN103K | T-19165       | 1.816          | 4.0      |
|            |            | 4 3/4  | 3 5/8  | 9/16                | 1.500    | 2.115  | 9/16   | 19/32               | 1 9/32              | 3 13/16 | 1.918                 | 1/2       |                  |        |               |                | 4.0      |
| RCJO, LCJO | 1 7/16     | 130.2  | 101.6  | 15.9                | 40.5     | 55.3   | 14.3   | 14.3                | 33.3                | 104.8   | 55.1                  | 12.7      | GN107KRRB (KLLB) | SN107  | T-19167       | 2.497          | 5.50     |
|            |            | 5 1/8  | 4      | 5/8                 | 1.594    | 2.177  | 9/16   | 9/16                | 1 5/16              | 4 1/8   | 2.168                 | 1/2       |                  |        |               |                | 5.50     |
| RCJO, LCJO | 1 1/2      | 136.5  | 104.8  | 15.9                | 44.4     | 60.8   | 15.9   | 15.9                | 37.3                | 114.3   | 63.0                  | 14.3      | GN108KRRB (KLLB) | SN108K | T-19169       | 3.133          | 6.90     |
|            |            | 5 3/8  | 4 1/8  | 5/8                 | 1.750    | 2.396  | 5/8    | 5/8                 | 1 15/32             | 4 1/2   | 2.480                 | 9/16      |                  |        |               |                | 6.90     |
| RCJO, LCJO | 1 11/16    | 142.9  | 111.1  | 17.5                | 46.8     | 62.4   | 15.9   | 15.1                | 38.9                | 123.8   | 69.3                  | 14.3      | GN111KRRB (KLLB) | SN111K | T-19171       | 3.573          | 7.87     |
|            |            | 5 5/8  | 4 3/8  | 11/16               | 1.844    | 2.458  | 5/8    | 19/32               | 1 17/32             | 4 7/8   | 2.730                 | 9/16      |                  |        |               |                | 7.87     |
| RCJO       | 1 15/16    | 165.1  | 130.2  | 17.5                | 53.2     | 70.4   | 17.5   | 16.7                | 42.1                | 141.3   | 75.7                  | 15.9      | GN115KRRB        | SN115K | T-19173       | 5.185          | 11.42    |
|            |            | 6 1/2  | 5 1/8  | 11/16               | 2.094    | 2.771  | 11/16  | 21/32               | 1 21/32             | 5 9/16  | 2.980                 | 5/8       |                  |        |               |                | 11.42    |
| RCJO       | 2 3/16     | 177.8  | 142.9  | 17.5                | 58.7     | 76.7   | 17.5   | 17.5                | 45.2                | 154     | 82.0                  | 15.9      | GN203KRRB        | SN203K | T-19175       | 6.424          | 14.15    |
|            |            | 7      | 5 5/8  | 11/16               | 2.312    | 3.021  | 11/16  | 11/16               | 1 25/32             | 6 1/16  | 3.230                 | 5/8       |                  |        |               |                | 14.15    |
| RCJO       | 2 7/16     | 190.5  | 149.2  | 19                  | 65.1     | 84.7   | 20.6   | 19                  | 48.4                | 160.3   | 88.4                  | 19        | GN207KRRB        | SN207K | T-19177       | 7.409          | 16.32    |
|            |            | 7 1/2  | 5 7/8  | 3/4                 | 2.562    | 3.333  | 13/16  | 3/4                 | 1 29/32             | 6 5/16  | 3.480                 | 3/4       |                  |        |               |                | 16.32    |
| RCJO       | 2 11/16    | 225.4  | 177.8  | 22.2                | 72.2     | 89.4   | 23.8   | 21.4                | 54.8                | 185.7   | 101.1                 | 22.2      | GN211KRRB        | SO211K | T-19179       | 9.534          | 21.0     |
|            |            | 8 7/8  | 7      | 7/8                 | 2.844    | 3.521  | 15/16  | 27/32               | 2 5/32              | 7 5/16  | 3.980                 | 7/8       |                  |        |               |                | 21.0     |
| RCJO       | 2 15/16    | 231.8  | 184.2  | 22.2                | 77.8     | 105.3  | 23.8   | 27                  | 62.7                | 198.4   | 112.2                 | 22.2      | GN215KRRB        | SN215K | T-19181       | 14.128         | 31.12    |
|            |            | 9 1/8  | 7 1/4  | 7/8                 | 3.062    | 4.146  | 15/16  | 1 1/16              | 2 15/32             | 7 13/16 | 4.418                 | 7/8       |                  |        |               |                | 31.12    |
| RCJO       | 3 7/16     | 279.4  | 215.9  | 28.6                | 84.1     | 121.2  | 27     | 36.5                | 73.8                | 228.6   | 132.3                 | 25.4      | GN307KRRB        | SN307K | T-24475       | 21.474         | 47.3     |
|            |            | 11     | 8 1/2  | 1 1/8               | 3.312    | 4.770  | 1 1/16 | 1 7/16              | 2 29/32             | 9       | 5.210                 | 1         |                  |        |               |                | 47.3     |
| RCJO       | 3 15/16    | 317.5  | 241.3  | 31.8                | 96.8     | 133.6  | 30.2   | 36.5                | 78.6                | 266.7   | 145.5                 | 28.6      | GN315KRRB        | SN315K | T-24477       | 30.645         | 67.5     |
|            |            | 12 1/2 | 9 1/2  | 1 1/4               | 3.812    | 5.260  | 1 3/16 | 1 7/16              | 3 3/32              | 10 1/2  | 5.730                 | 1 1/8     |                  |        |               |                | 67.5     |

### YCJM MEDIUM DUTY SERIES SETSCREW LOCK

- Four-bolt flanged cartridges featuring GYM-KRRB bearing inserts.
- Ideal for conveyor, fan and blower, sawmill, and feed and grain handling applications.
- Durable, cast iron housings are powder-paint coated and maintain an excellent finish while resisting corrosion, chemicals and weather exposure.
- Industrial-duty flanged cartridges incorporate premium features designed to extend bearing life.

**Suggested shaft tolerances:** 1" -1 15/16", nominal to -.013 mm, -.0005";  
2" - 3", nominal to -.025 mm, -.0010".



TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YCJM 1 7/16".

| Unit | Shaft Dia. | L ref.           | J ref.           | A <sub>1</sub> ref. | A ±.015"      | E max.         | B                | D ref.         | F ±.001"        | S <sub>1</sub> ref. | Bolt Size | Bearing Number |
|------|------------|------------------|------------------|---------------------|---------------|----------------|------------------|----------------|-----------------|---------------------|-----------|----------------|
|      | in.        | mm in.           | mm in.           | mm in.              | mm in.        | mm in.         | mm in.           | mm in.         | mm in.          | mm in.              | mm in.    |                |
| YCJM | 1          | 107.9<br>4 1/4   | 82.6<br>3 1/4    | 13.5<br>17/32       | 29.9<br>1.178 | 42.4<br>1.671  | 38.1<br>1 1/2    | 76.2<br>3      | 40.31<br>1.587  | 22.2<br>7/8         | 10<br>3/8 | GYM1100KRRB    |
| YCJM | 1 3/16     | 117.5<br>4 5/8   | 92.1<br>3 5/8    | 13.5<br>17/32       | 31.8<br>1.254 | 46.4<br>1.827  | 42.9<br>1 11/16  | 88.9<br>3 1/2  | 46.81<br>1.843  | 25.4<br>1           | 12<br>1/2 | GYM1103KRRB    |
| YCJM | 1 7/16     | 130.2<br>5 1/8   | 101.6<br>4       | 14.8<br>9/16        | 38.1<br>1.500 | 54.4<br>2.141  | 49.2<br>1 15/16  | 98.4<br>3 7/8  | 52.27<br>2.058  | 30.2<br>1 3/16      | 12<br>1/2 | GYM1107KRRB    |
| YCJM | 1 1/2      | 136.5<br>5 3/8   | 104.8<br>4 1/8   | 14.3<br>9/16        | 38.9<br>1.531 | 54.4<br>2.141  | 49.2<br>1 15/16  | 104.8<br>4 1/8 | 57.92<br>2.28   | 30.2<br>1 3/16      | 12<br>1/2 | GYM1108KRRB    |
| YCJM | 1 11/16    | 142.9            | 111.1            | 14.3                | 42.9          | 60.7           | 51.6             | 112.7          | 62.84           | 32.5                | 16        | GYM1111KRRB    |
| YCJM | 1 3/4      | 5 5/8            | 4 3/8            | 9/16                | 1.688         | 2.390          | 2 1/32           | 4 7/16         | 2.474           | 1 9/32              | 5/8       | GYM1112KRRB    |
| YCJM | 1 15/16    | 161.9            | 130.2            | 16.7                | 46.8          | 64.7           | 55.6             | 120.7          | 69.77           | 33.3                | 16        | GYM1115KRRB    |
| YCJM | 2          | 6 3/8            | 5 1/8            | 2 1/32              | 1.844         | 2.546          | 2 3/16           | 4 3/4          | 2.747           | 1 15/16             | 5/8       | GY1200KRRB     |
| YCJM | 2 3/16     | 174.6            | 142.9            | 17.5                | 49.2          | 74.3           | 65.1             | 136.5          | 76.48           | 39.1                | 16        | GYM1203KRRB    |
| YCJM | 2 1/4      | 6 7/8            | 5 5/8            | 1 1/16              | 1.937         | 2.926          | 2 9/16           | 5 3/8          | 3.011           | 1 9/16              | 5/8       | GY1204KRRB     |
| YCJM | 2 7/16     | 187.3            | 149.2            | 19.0                | 63.5          | 81.5           | 69.9             | 152.4          | 86.92           | 42.9                | 16        | GYM1207KRRB    |
| YCJM | 2 1/2      | 7 3/8            | 5 7/8            | 3/4                 | 2.500         | 3.208          | 2 3/4            | 6              | 3.422           | 1 11/16             | 5/8       | GYM1208KRRB    |
| YCJM | 2 11/16    | 196.8<br>7 3/4   | 152.4<br>6       | 22.2<br>7/8         | 66.7<br>2.625 | 86.2<br>3.396  | 77.8<br>3 1/16   | 161.9<br>6 3/8 | 91.92<br>3.619  | 44.4<br>1 3/4       | 20<br>3/4 | GYM1211KRRB    |
| YCJM | 2 15/16    | 196.8            | 152.4            | 22.2                | 66.7          | 90.8           | 77.8             | 179.4          | 98.37           | 44.4                | 20        | GYM1215KRRB    |
| YCJM | 3          | 7 3/4            | 6                | 7/8                 | 2.625         | 3.576          | 3 1/16           | 7 1/16         | 3.873           | 1 15/16             | 3/4       | GYM1300KRRB    |
| YCJM | 3 7/16     | 214.3<br>8 7/16  | 242.1<br>9 17/32 | 25.4<br>1           | 70.5<br>2.776 | 101.1<br>3.981 | 95.94<br>3 25/32 | 196.8<br>7 3/4 | 111.68<br>4.397 | 56.4<br>2 7/32      | 20<br>3/4 | GYM1307KRRB    |
| YCJM | 3 15/16    | 268.3<br>10 9/16 | 298.4<br>11 3/4  | 31.8<br>1 1/4       | 95.4<br>3.755 | 127.3<br>5.014 | 117.35<br>4 5/8  | 235.0<br>9 1/4 | 131.3<br>5.171  | 68.3<br>2 11/16     | 25<br>1   | GYM1315KRRB    |

D



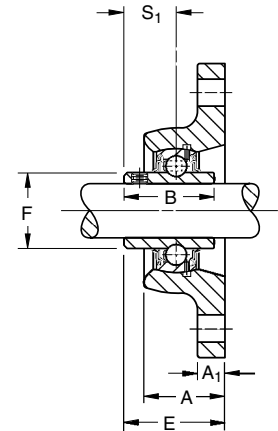
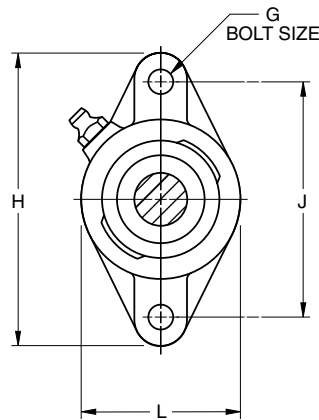


## BALL BEARINGS

### YCJTM MEDIUM DUTY SERIES SETSCREW LOCK

- Medium-duty, two-bolt flanged cartridges feature GYM-KRRB bearing inserts.
- Ideal for conveyor, fan and blower, sawmill, and feed and grain handling applications.
- Durable, cast iron housings are powder-paint coated and maintain an excellent finish while resisting corrosion, chemicals and weather exposure.
- Industrial-duty flanged cartridge units incorporate premium features designed to extend bearing life. They can replace competitive designs.

**Suggested shaft tolerances:** 1" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3", nominal to -.025 mm, -.0010".



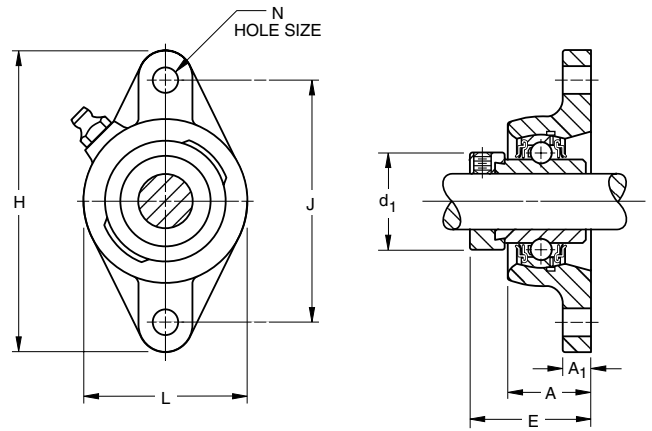
**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YCJTM 1 7/16".**

| Unit  | Shaft Dia. | H ref.          | J ±.010"         | L ref.         | A ±.015"      | E max.        | B               | A <sub>1</sub> ref. | F ±.001"       | S <sub>1</sub> | Bolt G    | Bearing Number |
|-------|------------|-----------------|------------------|----------------|---------------|---------------|-----------------|---------------------|----------------|----------------|-----------|----------------|
|       | in.        | mm in.          | mm in.           | mm in.         | mm in.        | mm in.        | mm in.          | mm in.              | mm in.         | mm in.         | mm in.    |                |
| YCJTM | 1          | 141.3<br>5 9/16 | 116.7<br>4 19/32 | 79.5<br>3 1/8  | 29.9<br>1.178 | 42.4<br>1.671 | 38.1<br>1 1/2   | 13.5<br>17/32       | 40.31<br>1.587 | 22.2<br>7/8    | 10<br>3/8 | GYM1100KRRB    |
| YCJTM | 1 3/16     | 155.6<br>6 1/8  | 130.2<br>5 1/8   | 92.1<br>3 5/8  | 31.8<br>1.254 | 46.4<br>1.827 | 42.9<br>1 11/16 | 11.9<br>15/32       | 46.79<br>1.843 | 25.4<br>1      | 12<br>1/2 | GYM1103KRRB    |
| YCJTM | 1 7/16     | 171.5<br>6 3/4  | 143.7<br>5 21/32 | 104.8<br>4 1/8 | 38.1<br>1.500 | 54.4<br>2.141 | 49.2<br>1 15/16 | 12.7<br>1/2         | 52.27<br>2.058 | 30.2<br>1 3/16 | 12<br>1/2 | GYM1107KRRB    |
| YCJTM | 1 1/2      | 179.4<br>7 1/16 | 148.4<br>5 27/32 | 111.1<br>4 3/8 | 38.9<br>1.531 | 54.4<br>2.141 | 49.2<br>1 15/16 | 12.7<br>1/2         | 57.92<br>2.280 | 30.2<br>1 3/16 | 12<br>1/2 | GYM1108KRRB    |
| YCJTM | 1 11/16    | 188.9           | 157.2            | 115.9          | 42.9          | 60.7          | 51.6            | 12.7                | 62.81          | 32.5           | 16        | GYM1111KRRB    |
| YCJTM | 1 3/4      | 77/16           | 6 3/16           | 4 9/16         | 1.688         | 2.390         | 2 1/32          | 1/2                 | 2.473          | 1 9/32         | 5/8       | GYM1112KRRB    |
| YCJTM | 1 15/16    | 215.9           | 184.2            | 127.0          | 46.8          | 64.7          | 55.6            | 16.7                | 69.77          | 33.3           | 16        | GYM1115KRRB    |
| YCJTM | 2          | 8 1/2           | 7 1/4            | 5              | 1.844         | 2.546         | 2 3/16          | 21/32               | 2.747          | 1 15/16        | 5/8       | GY1200KRRB     |

D

### RCJT, TCJT, LCJT INDUSTRIAL SERIES

- Cartridges are the same basic design as RCJ, TCJ, and LCJ types, except they have two bolt holes instead of four.
- Primarily designed for applications where the mounting area is restricted.
- RCJT cartridge is equipped with G-KRRB (R-Seal) wide inner ring bearings. The TCJT is equipped with G-KPPB (Tri-Ply Seal) wide inner ring bearings. The LCJT is equipped with the G-KLLB (Mechani-Seal) wide inner ring bearings.
- Units are factory prelubricated, but a grease fitting is provided for relubrication.
- Safety end caps are available for selected sizes.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RCJT | G-KRRB         | Page D54                    |
| TCJT | G-KPPB         | Page D65                    |
| LCJT | G-KLLB         | Page D62                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCJT 1 3/16", TCJT 1 3/16". POPULAR SIZES ARE IN BOLD.

| Unit              | Shaft Dia.     |     | H ref.  | J ±.010" | L ref. | A ±.015" | N      | E max. | A1 ref. | d1 ±.005" | Bearing Number |            | Collar Number         | Housing Wt. | Unit  |
|-------------------|----------------|-----|---------|----------|--------|----------|--------|--------|---------|-----------|----------------|------------|-----------------------|-------------|-------|
|                   | mm             | in. |         |          |        |          |        |        |         |           | RCJT           | TCJT       |                       |             |       |
| RCJT              | 1/2            |     |         |          |        |          |        |        |         |           | G1008KRRB      | —          | S1008K                |             |       |
| RCJT              | 5/8            |     | 98.4    | 76.2     | 54.0   | 23.6     | 10.7   | 40.6   | 10.3    | 28.1      | G1010KRRB      | —          | S1010K                | T-40219     | 0.590 |
| RCJT              | 1 1/16         |     | 3 7/8   | 3        | 2 1/8  | 0.929    | 2 7/64 | 1.599  | 1 3/32  | 1.105     | G1011KRRB      | —          | S1011K                |             | 1.30  |
| RCJT              | 17             |     |         |          |        |          |        |        |         |           | GE17KRRB       | —          | SE17K                 |             |       |
| <b>RCJT</b>       | <b>3/4</b>     |     | 111.9   | 89.7     | 60.5   | 27.8     | 10.7   | 46.4   | 11.1    | 32.8      | G1012KRRB      | —          | S1012K                | T-40220     | 0.590 |
| RCJT              | 20             |     | 4 13/32 | 3 17/32  | 2 3/8  | 1.094    | 2 7/64 | 1.828  | 7/16    | 1.292     | GE20KRRB       | —          | SE20K                 |             | 1.30  |
| RCJT, TCJT        | 1 3/16         |     |         |          |        |          |        |        |         |           | G1013KRRB      | G1013KPPB3 | S1013K                |             |       |
| RCJT, TCJT        | 7/8            |     | 123.8   | 99.2     | 69.8   | 27.9     | 11.5   | 46.7   | 11.1    | 23.9      | G1014KRRB      | G1014KPPB3 | S1014K                | T-40221     | 0.785 |
| RCJT, TCJT        | 1 5/16         |     | 4 7/8   | 3 29/32  | 2 3/4  | 1.100    | 2 9/64 | 1.839  | 7/16    | 1.480     | G1015KRRB      | G1015KPPB3 | S1015K                | (T-21412P)  | 1.73  |
| <b>RCJT, TCJT</b> | <b>1</b>       |     |         |          |        |          |        |        |         |           | G1100KRRB      | G1100KPPB3 | S1100K                |             |       |
| RCJT, TCJT        | 25             |     |         |          |        |          |        |        |         |           | GE25KRRB       | GE25KPPB3  | SE25K                 |             |       |
| RCJT, TCJT        | 1 1/16         |     |         |          |        |          |        |        |         |           | G1101KRRB      | G1101KPPB3 | S1101K                |             |       |
| RCJT, TCJT        | 1 1/8          |     | 141.3   | 116.7    | 79.4   | 29.9     | 11.5   | 50.5   | 11.9    | 43.7      | G1102KRRB      | G1102KPPB3 | S1102K                | T-40222     | 1.09  |
| <b>RCJT, TCJT</b> | <b>1 3/16</b>  |     | 5 9/16  | 4 19/32  | 3 1/8  | 1.178    | 2 9/64 | 1.990  | 1 5/32  | 1.730     | G1103KRRB      | G1103KPPB3 | S1103K                | (T-21548P)  | 2.40  |
| TCJT              | 1 1/4 S        |     |         |          |        |          |        |        |         |           | —              | G1103KPPB4 | S1103K3               |             |       |
| RCJT, TCJT        | 30             |     |         |          |        |          |        |        |         |           | GE30KRRB       | GE30KPPB3  | SE30K                 |             |       |
| RCJT, TCJT        | 1 1/4          |     |         |          |        |          |        |        |         |           | G1104KRRB      | G1104KPPB2 | S1104K <sup>(1)</sup> |             |       |
| RCJT, TCJT        | 1 5/16         |     | 155.6   | 130.2    | 92.1   | 31.8     | 13.1   | 53.5   | 11.9    | 53.6      | G1105KRRB      | G1105KPPB2 | S1105K <sup>(1)</sup> | T-40223     | 1.444 |
| RCJT, TCJT        | 1 3/8          |     | 6 1/8   | 5 1/8    | 3 5/8  | 1.254    | 3 3/64 | 2.106  | 1 5/32  | 2.112     | G1106KRRB      | G1106KPPB2 | S1106K <sup>(1)</sup> | (T-21414)   | 3.18  |
| <b>RCJT, TCJT</b> | <b>1 7/16</b>  |     |         |          |        |          |        |        |         |           | G1107KRRB      | G1107KPPB2 | S1107K <sup>(1)</sup> |             |       |
| RCJT, TCJT        | 35             |     |         |          |        |          |        |        |         |           | GE35KRRB       | GE35KPPB2  | SE35K                 |             |       |
| RCJT, TCJT        | 1 1/2          |     | 171.4   | 143.6    | 104.7  | 38.1     | 13.1   | 59.3   | 12.7    | 58.2      | G1108KRRB      | G1108KPPB3 | S1108KT               | T-40224     | 2.193 |
| RCJT, TCJT        | 1 9/16         |     | 6 3/4   | 5 21/32  | 4 1/8  | 1.500    | 3 3/64 | 2.334  | 1/2     | 2.292     | —              | G1109KPPB3 | S1109KT               | (T-22529)   | 4.83  |
| RCJT, TCJT        | 40             |     |         |          |        |          |        |        |         |           | GE40KRRB       | GE40KPPB3  | SE40K                 |             |       |
| RCJT, TCJT        | 1 5/8          |     |         |          |        |          |        |        |         |           | G1110KRRB      | G1110KPPB4 | S1110K                |             |       |
| <b>RCJT, TCJT</b> | <b>1 11/16</b> |     | 179.4   | 148      | 111.1  | 38.9     | 13.1   | 59.3   | 12.7    | 63.0      | G1111KRRB      | G1111KPPB4 | S1111K                | T-40225     | 2.379 |
| RCJT, TCJT        | 1 3/4          |     | 7 1/16  | 5 27/32  | 4 3/8  | 1.531    | 3 3/64 | 2.334  | 1/2     | 2.480     | G1112KRRB      | G1112KPPB4 | S1112K                | (T-21416)   | 5.24  |
| RCJT, TCJT        | 45             |     |         |          |        |          |        |        |         |           | GE45KRRB       | GE45KPPB4  | SE45K                 |             |       |
| RCJT, TCJT        | 1 7/8          |     | 188.9   | 157.2    | 115.9  | 42.9     | 17.1   | 66.4   | 12.7    | 69.3      | G1114KRRB      | G1114KPPB3 | S1114K                | T-40226     | 2.724 |
| <b>RCJT, TCJT</b> | <b>1 15/16</b> |     | 7 7/16  | 6 3/16   | 4 9/16 | 1.688    | 4 3/64 | 2.615  | 1/2     | 2.730     | G1115KRRB      | G1115KPPB3 | S1115K                | (T-21418)   | 6     |
| RCJT, TCJT        | 50             |     |         |          |        |          |        |        |         |           | GE50KRRB       | GE50KPPB3  | SE50K                 |             |       |
| RCJT, TCJT        | 2              |     |         |          |        |          |        |        |         |           | G1200KRRB      | G1200KPPB4 | S1200K                |             |       |
| RCJT, TCJT        | 2 1/8          |     | 215.9   | 184.1    | 127    | 46.8     | 17.1   | 75.1   | 16.7    | 75.7      | G1202KRRB      | G1202KPPB4 | S1202K                | T-40227     | 3.668 |
| RCJT, TCJT        | 2 3/16         |     | 8 1/2   | 7 1/4    | 5      | 1.844    | 4 3/64 | 2.958  | 2 1/32  | 2.980     | G1203KRRB      | G1203KPPB4 | S1203K                | (T-23788)   | 8.08  |
| RCJT, TCJT        | 55             |     |         |          |        |          |        |        |         |           | GE55KRRB       | GE55KPPB4  | SE55K                 |             |       |

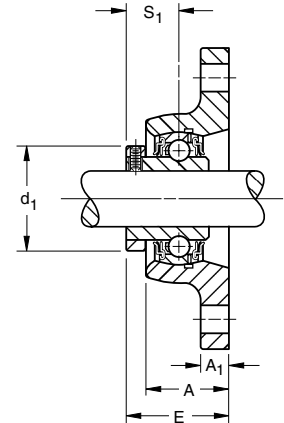
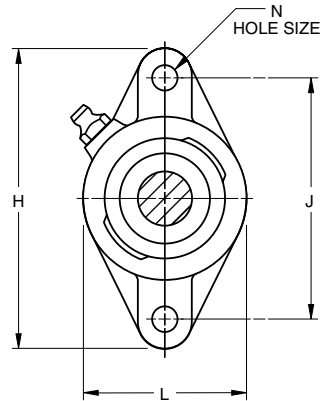
<sup>(1)</sup> Add C1 suffix to collar numbers for G...KPPB2 bearings (TCJT). Shaft diameter with an S = smaller housing.



## BALL BEARINGS

### RCJTC INDUSTRIAL SERIES CONCENTRIC COLLAR

- Same basic design as RCJT, except they use the concentric collar rather than the self-locking eccentric collar as the shaft locking device.
- All units are equipped with GC-KRRB wide inner ring concentric collars.
- The spherical outside diameter mounted in the corresponding machined housing seats provides the initial self-alignment.
- Bolt hole spacing dimensions are interchangeable with the RCJT Series and most competitive units.
- Units are factory prelubricated. A grease fitting is provided for relubrication.
- Safety end caps are available for selected sizes.



#### BEARING DATA

| Unit  | Bearing Number | Dimensions and Load Ratings |
|-------|----------------|-----------------------------|
| RCJTC | GC-KRRB        | Page D66                    |

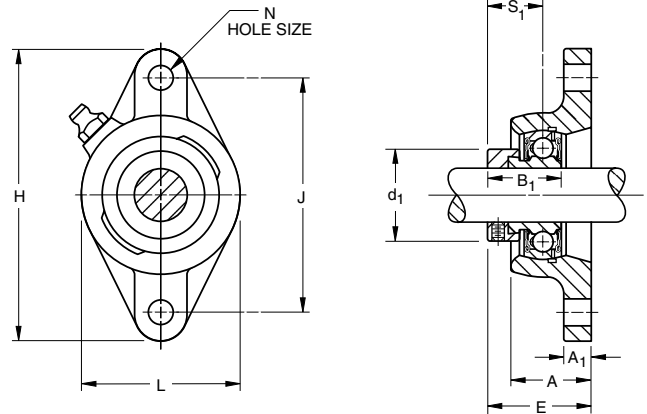
TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCJTC 1 3/16"

| Unit  | Shaft Dia. | H ref.           | J $\pm 0.010$ "  | L ref.          | A $\pm 0.015$ " | E max.        | N             | A <sub>1</sub> ref. | d <sub>1</sub> $\pm 0.005$ " | S <sub>1</sub> ref. | Bearing Number | Collar Number | Housing Number       | Unit Wt.      |
|-------|------------|------------------|------------------|-----------------|-----------------|---------------|---------------|---------------------|------------------------------|---------------------|----------------|---------------|----------------------|---------------|
|       | in.        | mm in.           | mm in.           | mm in.          | mm in.          | mm in.        | mm in.        | mm in.              | mm in.                       | mm in.              |                |               | new (old)            | kg lbs.       |
| RCJTC | 5/8        | 98.4<br>3 7/8    | 76.2<br>3        | 60.3<br>2 3/8   | 23.6<br>0.929   | 32.7<br>1.287 | 9.9<br>25/64  | 8.3<br>21/64        | 33.8<br>1.329                | 15.5<br>39/64       | GC1010KRRB     | C203          | T-40270<br>(T-27181) | 0.368<br>0.81 |
| RCJTC | 3/4        | 111.9<br>4 13/32 | 89.7<br>3 17/32  | 60.3<br>2 3/8   | 27.8<br>1.094   | 38.2<br>1.502 | 9.9<br>25/64  | 11.1<br>7/16        | 37.7<br>1.485                | 18.7<br>47/64       | GC1012KRRB     | C204          | T-40271<br>(T-27183) | 0.545<br>1.2  |
| RCJTC | 1          | 123.8<br>4 7/8   | 98.81<br>3 57/64 | 69.8<br>2 3/4   | 27.9<br>1.100   | 39.8<br>1.569 | 11.9<br>15/32 | 13.5<br>17/32       | 44.1<br>1.735                | 20.2<br>51/64       | GC1100KRRB     | C205          | T-40272<br>(T-27200) | 0.717<br>1.58 |
| RCJTC | 1 1/8      | 141.3            | 116.7            | 81              | 29.9            | 43.0          | 11.5          | 13.5                | 52.3                         | 22.6                | GC1102KRRB     | C206          | T-401273             | 1.035         |
| RCJTC | 1 3/16     | 5 9/16           | 4 19/32          | 3 3/16          | 1.178           | 1.693         | 29/64         | 17/32               | 2.058                        | 57/64               | GC1103KRRB     |               | (T-27197)            | 2.28          |
| RCJTC | 1 1/4 S    |                  |                  |                 |                 |               |               |                     |                              |                     | GC1103KRRB3    |               |                      |               |
| RCJTC | 1 1/4      | 155.6            | 130.2            | 92.1            | 31.8            | 46.6          | 13.1          | 14.3                | 58.2                         | 25.4                | GC1104KRRB     | C207          | T-40252              | 1.498         |
| RCJTC | 1 3/8      | 6 1/8            | 5 1/8            | 3 5/8           | 1.254           | 1.834         | 33/64         | 9/16                | 2.292                        | 1                   | GC1106KRRB     |               |                      | 3.30          |
| RCJTC | 1 7/16     |                  |                  |                 |                 |               |               |                     |                              |                     | GC1107KRRB     |               |                      |               |
| RCJTC | 1 11/16    | 179.4<br>7 1/16  | 148.4<br>5 27/32 | 111.1<br>4 3/8  | 38.9<br>1.531   | 53.7<br>2.116 | 13.1<br>33/64 | 14.3<br>9/16        | 72.9<br>2.871                | 29.4<br>1 5/32      | GC1111KRRB     | C209          | T-40275              | 2.097<br>4.62 |
| RCJTC | 1 15/16    | 188.9<br>7 7/16  | 157.2<br>6 3/16  | 115.9<br>4 9/16 | 42.9<br>1.688   | 58.5<br>2.303 | 17.1<br>43/64 | 14.3<br>9/16        | 79.3<br>3.121                | 30.2<br>1 3/16      | GC1115KRRB     | C210          | T-40276              | 2.497<br>5.50 |

Shaft diameter with an S = smaller housing.

**VCJT STANDARD SERIES**

- Same design and features as the VCJ Type, but has two bolt holes instead of four. This allows for mounting in restricted areas.
- Assembled with GRA-RRB bearings with positive contact land-riding seals and self-locking collars.
- Units are factory prelubricated. A grease fitting is provided for relubrication.
- Safety end caps are available for selected sizes.



| BEARING DATA |                |                             |
|--------------|----------------|-----------------------------|
| Unit         | Bearing Number | Dimensions and Load Ratings |
| VCJT         | GRA-RRB        | Page D57                    |

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
 2" - 2 3/16", nominal to **-.025 mm, -.0010"**.

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VCJT 1". POPULAR SIZES ARE IN BOLD.**

| Unit        | Shaft Dia.     |     | H ref.  | J ±.010 |        | L ref. | A ±.015" | E max. | N       | B <sub>1</sub> | A <sub>1</sub> ref. | d <sub>1</sub> ±.005" | S <sub>1</sub> | Bearing Number | Collar Number | Housing Number | Unit Wt. |        |
|-------------|----------------|-----|---------|---------|--------|--------|----------|--------|---------|----------------|---------------------|-----------------------|----------------|----------------|---------------|----------------|----------|--------|
|             | mm             | in. |         | mm in.  | mm in. |        |          |        |         |                |                     |                       |                |                |               |                | mm in.   | mm in. |
| VCJT        | 1/2            |     | 98.4    | 76.2    | 53.9   | 23.6   | 39.3     | 10.7   | 28.6    | 10.3           | 28.1                | 22.2                  | GRA008RRB      | S1008K         | T-40219       | 0.59           |          |        |
| VCJT        | 5/8            |     | 3 7/8   | 3       | 2 1/8  | 0.929  | 1.548    | 27/64  | 1 1/8   | 13/32          | 1.105               | 7/8                   | GRA010RRB      | S1010K         | (T-22244P)    | 1.3            |          |        |
| VCJT        | 17             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE17RRB      | SE17K          |               |                |          |        |
| <b>VCJT</b> | <b>3/4</b>     |     | 111.9   | 89.7    | 60.3   | 27.8   | 43.3     | 9.9    | 31      | 11.1           | 32.8                | 23.4                  | GRA012RRB      | S1012K         | T-40220       | 0.518          |          |        |
| VCJT        | 20             |     | 4 13/32 | 3 17/32 | 2 3/8  | 1.094  | 1.706    | 25/64  | 1 7/32  | 7/16           | 1.292               | 59/64                 | GRAE20RRB      | SE20K          | (T-21409P)    | 1.44           |          |        |
| VCJT        | 7/8            |     |         |         |        |        |          |        |         |                |                     |                       | GRA014RRB      | S1014K         |               |                |          |        |
| VCJT        | 15/16          |     | 123.8   | 99.2    | 69.8   | 27.9   | 43.2     | 11.5   | 31      | 11.1           | 23.9                | 23.4                  | GRA015RRB      | S1015K         | T-40221       | 0.74           |          |        |
| <b>VCJT</b> | <b>1</b>       |     | 4 7/8   | 3 29/32 | 2 3/4  | 1.100  | 1.701    | 29/64  | 1 7/32  | 7/16           | 1.480               | 59/64                 | GRA100RRB      | S1100K         | (T-21412P)    | 1.63           |          |        |
| VCJT        | 25             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE25RRB      | SE25K          |               |                |          |        |
| VCJT        | 1 1/8          |     |         |         |        |        |          |        |         |                |                     |                       | GRA102RRB      | S1102K         |               |                |          |        |
| <b>VCJT</b> | <b>1 3/16</b>  |     | 141.3   | 116.7   | 79.4   | 29.9   | 47.1     | 11.5   | 35.7    | 11.9           | 43.7                | 27                    | GRA103RRB      | S1103K         | T-40222       | 1.026          |          |        |
| VCJT        | 1 1/4 S        |     | 5 9/16  | 4 19/32 | 3 1/8  | 1.178  | 1.856    | 29/64  | 1 13/32 | 15/32          | 1.730               | 1 1/16                | GRA103RRB2     | S1103K3        | (T-21548P)    | 2.26           |          |        |
| VCJT        | 30             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE30RRB      | SE30K          |               |                |          |        |
| VCJT        | 1 1/4          |     |         |         |        |        |          |        |         |                |                     |                       | GRA104RRB      | S1104K         |               |                |          |        |
| VCJT        | 1 3/8          |     | 155.6   | 130.2   | 92.1   | 31.8   | 50.5     | 13.1   | 38.9    | 11.9           | 53.6                | 29.4                  | GRA106RRB      | S1106K         | T-40223       | 1.362          |          |        |
| <b>VCJT</b> | <b>1 7/16</b>  |     | 6 1/8   | 5 1/8   | 3 5/8  | 1.254  | 1.989    | 33/64  | 1 17/32 | 15/32          | 2.112               | 1 5/32                | GRA107RRB      | S1107K         | (T-21414)     | 3              |          |        |
| VCJT        | 35             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE35RRB      | SE35K          |               |                |          |        |
| <b>VCJT</b> | <b>1 1/2</b>   |     | 171.4   | 143.6   | 104.7  | 38.1   | 56.9     | 13.1   | 43.7    | 12.7           | 58.2                | 32.5                  | GRA108RRB      | S1108KT        | T-40224       | 2.075          |          |        |
| VCJT        | 40             |     | 6 3/4   | 5 21/32 | 4 1/8  | 1.500  | 2.243    | 33/64  | 1 23/32 | 1/2            | 2.292               | 1 9/32                | GRAE40RRB      | SE40K          | (T-22529)     | 4.57           |          |        |
| VCJT        | 1 5/8          |     |         |         |        |        |          |        |         |                |                     |                       | GRA110RRB      | S1110K         |               |                |          |        |
| <b>VCJT</b> | <b>1 11/16</b> |     | 179.4   | 148.0   | 111.1  | 38.9   | 57.0     | 13.1   | 43.7    | 12.7           | 63.0                | 32.5                  | GRA111RRB      | S1111K         | T-40225       | 2.229          |          |        |
| VCJT        | 1 3/4          |     | 7 1/16  | 5 27/32 | 4 3/8  | 1.531  | 2.244    | 33/64  | 1 23/32 | 1/2            | 2.480               | 1 9/32                | GRA112RRB      | S1112K         | (T-21416)     | 4.91           |          |        |
| VCJT        | 45             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE45RRB      | SE45K          |               |                |          |        |
| VCJT        | 1 7/8          |     |         |         |        |        |          |        |         |                |                     |                       | GRA114RRB      | S1114K         |               |                |          |        |
| <b>VCJT</b> | <b>1 15/16</b> |     | 188.9   | 157.2   | 115.8  | 42.9   | 61.0     | 17.1   | 43.7    | 12.7           | 69.3                | 32.5                  | GRA115RRB      | S1115K         | T-40226       | 2.492          |          |        |
| VCJT        | 2 S            |     | 7 7/16  | 6 3/16  | 4 9/16 | 1.688  | 2.400    | 43/64  | 1 23/32 | 1/2            | 2.730               | 1 9/32                | GRA115RRB2     | S1115K2        | (T-21418)     | 5.49           |          |        |
| VCJT        | 50             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE50RRB      | SE50K          |               |                |          |        |
| VCJT        | 2              |     | 215.9   | 184.1   | 127    | 46.8   | 67.9     | 17.1   | 48.4    | 16.7           | 75.7                | 36.5                  | GRA200RRB      | S1200K         | T-40227       | 3.092          |          |        |
| <b>VCJT</b> | <b>2 3/16</b>  |     | 8 1/2   | 7 1/4   | 5      | 1.844  | 2.672    | 43/64  | 1 29/32 | 21/32          | 2.980               | 2 7/16                | GRA203RRB      | S1203K         | (T-23788)     | 6.81           |          |        |
| VCJT        | 55             |     |         |         |        |        |          |        |         |                |                     |                       | GRAE55RRB      | SE55K          |               |                |          |        |

Shaft diameter with an S = smaller housing.

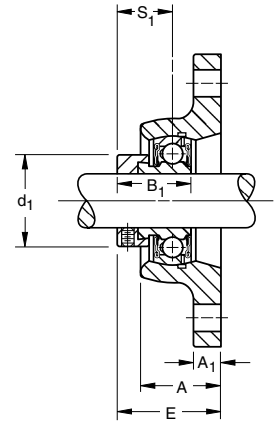
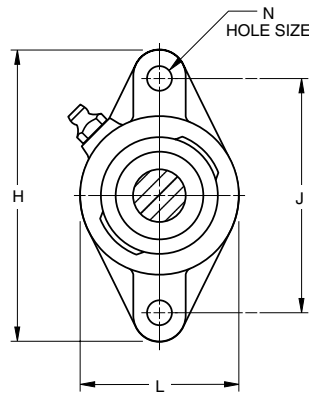


# BALL BEARINGS

## YCJT INDUSTRIAL SETSCREW SERIES

- Same design as the YCJ Series, but mounted with two bolts instead of four.
- All are equipped with GY-KRRB wide inner ring, setscrew bearings.
- Spherical outside diameter mounted in the corresponding machined housings seats provides the initial self-alignment.
- Units are factory prelubricated. A grease fitting is provided for relubrication.
- Safety end caps are available for selected sizes.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, -.0005"**;  
2" - 3 1/16", nominal to **-.025 mm, -.0010"**.



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YCJT | GY-KRRB        | Page D67                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YCJT 1 7/16". POPULAR SIZES ARE IN BOLD.**

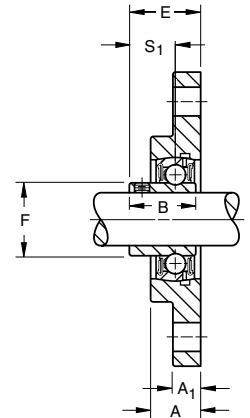
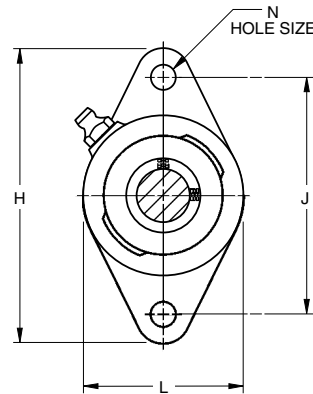
| Unit        | Shaft Dia. |                | H ref.  | J $\pm 0.010"$ | L ref. | A $\pm 0.015"$ | E max. | B       | A <sub>1</sub> ref. | F $\pm 0.001"$ | S <sub>1</sub> ref. | Hole Size | Bearing Number |
|-------------|------------|----------------|---------|----------------|--------|----------------|--------|---------|---------------------|----------------|---------------------|-----------|----------------|
|             | mm         | in.            |         |                |        |                |        |         |                     |                |                     |           |                |
| YCJT        |            | 1/2            | 98.4    | 76.2           | 54.0   | 23.6           | 32.9   | 27.4    | 11.1                | 23.9           | 15.9                | 10        | GY1008KRRB     |
| YCJT        |            | 5/8            | 3 7/8   | 3              | 2 1/8  | 0.929          | 1.296  | 1 5/64  | 7/16                | 0.941          | 5/8                 | 27/64     | GY1010KRRB     |
| YCJT        | 17         |                |         |                |        |                |        |         |                     |                |                     |           | GYE17KRRB      |
| <b>YCJT</b> |            | <b>3/4</b>     | 111.9   | 89.7           | 60.3   | 27.8           | 37.7   | 30.9    | 11.1                | 27.6           | 18.3                | 10        | GY1012KRRB     |
| YCJT        | 20         |                | 4 13/32 | 3 17/32        | 2 3/8  | 1.094          | 1.484  | 1 7/32  | 7/16                | 1.085          | 23/32               | 27/64     | GYE20KRRB      |
| YCJT        |            | 7/8            |         |                |        |                |        |         |                     |                |                     |           | GY1014KRRB     |
| YCJT        |            | 15/16          | 123.8   | 99.2           | 69.9   | 27.9           | 39.3   | 34.1    | 11.1                | 33.8           | 19.8                | 11.5      | GY1015KRRB     |
| <b>YCJT</b> |            | <b>1</b>       | 4 7/8   | 3 29/32        | 2 3/4  | 1.100          | 1.546  | 1 11/32 | 7/16                | 1.331          | 25/32               | 29/64     | GY1100KRRB     |
| YCJT        | 25         |                |         |                |        |                |        |         |                     |                |                     |           | GYE25KRRB      |
| YCJT        |            | 1 1/8          |         |                |        |                |        |         |                     |                |                     |           | GY1102KRRB     |
| <b>YCJT</b> |            | <b>1 3/16</b>  | 141.3   | 116.7          | 79.45  | 29.9           | 42.4   | 38.1    | 11.9                | 40.3           | 22.2                | 11.5      | GY1103KRRB     |
| YCJT        |            | 1 1/4 S        | 5 9/16  | 4 19/32        | 3 1/8  | 1.178          | 1.671  | 1 1/2   | 15/32               | 1.587          | 7/8                 | 29/64     | GY1103KRRB3    |
| YCJT        | 30         |                |         |                |        |                |        |         |                     |                |                     |           | GYE30KRRB      |
| YCJT        |            | 1 1/4          |         |                |        |                |        |         |                     |                |                     |           | GY1104KRRB     |
| YCJT        |            | 1 3/8          | 155.6   | 130.2          | 92.1   | 31.8           | 46.4   | 42.9    | 11.9                | 46.8           | 25.4                | 13        | GY1106KRRB     |
| <b>YCJT</b> |            | <b>1 7/16</b>  | 6 1/8   | 5 1/8          | 3 5/8  | 1.254          | 1.827  | 1 11/16 | 15/32               | 1.843          | 1                   | 33/64     | GY1107KRRB     |
| YCJT        | 35         |                |         |                |        |                |        |         |                     |                |                     |           | GYE35KRRB      |
| <b>YCJT</b> |            | <b>1 1/2</b>   | 171.5   | 143.7          | 104.8  | 38.1           | 54.4   | 49.2    | 12.7                | 52.2           | 30.2                | 13        | GY1108KRRB     |
| YCJT        | 40         |                | 6 3/4   | 5 21/32        | 4 1/8  | 1.500          | 2.141  | 1 15/16 | 1/2                 | 2.057          | 1 3/16              | 33/64     | GYE40KRRB      |
| YCJT        |            | 1 5/8          |         |                |        |                |        |         |                     |                |                     |           | GY1110KRRB     |
| <b>YCJT</b> |            | <b>1 11/16</b> | 179.4   | 148.4          | 111.1  | 38.9           | 54.4   | 49.2    | 12.7                | 57.9           | 30.2                | 13        | GY1111KRRB     |
| YCJT        |            | 1 3/4          | 7 1/16  | 5 27/32        | 4 3/8  | 1.531          | 2.14   | 1 15/16 | 1/2                 | 2.279          | 1 3/16              | 33/64     | GY1112KRRB     |
| YCJT        | 45         |                |         |                |        |                |        |         |                     |                |                     |           | GYE45KRRB      |
| <b>YCJT</b> |            | <b>1 15/16</b> | 188.9   | 157.2          | 115.9  | 42.9           | 60.7   | 51.6    | 12.7                | 62.8           | 32.5                | 17        | GY1115KRRB     |
| YCJT        |            | 2 S            | 7 7/16  | 6 3/16         | 4 9/16 | 1.688          | 2.390  | 2 1/32  | 1/2                 | 2.473          | 1 9/32              | 43/64     | GY1115KRRB3    |
| YCJT        | 50         |                |         |                |        |                |        |         |                     |                |                     |           | GYE50KRRB      |
| YCJT        |            | 2              | 215.9   | 184.2          | 127    | 46.8           | 64.7   | 55.6    | 16.7                | 69.7           | 33.3                | 17        | GY1200KRRB     |
| <b>YCJT</b> |            | <b>2 3/16</b>  | 8 1/2   | 7 1/4          | 5      | 1.844          | 2.547  | 2 3/16  | 21/32               | 2.745          | 1 15/16             | 43/64     | GY1203KRRB     |
| YCJT        | 55         |                |         |                |        |                |        |         |                     |                |                     |           | GYE55KRRB      |

Shaft diameter with an S = smaller housing.

**SCJT STANDARD SERIES**

- Same construction and design as SCJ Type, but mounted with two bolts instead of four.
- Assembled with GYA-RRB bearings with positive contact land-riding seals and setscrew locking.
- Units are factory prelubricated. A grease fitting is provided for relubrication.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
2" - 3 1/16", nominal to -.025 mm, -.0010".



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| SCJT | GYA-RRB        | Page D59                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: SCJT 1". POPULAR SIZES ARE IN BOLD.

| Unit        | Shaft Dia. |                | H       | J       | L      | A      | E       | N     | B       | A <sub>1</sub> | F       | S <sub>1</sub> | Bearing Number | Housing Number | Unit Wt. |
|-------------|------------|----------------|---------|---------|--------|--------|---------|-------|---------|----------------|---------|----------------|----------------|----------------|----------|
|             | mm         | in.            |         |         |        |        |         |       |         |                |         |                |                |                | kg       |
| SCJT        |            | 1/2            | 98.4    | 76.2    | 60.3   | 17.9   | 25.4    | 9.9   | 23.8    | 11.1           | 24.6    | 15.9           | GYA008RRB      | T-40136        | 0.34     |
| SCJT        |            | 5/8            | 3 7/8   | 3       | 2 9/8  | 45/64  | 1       | 25/64 | 15/16   | 7/16           | 31/32   | 5/8            | GYA010RRB      |                | 0.75     |
| SCJT        |            | 17             |         |         |        |        |         |       |         |                |         |                | GYAE17RRB      |                |          |
| <b>SCJT</b> |            | <b>3/4</b>     | 111.9   | 89.69   | 65.1   | 19     | 28.6    | 9.9   | 27      | 11.1           | 29      | 18.3           | GYA012RRB      | T-40138        | 0.43     |
| SCJT        |            | 20             | 4 13/32 | 3 17/32 | 2 9/16 | 3/4    | 1 1/8   | 25/64 | 1 1/16  | 7/16           | 1 9/64  | 23/32          | GYAE20RRB      |                | 0.94     |
| SCJT        |            | 7/8            |         |         |        |        |         |       |         |                |         |                | GYA014RRB      |                |          |
| SCJT        |            | 15/16          | 123.8   | 98.82   | 69.9   | 19.8   | 29.8    | 11.9  | 28.2    | 11.1           | 33.7    | 19.4           | GYA015RRB      | T-40140        | 0.48     |
| <b>SCJT</b> |            | <b>1</b>       | 4 7/8   | 3 57/64 | 2 3/4  | 25/32  | 1 11/64 | 15/32 | 1 7/64  | 7/16           | 1 21/64 | 49/64          | GYA100RRB      |                | 1.07     |
| SCJT        |            | 25             |         |         |        |        |         |       |         |                |         |                | GYAE25RRB      |                |          |
| SCJT        |            | 1 1/8          |         |         |        |        |         |       |         |                |         |                | GYA102RRB      |                |          |
| <b>SCJT</b> |            | <b>1 3/16</b>  | 141.3   | 116.68  | 79.4   | 21.4   | 34.1    | 11.5  | 32.5    | 13.5           | 40.1    | 23             | GYA103RRB      | T-40142        | 0.72     |
| SCJT        |            | 1 1/4 S        | 5 9/16  | 4 19/32 | 3 1/8  | 27/32  | 1 11/32 | 29/64 | 1 9/32  | 17/32          | 1 37/64 | 29/32          | GYA103RRB3     |                | 1.58     |
| SCJT        |            | 30             |         |         |        |        |         |       |         |                |         |                | GYAE30RRB      |                |          |
| SCJT        |            | 1 1/4          |         |         |        |        |         |       |         |                |         |                | GYA104RRB      |                |          |
| SCJT        |            | 1 3/8          | 155.6   | 130.18  | 92.1   | 24.6   | 38.1    | 13.1  | 36.5    | 14.3           | 46.8    | 25.8           | GYA106RRB      | T-40144        | 1.08     |
| <b>SCJT</b> |            | <b>1 7/16</b>  | 6 1/8   | 5 1/8   | 3 5/8  | 31/32  | 1 1/2   | 33/64 | 1 7/16  | 9/16           | 1 27/32 | 1 1/64         | GYA107RRB      |                | 2.37     |
| SCJT        |            | 35             |         |         |        |        |         |       |         |                |         |                | GYAE35RRB      |                |          |
| <b>SCJT</b> |            | <b>1 1/2</b>   | 171.5   | 143.67  | 104.8  | 26.2   | 40.9    | 13.1  | 39.3    | 14.3           | 52.4    | 27.8           | GYA108RRB      | T-40146        | 1.97     |
| SCJT        |            | 40             | 6 3/4   | 5 21/32 | 4 1/8  | 1 1/32 | 1 39/64 | 33/64 | 1 35/64 | 9/16           | 2 1/16  | 1 3/32         | GYAE40RRB      |                | 4.34     |
| SCJT        |            | 1 5/8          |         |         |        |        |         |       |         |                |         |                | GYA110RRB      |                |          |
| <b>SCJT</b> |            | <b>1 11/16</b> | 179.4   | 148.0   | 111.1  | 28.6   | 43.6    | 13.1  | 42.1    | 15.8           | 57.9    | 28.6           | GYA111RRB      | T-40170        | 2.03     |
| SCJT        |            | 1 3/4          | 7 1/16  | 5 27/32 | 4 9/8  | 1 1/8  | 1 23/32 | 33/64 | 1 21/32 | 5/8            | 2 5/32  | 1 7/8          | GYA112RRB      |                | 4.48     |
| SCJT        |            | 45             |         |         |        |        |         |       |         |                |         |                | GYAE45RRB      |                |          |
| <b>SCJT</b> |            | <b>1 15/16</b> | 189.9   | 157.16  | 115.8  | 28.6   | 46      | 17.1  | 44.4    | 16.6           | 62.7    | 30.9           | GYA115RRB      | T-40172        | 2.26     |
| SCJT        |            | 2 S            | 7 7/16  | 6 3/16  | 4 9/16 | 1 1/8  | 1 13/16 | 43/64 | 1 3/4   | 21/32          | 2 15/32 | 1 7/32         | GYA115RRB2     |                | 4.98     |
| SCJT        |            | 50             |         |         |        |        |         |       |         |                |         |                | GYAE50RRB      |                |          |
| SCJT        |            | 2              | 215.9   | 184.15  | 127    | 30.9   | 48      | 17.1  | 46.4    | 18.2           | 69.8    | 31.7           | GYA200RRB      | T-40174        | 2.79     |
| <b>SCJT</b> |            | <b>2 3/16</b>  | 8 1/2   | 7 1/4   | 5      | 1 7/32 | 1 57/64 | 43/64 | 1 53/64 | 23/32          | 2 3/4   | 1 1/4          | GYA203RRB      |                | 6.14     |
| SCJT        |            | 55             |         |         |        |        |         |       |         |                |         |                | GYAE55RRB      |                |          |

Shaft diameter with an S = smaller housing.





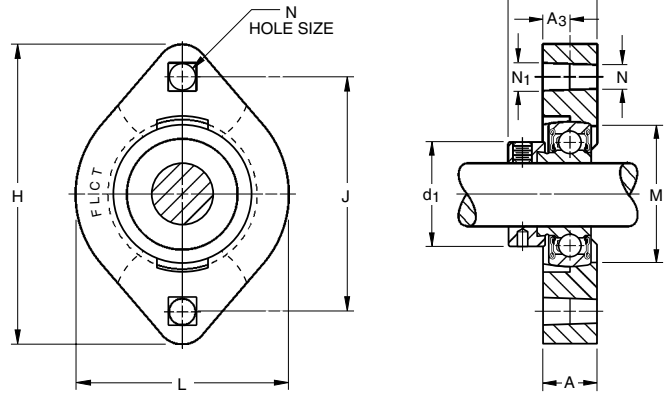


# BALL BEARINGS

## FLCT STANDARD SERIES

- Versatile power transmission units are designed to provide sturdy shaft support in minimum space at minimum cost.
- Space-saving, two-bolt unit mounts flush against the frame.
- Bolt hole spacing and size is the same as the pressed-steel flange unit.
- Equipped with RA-RRB extended inner ring ball bearings with positive contact land-riding seals.
- Permanently prelubricated.
- Positively resistant against contaminants.

Suggested shaft tolerances: nominal to **-.013 mm, -.0005"**.



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| FLCT | RA-RRB         | Page D56                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: FLCT 1 3/16".

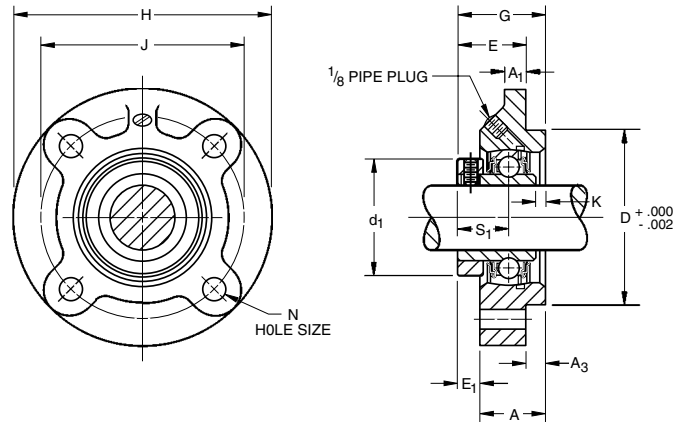
| Unit | Shaft Dia. |     | H       | J       | L       | E       | A     | A <sub>3</sub> | N <sub>1</sub> Sq. | Bolt Diam. | d <sub>1</sub> | M       | Bearing Number | Collar Number | Housing Number | Unit Wt. |     |
|------|------------|-----|---------|---------|---------|---------|-------|----------------|--------------------|------------|----------------|---------|----------------|---------------|----------------|----------|-----|
|      | mm         | in. |         |         |         |         |       |                |                    |            |                |         |                |               |                | mm       | in. |
| FLCT | 1/2        |     | 81      | 63.5    | 58.7    | 30.2    | 14.7  | 7.1            | 7.1                | 6.4        | 28.6           | 38.1    | RA008RRB       | S1008K        | T-34124        | 0.322    |     |
| FLCT | 5/8        |     | 3 3/16  | 2 1/2   | 2 5/16  | 1 3/16  | 37/64 | 9/32           | 9/32               | 1/4        | 1 1/8          | 1 1/2   | RA010RRB       | S1010K        |                | 0.71     |     |
| FLCT | 17         |     |         |         |         |         |       |                |                    |            |                |         | RAE17RRB       | SE17K         |                |          |     |
| FLCT | 3/4        |     | 90.5    | 71.4    | 66.7    | 32.9    | 17.1  | 8.7            | 8.7                | 7.9        | 33.3           | 45.2    | RA012RRB       | S1012K        | T-34122        | 0.445    |     |
| FLCT | 20         |     | 3 9/16  | 2 13/16 | 2 5/8   | 1 19/64 | 43/64 | 11/32          | 11/32              | 5/16       | 1 5/16         | 1 25/32 | RAE20RRB       | SE20K         |                | 0.98     |     |
| FLCT | 7/8        |     |         |         |         |         |       |                |                    |            |                |         | RA014RRB       | S1014K        |                |          |     |
| FLCT | 15/16      |     | 95.2    | 76.2    | 71      | 34.5    | 17.5  | 8.7            | 8.7                | 7.9        | 38.1           | 50.4    | RA015RRB       | S1015K        | T-33753        | 0.499    |     |
| FLCT | 1          |     | 3 3/4   | 3       | 2 51/64 | 1 23/64 | 11/16 | 11/32          | 11/32              | 5/16       | 1 1/2          | 1 63/64 | RA100RRB       | S1100K        |                | 1.1      |     |
| FLCT | 25         |     |         |         |         |         |       |                |                    |            |                |         | RAE25RRB       | SE25K         |                |          |     |
| FLCT | 1 1/8      |     |         |         |         |         |       |                |                    |            |                |         | RA102RRB       | S1102K        |                |          |     |
| FLCT | 1 3/16     |     | 112.7   | 90.5    | 84.1    | 38.5    | 20.6  | 10.3           | 10.3               | 9.5        | 44.4           | 59.5    | RA103RRB       | S1103K        | T-34120        | 0.835    |     |
| FLCT | 1 1/4 S    |     | 4 7/16  | 3 9/16  | 3 9/16  | 1 33/64 | 13/16 | 13/32          | 13/32              | 3/8        | 1 3/4          | 2 11/32 | RA103RRB2      | S1103K3       |                | 1.84     |     |
| FLCT | 30         |     |         |         |         |         |       |                |                    |            |                |         | RAE30RRB       | SE30K         |                |          |     |
| FLCT | 1 1/4      |     |         |         |         |         |       |                |                    |            |                |         | RA104RRB       | S1104K        |                |          |     |
| FLCT | 1 3/8      |     | 125.4   | 100     | 93.7    | 41.1    | 22.2  | 11.1           | 10.3               | 9.5        | 54             | 69.5    | RA106RRB       | S1106K        | T-34118        | 1.075    |     |
| FLCT | 1 7/16     |     | 4 15/16 | 3 15/16 | 3 11/16 | 1 21/32 | 7/8   | 7/16           | 13/32              | 3/8        | 2 1/8          | 2 47/64 | RA107RRB       | S1107K        |                | 2.37     |     |
| FLCT | 35         |     |         |         |         |         |       |                |                    |            |                |         | RAE35RRB       | SE35K         |                |          |     |

Shaft diameter with an S = smaller housing.

## RFC INDUSTRIAL PILOTED SERIES CONCENTRIC COLLAR

- Piloted flange cartridges assure accurate mounting fits and provide better support for heavy loads.
- Cast iron units are suited for applications such as material handling, industrial conveyor equipment, and farm and construction equipment.
- Assembled with R-Seal (GC-KRRB) bearings with a concentric locking collar.
- Units are factory prelubricated. A grease fitting is provided for relubrication if required.

**Suggested shaft tolerances:** ½" - 1 15/16", nominal to -.013 mm, .0005";  
2" - 2 3/16", nominal to -.025 mm, -.0010".



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RFC  | GC-KRRB        | Page D66                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RFC 1 7/16".

| Unit | Shaft Dia. | D              | J              | H              | S <sub>1</sub> | K           | N              | G               | A               | E <sub>1</sub> | A <sub>3</sub> | E               | A <sub>1</sub> | d <sub>1</sub>  | Bearing Number | Collar Number | Housing Number | Unit Wt.      |
|------|------------|----------------|----------------|----------------|----------------|-------------|----------------|-----------------|-----------------|----------------|----------------|-----------------|----------------|-----------------|----------------|---------------|----------------|---------------|
|      | in.        | mm in.         | mm in.         | mm in.         | mm in.         | mm in.      | mm in.         | mm in.          | mm in.          | mm in.         | mm in.         | mm in.          | mm in.         | mm in.          |                |               |                | kg lbs.       |
| RFC  | 1          | 76.2<br>3      | 92.1<br>3 5/8  | 111.1<br>4 3/8 | 20.2<br>5 1/64 | 3.6<br>9/64 | 10.3<br>13/32  | 37.7<br>1 31/64 | 28.2<br>1 7/64  | 9.5<br>3/8     | 6.4<br>1/4     | 31.4<br>1 15/64 | 9.5<br>3/8     | 44.4<br>1 3/4   | GC1100KRRB     | C205          | T-27031        | 1.152<br>2.54 |
| RFC  | 1 1/8      | 85.72          | 104.8          | 127            | 22.6           | 3.6         | 11.9           | 40.9            | 30.6            | 10.3           | 10.7           | 30.2            | 9.5            | 52.4            | GC1102KRRB     | C206          | T-27021        | 1.742         |
| RFC  | 1 3/16     | 3.375          | 4 1/8          | 5              | 5 1/64         | 9/64        | 15/32          | 1 39/64         | 1 13/64         | 13/32          | 2 1/64         | 1 3/16          | 3/8            | 2 1/16          | GC1103KRRB     |               |                | 3.84          |
| RFC  | 1 1/4 S    |                |                |                |                |             |                |                 |                 |                |                |                 |                |                 | GC1103KRRB3    |               |                |               |
| RFC  | 1 1/4      | 92.08          | 111.1          | 133.4          | 25.4           | 3.2         | 11.9           | 44.4            | 34.1            | 10.3           | 11.9           | 32.5            | 12.7           | 59.5            | GC1104KRRB     | C207          | T-26730        | 1.864         |
| RFC  | 1 3/8      | 3.625          | 4 3/8          | 5 1/4          | 1              | 1/8         | 15/32          | 1 3/4           | 1 11/32         | 13/32          | 15/32          | 1 9/32          | 1/2            | 2 11/32         | GC1106KRRB     |               |                | 4.11          |
| RFC  | 1 7/16     |                |                |                |                |             |                |                 |                 |                |                |                 |                |                 | GC1107KRRB     |               |                |               |
| RFC  | 1 1/2      | 92.08<br>3.625 | 111.1<br>4 3/8 | 133.4<br>5 1/4 | 27.4<br>1 5/64 | 4.8<br>3/16 | 11.9<br>15/32  | 48.8<br>1 59/64 | 38.1<br>1 1/2   | 10.7<br>2 7/64 | 11.9<br>15/32  | 36.9<br>1 29/64 | 12.7<br>1/2    | 68.3<br>2 11/16 | GC1108KRRB     | C208          | T-26587        | 2.141<br>4.72 |
| RFC  | 1 11/16    | 107.95         | 130.2          | 155.6          | 29.4           | —           | 13.5           | 46.8            | 34.1            | 12.7           | 11.9           | 34.9            | 11.5           | 73              | GC1111KRRB     | C209          | T-27276        | 2.817         |
| RFC  | 1 3/4      | 4.25           | 5 1/8          | 6 1/8          | 1 5/32         | —           | 1 7/32         | 1 27/32         | 1 11/32         | 1/2            | 15/32          | 1 3/8           | 2 9/64         | 2 7/8           | GC1112KRRB     |               |                | 6.21          |
| RFC  | 1 15/16    | 114.3<br>4.5   | 136.5<br>5 3/8 | 161.9<br>6 3/8 | 30.2<br>1 3/16 | 6.4<br>1/4  | 13.5<br>1 7/32 | 54.8<br>2 5/32  | 42.9<br>1 11/16 | 11.9<br>15/32  | 15.9<br>5/8    | 38.9<br>1 17/32 | 12.7<br>1/2    | 79.4<br>3 1/8   | GC1115KRRB     | C210          | T-26743        | 3.211<br>7.08 |
| RFC  | 2          | 127            | 152.4          | 181            | 33.3           | 7.1         | 15.1           | 61.1            | 44.4            | 16.7           | 22.2           | 38.9            | 12.7           | 88.9            | GC1200KRRB     | C211          | T-28287        | 4.082         |
| RFC  | 2 3/16     | 5              | 6              | 7 1/8          | 1 5/16         | 9/32        | 1 9/32         | 2 13/32         | 1 3/4           | 2 1/32         | 7/8            | 1 17/32         | 1/2            | 3 1/2           | GC1203KRRB     |               |                | 9             |

Shaft diameter with an S = smaller housing.





# BALL BEARINGS

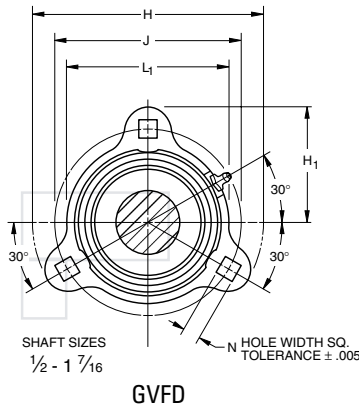
## GVFD, GVFDR RELUBRICATABLE SERIES - VFD, VFDR NON-RELUBRICATABLE SERIES

- Malleable iron flange cartridges provide self-alignment and rigid support for medium-duty applications.
- Mounting bolt holes are interchangeable with pressed steel flangette units of corresponding size.

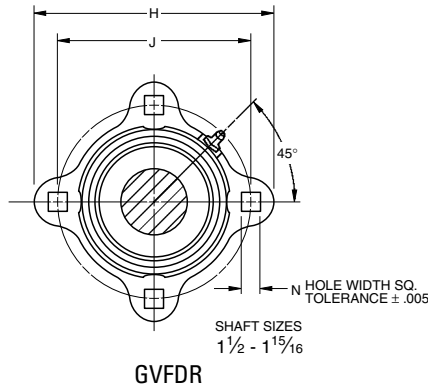
Suggested shaft tolerances: nominal to  $-.013$  mm,  $-.0005$ ".

### BEARING DATA

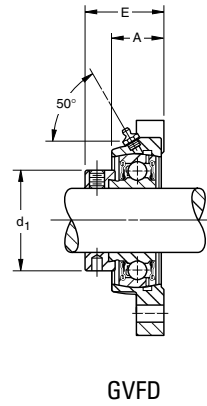
| Unit        | Bearing Number | Dimensions and Load Ratings |
|-------------|----------------|-----------------------------|
| VFD, VFDR   | RA...RRB       | Page D56                    |
| GVFD, GVFDR | GRA...RRB      | Page D57                    |



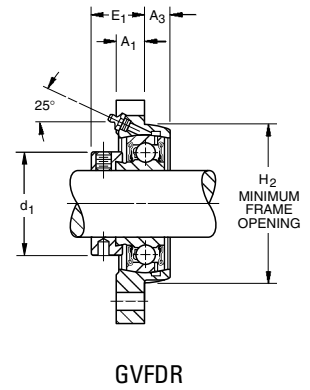
GVFD



GVFDR



GVFD



GVFDR

FOR NON-RELUBRICATABLE SERIES, OMIT G PREFIX ON UNIT AND BEARING NUMBER.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VFD 1 3/16" or VFDR 1 3/16" or GVFD 1 3/16" or GVFDR 1 3/16".

| Unit<br>face<br>mounted                     | Unit<br>reverse<br>mounted | Shaft<br>Dia. |     | H <sub>1</sub> | L <sub>1</sub> | H       | J       | N      | H <sub>2</sub> | E       | A      | E <sub>1</sub> | A <sub>3</sub> | A <sub>1</sub> | d <sub>1</sub> | Bearing<br>Number | Collar<br>Number | Unit<br>Wt. |
|---------------------------------------------|----------------------------|---------------|-----|----------------|----------------|---------|---------|--------|----------------|---------|--------|----------------|----------------|----------------|----------------|-------------------|------------------|-------------|
|                                             |                            | mm            | in. |                |                |         |         |        |                |         |        |                |                |                |                |                   |                  |             |
| <b>RELUBRICATABLE SERIES <sup>(1)</sup></b> |                            |               |     |                |                |         |         |        |                |         |        |                |                |                |                |                   |                  |             |
| GVFD                                        | GVFDR                      | 1/2           |     | 40.5           | 53.2           | 81      | 63.5    | 7.1    | 47.6           | 31.8    | 17.5   | 22.2           | 7.9            | 9.5            | 28.6           | GRA008RRB         | S1008K           | 2.63        |
| GVFD                                        | GVFDR                      | 5/8           |     | 1 19/32        | 2 3/32         | 3 3/16  | 2 1/2   | 9/32   | 1 7/8          | 1 1/4   | 1 1/16 | 7/8            | 5/16           | 3/8            | 1 1/8          | GRA010RRB         | S1010K           | 0.58        |
| GVFD                                        | GVFDR                      | 17            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE17RRB         | SE17K            |             |
| GVFD                                        | GVFDR                      | 3/4           |     | 45.2           | 60.3           | 90.5    | 71.4    | 8.7    | 54.8           | 34.1    | 19.8   | 23.4           | 9.1            | 10.7           | 33.3           | GRA012RRB         | S1012K           | 0.336       |
| GVFD                                        | GVFDR                      | 20            |     | 1 25/32        | 2 3/8          | 3 9/16  | 2 13/16 | 1 1/32 | 2 5/32         | 1 11/32 | 25/32  | 59/64          | 23/64          | 27/64          | 1 5/16         | GRAE20RRB         | SE20K            | 0.74        |
| GVFD                                        | GVFDR                      | 7/8           |     |                |                |         |         |        |                |         |        |                |                |                |                | GRA014RRB         | S1014K           |             |
| GVFD                                        | GVFDR                      | 15/16         |     | 47.6           | 66.7           | 95.2    | 76.2    | 8.7    | 60.3           | 34.1    | 19.8   | 23.4           | 9.1            | 10.7           | 38.1           | GRA015RRB         | S1015K           | 0.386       |
| GVFD                                        | GVFDR                      | 1             |     | 1 7/8          | 2 5/8          | 3 3/4   | 3       | 1 1/32 | 2 3/8          | 1 11/32 | 25/32  | 59/64          | 23/64          | 27/64          | 1 1/2          | GRA100RRB         | S1100K           | 0.85        |
| GVFD                                        | GVFDR                      | 25            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE25RRB         | SE25K            |             |
| GVFD                                        | GVFDR                      | 1 1/8         |     |                |                |         |         |        |                |         |        |                |                |                |                | GRA102RRB         | S1102K           |             |
| GVFD                                        | GVFDR                      | 1 3/16        |     | 56.4           | 78.6           | 112.7   | 90.5    | 10.3   | 71.4           | 38.9    | 22.2   | 26.6           | 10.7           | 11.9           | 44.5           | GRA103RRB         | S1103K           | 0.608       |
| GVFD                                        | GVFDR                      | 1 1/4 S       |     | 2 7/32         | 3 3/32         | 4 7/16  | 3 9/16  | 1 3/32 | 2 13/16        | 1 17/32 | 7/8    | 1 3/64         | 27/64          | 15/32          | 1 3/4          | GRA103RRB2        | S1103K3          | 1.34        |
| GVFD                                        | GVFDR                      | 30            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE30RRB         | SE30K            |             |
| GVFD                                        | GVFDR                      | 1 1/4         |     |                |                |         |         |        |                |         |        |                |                |                |                | GRA104RRB         | S1104K           | 0.821       |
| GVFD                                        | GVFDR                      | 1 3/8         |     | 61.1           | 88.9           | 122.2   | 100     | 10.3   | 81.8           | 42.1    | 23.8   | 29.4           | 11.1           | 12.7           | 54             | GRA106RRB         | S1106K           | 1.81        |
| GVFD                                        | GVFDR                      | 1 7/16        |     | 2 13/32        | 3 1/2          | 4 13/16 | 3 15/16 | 1 9/32 | 3 7/32         | 1 21/32 | 15/16  | 1 5/32         | 7/16           | 1/2            | 2 1/8          | GRA107RRB         | S1107            |             |
| GVFD                                        | GVFDR                      | 35            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE35RRB         | SE35K            |             |
| GVFD                                        | GVFDR                      | 1 1/2         |     | 73.8           | 98.4           | 147.6   | 119.1   | 13.5   | 89.7           | 48.4    | 28.6   | 32.5           | 12.7           | 15.9           | 60.3           | GRA108RRB         | S1108KT          | 1.334       |
| GVFD                                        | GVFDR                      | 40            |     | 2 29/32        | 3 7/8          | 5 13/16 | 4 11/16 | 1 7/32 | 3 17/32        | 1 29/32 | 1 1/8  | 1 9/32         | 1/2            | 5/8            | 2 3/8          | GRAE40RRB         | SE40K            | 2.94        |
| GVFD                                        | GVFDR                      | 1 5/8         |     |                |                |         |         |        |                |         |        |                |                |                |                | GRA110RRB         | S1110K           |             |
| GVFD                                        | GVFDR                      | 1 11/16       |     | 74.6           | 107.2          | 149.2   | 120.6   | 13.5   | 96             | 48.4    | 28.6   | 32.5           | 12.7           | 15.9           | 63.5           | GRA111RRB         | S1111K           | 1.361       |
| GVFD                                        | GVFDR                      | 1 3/4         |     | 2 15/16        | 4 7/32         | 5 7/8   | 4 3/4   | 1 7/32 | 3 25/32        | 1 29/32 | 1 1/8  | 1 9/32         | 1/2            | 5/8            | 2 1/2          | GRA112RRB         | S1112K           | 3           |
| GVFD                                        | GVFDR                      | 45            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE45RRB         | SE45K            |             |
| GVFD                                        | GVFDR                      | 1 7/8         |     | 77.8           | 113.5          | 155.6   | 127     | 13.5   | 100.8          | 48.4    | 28.6   | 32.5           | 12.7           | 15.9           | 69.8           | GRA114RRB         | S1114K           | 1.451       |
| GVFD                                        | GVFDR                      | 1 15/16       |     | 3 1/16         | 4 15/32        | 6 1/8   | 5       | 1 7/32 | 3 31/32        | 1 29/32 | 1 1/8  | 1 9/32         | 1/2            | 5/8            | 2 3/4          | GRA115RRB         | S1115K           | 3.2         |
| GVFD                                        | GVFDR                      | 50            |     |                |                |         |         |        |                |         |        |                |                |                |                | GRAE50RRB         | SE50K            |             |

<sup>(1)</sup> All units have a 1/4-28 grease fitting, except as noted.

: 10-32 grease fitting.

Shaft diameter with an S = smaller housing.

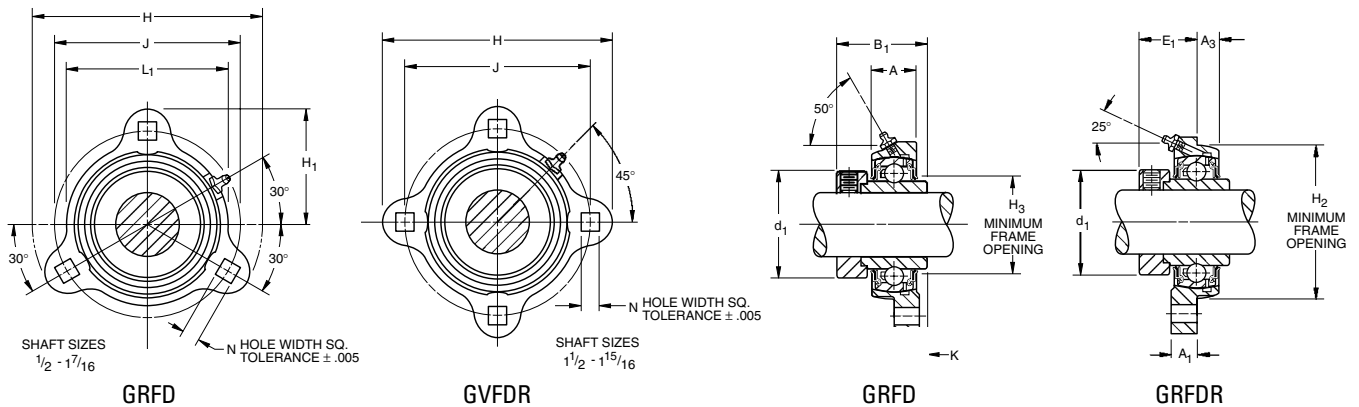
## GRFD, GRFDR RELUBRICATABLE SERIES - RFD, RFDR NON-RELUBRICATABLE SERIES

- Malleable iron flange cartridges provide self-alignment and rigid support for medium-duty applications.

Suggested shaft tolerances: nominal to  $-.013$  mm,  $-.0005$ ".

BEARING DATA

| Unit        | Bearing Number | Dimensions and Load Ratings |
|-------------|----------------|-----------------------------|
| RFD, RFDR   | ...KRRB        | Page D53                    |
| GRFD, GRFDR | G...KRRB       | Page D54                    |



FOR NON-RELUBRICATABLE SERIES, OMIT G PREFIX ON UNIT AND BEARING NUMBER.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: GRFD 1 3/16" or GRFDR 1 3/16" or RFD 1 3/16" or RFDR 1 3/16".

| Unit<br>face<br>mounted          | Unit<br>reverse<br>mounted | Shaft<br>Dia.<br>mm<br>in. | H1        | L1        | H         | J         | N         | H2        | E         | A         | E1        | A3        | A1        | d1        | H3        | K         | Bearing<br>Number | Collar<br>Number | Unit<br>Wt.<br>kg<br>lbs. |
|----------------------------------|----------------------------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------------|------------------|---------------------------|
|                                  |                            |                            | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. |                   |                  |                           |
| <b>RELUBRICATABLE SERIES (1)</b> |                            |                            |           |           |           |           |           |           |           |           |           |           |           |           |           |           |                   |                  |                           |
| GRFD                             | GRFDR                      | 1/2                        |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1008KRRB         | S1008K           |                           |
| GRFD                             | GRFDR                      | 5/8                        | 40.5      | 53.2      | 81        | 63.5      | 7.1       | 47.6      | 37.3      | 17.5      | 23.4      | 7.9       | 9.5       | 28.6      | 29.4      | 4.4       | G1010KRRB         | S1010K           | 0.259                     |
| GRFD                             | GRFDR                      | 1 1/16                     | 1 19/32   | 2 3/32    | 3 9/16    | 2 1/2     | 9/32      | 1 7/8     | 1 15/32   | 1 1/16    | 59/64     | 9/16      | 3/8       | 1 1/8     | 1 5/32    | 1 1/64    | G1011KRRB         | S1011K           | 0.57                      |
| GRFD                             | GRFDR                      | 17                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE17KRRB          | SE17K            |                           |
| GRFD                             | GRFDR                      | 3/4                        | 45.2      | 60.3      | 90.5      | 71.4      | 8.7       | 54.8      | 43.7      | 19.8      | 26.6      | 9.1       | 10.7      | 33.3      | 34.1      | 6.4       | G1012KRRB         | S1012K           | 0.395                     |
| GRFD                             | GRFDR                      | 20                         | 1 25/32   | 2 3/8     | 3 9/16    | 2 13/16   | 1 1/32    | 2 5/32    | 1 23/32   | 25/32     | 1 3/64    | 23/64     | 27/64     | 1 5/16    | 1 11/32   | 1/4       | GE20KRRB          | SE20K            | 0.87                      |
| GRFD                             | GRFDR                      | 7/8                        |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1014KRRB         | S1014K           |                           |
| GRFD                             | GRFDR                      | 15/16                      | 47.6      | 66.7      | 95.2      | 76.2      | 8.7       | 60.3      | 44.4      | 19.8      | 27        | 9.1       | 10.7      | 38.1      | 38.9      | 6.7       | G1015KRRB         | S1015K           | 0.463                     |
| GRFD                             | GRFDR                      | 1                          | 1 7/8     | 2 5/8     | 3 3/4     | 3         | 1 1/32    | 2 3/8     | 1 3/4     | 25/32     | 1 1/16    | 23/64     | 27/64     | 1 1/2     | 1 17/32   | 1 1/64    | G1100KRRB         | S1100K           | 1.02                      |
| GRFD                             | GRFDR                      | 25                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE25KRRB          | SE25K            |                           |
| GRFD                             | GRFDR                      | 1 1/16                     |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1101KRRB         | S1101K           |                           |
| GRFD                             | GRFDR                      | 1 1/8                      | 56.4      | 78.6      | 112.7     | 90.5      | 10.3      | 71.4      | 48.4      | 22.2      | 30.2      | 10.7      | 11.9      | 44.5      | 46        | 6.4       | G1102KRRB         | S1102K           | 6.26                      |
| GRFD                             | GRFDR                      | 1 3/16                     | 2 7/32    | 3 3/32    | 4 7/16    | 3 9/16    | 1 3/32    | 2 13/16   | 1 29/32   | 7/8       | 1 3/16    | 27/64     | 1 5/32    | 1 3/4     | 1 13/16   | 1/4       | G1103KRRB         | S1103K           | 1.38                      |
| GRFD                             | GRFDR                      | 1 1/4 S                    |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1103KRRB3        | S1103K3          |                           |
| GRFD                             | GRFDR                      | 30                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE30KRRB          | SE30K            |                           |
| GRFD                             | GRFDR                      | 1 1/4                      |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1104KRRB         | S1104K           |                           |
| GRFD                             | GRFDR                      | 1 5/16                     | 61.1      | 88.9      | 122.2     | 100       | 10.3      | 81.8      | 51.2      | 23.8      | 32.5      | 11.1      | 12.7      | 54        | 53.2      | 6.4       | G1105KRRB         | S1105K           | 0.857                     |
| GRFD                             | GRFDR                      | 1 3/8                      | 2 15/32   | 3 1/2     | 4 13/16   | 3 15/16   | 1 3/32    | 3 7/32    | 2 1/64    | 1 5/16    | 1 9/32    | 7/16      | 1/2       | 2 1/8     | 2 3/32    | 1/4       | G1106KRRB         | S1106K           | 1.89                      |
| GRFD                             | GRFDR                      | 1 7/16                     |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1107KRRB         | S1107K           |                           |
| GRFD                             | GRFDR                      | 35                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE35KRRB          | SE35K            |                           |
| GRFD                             | GRFDR                      | 1 1/2                      | 73.8      | 98.4      | 147.6     | 119.1     | 13.5      | 89.7      | 56.4      | 28.6      | 34.9      | 12.7      | 15.9      | 60.3      | 59.5      | 5.6       | G1108KRRB         | S1108KT          | 1.138                     |
| GRFD                             | GRFDR                      | 1 9/16                     | 2 29/32   | 3 7/8     | 5 13/16   | 4 11/16   | 1 7/32    | 3 17/32   | 2 7/32    | 1 1/8     | 1 3/8     | 1/2       | 5/8       | 2 3/8     | 2 11/32   | 7/32      | G1109KRRB         | S1109KT          | 2.50                      |
| GRFD                             | GRFDR                      | 40                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE40KRRB          | SE40K            |                           |
| GRFD                             | GRFDR                      | 1 5/8                      |           |           |           |           |           |           |           |           |           |           |           |           |           |           | G1110KRRB         | S1110K           |                           |
| GRFD                             | GRFDR                      | 1 1 1/16                   | 74.6      | 107.2     | 149.2     | 120.6     | 13.5      | 96        | 56.4      | 28.6      | 34.9      | 12.7      | 15.9      | 63.5      | 65.1      | 5.6       | G1111KRRB         | S1111K           | 1.488                     |
| GRFD                             | GRFDR                      | 1 3/4                      | 2 15/16   | 4 7/32    | 5 7/8     | 4 3/4     | 1 7/32    | 3 25/32   | 2 7/32    | 1 1/8     | 1 3/8     | 1/2       | 5/8       | 2 1/2     | 2 9/16    | 7/32      | G1112KRRB         | S1112K           | 3.28                      |
| GRFD                             | GRFDR                      | 45                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE45KRRB          | SE45K            |                           |
| GRFD                             | GRFDR                      | 1 7/8                      | 77.8      | 113.5     | 155.6     | 127       | 13.5      | 100.8     | 62.7      | 28.6      | 38.1      | 12.7      | 15.9      | 69.8      | 69.8      | 8.7       | G1114KRRB         | S1114K           | 1.692                     |
| GRFD                             | GRFDR                      | 1 15/16                    | 3 1/16    | 4 15/32   | 6 1/8     | 5         | 1 7/32    | 3 31/32   | 2 15/32   | 1 1/8     | 1 1/2     | 1/2       | 5/8       | 2 3/4     | 2 3/4     | 1 1/32    | G1115KRRB         | S1115K           | 3.73                      |
| GRFD                             | GRFDR                      | 50                         |           |           |           |           |           |           |           |           |           |           |           |           |           |           | GE50KRRB          | SE50K            |                           |

(1) All units have a 1/4-28 grease fitting, except as noted.

: 10-32 grease fitting.

Shaft diameter with an S = smaller housing.



# BALL BEARINGS

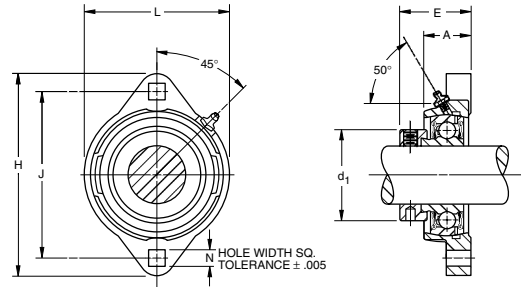
## GVFTD, GVFTDR RELUBRICATABLE SERIES - VFTD, VFTDR NON-RELUBRICATABLE SERIES

- Malleable iron flange cartridges provide self-alignment and rigid support for medium-duty applications.

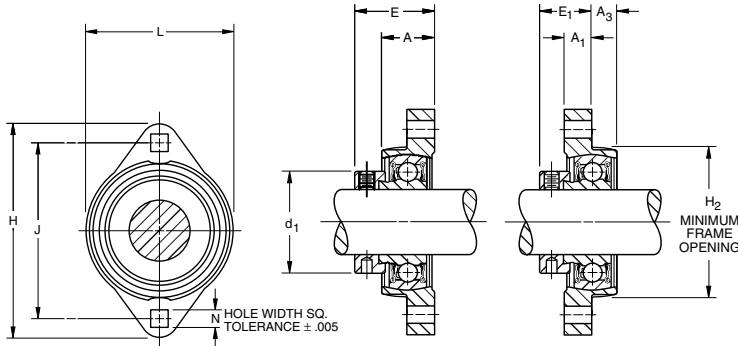
Suggested shaft tolerances: nominal to  $-.013$  mm,  $-.0005$ ".

### BEARING DATA

| Unit          | Bearing Number | Dimensions and Load Ratings |
|---------------|----------------|-----------------------------|
| VFTD, VFTDR   | RA...RRB       | Page D56                    |
| GVFTD, GVFTDR | GRA...RRB      | Page D57                    |

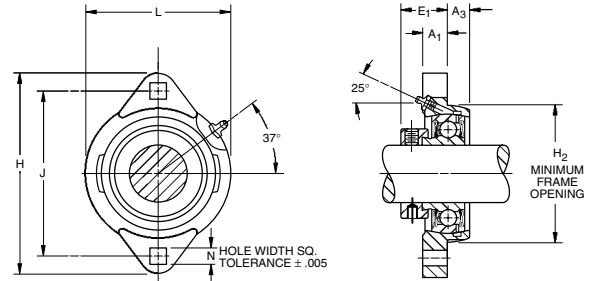


GVFTD



VFTD

VFTDR



GVFTDR

### FOR NON-RELUBRICATABLE SERIES, OMIT G PREFIX ON UNIT AND BEARING NUMBER.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VFTD 1 3/16" or VFTDR 1 3/16" or GVFTD 1 3/16" or GVFTDR 1 3/16".

| Unit<br>face<br>mounted                     | Unit<br>reverse<br>mounted | Shaft<br>Dia. | H         | J         | L         | N         | H <sub>2</sub> | E         | A         | E <sub>1</sub> | A <sub>3</sub> | A <sub>1</sub> | d <sub>1</sub> | Bearing<br>Number | Collar<br>Number | Unit<br>Wt. |
|---------------------------------------------|----------------------------|---------------|-----------|-----------|-----------|-----------|----------------|-----------|-----------|----------------|----------------|----------------|----------------|-------------------|------------------|-------------|
|                                             |                            |               | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in.      | mm<br>in.      | mm<br>in.      |                   |                  |             |
| <b>RELUBRICATABLE SERIES <sup>(1)</sup></b> |                            |               |           |           |           |           |                |           |           |                |                |                |                |                   |                  |             |
| GVFTD                                       | GVFTDR                     | 1/2           | 81        | 63.5      | 53.2      | 7.1       | 47.6           | 31.8      | 17.5      | 22.2           | 7.9            | 9.5            | 28.6           | GRA008RRB         | S1008K           | 0.245       |
| GVFTD                                       | GVFTDR                     | 5/8           | 3 3/16    | 2 1/2     | 2 3/32    | 9/32      | 1 7/8          | 1 1/4     | 1 1/16    | 7/8            | 5/16           | 3/8            | 1 1/8          | GRA010RRB         | S1010K           | 0.54        |
| GVFTD                                       | GVFTDR                     | 17            |           |           |           |           |                |           |           |                |                |                |                | GRAE17RRB         | SE17K            |             |
| GVFTD                                       | GVFTDR                     | 3/4           | 90.5      | 71.4      | 60.3      | 8.7       | 54.8           | 34.1      | 19.8      | 23.4           | 9.1            | 10.7           | 33.3           | GRA012RRB         | S1012K           | 0.331       |
| GVFTD                                       | GVFTDR                     | 20            | 3 9/16    | 2 13/16   | 2 3/8     | 1 1/32    | 2 5/32         | 1 11/32   | 2 5/32    | 5 9/64         | 2 3/64         | 2 7/64         | 1 5/16         | GRAE20RRB         | SE20K            | 0.73        |
| GVFTD                                       | GVFTDR                     | 7/8           |           |           |           |           |                |           |           |                |                |                |                | GRA014RRB         | S1014K           |             |
| GVFTD                                       | GVFTDR                     | 15/16         | 95.2      | 76.2      | 66.7      | 8.7       | 60.3           | 34.1      | 19.8      | 23.4           | 9.1            | 10.7           | 38.1           | GRA015RRB         | S1015K           | 0.363       |
| GVFTD                                       | GVFTDR                     | 1             | 3 3/4     | 3         | 2 5/8     | 1 1/32    | 2 3/8          | 1 11/32   | 2 5/32    | 5 9/64         | 2 3/64         | 2 7/64         | 1 1/2          | GRA100RRB         | S1100K           | 0.8         |
| GVFTD                                       | GVFTDR                     | 25            |           |           |           |           |                |           |           |                |                |                |                | GRAE25RRB         | SE25K            |             |
| GVFTD                                       | GVFTDR                     | 1 1/8         |           |           |           |           |                |           |           |                |                |                |                | GRA102RRB         | S1102K           |             |
| GVFTD                                       | GVFTDR                     | 1 3/16        | 112.7     | 90.5      | 78.6      | 10.3      | 71.4           | 38.9      | 22.2      | 26.6           | 10.7           | 11.9           | 44.5           | GRA103RRB         | S1103K           | 0.608       |
| GVFTD                                       | GVFTDR                     | 1 1/4 S       | 4 7/16    | 3 9/16    | 3 3/32    | 1 3/32    | 2 13/16        | 1 17/32   | 7/8       | 1 3/64         | 2 7/64         | 1 5/32         | 1 3/4          | GRA103RRB2        | S1103K3          | 1.34        |
| GVFTD                                       | GVFTDR                     | 30            |           |           |           |           |                |           |           |                |                |                |                | GRAE30RRB         | SE30K            |             |
| GVFTD                                       | GVFTDR                     | 1 1/4         |           |           |           |           |                |           |           |                |                |                |                | GRA104RRB         | S1104K           | 0.862       |
| GVFTD                                       | GVFTDR                     | 1 3/8         | 122.2     | 100       | 88.9      | 10.3      | 81.8           | 42.1      | 23.8      | 29.4           | 11.1           | 12.7           | 54             | GRA106RRB         | S1106K           | 1.9         |
| GVFTD                                       | GVFTDR                     | 1 7/16        | 4 13/16   | 3 15/16   | 3 1/2     | 1 3/32    | 3 7/32         | 1 2 1/32  | 1 5/16    | 1 5/32         | 7/16           | 1/2            | 2 1/8          | GRA107RRB         | S1107K           |             |
| GVFTD                                       | GVFTDR                     | 35            |           |           |           |           |                |           |           |                |                |                |                | GRAE35RRB         | SE35K            |             |

<sup>(1)</sup> All units have a 1/4-28 grease fitting.  
Shaft diameter with an S = smaller housing.

**GRFTD, GRFTDR RELUBRICATABLE SERIES - RFTD, RFTDR NON-RELUBRICATABLE SERIES**

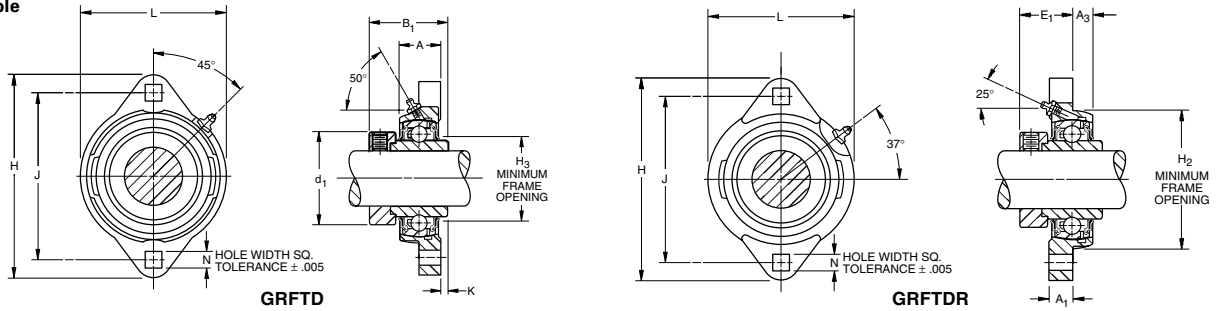
- Malleable iron flange cartridges provide self-alignment and rigid support for medium-duty applications.

Suggested shaft tolerances: nominal to  $-.013$  mm,  $-.0005$ ".

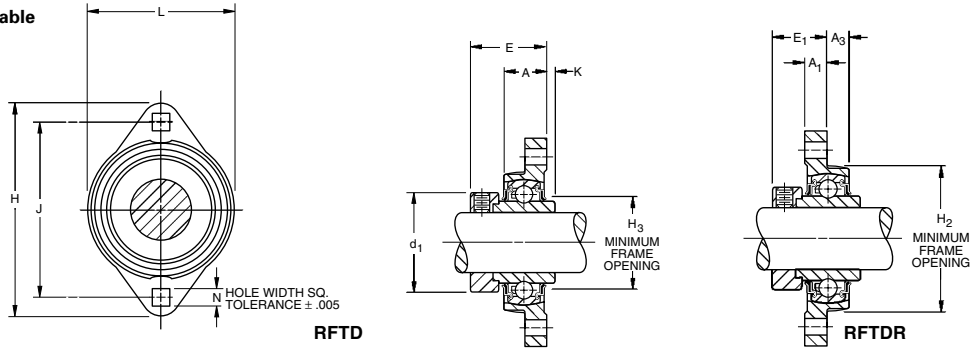
**BEARING DATA**

| Unit          | Bearing Number | Dimensions and Load Ratings |
|---------------|----------------|-----------------------------|
| RFTD, RFTDR   | ...KRRB        | Page D53                    |
| GRFTD, GRFTDR | G...KRRB       | Page D54                    |

**Relubricatable Series**



**Non-Relubricatable Series**



**FOR NON-RELUBRICATABLE SERIES, OMIT G PREFIX ON UNIT AND BEARING NUMBER.**

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RFTD 1 3/16" or RFTDR 1 3/16" or GRFTD 1 3/16" or GRFTDR 1 3/16".

| Unit face mounted                           | Unit reverse mounted | Shaft Dia. | H       | J       | L      | N     | H <sub>2</sub> | B <sub>1</sub> | A     | E <sub>1</sub> | A <sub>3</sub> | A <sub>1</sub> | d <sub>1</sub> | H <sub>3</sub> | K     | Bearing Number | Collar Number | Unit Wt. |
|---------------------------------------------|----------------------|------------|---------|---------|--------|-------|----------------|----------------|-------|----------------|----------------|----------------|----------------|----------------|-------|----------------|---------------|----------|
|                                             |                      |            | mm      | mm      | mm     | mm    | mm             | mm             | mm    | mm             | mm             | mm             | mm             | mm             | mm    |                |               |          |
|                                             |                      |            | in.     | in.     | in.    | in.   | in.            | in.            | in.   | in.            | in.            | in.            | in.            | in.            | in.   |                |               | lbs.     |
| <b>RELUBRICATABLE SERIES <sup>(1)</sup></b> |                      |            |         |         |        |       |                |                |       |                |                |                |                |                |       |                |               |          |
| GRFTD                                       | GRFTDR               | 1/2        |         |         |        |       |                |                |       |                |                |                |                |                |       | G1008KRRB      | S1008K        | 0.254    |
| GRFTD                                       | GRFTDR               | 5/8        | 81      | 63.5    | 53.2   | 7.1   | 47.6           | 37.3           | 15.9  | 23.4           | 9.9            | 9.5            | 28.6           | 29.4           | 4.4   | G1010KRRB      | S1010K        | 0.56     |
| GRFTD                                       | GRFTDR               | 1 1/16     | 3 3/16  | 2 1/2   | 2 3/32 | 9/32  | 1 7/8          | 1 15/32        | 5/8   | 59/64          | 9/16           | 3/8            | 1 1/8          | 1 5/32         | 11/64 | G1011KRRB      | S1011K        | 0.56     |
| GRFTD                                       | GRFTDR               | 17         |         |         |        |       |                |                |       |                |                |                |                |                |       | GE17KRRB       | SE17K         |          |
| GRFTD                                       | GRFTDR               | 3/4        | 90.5    | 71.4    | 60.3   | 8.7   | 54.8           | 43.7           | 19.8  | 26.6           | 9.1            | 10.7           | 33.3           | 34.1           | 6.4   | G1012KRRB      | S1012K        | 0.386    |
| GRFTD                                       | GRFTDR               | 20         | 3 9/16  | 2 13/16 | 2 3/8  | 11/32 | 2 5/32         | 1 23/32        | 25/32 | 1 3/64         | 23/64          | 27/64          | 1 5/16         | 1 11/32        | 1/4   | GE20KRRB       | SE20K         | 0.85     |
| GRFTD                                       | GRFTDR               | 7/8        |         |         |        |       |                |                |       |                |                |                |                |                |       | G1014KRRB      | S1014K        |          |
| GRFTD                                       | GRFTDR               | 1 5/16     | 95.2    | 76.2    | 66.7   | 8.7   | 60.3           | 44.4           | 19.8  | 27             | 9.1            | 10.7           | 38.1           | 38.9           | 6.7   | G1015KRRB      | S1015K        | 0.386    |
| GRFTD                                       | GRFTDR               | 1          | 3 3/4   | 3       | 2 5/8  | 11/32 | 2 3/8          | 1 3/4          | 25/32 | 1 1/16         | 23/64          | 27/64          | 1 1/2          | 1 17/32        | 17/64 | G1100KRRB      | S1100K        | 0.85     |
| GRFTD                                       | GRFTDR               | 25         |         |         |        |       |                |                |       |                |                |                |                |                |       | GE25KRRB       | SE25K         |          |
| GRFTD                                       | GRFTDR               | 1 1/16     |         |         |        |       |                |                |       |                |                |                |                |                |       | G1101KRRB      | S1101K        |          |
| GRFTD                                       | GRFTDR               | 1 1/8      | 112.7   | 90.5    | 78.6   | 10.3  | 71.4           | 48.4           | 22.2  | 30.2           | 10.7           | 11.9           | 44.5           | 46             | 6.4   | G1102KRRB      | S1102K        | 0.712    |
| GRFTD                                       | GRFTDR               | 1 3/16     | 4 7/16  | 3 9/16  | 3 3/32 | 13/32 | 2 13/16        | 1 29/32        | 7/8   | 1 9/16         | 27/64          | 15/32          | 1 3/4          | 1 13/16        | 1/4   | G1103KRRB      | S1103K        | 1.57     |
| GRFTD                                       | GRFTDR               | 1 1/4 S    |         |         |        |       |                |                |       |                |                |                |                |                |       | G1103KRRB3     | S1103K3       |          |
| GRFTD                                       | GRFTDR               | 30         |         |         |        |       |                |                |       |                |                |                |                |                |       | GE30KRRB       | SE30K         |          |
| GRFTD                                       | GRFTDR               | 1 1/4      |         |         |        |       |                |                |       |                |                |                |                |                |       | G1104KRRB      | S1104K        |          |
| GRFTD                                       | GRFTDR               | 1 5/16     | 122.2   | 100     | 88.9   | 10.3  | 81.8           | 51.2           | 23.8  | 32.5           | 11.1           | 12.7           | 54             | 53.2           | 6.4   | G1105KRRB      | S1105K        | 0.962    |
| GRFTD                                       | GRFTDR               | 1 3/8      | 4 13/16 | 3 15/16 | 3 1/2  | 13/32 | 3 7/32         | 2 1/64         | 15/16 | 1 9/32         | 7/16           | 1/2            | 2 1/8          | 2 3/32         | 1/4   | G1106KRRB      | S1106K        | 2.12     |
| GRFTD                                       | GRFTDR               | 1 7/16     |         |         |        |       |                |                |       |                |                |                |                |                |       | G1107KRRB      | S1107K        |          |
| GRFTD                                       | GRFTDR               | 35         |         |         |        |       |                |                |       |                |                |                |                |                |       | GE35KRRB       | SE35K         |          |

<sup>(1)</sup> All units have a 1/4-28 grease fitting. Shaft diameter with an S = smaller housing.



# BALL BEARINGS

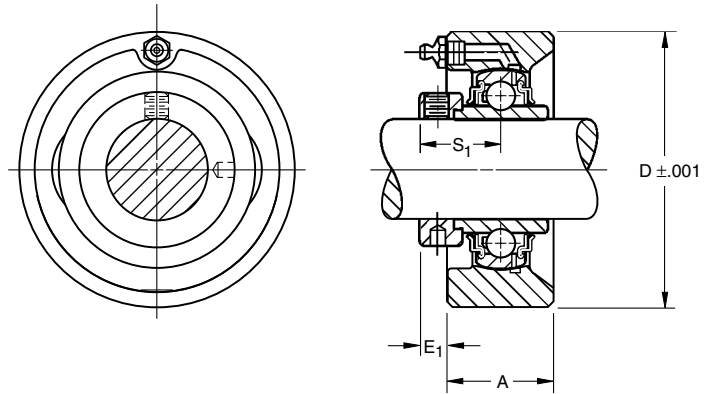
## RC SERIES

- Convenient for mounting in straight-bore housings.
- Bearing features a self-locking collar and spherical outside diameter fitted to a corresponding spherical seat in the cartridge that provides self-alignment.
- Equipped with a G-KRRB (R-Seal) bearing.

### Suggested housing bore:

**Shaft Rotating:** nominal +.025 mm to +.076 mm, +.001" to +.003".  
**Shaft Stationary:** nominal +.00 mm to -.050 mm, +.000" to -.002".  
 Avoid excessive tightening of anchor bolts.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to -.013 mm, -.0005";  
 2" - 3 15/16", nominal to -.025 mm, -.0010".



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RC   | G...KRRB       | Page D54                    |

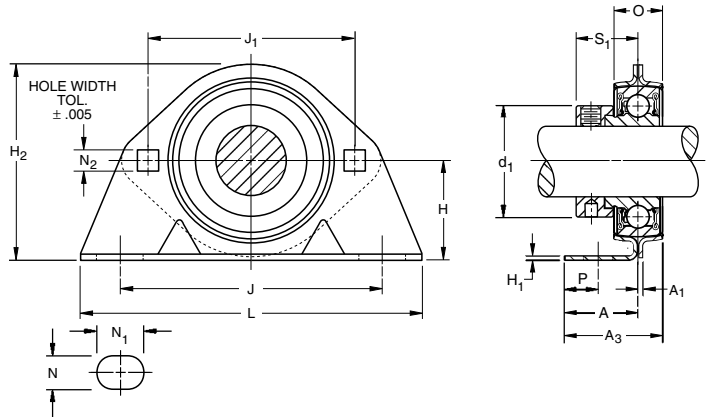
TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RC 1 3/16". POPULAR SIZES ARE IN BOLD.

| Unit      | Shaft Dia.     |     | D       | A      | E <sub>1</sub> | S <sub>1</sub> | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|-----------|----------------|-----|---------|--------|----------------|----------------|----------------|---------------|----------------|----------|
|           | mm             | in. |         |        |                |                |                |               |                |          |
| RC        | 1/2            |     |         |        |                |                | G1008KRRB      | S1008K        |                |          |
| RC        | 5/8            |     | 68.27   | 30.2   | 8.3            | 23.4           | G1010KRRB      | S1010K        | T-16793        | 0.549    |
| RC        | 11/16          |     | 2 11/16 | 1 3/16 | 21/64          | 59/64          | G1011KRRB      | S1011K        |                | 1.21     |
| RC        | 17             |     |         |        |                |                | GE17KRRB       | SE17K         |                |          |
| <b>RC</b> | <b>3/4</b>     |     | 74.61   | 36.5   | 8.3            | 26.6           | G1012KRRB      | S1012K        | T-16795        | 0.804    |
| RC        | 20             |     | 2 15/16 | 1 7/16 | 21/64          | 1 3/64         | GE20KRRB       | SE20K         |                | 1.77     |
| RC        | 7/8            |     |         |        |                |                | G1014KRRB      | S1014K        |                |          |
| RC        | 15/16          |     | 79.38   | 38.1   | 7.9            | 27             | G1015KRRB      | S1015K        | T-16797        | 0.876    |
| <b>RC</b> | <b>1</b>       |     | 3 1/8   | 1 1/2  | 5/16           | 1 1/16         | G1100KRRB      | S1100K        |                | 1.93     |
| RC        | 25             |     |         |        |                |                | GE25KRRB       | SE25K         |                |          |
| RC        | 1 1/16         |     |         |        |                |                | G1101KRRB      | S1101K        |                |          |
| RC        | 1 1/8          |     | 88.9    | 38.1   | 11.1           | 30.2           | G1102KRRB      | S1102K        | T-16798        | 1.171    |
| RC        | 1 3/16         |     | 3 1/2   | 1 1/2  | 7/16           | 1 3/16         | G1103KRRB      | S1103K        |                | 2.58     |
| RC        | 30             |     |         |        |                |                | GE30KRRB       | SE30K         |                |          |
| RC        | 1 1/4          |     |         |        |                |                | G1104KRRB      | S1104K        |                |          |
| RC        | 1 5/16         |     | 98.43   | 39.7   | 12.7           | 32.5           | G1105KRRB      | S1105K        | T-16686        | 1.448    |
| RC        | 1 3/8          |     | 3 7/8   | 1 9/16 | 1/2            | 1 9/32         | G1106KRRB      | S1106K        |                | 3.19     |
| <b>RC</b> | <b>1 7/16</b>  |     |         |        |                |                | G1107KRRB      | S1107K        |                |          |
| RC        | 35             |     |         |        |                |                | GE35KRRB       | SE35K         |                |          |
| <b>RC</b> | <b>1 1/2</b>   |     | 106.36  | 44.4   | 12.7           | 34.9           | G1108KRRB      | S1108KT       | T-16800        | 1.87     |
| RC        | 1 9/16         |     | 4 3/16  | 1 3/4  | 1/2            | 1 3/8          | G1109KRRB      | S1109KT       |                | 4.12     |
| RC        | 40             |     |         |        |                |                | GE40KRRB       | SE40K         |                |          |
| RC        | 1 5/8          |     |         |        |                |                | G1110KRRB      | S1110K        |                |          |
| <b>RC</b> | <b>1 11/16</b> |     | 111.13  | 44.4   | 12.7           | 34.9           | G1111KRRB      | S1111K        | T-16687        | 1.97     |
| RC        | 1 3/4          |     | 4 3/8   | 1 3/4  | 1/2            | 1 3/8          | G1112KRRB      | S1112K        |                | 4.34     |
| RC        | 45             |     |         |        |                |                | GE45KRRB       | SE45K         |                |          |
| RC        | 1 7/8          |     | 115.89  | 52.4   | 11.9           | 38.1           | G1114KRRB      | S1114K        | T-16802        | 2.452    |
| <b>RC</b> | <b>1 15/16</b> |     | 4 9/16  | 2 1/16 | 15/32          | 1 1/2          | G1115KRRB      | S1115K        |                | 5.4      |
| RC        | 50             |     |         |        |                |                | GE50KRRB       | SE50K         |                |          |
| RC        | 2              |     |         |        |                |                | G1200KRRB      | S1200K        |                |          |
| RC        | 2 1/8          |     | 125.41  | 58.7   | 14.3           | 43.7           | G1202KRRB      | S1202K        | T-16804        | 3.164    |
| <b>RC</b> | <b>2 3/16</b>  |     | 4 15/16 | 2 5/16 | 9/16           | 1 23/32        | G1203KRRB      | S1203K        |                | 6.97     |
| RC        | 55             |     |         |        |                |                | GE55KRRB       | SE55K         |                |          |
| RC        | 2 7/16         |     | 149.23  | 65.1   | 14.3           | 46.8           | G1207KRRB      | S1207K        | T-17927        | 5.13     |
| RC        | 60             |     | 5 7/8   | 2 9/16 | 9/16           | 1 27/32        | GE60KRRB       | SE60K         |                | 11.30    |

All units have 1/4" -28 grease fittings.

**PBS SERIES**

- Economical transmission unit for light-duty, moderate-speed requirements.
- Housing includes two heavy-gage, zinc-plated steel stampings. One is a standard stamping used in the MST two-bolt flangette unit.
- RA-RRB (extended inner-ring) bearings are regularly furnished with this bearing. RR wide inner rings also can be used.
- Timken self-locking collar completes the assembly.
- Made with precision bearing seat and dimensions held to close tolerances. This provides accurate bearing-to-housing fit and assures proper alignment of parts.
- RA-RRB bearing used in the PBS pillow block has positive contact land-riding seals. It includes a shroud cap design and is permanently prelubricated.
- Base-to-center height and bolt spacing are interchangeable with many other pillow blocks on the market.



**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| PBS  | RA...RRB       | Page D56                    |

Suggested shaft tolerances: nominal to **-.013 mm, -.0005"**.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: **PBS 1 7/16"**

| Unit       | Shaft Dia.     | H       | J       | N <sub>1</sub> | L      | H <sub>2</sub> | J <sub>1</sub> | d <sub>1</sub> | S <sub>1</sub> | O      | A      | H <sub>1</sub> | A <sub>1</sub> | A <sub>3</sub> | N <sub>2</sub> | P      | N      | Bearing Number | Flangette Number | Stamping Radial Load Rating <sup>(1)</sup> | Unit Wt. |
|------------|----------------|---------|---------|----------------|--------|----------------|----------------|----------------|----------------|--------|--------|----------------|----------------|----------------|----------------|--------|--------|----------------|------------------|--------------------------------------------|----------|
|            |                | mm in.  | mm in.  | mm in.         | mm in. | mm in.         | mm in.         | mm in.         | mm in.         | mm in. | mm in. | mm in.         | mm in.         | mm in.         | mm in.         | mm in. | mm in. |                |                  |                                            | mm in.   |
| PBS        | 1/2            | 30.2    | 92.1    | 15.9           | 123.8  | 59.5           | 63.5           | 28.6           | 22.2           | 14.3   | 25.4   | 2.64           | 1.9            | 32.5           | 7.1            | 10.3   | 10.3   | RA008RRB       | 40               | 2650                                       | 0.34     |
| <b>PBS</b> | <b>5/8</b>     | 1 3/16  | 3 5/8   | 5/8            | 4 7/8  | 2 11/32        | 2 1/2          | 1 1/8          | 7/8            | 9/16   | 1      | 0.104          | 0.075          | 1 9/32         | 9/32           | 13/32  | 13/32  | RA010RRB       | MST-(ZP)         | 600                                        | 0.75     |
| PBS        | 17             |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RAE17RRB       |                  |                                            |          |
| <b>PBS</b> | <b>3/4</b>     | 33.3    | 96.8    | 15.9           | 127    | 68.3           | 71.4           | 33.3           | 23.4           | 15.9   | 25.4   | 3.02           | 2.11           | 33.3           | 8.7            | 10.3   | 10.3   | RA012RRB       | 47               | 3100                                       | 0.44     |
| PBS        | 20             | 1 5/16  | 3 13/16 | 5/8            | 5      | 2 11/16        | 2 13/16        | 1 5/16         | 59/64          | 5/8    | 1      | 0.119          | 0.083          | 1 5/16         | 11/32          | 13/32  | 13/32  | RAE20RRB       | MST-(ZP)         | 700                                        | 0.97     |
| PBS        | 7/8            |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RA014RRB       |                  |                                            |          |
| PBS        | 15/16          | 36.5    | 95.2    | 20.6           | 133.4  | 72.2           | 76.2           | 38.1           | 23.4           | 17.5   | 25.4   | 3.4            | 2.11           | 34.1           | 8.7            | 11.1   | 11.1   | RA015RRB       | 52               | 3550                                       | 0.544    |
| <b>PBS</b> | <b>1</b>       | 1 7/16  | 3 3/4   | 13/16          | 5 1/4  | 2 27/32        | 3              | 1 1/2          | 59/64          | 11/16  | 1      | 0.134          | 0.083          | 1 11/32        | 11/32          | 7/16   | 7/16   | RA100RRB       | MST-(ZP)         | 800                                        | 1.2      |
| PBS        | 25             |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RAE25RRB       |                  |                                            |          |
| PBS        | 1 1/8          |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RA102RRB       |                  |                                            |          |
| PBS        | 1 3/16         | 42.9    | 119.1   | 22.2           | 158.8  | 84.9           | 90.5           | 44.4           | 26.6           | 17.5   | 30.2   | 3.4            | 2.64           | 37.3           | 10.3           | 14.3   | 14.3   | RA103RRB       | 62               | 3550                                       | 0.744    |
| <b>PBS</b> | <b>1 1/4 S</b> | 1 11/16 | 4 11/16 | 7/8            | 6 1/4  | 3 11/32        | 3 9/16         | 1 3/4          | 1 3/64         | 11/16  | 1 3/16 | 0.134          | 0.104          | 1 15/32        | 13/32          | 9/16   | 9/16   | RA103RRB2      | MST-(ZP)         | 800                                        | 1.64     |
| PBS        | 30             |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RAE30RRB       |                  |                                            |          |
| <b>PBS</b> | <b>1 1/4</b>   | 47.6    | 127     | 22.2           | 165.1  | 94.5           | 100            | 54             | 29.4           | 22.2   | 34.9   | 3.78           | 2.64           | 46             | 10.3           | 14.3   | 14.3   | RA104RRB       | 72               | 4000                                       | 1.089    |
| PBS        | 1 3/8          | 1 7/8   | 5       | 7/8            | 6 1/2  | 3 23/32        | 3 15/16        | 2 1/8          | 1 5/32         | 7/8    | 1 3/8  | 0.149          | 0.104          | 1 13/16        | 13/32          | 9/16   | 9/16   | RA106RRB       | MST-(ZP)         | 900                                        | 2.4      |
| PBS        | 1 7/16         |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RA107RRB       |                  |                                            |          |
| PBS        | 35             |         |         |                |        |                |                |                |                |        |        |                |                |                |                |        |        | RAE35RRB       |                  |                                            |          |

<sup>(1)</sup> Stamping thrust rating is 1/5 of stamping radial load rating. Shaft diameter with an S = smaller housing.







# BALL BEARINGS

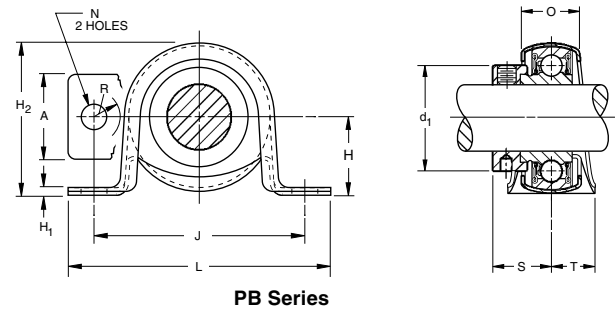
## PB SERIES - RPB SERIES

- PB Series provides the advantages of ball bearings at an economical price.
- Used for light-duty applications.
- Consists of a two-piece separable zinc-plated steel housing with spherical bearing seat. This allows the spherically ground bearing to have initial self-alignment in all directions.
- The ball bearing is a RA-RRB extended inner ring type with positive contact land-riding seals and a self-locking collar.
- Incorporates improved shroud cap design and comes permanently prelubricated.
- RPB has same construction as PB-Type, but with a thick, electrically-conductive rubber interliner.
- Bearings in the RPB unit are designated as RA-RRB F-450 and have a special ball and race finish for quiet operation.
- RABR unit consists of the bearing with the rubber interliner.

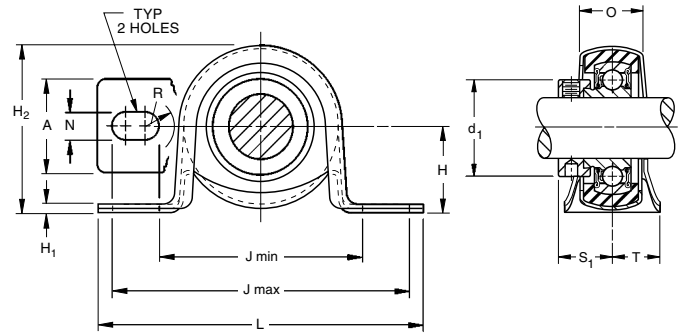
Suggested shaft tolerances: nominal to **-.013 mm, -.0005"**.

### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| PB   | RA...RRB       | Page D56                    |
| RPB  | RA...RRB       | Page D56                    |



PB Series



RPB Series

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: PB 1 3/16". POPULAR SIZES ARE IN BOLD.

| Unit | Shaft Dia. | H         | H <sub>2</sub> | J max.    | J min.    | L         | A         | H <sub>1</sub> | N         | R         | d <sub>1</sub> | O         | S <sub>1</sub> | T         | Bearing Number | Collar Number | Stamping Radial Load Rating <sup>(2)</sup> | Unit Wt.   |
|------|------------|-----------|----------------|-----------|-----------|-----------|-----------|----------------|-----------|-----------|----------------|-----------|----------------|-----------|----------------|---------------|--------------------------------------------|------------|
|      | mm<br>in.  | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in.      | mm<br>in. |                |               | N<br>lbs.                                  | kg<br>lbs. |
| PB   | 1/2        | 22.2      | 44.4           | 81        | 55.6      | 92.1      | 25.4      | 2.54           | 8.7       | 8.7       | 28.6           | 18.24     | 22.07          | 12.7      | RA008RRB       | S1008K        | 1340                                       | 0.2        |
| PB   | 5/8        | 28.6      | 56.4           | 100       | 71.4      | 114       | 28.6      | 5.28           | 10.3      | 10.3      | 38.1           | 25.4      | 23.44          | 14.3      | RA010RRB       | S1010K        | 300                                        | 0.44       |
| PB   | 17         | 429       | 862            | 1524      | 1118      | 1829      | 429       | 133            | 271       | 271       | 1524           | 635       | 584            | 362       | RAE17RRB       | SE17K         |                                            |            |
| PB   | 3/4        | 25.4      | 52.4           | 88.9      | 63.5      | 104.8     | 25.4      | 2.54           | 10.3      | 10.3      | 33.3           | 21.82     | 23.44          | 15.9      | RA012RRB       | S1012K        | 1560                                       | 0.259      |
| PB   | 20         | 63.5      | 127            | 225       | 158.8     | 254       | 63.5      | 6.35           | 25.4      | 25.4      | 104.8          | 63.5      | 58.4           | 36.2      | RAE20RRB       | SE20K         | 350                                        | 0.57       |
| PB   | 7/8        | 28.6      | 56.4           | 100       | 71.4      | 114       | 28.6      | 5.28           | 10.3      | 10.3      | 38.1           | 25.4      | 23.44          | 14.3      | RA014RRB       | S1014K        |                                            |            |
| PB   | 15/16      | 38.1      | 76.2           | 133       | 95.3      | 152.4     | 38.1      | 7.62           | 13.3      | 13.3      | 50.8           | 31.75     | 28.27          | 17.8      | RA015RRB       | S1015K        | 1760                                       | 0.295      |
| PB   | 1          | 41.3      | 82.6           | 146       | 104.5     | 165.1     | 41.3      | 8.26           | 14.6      | 14.6      | 55.1           | 34.27     | 30.48          | 19.0      | RA100RRB       | S1100K        | 400                                        | 0.65       |
| PB   | 25         | 101.6     | 203.2          | 365       | 261.6     | 412.7     | 101.6     | 10.16          | 36.5      | 36.5      | 182.9          | 101.6     | 91.4           | 57.1      | RAE25RRB       | SE25K         |                                            |            |
| PB   | 1 1/8      | 33.3      | 66.7           | 104.8     | 76.2      | 123.8     | 31.8      | 3.68           | 10.3      | 10.3      | 44.5           | 25.4      | 26.72          | 19        | RA102RRB       | S1102K        |                                            |            |
| PB   | 1 3/16     | 39.7      | 79.4           | 127       | 91.1      | 141.3     | 39.7      | 3.97           | 12.7      | 12.7      | 51.8           | 29.8      | 28.27          | 17.8      | RA103RRB       | S1103K        | 2650                                       | 0.476      |
| PB   | 1 1/4 S    | 38.1      | 76.2           | 133       | 95.3      | 152.4     | 38.1      | 7.62           | 13.3      | 13.3      | 50.8           | 31.75     | 28.27          | 17.8      | RA103RRB2      | S1103K3       | 600                                        | 1.05       |
| PB   | 30         | 762       | 1524           | 2714      | 1927      | 2927      | 762       | 76.2           | 271       | 271       | 1524           | 762       | 691            | 429       | RAE30RRB       | SE30K         |                                            |            |

<sup>(1)</sup> Housing thrust rating is 1/3 of housing radial load rating.

Load ratings are upright mounted capacities with load direction toward base. These units should not be mounted vertically or upside down.

Shaft diameter with an S = smaller housing.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RPB 1 3/16". POPULAR SIZES ARE IN BOLD.

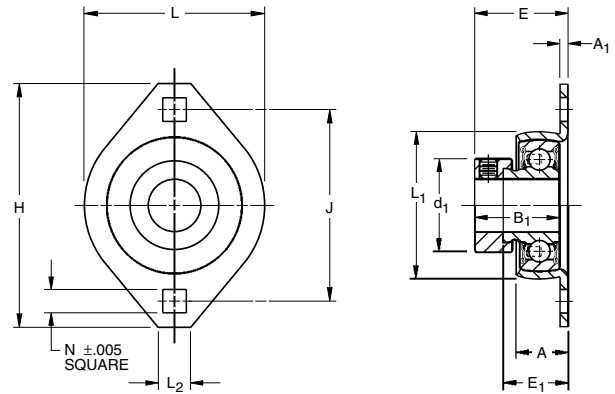
| Unit | Shaft Dia. | H         | H <sub>2</sub> | J max.    | J min.    | L         | A         | H <sub>1</sub> | N (width) | R         | d <sub>1</sub> | O         | S <sub>1</sub> | T         | Bearing Number <sup>(1)</sup> | Collar Number | Stamping Radial Load Rating <sup>(2)</sup> | Unit Wt.   |
|------|------------|-----------|----------------|-----------|-----------|-----------|-----------|----------------|-----------|-----------|----------------|-----------|----------------|-----------|-------------------------------|---------------|--------------------------------------------|------------|
|      | mm<br>in.  | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in.      | mm<br>in. |                               |               | N<br>lbs.                                  | kg<br>lbs. |
| RPB  | 1/2        | 25.4      | 52.4           | 88.9      | 63.5      | 104.8     | 25.4      | 2.54           | 10.3      | 10.3      | 28.6           | 21.59     | 22.07          | 15.9      | RA008RRB                      | S1008K        | 880                                        | 0.2        |
| RPB  | 5/8        | 31.8      | 63.5           | 111.8     | 81.3      | 127       | 31.8      | 3.18           | 12.7      | 12.7      | 35.1           | 26.17     | 26.67          | 19.0      | RA010RRB                      | S1010K        | 200                                        | 0.44       |
| RPB  | 17         | 429       | 862            | 1524      | 1118      | 1829      | 429       | 133            | 271       | 271       | 1524           | 635       | 584            | 362       | RAE17RRB                      | SE17K         |                                            |            |
| RPB  | 3/4        | 28.58     | 56.4           | 100       | 71.4      | 114       | 28.6      | 5.28           | 10.3      | 10.3      | 33.3           | 25.4      | 23.44          | 14.3      | RA012RRB                      | S1012K        | 1120                                       | 0.259      |
| RPB  | 20         | 71.4      | 142.8          | 225       | 158.8     | 254       | 71.4      | 7.14           | 25.4      | 25.4      | 104.8          | 63.5      | 58.4           | 36.2      | RAE20RRB                      | SE20K         | 250                                        | 0.57       |
| RPB  | 7/8        | 33.34     | 66.7           | 104.8     | 76.2      | 123.8     | 31.8      | 3.68           | 10.3      | 10.3      | 44.5           | 25.4      | 26.72          | 19        | RA014RRB                      | S1014K        |                                            |            |
| RPB  | 15/16      | 39.7      | 79.4           | 133       | 95.3      | 152.4     | 39.7      | 3.97           | 12.7      | 12.7      | 51.8           | 29.8      | 28.27          | 17.8      | RA015RRB                      | S1015K        | 1340                                       | 0.295      |
| RPB  | 1          | 41.3      | 82.6           | 146       | 104.5     | 165.1     | 41.3      | 8.26           | 14.6      | 14.6      | 55.1           | 34.27     | 30.48          | 19.0      | RA100RRB                      | S1100K        | 300                                        | 0.65       |
| RPB  | 25         | 101.6     | 203.2          | 365       | 261.6     | 412.7     | 101.6     | 10.16          | 36.5      | 36.5      | 182.9          | 101.6     | 91.4           | 57.1      | RAE25RRB                      | SE25K         |                                            |            |
| LRPB | 1 3/16     | 33.34     | 66.7           | 104.8     | 76.2      | 123.8     | 31.8      | 3.68           | 10.3      | 10.3      | 44.4           | 25.4      | 28.3           | 19        | RAL103NPPB                    | LS103K        | 1340                                       | 0.476      |
|      |            | 85.4      | 170.8          | 291.4     | 203.2     | 304.8     | 85.4      | 8.54           | 29.1      | 29.1      | 170.8          | 85.4      | 76.2           | 47.6      |                               |               | 300                                        | 1.05       |

<sup>(1)</sup> Bearing suffix number FS450.

<sup>(2)</sup> Housing thrust rating is 1/3 of housing radial load rating. Maximum suggested speed is 2400 RPM.

### VFMST SERIES

- Zinc-plated, pressed-metal flange unit is assembled with an RA-RR prelubricated extended inner ring type bearing.
- Ideal for light-duty applications.
- Features flush-mounting.
- Additional contamination protection.
- Self-aligning.



**BEARING DATA**

| Unit  | Bearing Number | Dimensions and Load Ratings |
|-------|----------------|-----------------------------|
| VFMST | RA...RRB       | Page D56                    |

POPULAR SIZES ARE IN BOLD.

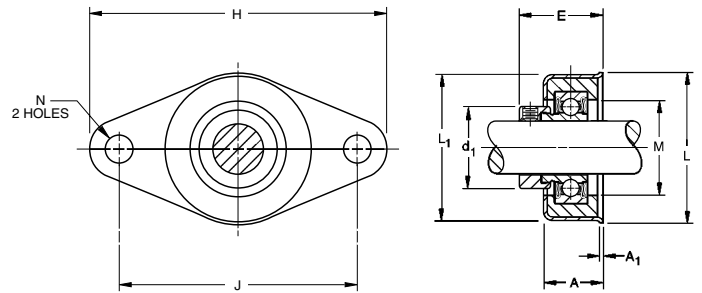
| Unit         | Shaft Dia.    | H      | J       | L       | E       | A      | N      | L <sub>1</sub> | E <sub>1</sub> | L <sub>2</sub> | B <sub>1</sub> | d <sub>1</sub> | A <sub>1</sub> | Bearing Number | Collar Number | Stamping Size | Radial Load Rating <sup>(1)</sup> |      |
|--------------|---------------|--------|---------|---------|---------|--------|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|-----------------------------------|------|
|              |               |        |         |         |         |        |        |                |                |                |                |                |                |                |               |               | N                                 | lbs. |
| <b>VFMST</b> | <b>3/4</b>    | 90.5   | 71.4    | 66.7    | 33.3    | 16.7   | 8.7    | 50.8           | 23             | 12.7           | 31             | 33.3           | 2.64           | RA012RRB       | S1012K        | 47FMST        | 2240                              |      |
| VFMST        | 20            | 3 9/16 | 2 13/16 | 2 5/8   | 1 5/16  | 2 1/32 | 1 1/32 | 2              | 2 9/32         | 1/2            | 1 7/32         | 1 5/16         | 0.104          | RAE20RRB       | SE20K         |               | 500                               |      |
| VFMST        | <b>7/8</b>    |        |         |         |         |        |        |                |                |                |                |                |                | RA014RRB       | S1014K        |               |                                   |      |
| VFMST        | <b>1 5/16</b> | 95.2   | 76.2    | 71      | 33.3    | 18.3   | 8.7    | 55.6           | 23.8           | 12.7           | 31             | 38.1           | 2.64           | RA015RRB       | S1015K        | 52FMST        | 2650                              |      |
| <b>VFMST</b> | <b>1</b>      | 3 3/4  | 3       | 2 51/64 | 1 5/16  | 2 3/32 | 1 1/32 | 2 3/16         | 1 5/16         | 1/2            | 1 7/32         | 1 1/2          | 0.104          | RA100RRB       | S1100K        |               | 600                               |      |
| VFMST        | 25            |        |         |         |         |        |        |                |                |                |                |                |                | RAE25RRB       | SE25K         |               |                                   |      |
| <b>VFMST</b> | <b>1 1/8</b>  |        |         |         |         |        |        |                |                |                |                |                |                | RA102RRB       | S1102K        |               |                                   |      |
| VFMST        | 1 3/16        | 112.7  | 90.5    | 84.1    | 38.9    | 23     | 10.3   | 66.7           | 27.8           | 15.9           | 35.7           | 44.4           | 3.4            | RA103RRB       | S1103K        | 62FMST        | 3550                              |      |
| VFMST        | 1 1/4 S       | 4 7/16 | 3 9/16  | 3 5/16  | 1 11/32 | 2 9/32 | 1 3/32 | 2 5/8          | 1 3/32         | 5/8            | 1 13/32        | 1 3/4          | 0.134          | RA103RRB2      | S1103K3       |               | 800                               |      |
| VFMST        | 30            |        |         |         |         |        |        |                |                |                |                |                |                | RAE30RRB       | SE30K         |               |                                   |      |

Shaft diameter with an S = smaller housing.

<sup>(1)</sup> Housing thrust rating is 1/3 of housing radial load rating.

### LFST SERIES

- Zinc-plated, pressed-steel and flush-mounted.
- Simplifies bearing flange unit installations.
- Conductive rubber interliner reduces noise and vibration. Allows for alignment while pressed-steel flange assures rigid bearing support.
- Bolt hole spacing permits interchangeability with competitive mountings.
- Offers compact, economical, corrosion-resistant housing and balanced design.
- Features Timken RAL light series ball bearings. The RAL provides precision in an extended inner ring bearing with superior shroud seal protection and self-locking collar.
- Bearings are prelubricated.



**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| LFST | RAL...NPP      | Page D60                    |

Suggested shaft tolerances: nominal to **-.013 mm, -.0005"**.

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: LFST 1". POPULAR SIZES ARE IN BOLD.

| Unit        | Shaft Dia. | H     | J     | L     | L <sub>1</sub> | E      | N   | A      | A <sub>1</sub> | d <sub>1</sub> | M      | Bearing Number | Collar Number | Housing Radial Load Rating <sup>(1)</sup> |      |
|-------------|------------|-------|-------|-------|----------------|--------|-----|--------|----------------|----------------|--------|----------------|---------------|-------------------------------------------|------|
|             |            |       |       |       |                |        |     |        |                |                |        |                |               | N                                         | lbs. |
| LFST        | 1/2        | 114.3 | 92.1  | 57.2  | 55.6           | 31     | 9.5 | 23     | 1.52           | 25.4           | 29.4   | RAL008NPP      | LS008K        | 880                                       |      |
| <b>LFST</b> | <b>5/8</b> | 4 1/2 | 3 5/8 | 2 1/4 | 2 3/16         | 1 7/32 | 3/8 | 2 9/32 | 0.06           | 1              | 1 5/32 | RAL010NPP      | LS010K        | 200                                       |      |
| <b>LFST</b> | <b>3/4</b> | 114.3 | 92.1  | 57.2  | 55.6           | 31     | 9.5 | 23     | 1.52           | 29.8           | 34.9   | RAL012NPP      | LS012K        | 1120                                      |      |
|             |            | 4 1/2 | 3 5/8 | 2 1/4 | 2 3/16         | 1 7/32 | 3/8 | 2 9/32 | 0.06           | 1 11/64        | 1 3/8  |                |               | 250                                       |      |
| LFST        | 1 5/16     | 114.3 | 92.1  | 57.2  | 55.6           | 31     | 9.5 | 23     | 1.52           | 36.1           | 39.7   | RAL015NPP      | LS015K        | 1340                                      |      |
| <b>LFST</b> | <b>1</b>   | 4 1/2 | 3 5/8 | 2 1/4 | 2 3/16         | 1 7/32 | 3/8 | 2 9/32 | 0.06           | 1 27/64        | 1 9/16 | RAL100NPP      | LS100K        | 300                                       |      |

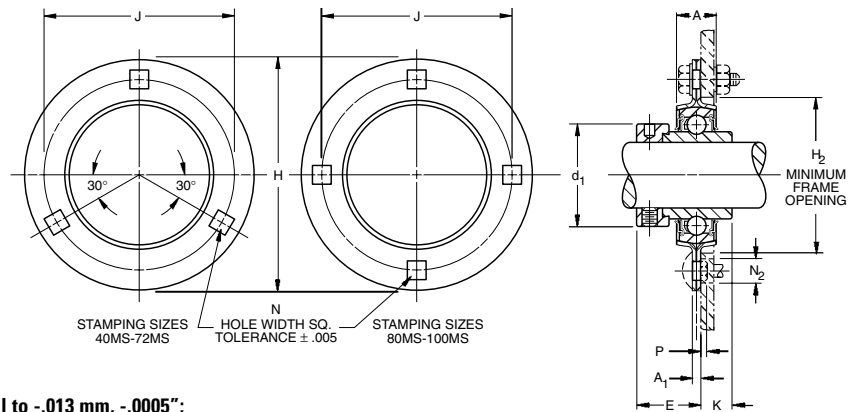
<sup>(1)</sup> Housing thrust rating is 1/3 of housing radial load rating. Maximum suggested speed is 2400 RPM.



# BALL BEARINGS

## RR FLANGETTE UNIT

- Consists of two interchangeable, pressed-steel, zinc-plated flanges housing a standard bearing with self-locking collar.
- Spherical inside surfaces of each pair of flanges mate with the spherical outside surface of the bearing's outer ring. This provides initial self-alignment.
- Flangette is equipped with the KRRB (R-Seal) wide inner ring ball bearing.
- All units are non-relubricatable.



**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to **-.013 mm, -.0005"**;  
 2" -  $2 \frac{3}{16}$ ", nominal to **-.025 mm, -.0010"**.

### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RR   | KRRB           | Page D53                    |

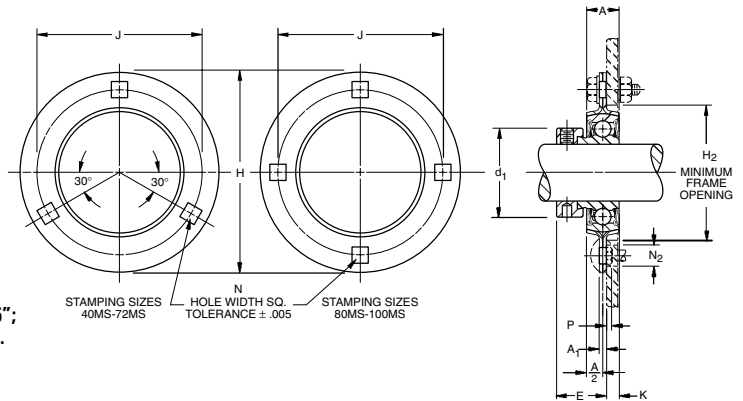
| Unit | Shaft Dia.        | H                 | A               | J                 | N Hole Width    | H <sub>2</sub>    | A <sub>1</sub> | E                 | K               | d <sub>1</sub>   | Bolt Size      | P           |            | N <sub>2</sub> Flange Hole Diam to Clear Sq. Shank | Bearing Number                  | Collar Number             | Stamping <sup>(2)</sup> Radial Load Rating <sup>(1)</sup> | Unit Wt. |       |
|------|-------------------|-------------------|-----------------|-------------------|-----------------|-------------------|----------------|-------------------|-----------------|------------------|----------------|-------------|------------|----------------------------------------------------|---------------------------------|---------------------------|-----------------------------------------------------------|----------|-------|
|      |                   |                   |                 |                   |                 |                   |                |                   |                 |                  |                | Short Shank | Long Shank |                                                    |                                 |                           |                                                           | N        | kg    |
| RR   | $\frac{1}{2}$     | 81                | 14.2            | 63.5              | 7.1             | 49.2              | 3.8            | 25.4              | 11.9            | 28.6             | 6.4            | 0.15        | 2.54       | 10.3                                               | 1008KRRB                        | S1008K                    | 40MS                                                      | 2650     | 0.295 |
| RR   | $\frac{5}{8}$     | $3 \frac{3}{16}$  | $\frac{9}{16}$  | $2 \frac{1}{2}$   | $\frac{9}{32}$  | $1 \frac{15}{16}$ | 0.15           | 1                 | $\frac{15}{32}$ | $1 \frac{1}{8}$  | $\frac{1}{4}$  | 0.006       | 0.1        | $\frac{13}{32}$                                    | 1010KRRB<br>E17KRRB             | S1010K<br>SE17K           | 600                                                       | 0.65     |       |
| RR   | 17                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | $\frac{3}{4}$     | 90.5              | 15.8            | 71.4              | 8.7             | 55.6              | 4.22           | 28.6              | 15.1            | 33.3             | 7.9            | 0.53        | 2.92       | 12.7                                               | 1012KRRB                        | S1012K                    | 47MS                                                      | 3100     | 0.404 |
| RR   | 20                | $3 \frac{9}{16}$  | $\frac{5}{8}$   | $2 \frac{13}{16}$ | $\frac{11}{32}$ | $2 \frac{3}{16}$  | 0.166          | $1 \frac{1}{8}$   | $\frac{19}{32}$ | $1 \frac{5}{16}$ | $\frac{5}{16}$ | 0.021       | 0.115      | $\frac{1}{2}$                                      | E20KRRB                         | SE20K                     | 700                                                       | 0.89     |       |
| RR   | $\frac{7}{8}$     |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    | 1014KRRB                        | S1014K                    |                                                           |          |       |
| RR   | $\frac{15}{16}$   | 95.2              | 17.4            | 76.2              | 8.7             | 60.3              | 4.22           | 28.6              | 15.1            | 38.1             | 7.9            | 0.53        | 2.92       | 12.7                                               | 1015KRRB                        | S1015K                    | 52MS                                                      | 3550     | 0.49  |
| RR   | 1                 | $3 \frac{3}{4}$   | $\frac{11}{16}$ | 3                 | $\frac{11}{32}$ | $2 \frac{9}{8}$   | 0.166          | $1 \frac{1}{8}$   | $\frac{19}{32}$ | $1 \frac{1}{2}$  | $\frac{5}{16}$ | 0.021       | 0.115      | $\frac{1}{2}$                                      | 1100KRRB<br>E25KRRB             | S1100K<br>SE25K           | 800                                                       | 1.08     |       |
| RR   | 25                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | $1 \frac{1}{8}$   |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    | 1102KRRB                        | S1102K                    |                                                           |          |       |
| RR   | $1 \frac{3}{16}$  | 112.7             | 17.4            | 90.5              | 10.3            | 71.4              | 5.28           | 32.5              | 15.9            | 44.5             | 9.5            | 0.28        | 2.64       | 15.1                                               | 1103KRRB                        | S1103K                    | 62MS                                                      | 4900     | 0.753 |
| RR   | $1 \frac{1}{4}$ S | $4 \frac{7}{16}$  | $\frac{11}{16}$ | $3 \frac{9}{16}$  | $\frac{13}{32}$ | $2 \frac{13}{16}$ | 0.208          | $1 \frac{9}{32}$  | $\frac{5}{8}$   | $1 \frac{3}{4}$  | $\frac{3}{8}$  | 0.011       | 0.104      | $\frac{19}{32}$                                    | 1103KRRB3<br>E30KRRB            | S1103K3<br>SE30K          | 1100                                                      | 1.66     |       |
| RR   | 30                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | $1 \frac{1}{4}$   |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    | 1104KRRB                        | S1104K                    |                                                           |          |       |
| RR   | $1 \frac{5}{16}$  | 122.2             | 19              | 100               | 10.3            | 81                | 5.28           | 34.9              | 15.9            | 54               | 9.5            | 0.28        | 2.64       | 15.1                                               | 1105KRRB                        | S1105K                    | 72MS                                                      | 6220     | 0.962 |
| RR   | $1 \frac{3}{8}$   | $4 \frac{13}{16}$ | $\frac{3}{4}$   | $3 \frac{15}{16}$ | $\frac{13}{32}$ | $3 \frac{3}{16}$  | 0.208          | $1 \frac{3}{8}$   | $\frac{5}{8}$   | $2 \frac{1}{8}$  | $\frac{3}{8}$  | 0.011       | 0.104      | $\frac{19}{32}$                                    | 1106KRRB<br>1107KRRB<br>E35KRRB | S1106K<br>S1107K<br>SE35K | 1400                                                      | 2.12     |       |
| RR   | $1 \frac{7}{16}$  |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | 35                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | $1 \frac{1}{2}$   | 147.6             | 20.6            | 119.1             | 13.5            | 90.5              | 6.8            | 38.1              | 18.3            | 60.3             | 12.7           | 0.33        | 2.72       | 19.4                                               | 1108KRRB                        | S1108KT                   | 80MS                                                      | 7500     | 1.143 |
| RR   | $1 \frac{9}{16}$  | $5 \frac{13}{16}$ | $\frac{13}{16}$ | $4 \frac{11}{16}$ | $\frac{17}{32}$ | $3 \frac{9}{16}$  | 0.268          | $1 \frac{1}{2}$   | $\frac{23}{32}$ | $2 \frac{3}{8}$  | $\frac{1}{2}$  | 0.013       | 0.107      | $\frac{49}{64}$                                    | 1109KRRB<br>E40KRRB             | S1109KT<br>SE40K          | 1700                                                      | 2.52     |       |
| RR   | $1 \frac{5}{8}$   | 149.2             | 22.2            | 120.6             | 13.5            | 96.8              | 6.8            | 38.1              | 18.3            | 63.5             | 12.7           | 0.33        | 2.72       | 19.4                                               | 1110KRRB                        | S1110K                    | 85MS                                                      | 7500     | 1.651 |
| RR   | $1 \frac{11}{16}$ | $5 \frac{7}{8}$   | $\frac{7}{8}$   | $4 \frac{3}{4}$   | $\frac{17}{32}$ | $3 \frac{13}{16}$ | 0.268          | $1 \frac{1}{2}$   | $\frac{23}{32}$ | $2 \frac{1}{2}$  | $\frac{1}{2}$  | 0.013       | 0.107      | $\frac{49}{64}$                                    | 1111KRRB<br>E45KRRB             | S1111K<br>SE45K           | 1700                                                      | 3.64     |       |
| RR   | 45                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | $1 \frac{7}{8}$   | 155.6             | 22.2            | 127               | 13.5            | 101.6             | 7.56           | 42.1              | 20.6            | 69.8             | 12.7           | 0           | 1.96       | 19.4                                               | 1114KRRB                        | S1114K                    | 90MS                                                      | 8500     | 1.878 |
| RR   | $1 \frac{15}{16}$ | $6 \frac{1}{8}$   | $\frac{7}{8}$   | 5                 | $\frac{17}{32}$ | 4                 | 0.298          | $1 \frac{21}{32}$ | $\frac{13}{16}$ | $2 \frac{3}{4}$  | $\frac{1}{2}$  | 0           | 0.077      | $\frac{49}{64}$                                    | 1115KRRB<br>E50KRRB             | S1115K<br>SE50K           | 1900                                                      | 4.14     |       |
| RR   | 50                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |
| RR   | 2                 |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    | 1200KRRB                        | S1200K                    |                                                           |          |       |
| RR   | $2 \frac{1}{8}$   | 166.7             | 23.8            | 138.1             | 13.5            | 112.7             | 7.56           | 47.6              | 23.8            | 76.2             | 12.7           | 0           | 1.96       | 19.4                                               | 1202KRRB                        | S1202K                    | 100MS                                                     | 10200    | 2.268 |
| RR   | $2 \frac{3}{16}$  | $6 \frac{9}{16}$  | $\frac{15}{16}$ | $5 \frac{7}{16}$  | $\frac{17}{32}$ | $4 \frac{7}{16}$  | 0.298          | $1 \frac{7}{8}$   | $\frac{19}{16}$ | 3                | $\frac{1}{2}$  | 0           | 0.077      | $\frac{49}{64}$                                    | 1203KRRB<br>E55KRRB             | S1203K<br>SE55K           | 2300                                                      | 5        |       |
| RR   | 55                |                   |                 |                   |                 |                   |                |                   |                 |                  |                |             |            |                                                    |                                 |                           |                                                           |          |       |

<sup>(1)</sup> Thrust ratings for stamping are 50% of radial ratings.  
<sup>(2)</sup> Stampings must be ordered in pairs to assemble bearing.  
 Shaft diameter with an S = smaller housing.

### RA FLANGETTE UNIT

- Similar to Timken RR flangette unit.
- Consists of two interchangeable, pressed-steel, zinc-plated flanges that house a standard ball bearing.
- Incorporates an extended inner ring bearing with a self-locking collar and spherical seat in the cartridge, providing initial self-alignment.
- Equipped with a RA-RRB extended inner ring ball bearing.
- Units are non-relubricatable.

**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1\frac{15}{16}$ ", nominal to **-.013 mm, -.0005"**;  
 2" -  $2\frac{3}{16}$ ", nominal to **-.025 mm, -.0010"**.



**BEARING DATA**

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RA   | RA...RRB       | Page D56                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RA 1" Flangette.

| Unit | Shaft Dia.       | H                | A               | J                | N Hole Width    | H <sub>2</sub>   | A <sub>1</sub> | E                | K               | d <sub>1</sub>  | Bolt Size      | P           |            | N <sub>2</sub> Flange Hole Diam to Clear Sq. Shank | Bearing Number       | Collar Number    | Stamping <sup>(2)</sup> Size | Radial Load Rating <sup>(1)</sup> | Unit Wt. |
|------|------------------|------------------|-----------------|------------------|-----------------|------------------|----------------|------------------|-----------------|-----------------|----------------|-------------|------------|----------------------------------------------------|----------------------|------------------|------------------------------|-----------------------------------|----------|
|      |                  |                  |                 |                  |                 |                  |                |                  |                 |                 |                | Short Shank | Long Shank |                                                    |                      |                  |                              |                                   |          |
| RA   | $\frac{1}{2}$    | 81               | 14.2            | 63.5             | 7.1             | 49.2             | 3.81           | 23.8             | 5.6             | 28.6            | 6.4            | 0.15        | 2.54       | 10.3                                               | RA008RRB             | S1008K           | 40MS                         | 2650                              | 0.277    |
| RA   | $\frac{9}{16}$   | $3\frac{3}{16}$  | $\frac{9}{16}$  | $2\frac{1}{2}$   | $\frac{9}{32}$  | $1\frac{15}{16}$ | 0.150          | $\frac{15}{16}$  | $\frac{7}{32}$  | $1\frac{1}{8}$  | $\frac{1}{4}$  | 0.006       | 0.1        | $\frac{13}{32}$                                    | RA009RRB<br>RA010RRB | S1009K<br>S1010K |                              | 600                               | 0.61     |
| RA   | 17               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE17RRB             | SE17K            |                              |                                   |          |
| RA   | $\frac{3}{4}$    | 90.5             | 15.8            | 71.4             | 8.7             | 55.6             | 4.22           | 25               | 6.4             | 33.3            | 7.9            | 0.53        | 2.92       | 12.7                                               | RA012RRB             | S1012K           | 47MS                         | 3100                              | 0.363    |
| RA   | 20               | $3\frac{9}{16}$  | $\frac{5}{8}$   | $2\frac{13}{16}$ | $\frac{11}{32}$ | $2\frac{3}{16}$  | 0.166          | $\frac{63}{64}$  | $\frac{1}{4}$   | $1\frac{5}{16}$ | $\frac{5}{16}$ | 0.021       | 0.115      | $\frac{1}{2}$                                      | RAE20RRB             | SE20K            |                              | 700                               | 0.8      |
| RA   | $\frac{13}{16}$  |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA013RRB             | S1013K           |                              |                                   |          |
| RA   | $\frac{7}{8}$    | 95.2             | 17.4            | 76.2             | 8.7             | 60.3             | 4.22           | 25               | 7.1             | 38.1            | 7.9            | 0.53        | 2.92       | 12.7                                               | RA014RRB             | S1014K           | 52MS                         | 3550                              | 0.408    |
| RA   | $\frac{15}{16}$  | $3\frac{3}{4}$   | $\frac{11}{16}$ | 3                | $\frac{11}{32}$ | $2\frac{3}{8}$   | 0.166          | $\frac{63}{64}$  | $\frac{9}{32}$  | $1\frac{1}{2}$  | $\frac{5}{16}$ | 0.021       | 0.115      | $\frac{1}{2}$                                      | RA015RRB             | S1015K           |                              | 800                               | 0.9      |
| RA   | 1                |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA100RRB             | S1100K           |                              |                                   |          |
| RA   | 25               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE25RRB             | SE25K            |                              |                                   |          |
| RA   | $1\frac{1}{16}$  |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA101RRB             | S1101K           |                              |                                   |          |
| RA   | $1\frac{1}{8}$   | 112.7            | 17.4            | 90.5             | 10.3            | 71.4             | 5.28           | 29.0             | 6.7             | 44.5            | 9.5            | 0.28        | 2.64       | 15.1                                               | RA102RRB             | S1102K           | 62MS                         | 4900                              | 0.667    |
| RA   | $1\frac{3}{16}$  | $4\frac{7}{16}$  | $\frac{11}{16}$ | $3\frac{9}{16}$  | $\frac{13}{32}$ | $2\frac{13}{16}$ | 0.208          | $1\frac{9}{64}$  | $\frac{17}{64}$ | $1\frac{3}{4}$  | $\frac{3}{8}$  | 0.011       | 0.104      | $\frac{19}{32}$                                    | RA103RRB             | S1103K           |                              | 1100                              | 1.47     |
| RA   | $1\frac{1}{4}$ S |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA103RRB3            | S1103K3          |                              |                                   |          |
| RA   | 30               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE30RRB             | SE30K            |                              |                                   |          |
| RA   | $1\frac{1}{4}$   |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA104RRB             | S1104K           |                              |                                   |          |
| RA   | $1\frac{5}{16}$  | 122.2            | 19              | 100              | 10.3            | 81               | 5.28           | 31.8             | 7.5             | 54              | 9.5            | 0.28        | 2.64       | 15.1                                               | RA105RRB             | S1105K           | 72MS                         | 6220                              | 0.889    |
| RA   | $1\frac{3}{8}$   | $4\frac{13}{16}$ | $\frac{3}{4}$   | $3\frac{15}{16}$ | $\frac{13}{32}$ | $3\frac{3}{16}$  | 0.208          | $1\frac{1}{4}$   | $\frac{19}{64}$ | $2\frac{1}{8}$  | $\frac{3}{8}$  | 0.011       | 0.104      | $\frac{19}{32}$                                    | RA106RRB             | S1106K           |                              | 1400                              | 1.96     |
| RA   | $1\frac{7}{16}$  |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA107RRB             | S1107K           |                              |                                   |          |
| RA   | 35               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE35RRB             | SE35K            |                              |                                   |          |
| RA   | $1\frac{1}{2}$   | 147.6            | 20.6            | 119.1            | 13.5            | 90.5             | 6.8            | 36.1             | 7.5             | 60.3            | 12.7           | 0.33        | 2.72       | 19.4                                               | RA108RRB             | S1108KT          | 80MS                         | 7500                              | 1.447    |
| RA   | $1\frac{9}{16}$  | $5\frac{13}{16}$ | $\frac{13}{16}$ | $4\frac{11}{16}$ | $\frac{17}{32}$ | $3\frac{9}{16}$  | 0.268          | $1\frac{27}{64}$ | $\frac{19}{64}$ | $2\frac{3}{8}$  | $\frac{1}{2}$  | 0.013       | 0.107      | $\frac{49}{64}$                                    | RA109RRB             | S1109KT          |                              | 1700                              | 3.19     |
| RA   | 40               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE40RRB             | SE40K            |                              |                                   |          |
| RA   | $1\frac{5}{8}$   |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA110RRB             | S1110K           |                              |                                   |          |
| RA   | $1\frac{11}{16}$ | 149.2            | 22.2            | 120.6            | 13.5            | 96.8             | 6.8            | 36.1             | 7.5             | 63.5            | 12.7           | 0.33        | 2.72       | 19.4                                               | RA111RRB             | S1111K           | 85MS                         | 7500                              | 1.479    |
| RA   | $1\frac{3}{4}$   | $5\frac{7}{8}$   | $\frac{7}{8}$   | $4\frac{3}{4}$   | $\frac{17}{32}$ | $3\frac{13}{16}$ | 0.268          | $1\frac{27}{64}$ | $\frac{19}{64}$ | $2\frac{1}{2}$  | $\frac{1}{2}$  | 0.013       | 0.107      | $\frac{49}{64}$                                    | RA112RRB             | S1112K           |                              | 1700                              | 3.26     |
| RA   | 45               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE45RRB             | SE45K            |                              |                                   |          |
| RA   | $1\frac{13}{16}$ |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA113RRB             | S1113K           |                              |                                   |          |
| RA   | $1\frac{7}{8}$   | 155.6            | 22.2            | 127              | 13.5            | 101.6            | 7.56           | 36.5             | 7.1             | 69.8            | 12.7           | 0           | 1.96       | 19.4                                               | RA114RRB             | S1114K           | 90MS                         | 8500                              | 1.669    |
| RA   | $1\frac{15}{16}$ | $6\frac{1}{8}$   | $\frac{7}{8}$   | 5                | $\frac{17}{32}$ | 4                | 0.300          | $1\frac{7}{16}$  | $\frac{9}{32}$  | $2\frac{3}{4}$  | $\frac{1}{2}$  | 0           | 0.077      | $\frac{49}{64}$                                    | RA115RRB             | S1115K           |                              | 1900                              | 3.68     |
| RA   | 50               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE50RRB             | SE50K            |                              |                                   |          |
| RA   | 2                |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA200RRB             | S1200K           |                              |                                   |          |
| RA   | $2\frac{1}{16}$  | 166.7            | 23.8            | 138.1            | 13.5            | 112.7            | 7.56           | 40.5             | 8.3             | 76.2            | 12.7           | 0           | 1.96       | 19.4                                               | RA201RRB             | S1201K           | 100MS                        | 10200                             | 2        |
| RA   | $2\frac{1}{8}$   | $6\frac{9}{16}$  | $\frac{15}{16}$ | $5\frac{7}{16}$  | $\frac{17}{32}$ | $4\frac{7}{16}$  | 0.300          | $1\frac{19}{32}$ | $\frac{29}{64}$ | 3               | $\frac{1}{2}$  | 0           | 0.077      | $\frac{49}{64}$                                    | RA202RRB             | S1202K           |                              | 2300                              | 4.41     |
| RA   | $2\frac{3}{16}$  |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RA203RRB             | S1203K           |                              |                                   |          |
| RA   | 55               |                  |                 |                  |                 |                  |                |                  |                 |                 |                |             |            |                                                    | RAE55RRB             | SE55K            |                              |                                   |          |

<sup>(1)</sup> Thrust ratings for stamping are 50% of radial ratings.  
<sup>(2)</sup> Stampings must be ordered in pairs to assemble bearing.  
 Shaft diameter with an S = smaller housing.



# BALL BEARINGS

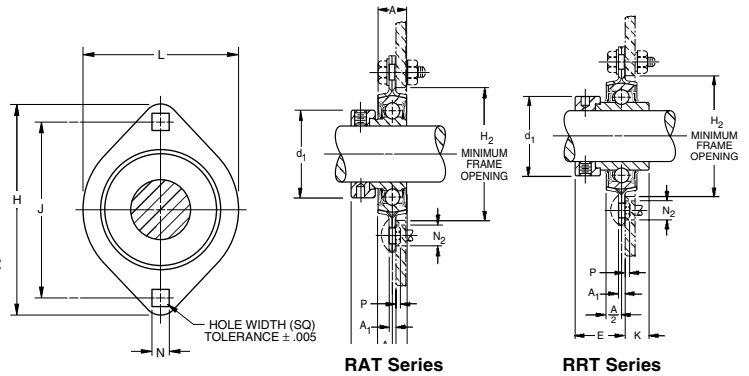
## RAT, RRT TWO-BOLT FLANGETTE UNITS

- Designed for installations where the standard three-bolt flangettes cannot be used due to space limitations.
- Like standard three-bolt flangettes, they are available with RA-RRB extended inner ring ball bearings and the KRRB wide inner ring ball bearings (RRT) with self-locking collars.
- All units are non-relubricatable.

**Suggested shaft tolerances:** 1/2" - 1 15/16", nominal to **-.013 mm, *-.0005"***;  
2" - 2 3/16", nominal to **-.25 mm, *-.0010"***.

### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RAT  | RA...RRB       | Page D56                    |
| RRT  | ...KRRB        | Page D53                    |



**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RAT 1" Flangette or RRT 1" Flangette.**

| Unit       | Shaft Dia. | L       | H       | A      | J       | N Hole Width | H <sub>2</sub> | A <sub>1</sub> | E       | K      | d <sub>1</sub> | Bolt Size | P           |            | N <sub>2</sub> Flange Hole Diam to Clear Sq. Shank | Bearing Number | Collar Number | Stamping <sup>(2)</sup> Size | Radial Load Rating <sup>(1)</sup> | Unit Wt. |
|------------|------------|---------|---------|--------|---------|--------------|----------------|----------------|---------|--------|----------------|-----------|-------------|------------|----------------------------------------------------|----------------|---------------|------------------------------|-----------------------------------|----------|
|            |            |         |         |        |         |              |                |                |         |        |                |           | Short Shank | Long Shank |                                                    |                |               |                              |                                   |          |
|            |            | mm      | mm      | mm     | mm      | mm           | mm             | mm             | mm      | mm     | mm             | mm        | mm          | mm         | mm                                                 |                |               | mm                           | mm                                |          |
| <b>RAT</b> |            |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    |                |               |                              |                                   |          |
| RAT        | 1/2        | 58.7    | 81      | 14.2   | 63.5    | 7.1          | 49.2           | 3.81           | 23.8    | 5.6    | 28.6           | 6.4       | 0.15        | 2.54       | 10.3                                               | RA008RRB       | S1008K        | 40MST                        | 2650                              | 0.213    |
| RAT        | 5/8        | 2 5/16  | 3 3/16  | 9/16   | 2 1/2   | 9/32         | 1 15/16        | 0.150          | 1 5/16  | 7/32   | 1 1/8          | 1/4       | 0.006       | 0.1        | 1 3/32                                             | RA010RRB       | S1010K        |                              | 600                               | 0.47     |
| RAT        | 17         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RAE17RRB       | SE17K         |                              |                                   |          |
| RAT        | 3/4        | 66.7    | 90.5    | 15.8   | 71.4    | 8.7          | 55.6           | 4.22           | 25      | 6.4    | 33.3           | 7.9       | 0.53        | 2.92       | 12.7                                               | RA012RRB       | S1012K        | 47MST                        | 3100                              | 0.299    |
| RAT        | 20         | 2 5/8   | 3 9/16  | 5/8    | 2 13/16 | 1 1/32       | 2 3/16         | 0.166          | 63/64   | 1/4    | 1 5/16         | 5/16      | 0.021       | 0.115      | 1/2                                                | RAE20RRB       | SE20K         |                              | 700                               | 0.66     |
| RAT        | 7/8        |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RA014RRB       | S1014K        |                              |                                   |          |
| RAT        | 15/16      | 71      | 95.2    | 17.4   | 76.2    | 8.7          | 60.3           | 4.22           | 25      | 7.1    | 38.1           | 7.9       | 0.53        | 2.92       | 12.7                                               | RA015RRB       | S1015K        | 52MST                        | 3550                              | 0.331    |
| RAT        | 1          | 2 51/64 | 3 3/4   | 1 1/16 | 3       | 1 1/32       | 2 3/8          | 0.166          | 63/64   | 9/32   | 1 1/2          | 5/16      | 0.021       | 0.115      | 1/2                                                | RA100RRB       | S1100K        |                              | 800                               | 0.73     |
| RAT        | 25         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RAE25RRB       | SE25K         |                              |                                   |          |
| RAT        | 1 1/16     |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RA101RRB       | S1103K        |                              |                                   |          |
| RAT        | 1 1/8      | 84.1    | 112.7   | 17.4   | 90.5    | 10.3         | 71.4           | 5.28           | 29      | 6.7    | 44.5           | 9.5       | 0.28        | 2.64       | 15.1                                               | RA102RRB       | S1102K        | 62MST                        | 4900                              | 0.531    |
| RAT        | 1 3/16     | 3 5/16  | 4 7/16  | 1 1/16 | 3 3/16  | 1 3/32       | 2 13/16        | 0.208          | 1 9/64  | 1 7/64 | 1 3/4          | 3/8       | 0.011       | 0.104      | 1 9/32                                             | RA103RRB       | S1103K        |                              | 1100                              | 1.17     |
| RAT        | 1 1/4 S    |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RA103RRB2      | S1103K3       |                              |                                   |          |
| RAT        | 30         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RAE30RRB       | SE30K         |                              |                                   |          |
| RAT        | 1 1/4      |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RA104RRB       | S1104K        |                              |                                   |          |
| RAT        | 1 5/16     | 93.7    | 125.4   | 22.2   | 100     | 10.3         | 81             | 5.28           | 32.1    | 6.7    | 54             | 9.5       | 0.28        | 2.64       | 15.1                                               | RA105RRB       | S1105K        | 72MST                        | 6220                              | 0.476    |
| RAT        | 1 3/8      | 3 11/16 | 4 15/16 | 7/8    | 3 15/16 | 1 3/32       | 3 3/16         | 0.208          | 1 17/64 | 1 7/64 | 2 1/8          | 3/8       | 0.011       | 0.104      | 1 9/32                                             | RA106RRB       | S1106K        |                              | 1400                              | 1.05     |
| RAT        | 1 7/16     |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RA107RRB       | S1107K        |                              |                                   |          |
| RAT        | 35         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | RAE35RRB       | SE35K         |                              |                                   |          |
| <b>RRT</b> |            |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    |                |               |                              |                                   |          |
| RRT        | 1/2        | 58.7    | 81      | 14.2   | 63.5    | 7.1          | 49.2           | 3.81           | 23.8    | 5.6    | 28.6           | 6.4       | 0.15        | 2.54       | 10.3                                               | 1008KRRB       | S1008K        | 40MST                        | 2650                              | 0.213    |
| RRT        | 5/8        | 2 5/16  | 3 3/16  | 9/16   | 2 1/2   | 9/32         | 1 15/16        | 0.150          | 1 5/16  | 7/32   | 1 1/8          | 1/4       | 0.006       | 0.1        | 1 3/32                                             | 1010KRRB       | S1010K        |                              | 600                               | 0.47     |
| RRT        | 17         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | E17KRRB        | SE17K         |                              |                                   |          |
| RRT        | 3/4        | 66.7    | 90.5    | 15.8   | 71.4    | 8.7          | 55.6           | 4.22           | 25      | 6.4    | 33.3           | 7.9       | 0.53        | 2.92       | 12.7                                               | 1012KRRB       | S1012K        | 47MST                        | 3100                              | 0.299    |
| RRT        | 20         | 2 5/8   | 3 9/16  | 5/8    | 2 13/16 | 1 1/32       | 2 3/16         | 0.166          | 63/64   | 1/4    | 1 5/16         | 5/16      | 0.021       | 0.115      | 1/2                                                | E20KRRB        | SE20K         |                              | 700                               | 0.66     |
| RRT        | 7/8        |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | 1014KRRB       | S1014K        |                              |                                   |          |
| RRT        | 15/16      | 71      | 95.2    | 17.4   | 76.2    | 8.7          | 60.3           | 4.22           | 25      | 7.1    | 38.1           | 7.9       | 0.53        | 2.92       | 12.7                                               | 1015KRRB       | S1015K        | 52MST                        | 3550                              | 0.331    |
| RRT        | 1          | 2 51/64 | 3 3/4   | 1 1/16 | 3       | 1 1/32       | 2 3/8          | 0.166          | 63/64   | 9/32   | 1 1/2          | 5/16      | 0.021       | 0.115      | 1/2                                                | 1100KRRB       | S1100K        |                              | 800                               | 0.73     |
| RRT        | 25         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | E25KRRB        | SE25K         |                              |                                   |          |
| RRT        | 1 1/16     |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | 1101KRRB       | S1103K        |                              |                                   |          |
| RRT        | 1 1/8      | 84.1    | 112.7   | 17.4   | 90.5    | 10.3         | 71.4           | 5.28           | 29      | 6.7    | 44.5           | 9.5       | 0.28        | 2.64       | 15.1                                               | 1102KRRB       | S1102K        | 62MST                        | 4900                              | 0.531    |
| RRT        | 1 3/16     | 3 5/16  | 4 7/16  | 1 1/16 | 3 3/16  | 1 3/32       | 2 13/16        | 0.208          | 1 9/64  | 1 7/64 | 1 3/4          | 3/8       | 0.011       | 0.104      | 1 9/32                                             | 1103KRRB       | S1103K        |                              | 1100                              | 1.17     |
| RRT        | 1 1/4 S    |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | 1103KRRB3      | S1103K3       |                              |                                   |          |
| RRT        | 30         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | E30KRRB        | SE30K         |                              |                                   |          |
| RRT        | 1 1/4      |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | 1104KRRB       | S1104K        |                              |                                   |          |
| RRT        | 1 5/16     | 93.7    | 125.4   | 22.2   | 100     | 10.3         | 81             | 5.28           | 32.1    | 6.7    | 54             | 9.5       | 0.28        | 2.64       | 15.1                                               | 1105KRRB       | S1105K        | 72MST                        | 6220                              | 0.476    |
| RRT        | 1 3/8      | 3 11/16 | 4 15/16 | 7/8    | 3 15/16 | 1 3/32       | 3 3/16         | 0.208          | 1 17/64 | 1 7/64 | 2 1/8          | 3/8       | 0.011       | 0.104      | 1 9/32                                             | 1106KRRB       | S1106K        |                              | 1400                              | 1.05     |
| RRT        | 1 7/16     |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | 1107KRRB       | S1107K        |                              |                                   |          |
| RRT        | 35         |         |         |        |         |              |                |                |         |        |                |           |             |            |                                                    | E35KRRB        | SE35K         |                              |                                   |          |

<sup>(1)</sup> Thrust ratings for stamping are 50% of radial ratings.

<sup>(2)</sup> Stampings must be ordered in pairs to assemble bearing. Shaft diameter with an S = smaller housing.

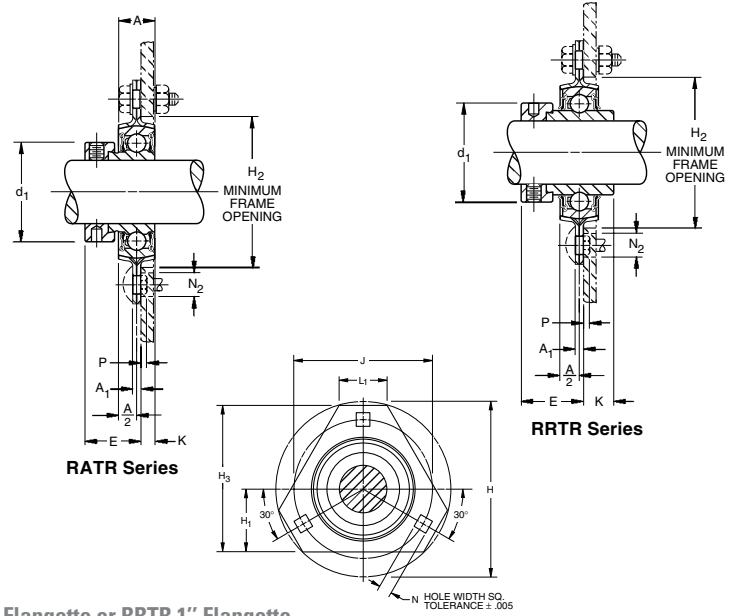
### RATR, RRTR TRIANGLE FLANGETTE UNITS

- Similar to standard 47MS, 52MS, 62MS and 72MS, except the stamping is triangular instead of round.
- Used where space is a factor or where it is necessary to cut off one or more sides of the standard flangette stamping.
- RA-RRB and KRRB may be used with this stamping, as with other types of flangettes.
- All units are non-relubricatable.

Suggested shaft tolerances:  $\frac{1}{2}$ " - 1  $\frac{15}{16}$ ", nominal to -.013 mm, -.0005";  
 2" - 2  $\frac{3}{16}$ ", nominal to -.025 mm, -.0010".

BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RATR | RA...RRB       | Page D56                    |
| RRTR | ...KRRB        | Page D53                    |



TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RATR 1" Flangette or RRTR 1" Flangette.

| Unit        | Shaft Dia. | H <sub>3</sub> | H      | A      | J       | N Hole Width | H <sub>2</sub> | A <sub>1</sub> | E       | K      | d <sub>1</sub> | H <sub>1</sub> | L <sub>1</sub> | Bolt Size | P     | N <sub>2</sub> Flange Hole Diam to Clear Sq. Shank | Bearing Number | Collar Number | Stamping <sup>(2)</sup> Size | Radial Load Rating <sup>(1)</sup> | Unit Wt. |       |
|-------------|------------|----------------|--------|--------|---------|--------------|----------------|----------------|---------|--------|----------------|----------------|----------------|-----------|-------|----------------------------------------------------|----------------|---------------|------------------------------|-----------------------------------|----------|-------|
|             |            |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                |               |                              |                                   | N        | kg    |
|             |            | mm             | mm     | mm     | mm      | mm           | mm             | mm             | mm      | mm     | mm             | mm             | mm             | mm        | mm    | mm                                                 | mm             | mm            | mm                           | mm                                | mm       | mm    |
|             |            | in.            | in.    | in.    | in.     | in.          | in.            | in.            | in.     | in.    | in.            | in.            | in.            | in.       | in.   | in.                                                | in.            | in.           | in.                          | in.                               | in.      | in.   |
| <b>RATR</b> |            |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                |               |                              |                                   |          |       |
| RATR        | 3/4        | 76.2           | 90.5   | 15.8   | 71.4    | 8.7          | 55.6           | 4.22           | 25      | 6.4    | 33.3           | 33.3           | 27             | 7.9       | 0.15  | 2.54                                               | 12.7           | RA012RRB      | S1012K                       | 47MSTR                            | 3100     | 0.313 |
| RATR        | 20         | 3              | 3 3/16 | 5/8    | 2 13/16 | 1 1/32       | 2 3/16         | 0.166          | 63/64   | 1/4    | 1 5/16         | 1 5/16         | 1 1/16         | 5/16      | 0.006 | 0.1                                                | 1/2            | RAE20RRB      | SE20K                        |                                   | 700      | 0.69  |
| RATR        | 7/8        | 79.4           | 95.2   | 17.4   | 76.2    | 8.7          | 60.3           | 4.22           | 25      | 7.1    | 38.1           | 34.9           | 27.8           | 7.9       | 0.53  | 2.92                                               | 12.7           | RA014RRB      | S1014K                       |                                   |          |       |
| RATR        | 1 5/16     | 79.4           | 95.2   | 17.4   | 76.2    | 8.7          | 60.3           | 4.22           | 25      | 7.1    | 38.1           | 34.9           | 27.8           | 7.9       | 0.53  | 2.92                                               | 12.7           | RA015RRB      | S1015K                       | 52MSTR                            | 3550     | 0.354 |
| RATR        | 1          | 3 1/8          | 3 3/4  | 1 1/16 | 3       | 1 1/32       | 2 3/8          | 0.166          | 63/64   | 9/32   | 1 1/2          | 1 3/8          | 1 3/32         | 5/16      | 0.021 | 0.115                                              | 1/2            | RA100RRB      | S1100K                       |                                   | 800      | 0.78  |
| RATR        | 25         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RAE25RRB      | SE25K                        |                                   |          |       |
| RATR        | 1 1/16     |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RA101RRB      | S1103K                       |                                   |          |       |
| RATR        | 1 1/8      | 93.7           | 112.7  | 17.4   | 90.5    | 10.3         | 71.4           | 5.28           | 29      | 6.7    | 44.5           | 38.1           | 25.4           | 9.5       | 0.28  | 2.64                                               | 15.1           | RA102RRB      | S1102K                       | 62MSTR                            | 4900     | 0.526 |
| RATR        | 1 3/16     | 3 11/16        | 4 7/16 | 1 1/16 | 3 3/16  | 1 3/32       | 2 13/16        | 0.208          | 1 9/64  | 1 7/64 | 1 3/4          | 1 1/2          | 1              | 3/8       | 0.011 | 0.104                                              | 1 9/32         | RA103RRB      | S1103K                       |                                   | 1100     | 1.16  |
| RATR        | 1 1/4 S    |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RA103RRB2     | S1103K3                      |                                   |          |       |
| RATR        | 30         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RAE30RRB      | SE30K                        |                                   |          |       |
| RATR        | 1 1/4      |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RA104RRB      | S1104K                       |                                   |          |       |
| RATR        | 1 5/16     | 105.6          | 127    | 19     | 100     | 10.3         | 81             | 5.28           | 32.1    | 6.7    | 54             | 44.4           | 32.1           | 9.5       | .028  | 2.64                                               | 15.1           | RA105RRB      | S1105K                       | 72MSTR                            | 6300     | 0.703 |
| RATR        | 1 3/8      | 4 5/32         | 5      | 3/4    | 3 15/16 | 1 3/32       | 3 3/16         | 0.208          | 1 17/64 | 1 7/64 | 2 1/8          | 1 3/4          | 1 17/64        | 3/8       | 0.011 | 0.104                                              | 1 9/32         | RA106RRB      | S1106K                       |                                   | 1400     | 1.55  |
| RATR        | 1 7/16     |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RA107RRB      | S1107K                       |                                   |          |       |
| RATR        | 35         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | RAE35RRB      | SE35K                        |                                   |          |       |
| <b>RRTR</b> |            |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                |               |                              |                                   |          |       |
| RRTR        | 3/4        | 76.2           | 90.5   | 15.8   | 71.4    | 8.7          | 55.6           | 4.22           | 28.6    | 15.1   | 33.3           | 33.3           | 27             | 7.9       | 0.15  | 2.54                                               | 12.7           | 1012KRRB      | S1012K                       | 47MSTR                            | 3100     | 0.313 |
| RRTR        | 20         | 3              | 3 3/16 | 5/8    | 2 13/16 | 1 1/32       | 2 3/16         | 0.166          | 1 1/8   | 1 9/32 | 1 5/16         | 1 5/16         | 1 1/16         | 5/16      | 0.006 | 0.1                                                | 1/2            | E20KRRB       | SE20K                        |                                   | 700      | 0.69  |
| RRTR        | 7/8        |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | 1014KRRB      | S1014K                       |                                   |          |       |
| RRTR        | 1 5/16     | 79.4           | 95.2   | 17.4   | 76.2    | 8.7          | 60.3           | 4.22           | 28.6    | 15.1   | 38.1           | 34.9           | 27.8           | 7.9       | 0.53  | 2.92                                               | 12.7           | 1015KRRB      | S1015K                       | 52MSTR                            | 3550     | 0.354 |
| RRTR        | 1          | 3 1/8          | 3 3/4  | 1 1/16 | 3       | 1 1/32       | 2 3/8          | 0.166          | 1 1/8   | 1 9/32 | 1 1/2          | 1 3/8          | 1 3/32         | 5/16      | 0.021 | 0.115                                              | 1/2            | 1100KRRB      | S1100K                       |                                   | 800      | 0.78  |
| RRTR        | 25         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | E25KRRB       | SE25K                        |                                   |          |       |
| RRTR        | 1 1/16     |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | 1101KRRB      | S1103K                       |                                   |          |       |
| RRTR        | 1 1/8      | 93.7           | 112.7  | 17.4   | 90.5    | 10.3         | 71.4           | 5.28           | 32.5    | 15.9   | 44.5           | 38.1           | 25.4           | 9.5       | 0.28  | 2.64                                               | 15.1           | 1102KRRB      | S1102K                       | 62MSTR                            | 4900     | 0.526 |
| RRTR        | 1 3/16     | 3 11/16        | 4 7/16 | 1 1/16 | 3 3/16  | 1 3/32       | 2 13/16        | 0.208          | 1 9/32  | 5/8    | 1 3/4          | 1 1/2          | 1              | 3/8       | 0.011 | 0.104                                              | 1 9/32         | 1103KRRB      | S1103K                       |                                   | 1100     | 1.16  |
| RRTR        | 1 1/4 S    |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | 1103KRRB3     | S1103K3                      |                                   |          |       |
| RRTR        | 30         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | E30KRRB       | SE30K                        |                                   |          |       |
| RRTR        | 1 1/4      |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | 1104KRRB      | S1104K                       |                                   |          |       |
| RRTR        | 1 5/16     | 105.6          | 127    | 19     | 100     | 10.3         | 81             | 5.28           | 34.9    | 16.3   | 54             | 44.4           | 32.1           | 9.5       | .028  | 2.64                                               | 15.1           | 1105KRRB      | S1105K                       | 72MSTR                            | 6300     | 0.703 |
| RRTR        | 1 3/8      | 4 5/32         | 5      | 3/4    | 3 15/16 | 1 3/32       | 3 3/16         | 0.208          | 1 3/8   | 4 1/64 | 2 1/8          | 1 3/4          | 1 17/64        | 3/8       | 0.011 | 0.104                                              | 1 9/32         | 1106KRRB      | S1106K                       |                                   | 1400     | 1.55  |
| RRTR        | 1 7/16     |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | 1107KRRB      | S1107K                       |                                   |          |       |
| RRTR        | 35         |                |        |        |         |              |                |                |         |        |                |                |                |           |       |                                                    |                | E35KRRB       | SE35K                        |                                   |          |       |

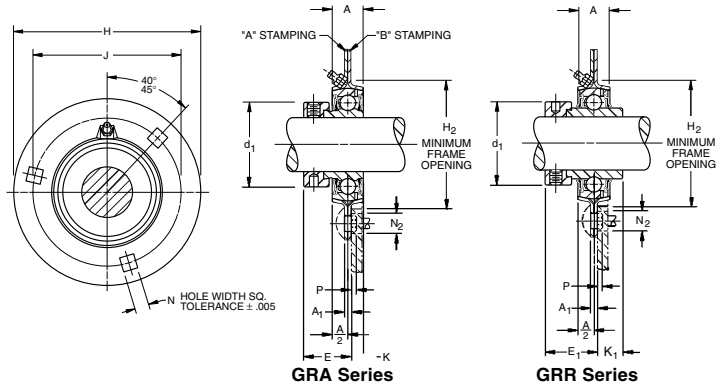
(1) Thrust ratings for stamping are 50% of radial ratings.  
 (2) Stampings must be ordered in pairs to assemble bearing.  
 Shaft diameter with an S = smaller housing.



# BALL BEARINGS

## GRA AND GRR RELUBRICATABLE FLANGETTE UNITS

- Supplement to the standard non-relubricatable type.
- Zinc-plated and designed for relubrication in applications where excessive moisture and severe contamination are present.
- Relubricatable flangettes are dimensionally interchangeable with the non-relubricated types. Load ratings are also the same.
- Relubricatable units incorporate G-KRRB bearings and GRA-RRB inner ring bearings with positive contact land-riding seals and self-locking collars.
- Two stampings are needed to make a complete relubricatable flangette. Stamping A contains the boss for the grease fitting and a grease groove to allow grease to enter holes in the outer ring of the bearing. Stamping B contains a similar groove for the same purpose. With the grease groove in both stampings, the bearing can be reversed in the housing and still be relubricated.



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| GRA  | GRA...RRB      | Page D57                    |
| GRR  | G...KRRB       | Page D54                    |

**Suggested shaft tolerances:**  $\frac{1}{2}$ " -  $1 \frac{15}{16}$ ", nominal to  $-.10$  mm,  $-.0005$ ";  
 $2$ " -  $2 \frac{3}{16}$ ", nominal to  $-.0255$  mm,  $-.0010$ ".

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: GRA 1" Flangette.**

| Unit                                          | Shaft Dia. | H      | A      | J      | N Hole Width | H <sub>2</sub> | A <sub>1</sub> | E      | E <sub>1</sub> | K      | K <sub>1</sub> | d <sub>1</sub> | P      | N <sub>2</sub> Flange Hole Diam. to Clear Sq. Shank | Bearing Number |            | Collar     | Stamping Radial Load Rating <sup>(1)</sup> |       |
|-----------------------------------------------|------------|--------|--------|--------|--------------|----------------|----------------|--------|----------------|--------|----------------|----------------|--------|-----------------------------------------------------|----------------|------------|------------|--------------------------------------------|-------|
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     | (GRA)          | (GRR)      |            |                                            |       |
|                                               | mm in.     | mm in. | mm in. | mm in. | mm in.       | mm in.         | mm in.         | mm in. | mm in.         | mm in. | mm in.         | mm in.         | mm in. | mm in.                                              |                |            | N lbs.     |                                            |       |
| G52MSA & G52MSB                               | 25         | 95.2   | 17.4   | 76.2   | 8.7          | 60.3           | 4.22           | 25.4   | 29             | 6.7    | 13.5           | 38.1           | 0.53   | 2.92                                                | 12.7           | GRA013RRB  | G1013KRRB  | S1013K                                     | 3550  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA014RRB  | G1014KRRB  | S1014K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA015RRB  | G1015KRRB  | S1015K                                     | 800   |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA100RRB  | G1100KRRB  | S1100K                                     |       |
| G62MSA & G62MSB                               | 30         | 112.7  | 19.05  | 90.5   | 10.3         | 71.4           | 5.28           | 29.4   | 32.9           | 6.7    | 15.5           | 44.1           | 0.28   | 2.64                                                | 15.1           | GRAE25RRB  | GE25KRRB   | SE25K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA101RRB  | G1101KRRB  | S1103K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA102RRB  | G1102KRRB  | S1102K                                     | 4900  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA103RRB  | G1103KRRB  | S1103K                                     | 1100  |
| G72MSA & G72MSB                               | 35         | 122.2  | 22.2   | 100    | 10.3         | 81             | 6.8            | 32.9   | 35.7           | 7.9    | 15.5           | 54             | 0.28   | 2.64                                                | 15.1           | GRA103RRB2 | G1103KRRB3 | S1103K3                                    |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE30RRB  | GE30KRRB   | SE30K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA104RRB  | G1104KRRB  | S1104K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA105RRB  | G1105KRRB  | S1105K                                     | 6220  |
| G80MSA <sup>(2)</sup> & G80MSB <sup>(2)</sup> | 40         | 147.6  | 31.8   | 119.1  | 13.5         | 90.4           | 7.56           | 36.5   | 38.9           | 12.3   | 17.9           | 60.3           | 0.33   | 2.72                                                | 19.4           | GRA106RRB  | G1106KRRB  | S1106K                                     | 1400  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA107RRB  | G1107KRRB  | S1107K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE35RRB  | GE35KRRB   | SE35K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA108RRB  | G1108KRRB  | S1108KT                                    | 7500  |
| G85MSA <sup>(2)</sup> & G85MSB <sup>(2)</sup> | 45         | 149.2  | 31.8   | 120.6  | 13.5         | 96.8           | 7.56           | 36.5   | 38.9           | 11.9   | 17.9           | 63.5           | 0.33   | 2.72                                                | 19.4           | GRA109RRB  | G1109KRRB  | S1109KT                                    | 1700  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE40RRB  | GE40KRRB   | SE40K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA110RRB  | G1110KRRB  | S1110K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA111RRB  | G1111KRRB  | S1111K                                     | 7500  |
| G90MSA <sup>(2)</sup> & G90MSB <sup>(2)</sup> | 50         | 155.6  | 25.4   | 127    | 13.5         | 101.6          | 8.34           | 36.9   | 42.5           | 8.3    | 20.6           | 69.8           | -      | 1.96                                                | 19.4           | GRA112RRB  | G1112KRRB  | S1112K                                     | 1700  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE45RRB  | GE45KRRB   | SE45K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA113RRB  | G1113KRRB  | S1113K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA114RRB  | G1114KRRB  | S1114K                                     | 8500  |
| G100MSA & G100MSB                             | 55         | 166.7  | 31.8   | 138.1  | 13.5         | 112.7          | 8.34           | 40.5   | 47.6           | 11.9   | 23.8           | 76.2           | -      | 1.96                                                | 19.4           | GRA115RRB  | G1115KRRB  | S1115K                                     | 1900  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE50RRB  | GE50KRRB   | SE50K                                      |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA200RRB  | G1200KRRB  | S1200K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA201RRB  | G1201KRRB  | S1201K                                     | 10200 |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA202RRB  | G1202KRRB  | S1202K                                     | 2300  |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRA203RRB  | G1203KRRB  | S1203K                                     |       |
|                                               |            |        |        |        |              |                |                |        |                |        |                |                |        |                                                     |                | GRAE55RRB  | GE55KRRB   | SE55K                                      |       |

<sup>(1)</sup> Thrust ratings for stampings are 50% of radial ratings.

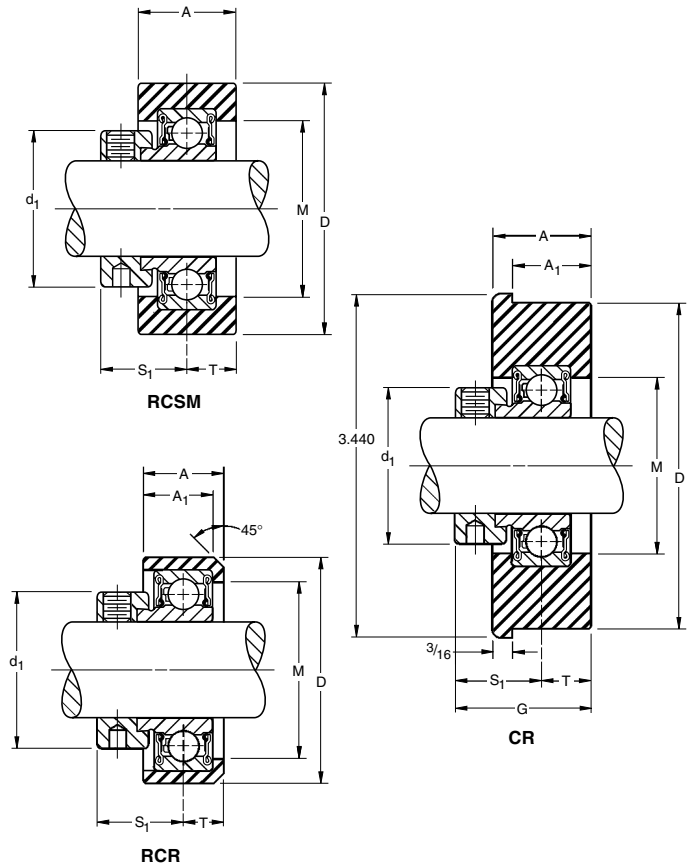
<sup>(2)</sup> Four bolt holes.

Shaft diameter with an S = smaller housing.



### RCSM, RCR, CR SERIES

- RCSM and RCR are quiet, synthetic, conductive rubber cylindrical cartridges designed for domestic heating, air-conditioning, ventilating equipment and other applications that require noise-free operation.
- All units are available with the RA-RRB extended inner ring bearings with positive contact land-riding seals and self-locking collar.
- Initial supply of grease is provided in the one-piece, non-relubricatable cartridges.
- Timken patented CR unit was designed to accommodate the wide tolerances of hot or cold rolled #10 gage (.134 in.), 3 1/2 in. O.D., electric resistance welded mechanical tubing similar to what is found in post office conveyor systems.



BEARING DATA

| Unit          | Bearing Number | Dimensions and Load Ratings |
|---------------|----------------|-----------------------------|
| RCSM, RCR, CR | RA...RR        | Page D56                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RCSM 3/4" or RCR 3/4" or CR 3/4". POPULAR SIZES ARE IN BOLD.

| Unit                                                                           | Shaft Dia. | D         | A         | A <sub>1</sub> | G         | M         | d <sub>1</sub> | S <sub>1</sub> | T         | Bearing Number <sup>(2)</sup> | Collar Number | Housing Radial Load Rating <sup>(1)</sup> | Unit Wt.   |
|--------------------------------------------------------------------------------|------------|-----------|-----------|----------------|-----------|-----------|----------------|----------------|-----------|-------------------------------|---------------|-------------------------------------------|------------|
|                                                                                | mm<br>in.  | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in. | mm<br>in. | mm<br>in.      | mm<br>in.      | mm<br>in. |                               |               | N<br>lbs.                                 | kg<br>lbs. |
| <b>RCSM SERIES</b>                                                             |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| Suggested Housing Diameter = Nominal D ± .013 mm ± .005"                       |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| RCSM                                                                           | 1/2        | 64.3      | 25.4      | -              | -         | 34.9      | 28.6           | 22.2           | 12.7      | RA008RR                       | S1008K        | 880                                       | 0.395      |
| RCSM                                                                           | 5/8        | 2 17/32   | 1         | -              | -         | 1 3/8     | 1 1/8          | 7/8            | 1/2       | RA010RR                       | S1010K        | 200                                       | 0.87       |
| RCSM                                                                           | 17         |           |           |                |           |           |                |                |           | RAE17RR                       | SE17K         |                                           |            |
| RCSM                                                                           | 3/4        | 64.3      | 25.4      | -              | -         | 39.7      | 33.3           | 23.4           | 12.7      | RA012RR                       | S1012K        | 1120                                      | 0.472      |
| RCSM                                                                           | 20         | 2 17/32   | 1         | -              | -         | 1 9/16    | 1 5/16         | 59/64          | 1/2       | RAE20RR                       | SE20K         | 250                                       | 1.04       |
| RCSM                                                                           | 15/16      | 64.3      | 25.4      | -              | -         | 45.2      | 38.1           | 23.4           | 12.7      | RA015RR                       | S1015K        | 1340                                      | 0.527      |
| RCSM                                                                           | <b>1</b>   | 2 17/32   | 1         | -              | -         | 1 25/32   | 1 1/2          | 59/64          | 1/2       | RA100RR                       | S1100K        | 300                                       | 1.16       |
| RCSM                                                                           | 25         |           |           |                |           |           |                |                |           | RAE25RR                       | SE25K         |                                           |            |
| LRCSM                                                                          | 1 3/16     | 64.3      | 25.4      | -              | -         | 47.6      | 42.1           | 19.8           | 12.7      | RAL103NPP                     | LS103K        | 1340                                      | 0.627      |
|                                                                                |            | 2 17/32   | 1         | -              | -         | 1 7/8     | 1 21/32        | 25/32          | 1/2       |                               |               | 300                                       | 1.38       |
| <b>RCSM SERIES</b>                                                             |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| Suggested Housing Diameter = Nominal D -0.13 mm to -.038 mm, -.005" to -.0015" |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| LRCR                                                                           | 3/4        | 46        | 18.3      | 15.9           | -         | 34.9      | 30.2           | 18.7           | 9.9       | RAL012NPP                     | LS012K        | 880                                       | 0.272      |
|                                                                                |            | 1 13/16   | 23/32     | 5/8            | -         | 1 3/8     | 1 3/16         | 47/64          | 25/64     |                               |               | 200                                       | 0.6        |
| RCR                                                                            | <b>1</b>   | 57.2      | 19.8      | 17.5           | -         | 44.4      | 38.1           | 23.4           | 9.9       | RA100RR                       | S1100K        | 1340                                      | 0.409      |
| RCR                                                                            | 25         | 2 1/4     | 25/32     | 11/16          | -         | 1 3/4     | 1 1/2          | 59/64          | 25/64     | RAE25RR                       | SE25K         | 300                                       | 0.9        |
| <b>RCSM SERIES</b>                                                             |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| Suggested Housing Diameter 82.73 mm to 81.76 mm, 3.257" to 3.219"              |            |           |           |                |           |           |                |                |           |                               |               |                                           |            |
| CR                                                                             | 3/4        | 83.57     | 25.4      | 22.2           | 36.1      | 39.7      | 33.3           | 23.4           | 12.7      | RA012RR                       | S1012K        | 670                                       | 0.318      |
| CR                                                                             | 20         | 3.29      | 1         | 7/8            | 1 27/64   | 1 9/16    | 1 5/16         | 59/64          | 1/2       | RAE20RR                       | SE20K         | 150                                       | 0.7        |
| CR                                                                             | <b>1</b>   | 83.57     | 25.4      | 22.2           | 36.1      | 45.2      | 38.1           | 23.4           | 12.7      | RA100RR                       | S1100K        | 880                                       | 0.34       |
| CR                                                                             | 25         | 3.29      | 1         | 7/8            | 1 27/64   | 1 25/32   | 1 1/2          | 59/64          | 1/2       | RAE25RR                       | SE25K         | 200                                       | 0.75       |
| LCR                                                                            | <b>1</b>   | 83.57     | 25.4      | 20.6           | 33.3      | 39.7      | 36.1           | 19.8           | 14.3      | RAL100NPP                     | S1100K        | 880                                       | 0.309      |
| LCR                                                                            | 25         | 3.29      | 1         | 13/16          | 1 5/16    | 1 9/16    | 1 27/64        | 25/32          | 9/16      | RALE25NPP                     | SE25K         | 200                                       | 0.68       |

(1) Steady loads only. Thrust load is 1/3 radial load rating. Maximum suggested speed – 2400 RPM.

(2) Suffix for RA bearing is FS450 (RCSM and RCR Series).



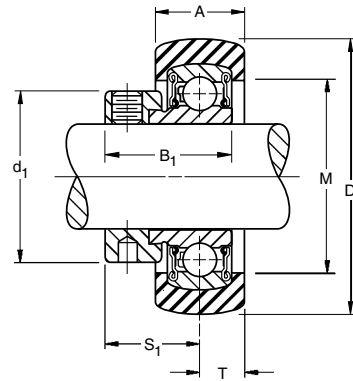


# BALL BEARINGS

## RABR HVAC SPECIAL SERIES

- Features a conductive rubber interliner to dissipate static charges.
- Quiet RA-RRB extended inner ring bearings are prelubricated and have positive-contact, land-riding seals with self-locking collars.
- RABR units can be mounted in tri-arm brackets or pressed-steel stampings.
- Maximum suggested speed: 2400 RPM.

Suggested housing diameter = Nominal (A) -.130 mm -.380 mm, -.005", -.015".



### BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RABR | RA..RRB        | Page D56                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RABR 1". POPULAR SIZES ARE IN BOLD.

| Unit        | Shaft Dia. | D     | B <sub>1</sub> | A      | M       | d <sub>1</sub> | S <sub>1</sub> | T      | Bearing Number <sup>(1)</sup> | Collar Number | Housing Radial Load Rating <sup>(2)</sup> |
|-------------|------------|-------|----------------|--------|---------|----------------|----------------|--------|-------------------------------|---------------|-------------------------------------------|
|             |            |       |                |        |         |                |                |        |                               |               | N lbs.                                    |
| <b>RABR</b> | <b>1/2</b> | 47.37 | 28.6           | 17.5   | 34.9    | 28.6           | 22.2           | 8.7    | RA008RRB                      | S1008K        | 880                                       |
| <b>RABR</b> | <b>5/8</b> | 1.865 | 1 1/8          | 1 1/16 | 1 3/8   | 1 1/8          | 7/8            | 1 1/32 | RA010RRB                      | S1010K        | 200                                       |
| RABR        | 17         |       |                |        |         |                |                |        | RAE17RRB                      | SE17K         |                                           |
| <b>RABR</b> | <b>3/4</b> | 53.37 | 31             | 17.5   | 41.3    | 33.3           | 23.4           | 8.7    | RA012RRB                      | S1012K        | 1120                                      |
| RABR        | 20         | 2.062 | 1 7/32         | 1 1/16 | 1 5/8   | 1 5/16         | 59/64          | 1 1/32 | RAE20RRB                      | SE20K         | 250                                       |
| RABR        | 15/16      | 62.38 | 31             | 20.6   | 46.8    | 38.1           | 23.4           | 10.3   | RA015RRB                      | S1015K        | 1340                                      |
| <b>RABR</b> | <b>1</b>   | 2.456 | 1 7/32         | 1 3/16 | 1 27/32 | 1 1/2          | 59/64          | 1 3/32 | RA100RRB                      | S1100K        | 300                                       |
| RABR        | 25         |       |                |        |         |                |                |        | RAE25RRB                      | SE25K         |                                           |
| RABR        | 1 3/16     | 62.38 | 35.7           | 20.6   | 46.8    | 44.4           | 28.6           | 10.3   | RAL103PP                      | LS103K        | 1340                                      |
| RABR        | 30         | 2.456 | 1 13/32        | 1 3/16 | 1 27/32 | 1 3/4          | 1 1/8          | 1 3/32 | RAE30PP3                      | SE30K         | 300                                       |

<sup>(1)</sup> For replacement of bearings, specify suffix FS-450.

<sup>(2)</sup> Thrust load is 1/3 radial load rating.

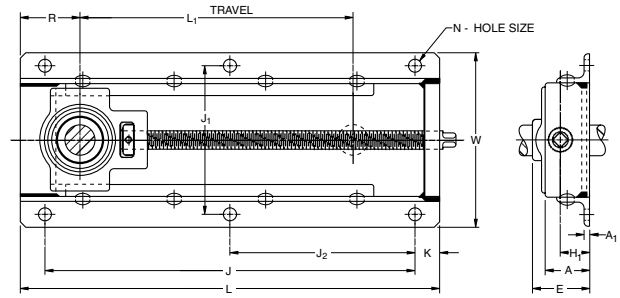
Maximum suggested speed is 2400 RPM.

D

**NLTU SERIES**

**SIDE-MOUNTED, PRESSED-STEEL NLTU SERIES**

- Take-up frame incorporates RTU take-up units as shown on the following pages.
- The frame is designed for side mounting and made of welded steel.



TO ORDER, COMPLETE ASSEMBLY, SPECIFY NLTU FRAME AND RTU TAKE-UP UNIT REQUIRED.

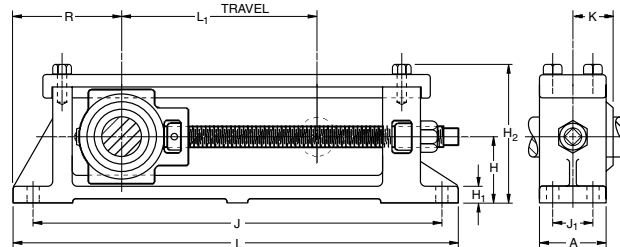
Example: NLTU5 frame and RTU 1 11/16". If frame only is required, order by frame number. Example: NLTU3.

| NLTU Frame No. | Shaft Dia.                                                    | L <sub>1</sub> | R       | J       | L       | A <sub>1</sub> | H <sub>1</sub> | E       | J <sub>1</sub> | W       | A      | J <sub>2</sub> | K      | N      | Bolts 6 req'd. | Unit Wt. |
|----------------|---------------------------------------------------------------|----------------|---------|---------|---------|----------------|----------------|---------|----------------|---------|--------|----------------|--------|--------|----------------|----------|
|                | in.                                                           | mm in.         | mm in.  | mm in.  | mm in.  | mm in.         | mm in.         | mm in.  | mm in.         | mm in.  | mm in. | mm in.         | mm in. | mm in. | in.            | kg lbs.  |
| 1              | 5/16, 3/4,                                                    | 231.8          | 62.7    | 327     | 377.8   | 4.8            | 27             | 54      | 141.3          | 166.7   | 44.4   | 163.5          | 25.4   | 12.7   | 7/16           | 3.691    |
|                | 13/16, 7/8, 15/16, 1                                          | 9 1/8          | 2 15/32 | 12 7/8  | 14 7/8  | 3/16           | 1 1/16         | 2 1/8   | 5 9/16         | 6 9/16  | 1 3/4  | 6 7/16         | 1      | 1/2    |                | 8.13     |
| 3              | 1 1/16, 1 1/8, 1 3/16, 1 1/4, 1 5/16, 1 3/8, 1 7/16           | 290.5          | 64.23   | 392.1   | 432.2   | 4.8            | 31.8           | 61.9    | 154            | 179.4   | 50.8   | 196.1          | 25.4   | 12.7   | 7/16           | 5.003    |
|                |                                                               | 11 7/16        | 2 17/32 | 15 7/16 | 17 7/16 | 3/16           | 1 1/4          | 2 7/16  | 6 1/16         | 7 1/16  | 2      | 7 23/32        | 1      | 1/2    |                | 11.02    |
|                |                                                               | 290.5          | 61.9    | 392.1   | 432.2   | 4.8            | 31.8           | 64.3    | 154            | 179.4   | 50.8   | 196.1          | 25.4   | 12.7   | 7/16           |          |
| 5              | 1 1/2, 1 9/16, 1 5/8, 1 11/16, 1 3/4, 1 13/16, 1 7/8, 1 15/16 | 298.4          | 92.9    | 444.5   | 501.6   | 4.8            | 36.5           | 71.4    | 185.7          | 223.8   | 57.2   | 222.5          | 28.6   | 14.3   | 1/2            | 8.217    |
|                |                                                               | 11 3/4         | 3 21/32 | 17 1/2  | 19 3/4  | 3/16           | 1 7/16         | 2 13/16 | 7 9/16         | 8 13/16 | 2 1/4  | 8 3/4          | 1 1/8  | 9/16   |                | 18.1     |
| 7              | 2, 2 1/16, 2 1/8, 2 3/16, 2 1/4, 2 5/16, 2 3/8, 2 7/16        | 362            | 92.9    | 546.1   | 603.2   | 4.8            | 38.1           | 81.8    | 219.1          | 265.1   | 63.5   | 273            | 28.6   | 15.9   | 9/16           | 12.312   |
|                |                                                               | 14 1/4         | 3 21/32 | 21 1/2  | 23 3/4  | 3/16           | 1 1/2          | 3 7/32  | 8 5/8          | 10 7/16 | 2 1/2  | 10 3/4         | 1 1/8  | 5/8    |                | 27.12    |
|                |                                                               | 362            | 92.9    | 546.1   | 603.2   | 4.8            | 38.1           | 84.9    | 219.1          | 265.1   | 63.5   | 273            | 28.6   | 15.9   | 9/16           |          |
|                |                                                               | 14 1/4         | 3 21/32 | 21 1/2  | 23 3/4  | 3/16           | 1 1/2          | 3 11/32 | 8 5/8          | 10 7/16 | 2 1/2  | 10 3/4         | 1 1/8  | 5/8    |                |          |

**TU SERIES**

**TOP-MOUNTED CAST IRON TU SERIES**

- Take-up frame incorporates RTU take-up units as shown on the following pages.
- The frame is designed for top mounting and is made of cast iron.



TO ORDER, COMPLETE ASSEMBLY, SPECIFY TU FRAME AND RTU OR TU TAKE-UP UNIT REQUIRED. Example: TU5 frame and RTU 1 11/16".

| TU Frame No. | Shaft Dia.                                                    | L <sub>1</sub> | R      | J      | L      | H <sub>1</sub> | H       | H <sub>2</sub> | J <sub>1</sub> | A      | K      | Bolts 4 req'd. | Unit Wt. |
|--------------|---------------------------------------------------------------|----------------|--------|--------|--------|----------------|---------|----------------|----------------|--------|--------|----------------|----------|
|              | in.                                                           | mm in.         | mm in. | mm in. | mm in. | mm in.         | mm in.  | mm in.         | mm in.         | mm in. | mm in. | in.            | kg lbs.  |
| 1            | 3/4, 13/16,                                                   | 203.2          | 114.3  | 419.2  | 469.9  | 14.3           | 63.5    | 131            | 34.9           | 54     | —      | 3/8            | 7.491    |
|              | 7/8, 15/16, 1                                                 | 8              | 4 1/2  | 16 1/2 | 18 1/2 | 9/16           | 2 1/2   | 5 5/32         | 1 3/8          | 2 1/8  | —      |                | 16.5     |
| 3            | 1 1/16, 1 1/8, 1 3/16, 1 1/4, 1 5/16, 1 3/8, 1 7/16           | 254            | 127    | 492.1  | 542.9  | 15.9           | 71.4    | 149.2          | 38.1           | 65.1   | —      | 7/16           | 11.464   |
|              |                                                               | 10             | 5      | 19 3/8 | 21 3/8 | 5/8            | 2 13/16 | 5 7/8          | 1 1/2          | 2 9/16 | —      |                | 25.25    |
| 5            | 1 1/2, 1 9/16, 1 5/8, 1 11/16, 1 3/4, 1 13/16, 1 7/8, 1 15/16 | 254            | 139.7  | 530.2  | 581    | 19             | 82.6    | 171.4          | 50.8           | 88.9   | —      | 1/2            | 20.203   |
|              |                                                               | 10             | 5 1/2  | 20 7/8 | 22 7/8 | 3/4            | 3 1/4   | 6 3/4          | 2              | 3 1/2  | —      |                | 44.5     |
| 7            | 2, 2 1/16, 2 1/8, 2 3/16, 2 1/4, 2 5/16, 2 3/8, 2 7/16        | 304.8          | 168.3  | 644.5  | 708    | 22.2           | 101.6   | 211.9          | 63.5           | 101.6  | —      | 5/8            | 36.320   |
|              |                                                               | 12             | 6 5/8  | 25 3/8 | 27 7/8 | 7/8            | 4       | 8 11/32        | 2 1/2          | 4      | —      |                | 80       |
| 9            | 2 11/16, 2 15/16 <sup>(1)</sup>                               | 304.8          | 193.7  | 695.3  | 771.5  | 25.4           | 117.5   | 243.7          | 82.6           | 120.6  | 65.1   | 5/8            | 52.778   |
|              |                                                               | 12             | 7 5/8  | 27 3/8 | 30 3/8 | 1              | 4 5/8   | 9 19/32        | 3 1/4          | 4 3/4  | 2 9/16 |                | 116.25   |

<sup>(1)</sup> Dimension K is 69.1 mm (2 23/32") for 2 15/16" shaft diameters.

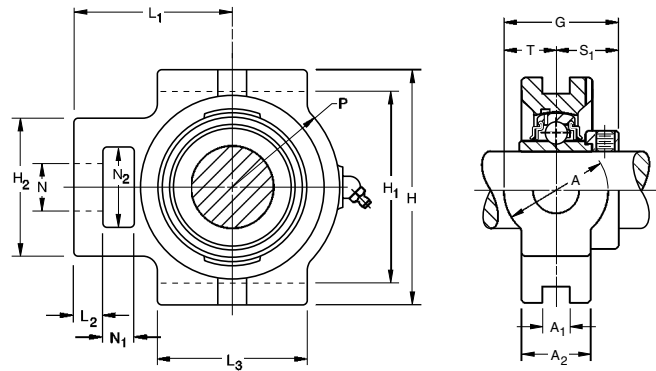


# BALL BEARINGS

## RTU INDUSTRIAL SERIES

- Ball bearing take-up units are used where shaft adjustment and belt-tightening devices are required, such as in conveyor applications.
- Both types of take-up units incorporate self-aligning B-Type wide inner ring ball bearings with self-locking collars
- Use a G-KRRB, R-Seal Type wide inner ring bearing.
- Provides compact, efficient supports for adjustable shafts and conveyor take-up pulleys.
- Units are factory prelubricated. A grease fitting is provided for relubrication if required.
- See preceding page for take-up frames to fit these units.
- **Contact your Timken representative to discuss highly corrosive applications (e.g., food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**

**Suggested shaft tolerances:**  $\frac{3}{4}$ " - 1  $\frac{15}{16}$ ", nominal to **-.013 mm,  $-.0005$ "**;  
 2" - 2  $\frac{15}{16}$ ", nominal to **-.025 mm,  $-.0010$ "**.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| RTU  | G-KRRB         | Page D54                    |

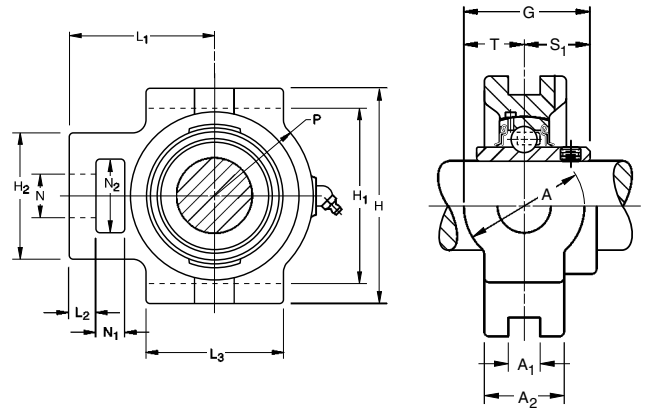
**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: RTU  $\frac{3}{4}$ " or RTU 2  $\frac{11}{16}$ ". POPULAR SIZES ARE IN BOLD.**

| Unit       | Shaft Dia.                          | G                 |                  | T                 |                   | S <sub>1</sub>    |                  | A <sub>2</sub>    |                  | A <sub>1</sub>  |                   | A             |                 | L <sub>1</sub>    |                 | H <sub>2</sub>    |                 | N         |         | N <sub>2</sub> |       | L <sub>2</sub> |     | N <sub>1</sub> |     | P  |     | L <sub>3</sub> |     | H <sub>1</sub> |     | H  |     | Bearing Number | Collar Number | Housing Number | Unit Wt. |
|------------|-------------------------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|------------------|-----------------|-------------------|---------------|-----------------|-------------------|-----------------|-------------------|-----------------|-----------|---------|----------------|-------|----------------|-----|----------------|-----|----|-----|----------------|-----|----------------|-----|----|-----|----------------|---------------|----------------|----------|
|            |                                     | mm                | in.              | mm                | in.               | mm                | in.              | mm                | in.              | mm              | in.               | mm            | in.             | mm                | in.             | mm                | in.             | mm        | in.     | mm             | in.   | mm             | in. | mm             | in. | mm | in. | mm             | in. | mm             | in. | mm | in. |                |               |                |          |
| <b>RTU</b> | <b><math>\frac{3}{4}</math></b>     | 47.6              | 20.6             | 27                | 34.1              | 13.5              | 41.3             | 67.5              | 57.2             | 19              | 31.8              | 12.7          | 15.9            | 49.2              | 57.2            | 76.2              | 92.1            | G1012KRRB | S1012K  | T-18832        | 1.444 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 20                                  | 1 $\frac{7}{8}$   | 1 $\frac{3}{16}$ | 1 $\frac{1}{16}$  | 1 $\frac{11}{32}$ | 1 $\frac{7}{32}$  | 1 $\frac{5}{8}$  | 2 $\frac{21}{32}$ | 2 $\frac{1}{4}$  | $\frac{3}{4}$   | 1 $\frac{1}{4}$   | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{15}{16}$ | 2 $\frac{1}{4}$ | 3                 | 3 $\frac{5}{8}$ | GE20KRRB  | SE20K   |                | 3.18  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b><math>\frac{7}{8}</math></b>     | 42.9              | 22.2             | 27                | 37.3              | 13.5              | 44.4             | 67.5              | 57.2             | 19              | 31.8              | 12.7          | 15.9            | 34.9              | 57.2            | 76.2              | 92.1            | G1014KRRB | S1014K  | T-18696        | 1.498 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{15}{16}$                   | 1 $\frac{15}{16}$ | $\frac{7}{8}$    | 1 $\frac{1}{16}$  | 1 $\frac{15}{32}$ | 1 $\frac{7}{32}$  | 1 $\frac{3}{4}$  | 2 $\frac{21}{32}$ | 2 $\frac{1}{4}$  | $\frac{3}{4}$   | 1 $\frac{1}{4}$   | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{3}{8}$   | 2 $\frac{1}{4}$ | 3                 | 3 $\frac{5}{8}$ | G1015KRRB | S1015K  |                | 1.498 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1</b>                            | 1 $\frac{15}{16}$ | $\frac{7}{8}$    | 1 $\frac{1}{16}$  | 1 $\frac{15}{32}$ | 1 $\frac{7}{32}$  | 1 $\frac{3}{4}$  | 2 $\frac{21}{32}$ | 2 $\frac{1}{4}$  | $\frac{3}{4}$   | 1 $\frac{1}{4}$   | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{3}{8}$   | 2 $\frac{1}{4}$ | 3                 | 3 $\frac{5}{8}$ | G1100KRRB | S1100K  |                | 3.3   |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 25                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | GE25KRRB  | SE25K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{1}{16}</math></b>  | 55.6              | 25.4             | 30.2              | 38.1              | 13.5              | 50.8             | 72.2              | 61.9             | 22.2            | 36.5              | 12.7          | 15.9            | 41.3              | 63.5            | 88.9              | 104.8           | G1101KRRB | S1101K  | T-18694        | 1.92  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{1}{8}$                     | 2 $\frac{3}{16}$  | 1                | 1 $\frac{3}{16}$  | 1 $\frac{1}{2}$   | 1 $\frac{7}{32}$  | 2                | 2 $\frac{27}{32}$ | 2 $\frac{7}{16}$ | $\frac{7}{8}$   | 1 $\frac{7}{16}$  | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{5}{8}$   | 2 $\frac{1}{2}$ | 3 $\frac{1}{2}$   | 4 $\frac{1}{8}$ | G1102KRRB | S1102K  |                | 1.92  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{3}{16}</math></b>  | 55.6              | 25.4             | 30.2              | 38.1              | 13.5              | 50.8             | 72.2              | 61.9             | 22.2            | 36.5              | 12.7          | 15.9            | 41.3              | 63.5            | 88.9              | 104.8           | G1103KRRB | S1103K  | T-18694        | 4.23  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 30                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | GE30KRRB  | SE30K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{1}{4}</math></b>   | 54.8              | 22.2             | 32.5              | 36.5              | 13.5              | 44.5             | 74.6              | 63.5             | 22.2            | 36.5              | 12.7          | 15.9            | 49.2              | 69.8            | 88.9              | 104.8           | G1104KRRB | S1104K  | T-18692        | 2.025 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{5}{16}$                    | 2 $\frac{5}{32}$  | $\frac{7}{8}$    | 1 $\frac{9}{32}$  | 1 $\frac{7}{16}$  | 1 $\frac{7}{32}$  | 1 $\frac{3}{4}$  | 2 $\frac{15}{16}$ | 2 $\frac{1}{2}$  | $\frac{7}{8}$   | 1 $\frac{7}{16}$  | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{15}{16}$ | 2 $\frac{3}{4}$ | 3 $\frac{1}{2}$   | 4 $\frac{1}{8}$ | G1105KRRB | S1105K  |                | 2.025 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{3}{8}</math></b>   | 54.8              | 22.2             | 32.5              | 36.5              | 13.5              | 44.5             | 74.6              | 63.5             | 22.2            | 36.5              | 12.7          | 15.9            | 49.2              | 69.8            | 88.9              | 104.8           | G1106KRRB | S1106K  | T-18692        | 4.46  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{3}{8}$                     | 2 $\frac{5}{32}$  | $\frac{7}{8}$    | 1 $\frac{9}{32}$  | 1 $\frac{7}{16}$  | 1 $\frac{7}{32}$  | 1 $\frac{3}{4}$  | 2 $\frac{15}{16}$ | 2 $\frac{1}{2}$  | $\frac{7}{8}$   | 1 $\frac{7}{16}$  | $\frac{1}{2}$ | $\frac{5}{8}$   | 1 $\frac{15}{16}$ | 2 $\frac{3}{4}$ | 3 $\frac{1}{2}$   | 4 $\frac{1}{8}$ | G1107KRRB | S1107K  |                | 4.46  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{7}{16}</math></b>  | 67.5              | 32.5             | 34.9              | 44.4              | 17.5              | 65.1             | 88.1              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 53.3              | 82.6            | 100.8             | 120.6           | GE35KRRB  | SE35K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 35                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | G1108KRRB | S1108K  | T-18834        | 3.314 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{1}{2}</math></b>   | 67.5              | 32.5             | 34.9              | 44.4              | 17.5              | 65.1             | 88.1              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 53.3              | 82.6            | 100.8             | 120.6           | G1108KRRB | S1108KT | T-18834        | 3.314 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{9}{16}$                    | 2 $\frac{21}{32}$ | 1 $\frac{9}{32}$ | 1 $\frac{3}{8}$   | 1 $\frac{3}{4}$   | 1 $\frac{11}{16}$ | 2 $\frac{9}{16}$ | 3 $\frac{15}{32}$ | 3 $\frac{1}{4}$  | 1 $\frac{1}{8}$ | 1 $\frac{15}{16}$ | $\frac{5}{8}$ | $\frac{3}{4}$   | 2 $\frac{3}{32}$  | 3 $\frac{1}{4}$ | 3 $\frac{31}{32}$ | 4 $\frac{3}{4}$ | G1109KRRB | S1109K  |                | 7.3   |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{5}{8}</math></b>   | 67.5              | 32.5             | 34.9              | 44.4              | 17.5              | 65.1             | 88.1              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 53.3              | 82.6            | 100.8             | 120.6           | GE40KRRB  | SE40K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 40                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | G1110KRRB | S1110K  | T-18762        | 3.164 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{11}{16}</math></b> | 67.5              | 32.5             | 34.9              | 44.4              | 17.5              | 65.1             | 88.1              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 53.3              | 82.6            | 100.8             | 120.6           | G1110KRRB | S1110K  | T-18762        | 3.164 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{3}{4}$                     | 2 $\frac{21}{32}$ | 1 $\frac{9}{32}$ | 1 $\frac{3}{8}$   | 1 $\frac{3}{4}$   | 1 $\frac{11}{16}$ | 2 $\frac{9}{16}$ | 3 $\frac{15}{32}$ | 3 $\frac{1}{4}$  | 1 $\frac{1}{8}$ | 1 $\frac{15}{16}$ | $\frac{5}{8}$ | $\frac{3}{4}$   | 2 $\frac{3}{32}$  | 3 $\frac{1}{4}$ | 3 $\frac{31}{32}$ | 4 $\frac{3}{4}$ | G1111KRRB | S1111K  |                | 6.97  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{3}{4}</math></b>   | 67.5              | 32.5             | 34.9              | 44.4              | 17.5              | 65.1             | 88.1              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 53.3              | 82.6            | 100.8             | 120.6           | G1112KRRB | S1112K  | T-18762        | 3.164 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 45                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | GE45KRRB  | SE45K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{7}{8}</math></b>   | 70.6              | 32.5             | 38.1              | 49.2              | 17.5              | 65.1             | 91.3              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 59.5              | 85.7            | 100.8             | 120.6           | G1114KRRB | S1114K  | T-18690        | 3.587 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 1 $\frac{15}{16}$                   | 2 $\frac{25}{32}$ | 1 $\frac{9}{32}$ | 1 $\frac{1}{2}$   | 1 $\frac{15}{16}$ | 1 $\frac{11}{16}$ | 2 $\frac{9}{16}$ | 3 $\frac{19}{32}$ | 3 $\frac{1}{4}$  | 1 $\frac{1}{8}$ | 1 $\frac{15}{16}$ | $\frac{5}{8}$ | $\frac{3}{4}$   | 2 $\frac{11}{32}$ | 3 $\frac{3}{8}$ | 3 $\frac{31}{32}$ | 4 $\frac{3}{4}$ | G1115KRRB | S1115K  |                | 7.9   |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>1 <math>\frac{15}{16}</math></b> | 70.6              | 32.5             | 38.1              | 49.2              | 17.5              | 65.1             | 91.3              | 82.6             | 28.6            | 49.2              | 15.9          | 19              | 59.5              | 85.7            | 100.8             | 120.6           | GE50KRRB  | SE50K   | T-18690        | 3.587 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 50                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | G1115KRRB | S1115K  |                | 7.9   |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>2</b>                            | 77                | 34.9             | 43.7              | 55.6              | 27                | 69.8             | 119.9             | 101.6            | 34.9            | 63.5              | 19            | 31.8            | 69.1              | 101.6           | 129.4             | 149.2           | G1200KRRB | S1201K  | T-18828        | 6.333 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 2 $\frac{1}{8}$                     | 3 $\frac{1}{32}$  | 1 $\frac{3}{8}$  | 1 $\frac{23}{32}$ | 2 $\frac{3}{16}$  | 1 $\frac{1}{16}$  | 2 $\frac{3}{4}$  | 4 $\frac{23}{32}$ | 4                | 1 $\frac{3}{8}$ | 2 $\frac{1}{2}$   | $\frac{3}{4}$ | 1 $\frac{1}{4}$ | 2 $\frac{23}{32}$ | 4               | 5 $\frac{3}{32}$  | 5 $\frac{7}{8}$ | G1202KRRB | S1202K  |                | 13.95 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>2 <math>\frac{1}{8}</math></b>   | 77                | 34.9             | 43.7              | 55.6              | 27                | 69.8             | 119.9             | 101.6            | 34.9            | 63.5              | 19            | 31.8            | 69.1              | 101.6           | 129.4             | 149.2           | G1203KRRB | S1203K  | T-18828        | 6.333 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 2 $\frac{1}{8}$                     | 3 $\frac{1}{32}$  | 1 $\frac{3}{8}$  | 1 $\frac{23}{32}$ | 2 $\frac{3}{16}$  | 1 $\frac{1}{16}$  | 2 $\frac{3}{4}$  | 4 $\frac{23}{32}$ | 4                | 1 $\frac{3}{8}$ | 2 $\frac{1}{2}$   | $\frac{3}{4}$ | 1 $\frac{1}{4}$ | 2 $\frac{23}{32}$ | 4               | 5 $\frac{3}{32}$  | 5 $\frac{7}{8}$ | GE55KRRB  | SE55K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>2 <math>\frac{1}{4}</math></b>   | 81.8              | 34.9             | 46.8              | 52.4              | 27                | 69.8             | 119.9             | 101.6            | 34.9            | 63.5              | 19            | 31.8            | 69.1              | 101.6           | 129.4             | 149.2           | G1204KRRB | S1204K  | T-18830        | 5.993 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 2 $\frac{3}{8}$                     | 3 $\frac{7}{32}$  | 1 $\frac{3}{8}$  | 1 $\frac{27}{32}$ | 2 $\frac{1}{16}$  | 1 $\frac{1}{16}$  | 2 $\frac{3}{4}$  | 4 $\frac{23}{32}$ | 4                | 1 $\frac{3}{8}$ | 2 $\frac{1}{2}$   | $\frac{3}{4}$ | 1 $\frac{1}{4}$ | 2 $\frac{23}{32}$ | 4               | 5 $\frac{3}{32}$  | 5 $\frac{7}{8}$ | G1206KRRB | S1206K  |                | 13.2  |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| <b>RTU</b> | <b>2 <math>\frac{1}{16}</math></b>  | 81.8              | 34.9             | 46.8              | 52.4              | 27                | 69.8             | 119.9             | 101.6            | 34.9            | 63.5              | 19            | 31.8            | 69.1              | 101.6           | 129.4             | 149.2           | G1207KRRB | S1207K  | T-18830        | 5.993 |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |
| RTU        | 60                                  |                   |                  |                   |                   |                   |                  |                   |                  |                 |                   |               |                 |                   |                 |                   |                 | GE60KRRB  | SE60K   |                |       |                |     |                |     |    |     |                |     |                |     |    |     |                |               |                |          |

**YTU INDUSTRIAL SERIES**

- Used where shaft adjustment and belt-tightening devices are required, such as conveyor applications.
- Incorporates self-aligning B-Type extra wide inner ring ball bearings with setscrew lock.
- Provides compact, efficient supports for adjustable shafts and conveyor take-up pulleys.
- Factory prelubricated. A grease fitting is provided for relubrication if required.
- See preceding pages for take-up frames to fit these units.
- Safety end caps are available for selected sizes.
- **Contact your Timken representative to discuss highly corrosive applications (e.g., food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**

**Suggested shaft tolerances:** 1/2" - **1 15/16"**, nominal to **-.013 mm, -.0005"**;  
 2" - **2 15/16"**, nominal to **-.025 mm, -.0010"**.



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| YTU  | GY...KRRB      | Page D67                    |

**TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: YTU 3/4". POPULAR SIZES ARE IN BOLD.**

| Unit       | Shaft Dia.    | G       | T      | S <sub>1</sub> | A <sub>2</sub> | A <sub>1</sub> | A      | L <sub>1</sub> | H <sub>2</sub> | N      | N <sub>2</sub> | L <sub>2</sub> | N <sub>1</sub> | P       | L <sub>3</sub> | H <sub>1</sub> | H      | Bearing Number | Housing Number |
|------------|---------------|---------|--------|----------------|----------------|----------------|--------|----------------|----------------|--------|----------------|----------------|----------------|---------|----------------|----------------|--------|----------------|----------------|
|            |               | mm in.  | mm in. | mm in.         | mm in.         | mm in.         | mm in. | mm in.         | mm in.         | mm in. | mm in.         | mm in.         | mm in.         | mm in.  | mm in.         | mm in.         | mm in. |                |                |
| <b>YTU</b> | <b>3/4</b>    | 38.9    | 20.6   | 18.3           | 34.1           | 13.5           | 41.3   | 67.5           | 57.2           | 19     | 31.8           | 12.7           | 15.9           | 33.3    | 57.2           | 76.2           | 92.1   | GY1012KRRB     | T-18832        |
| YTU        | 20            | 1 17/32 | 13/16  | 0.719          | 1 11/32        | 17/32          | 1 5/8  | 2 21/32        | 2 1/4          | 3/4    | 1 1/4          | 1/2            | 5/8            | 1 5/16  | 2 1/4          | 3              | 3 5/8  | GYE20KRRB      |                |
| <b>YTU</b> | <b>7/8</b>    |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GY1014KRRB     | T-18696        |
| YTU        | 15/16         | 42.1    | 22.2   | 19.8           | 37.3           | 13.5           | 44.4   | 67.5           | 57.2           | 19     | 31.8           | 12.7           | 15.9           | 34.9    | 57.2           | 76.2           | 92.1   | GY1015KRRB     |                |
| <b>YTU</b> | <b>1</b>      | 1 21/32 | 7/8    | 0.781          | 1 15/32        | 17/32          | 1 3/4  | 2 21/32        | 2 1/4          | 3/4    | 1 1/4          | 1/2            | 5/8            | 1 3/8   | 2 1/4          | 3              | 3 5/8  | GY1100KRRB     |                |
| YTU        | 25            |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GYE25KRRB      |                |
| YTU        | 1 1/8         | 47.6    | 25.4   | 22.2           | 38.1           | 13.5           | 50.8   | 72.2           | 61.9           | 22.2   | 36.5           | 12.7           | 15.9           | 41.3    | 63.5           | 88.9           | 104.8  | GY1102KRRB     | T-18694        |
| <b>YTU</b> | <b>1 3/16</b> | 1 7/8   | 1      | 0.875          | 1 1/2          | 17/32          | 2      | 2 27/32        | 2 7/16         | 7/8    | 1 7/16         | 1/2            | 5/8            | 1 5/8   | 2 1/2          | 3 1/2          | 4 1/8  | GY1103KRRB     |                |
| YTU        | 30            |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GYE30KRRB      |                |
| YTU        | 1 1/4         | 47.6    | 22.2   | 25.4           | 36.5           | 13.5           | 44.5   | 74.6           | 63.5           | 22.2   | 36.5           | 12.7           | 15.9           | 49.2    | 69.8           | 88.9           | 104.8  | GY1104KRRB     | T-18692        |
| YTU        | 1 3/8         | 1 7/8   | 7/8    | 1              | 1 7/16         | 17/32          | 1 3/4  | 2 15/16        | 2 1/2          | 7/8    | 1 7/16         | 1/2            | 5/8            | 1 15/16 | 2 3/4          | 3 1/2          | 4 1/8  | GY1106KRRB     |                |
| YTU        | 1 7/16        |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GY1107KRRB3    |                |
| YTU        | 35            |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GYE35KRRB      |                |
| YTU        | 1 1/2         | 62.7    | 32.5   | 30.2           | 44.4           | 17.5           | 65.1   | 88.1           | 82.6           | 28.6   | 49.2           | 15.9           | 19             | 53.3    | 82.6           | 100.8          | 120.6  | GY1108KRRB     | T-18834        |
| YTU        | 40            | 2 15/32 | 1 9/32 | 1.188          | 1 3/4          | 11/16          | 2 9/16 | 3 15/32        | 3 1/4          | 1 1/8  | 1 15/16        | 5/8            | 3/4            | 2 3/32  | 3 1/4          | 3 31/32        | 4 3/4  | GYE40KRRB      |                |
| <b>YTU</b> | <b>1 5/8</b>  |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GY1110KRRB     |                |
| YTU        | 1 11/16       | 62.7    | 32.5   | 30.2           | 44.4           | 17.5           | 65.1   | 88.1           | 82.6           | 28.6   | 49.2           | 15.9           | 19             | 53.3    | 82.6           | 100.8          | 120.6  | GY1111KRRB     | T-18762        |
| YTU        | 1 3/4         | 2 15/16 | 1 9/32 | 1.188          | 1 3/4          | 11/16          | 2 9/16 | 3 15/32        | 3 1/4          | 1 1/8  | 1 15/16        | 5/8            | 3/4            | 2 3/32  | 3 1/4          | 3 31/32        | 4 3/4  | GY1112KRRB     |                |
| YTU        | 45            |         |        |                |                |                |        |                |                |        |                |                |                |         |                |                |        | GYE45KRRB      |                |
| YTU        | 1 15/16       | 65      | 32.5   | 32.5           | 49.2           | 17.5           | 65.1   | 91.3           | 82.6           | 28.6   | 49.2           | 15.9           | 19             | 59.5    | 85.7           | 100.8          | 120.6  | GY1115KRRB     | T-18690        |
| YTU        | 50            | 2 9/16  | 1 9/32 | 1.281          | 1 15/16        | 11/16          | 2 9/16 | 3 19/32        | 3 1/4          | 1 1/8  | 1 15/16        | 5/8            | 3/4            | 2 11/32 | 3 3/8          | 3 31/32        | 4 3/4  | GYE50KRRB      |                |
| <b>YTU</b> | <b>2 3/16</b> | 68.3    | 34.9   | 33.3           | 55.6           | 27             | 69.8   | 119.9          | 101.6          | 34.9   | 63.5           | 19             | 31.8           | 69.1    | 101.6          | 129.4          | 149.2  | GY1203KRRB     | T-18828        |
| YTU        | 55            | 2 11/16 | 1 3/8  | 1.312          | 2 3/16         | 1 1/16         | 2 3/4  | 4 23/32        | 4              | 1 3/8  | 2 1/2          | 3/4            | 1 1/4          | 2 23/32 | 4              | 5 3/32         | 5 7/8  | GYE55KRRB      |                |
| YTU        | 2 1/4         | 74.6    | 34.9   | 39.7           | 52.4           | 27             | 69.8   | 119.9          | 101.6          | 34.9   | 63.5           | 19             | 31.8           | 69.1    | 101.6          | 129.4          | 149.2  | GY1204KRRB     | T-18830        |
| YTU        | 2 7/16        | 2 15/16 | 1 3/8  | 1.562          | 2 1/16         | 1 1/16         | 2 3/4  | 4 23/32        | 4              | 1 3/8  | 2 1/2          | 3/4            | 1 1/4          | 2 23/32 | 4              | 5 3/32         | 5 7/8  | GY1207KRRB     |                |



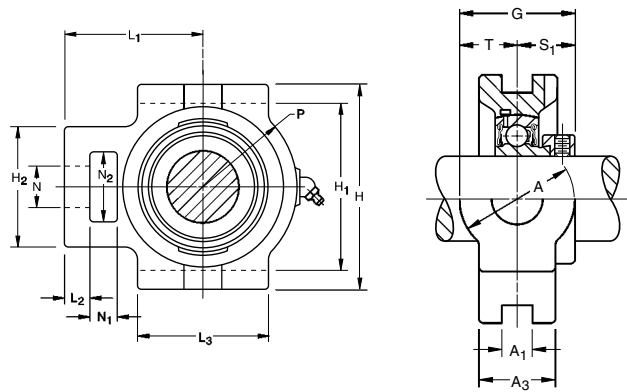


# BALL BEARINGS

## VTU STANDARD SERIES

- Used where shaft adjustment and belt-tightening devices are required (e.g., conveyor belt applications).
- Provides shaft-aligning B-Type wide inner ring ball bearings with self-locking collars.
- Provides compact, efficient supports for adjustable shafts and conveyor take-up pulleys.
- Units are factory prelubricated. A grease fitting is provided for relubrication if required.
- See preceding pages for take-up frames to fit these units.

**Suggested shaft tolerances:**  $3/4'' - 1\ 15/16''$ , nominal to  $-.013\text{ mm}$ ,  $-.0005''$ .  
 $2'' - 2\ 15/16''$ , nominal to  $-.025\text{ mm}$ ,  $-.0010''$ .



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| VTU  | GRA...RRB      | Page D57                    |

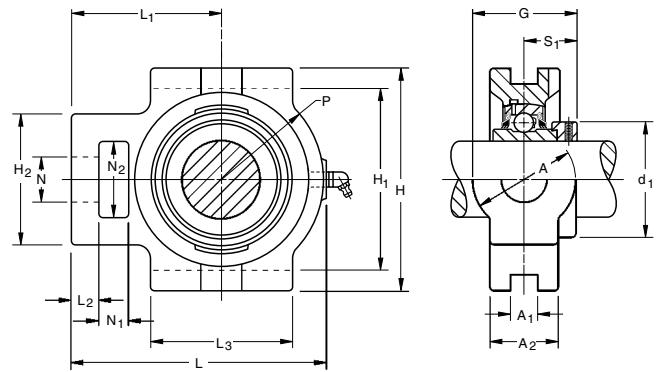
TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: VTU  $3/4''$  or VTU  $2\ 11/16''$ . POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.                   | G          | T         | S <sub>1</sub> | A <sub>2</sub> | A <sub>1</sub> | A         | L <sub>1</sub> | H <sub>2</sub> | N         | N <sub>2</sub> | L <sub>2</sub> | N <sub>1</sub> | P          | L <sub>3</sub> | H <sub>1</sub> | H         | Bearing Number | Collar Number | Housing Number | Unit Wt.   |
|------------|------------------------------|------------|-----------|----------------|----------------|----------------|-----------|----------------|----------------|-----------|----------------|----------------|----------------|------------|----------------|----------------|-----------|----------------|---------------|----------------|------------|
|            | mm<br>in.                    | mm<br>in.  | mm<br>in. | mm<br>in.      | mm<br>in.      | mm<br>in.      | mm<br>in. | mm<br>in.      | mm<br>in.      | mm<br>in. | mm<br>in.      | mm<br>in.      | mm<br>in.      | mm<br>in.  | mm<br>in.      | mm<br>in.      | mm<br>in. |                |               |                | kg<br>lbs. |
| VTU        | $3/4$                        | 44.1       | 20.6      | 23.4           | 34.1           | 13.5           | 41.3      | 67.5           | 57.2           | 19        | 31.8           | 12.7           | 15.9           | 33.3       | 57.2           | 76.2           | 92.1      | GRA012RRB      | S1012K        | T-18832        | 1.372      |
| VTU        | 20                           | $1\ 47/64$ | $13/16$   | $59/64$        | $1\ 11/32$     | $17/32$        | $1\ 5/8$  | $2\ 21/32$     | $2\ 1/4$       | $3/4$     | $1\ 1/4$       | $1/2$          | $5/8$          | $1\ 5/16$  | $2\ 1/4$       | 3              | $3\ 5/8$  | GRAE20RRB      | SE20K         |                | 3.02       |
| VTU        | $7/8$                        |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRA014RRB      |               |                |            |
| VTU        | $15/16$                      | 45.2       | 22.2      | 23.0           | 37.3           | 13.5           | 44.4      | 67.5           | 57.2           | 19        | 31.8           | 12.7           | 15.9           | 34.9       | 57.2           | 76.2           | 92.1      | GRA015RRB      | S1015K        | T-18696        | 1.458      |
| <b>VTU</b> | <b>1</b>                     | $1\ 25/32$ | $7/8$     | $29/32$        | $1\ 15/32$     | $17/32$        | $1\ 3/4$  | $2\ 21/32$     | $2\ 1/4$       | $3/4$     | $1\ 1/4$       | $1/2$          | $5/8$          | $1\ 3/8$   | $2\ 1/4$       | 3              | $3\ 5/8$  | GRA100RRB      | S1100K        |                | 3.21       |
| VTU        | 25                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE25RRB      | SE25K         |                |            |
| VTU        | $1\ 1/8$                     | 52         | 25.4      | 27             | 38.1           | 13.5           | 50.8      | 72.2           | 61.9           | 22.2      | 36.5           | 12.7           | 15.9           | 41.3       | 63.5           | 88.9           | 104.8     | GRA102RRB      | S1102K        | T-18694        | 1.862      |
| <b>VTU</b> | <b><math>1\ 3/16</math></b>  | $2\ 1/16$  | 1         | $1\ 1/16$      | $1\ 1/2$       | $17/32$        | 2         | $2\ 21/32$     | $2\ 7/16$      | $7/8$     | $1\ 7/16$      | $1/2$          | $5/8$          | $1\ 5/8$   | $2\ 1/2$       | $3\ 1/2$       | $4\ 1/8$  | GRA103RRB      | S1103K3       |                | 4.10       |
| VTU        | 30                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE30RRB      | SE30K         |                |            |
| VTU        | $1\ 1/4$                     |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRA104RRB      | S1104K        |                |            |
| VTU        | $1\ 3/8$                     | 51.6       | 22.2      | 29.4           | 36.5           | 13.5           | 44.5      | 74.6           | 63.5           | 22.2      | 36.5           | 12.7           | 15.9           | 49.2       | 69.8           | 88.9           | 104.8     | GRA106RRB      | S1106K        | T-18692        | 1.953      |
| <b>VTU</b> | <b><math>1\ 7/16</math></b>  | $2\ 1/32$  | $7/8$     | $1\ 5/32$      | $1\ 7/16$      | $17/32$        | $1\ 3/4$  | $2\ 15/16$     | $2\ 1/2$       | $7/8$     | $1\ 7/16$      | $1/2$          | $5/8$          | $1\ 15/16$ | $2\ 3/4$       | $3\ 1/2$       | $4\ 1/8$  | GRA107RRB      | S1107K        |                | 4.30       |
| VTU        | 35                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE35RRB      | SE35K         |                |            |
| VTU        | $1\ 1/2$                     | 65         | 32.5      | 32.5           | 44.4           | 17.5           | 65.1      | 88.1           | 82.6           | 28.6      | 49.2           | 15.9           | 19             | 53.3       | 82.6           | 100.8          | 120.6     | GRA108RRB      | S1108KT       | T-18834        | 3.192      |
| VTU        | 40                           | $2\ 9/16$  | $1\ 9/32$ | $1\ 9/32$      | $1\ 3/4$       | $1\ 11/16$     | $2\ 9/16$ | $3\ 15/32$     | $3\ 1/4$       | $1\ 1/8$  | $1\ 15/16$     | $5/8$          | $3/4$          | $2\ 3/32$  | $3\ 1/4$       | $3\ 31/32$     | $4\ 3/4$  | GRAE40RRB      | SE40K         |                | 7.03       |
| VTU        | $1\ 5/8$                     |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRA110RRB      | S1110K        |                |            |
| VTU        | $1\ 11/16$                   | 65         | 32.5      | 32.5           | 44.4           | 17.5           | 65.1      | 88.1           | 82.6           | 28.6      | 49.2           | 15.9           | 19             | 53.3       | 82.6           | 100.8          | 120.6     | GRA111RRB      | S1111K        | T-18762        | 3.009      |
| VTU        | $1\ 3/4$                     | $2\ 9/16$  | $1\ 9/32$ | $1\ 9/32$      | $1\ 3/4$       | $1\ 11/16$     | $2\ 9/16$ | $3\ 15/32$     | $3\ 1/4$       | $1\ 1/8$  | $1\ 15/16$     | $5/8$          | $3/4$          | $2\ 3/32$  | $3\ 1/4$       | $3\ 31/32$     | $4\ 3/4$  | GRA112RRB      | S1112K        |                | 6.63       |
| VTU        | 45                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE45RRB      | SE45K         |                |            |
| VTU        | $1\ 7/8$                     | 65         | 32.5      | 32.5           | 49.2           | 17.5           | 65.1      | 91.3           | 82.6           | 28.6      | 49.2           | 15.9           | 19             | 59.5       | 85.7           | 100.8          | 120.6     | GRA114RRB      | S1114K        | T-18690        | 3.342      |
| <b>VTU</b> | <b><math>1\ 15/16</math></b> | $2\ 9/16$  | $1\ 9/32$ | $1\ 9/32$      | $1\ 15/16$     | $1\ 11/16$     | $2\ 9/16$ | $3\ 19/32$     | $3\ 1/4$       | $1\ 1/8$  | $1\ 15/16$     | $5/8$          | $3/4$          | $2\ 11/32$ | $3\ 3/8$       | $3\ 31/32$     | $4\ 3/4$  | GRA115RRB      | S1115K        |                | 7.36       |
| VTU        | 50                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE50RRB      | SE50K         |                |            |
| VTU        | 2                            | 71.4       | 34.9      | 36.5           | 55.6           | 27             | 69.8      | 119.9          | 101.6          | 34.9      | 63.5           | 19             | 31.8           | 69.1       | 101.6          | 129.4          | 149.2     | GRA200RRB      | S1200K        | T-18828        | 5.784      |
| VTU        | $2\ 3/16$                    | $2\ 13/16$ | $1\ 3/8$  | $1\ 7/16$      | $2\ 3/16$      | $1\ 1/16$      | $2\ 3/4$  | $4\ 23/32$     | 4              | $1\ 3/8$  | $2\ 1/2$       | $3/4$          | $1\ 1/4$       | $2\ 23/32$ | 4              | $5\ 3/32$      | $5\ 7/8$  | GRA203RRB      | S1203K        |                | 12.73      |
| VTU        | 55                           |            |           |                |                |                |           |                |                |           |                |                |                |            |                |                |           | GRAE55RRB      | SE55K         |                |            |

### TTU INDUSTRIAL SERIES

- Used where shaft adjustment and belt-tightening devices are required (e.g., in conveyor belt applications).
- Incorporates self-aligning, B-Type, extra wide inner ring ball bearings with self-locking collars.
- Uses a G-KPPB4 (Tri-Ply) type wide inner ring bearing.
- Provides compact, efficient supports for adjustable shafts and conveyor take-up pulleys.
- Units are factory prelubricated. A grease fitting is provided for relubrication if required.
- **Contact your Timken representative to discuss highly corrosive applications (e.g., food processing, chemical exposure) where Timken thin dense chrome coated bearings can be utilized.**

Suggested shaft tolerances: 2" - 2 3/16", nominal to -.025 mm, -.0010".



BEARING DATA

| Unit | Bearing Number | Dimensions and Load Ratings |
|------|----------------|-----------------------------|
| TTU  | G-KPPB4        | Page D65                    |

TO ORDER, SPECIFY UNIT AND SHAFT DIAMETER. Example: TTU 3/4". POPULAR SIZES ARE IN BOLD.

| Unit       | Shaft Dia.    |     | G (max.) | L     | S <sub>1</sub> | d <sub>1</sub> ±.005" | A <sub>2</sub> ±.010" | A <sub>1</sub> | A     | L <sub>1</sub> ref. | H <sub>2</sub> | N min. | N <sub>2</sub> ref. | L <sub>2</sub> | N <sub>1</sub> | P ref.  | L <sub>3</sub> | H <sub>1</sub> ref. | H     | Bearing Number | Housing Number     |    |
|------------|---------------|-----|----------|-------|----------------|-----------------------|-----------------------|----------------|-------|---------------------|----------------|--------|---------------------|----------------|----------------|---------|----------------|---------------------|-------|----------------|--------------------|----|
|            | mm            | in. |          |       |                |                       |                       |                |       |                     |                |        |                     |                |                |         |                |                     |       |                |                    | mm |
| TTU        | 2             |     |          |       |                |                       |                       |                |       |                     |                |        |                     |                |                |         |                |                     |       |                | G1200KPPB4         |    |
| TTU        | 2 1/16        |     | 79       | 190.5 | 43.6           | 75.7                  | 55.6                  | 27             | 69.8  | 119.9               | 101.6          | 63.5   | 34.7                | 19             | 31.8           | 69.1    | 101.6          | 129.4               | 149.2 |                | G1201KPPB4 T-18830 |    |
| TTU        | 2 1/8         |     | 3.109    | 7 1/2 | 1.716          | 2.980                 | 2 3/16                | 1 1/16         | 2 3/4 | 4 23/32             | 4              | 2 1/2  | 1.365               | 3/4            | 1 1/4          | 2 23/32 | 4              | 5 3/32              | 5 7/8 |                | G1202KPPB4         |    |
| <b>TTU</b> | <b>2 3/16</b> |     |          |       |                |                       |                       |                |       |                     |                |        |                     |                |                |         |                |                     |       |                | G1203KPPB4         |    |
| TTU        | 55            |     |          |       |                |                       |                       |                |       |                     |                |        |                     |                |                |         |                |                     |       |                | GE55KPPB4          |    |

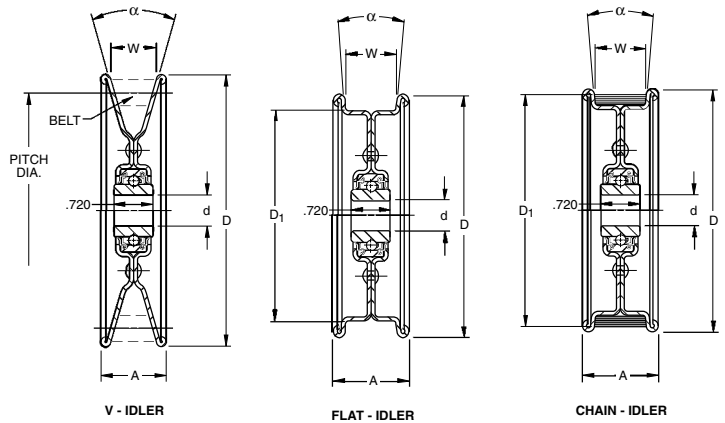




# BALL BEARINGS

## IDLER PULLEY UNITS

- A pressed-steel pulley and a Timken precision ball bearing with rubber seals are combined to make a self-contained unit.
- Two pulley designs are available. One for V-belts and another for the backs of V-belts. Both are made for A, B, C and D section belts.
- A chain idler is available that is identical in construction to the flat idler, with the addition of an assembled rubber "tire" (part number A-10927). The rubber "tire" cushions the chain, preventing undue wear on the pulley surface or chain.
- Idler pulley units feature a Timken single-row radial ball bearing with an inner ring extended on both sides. This provides clearance for abutting parts and greater support on the shaft.
- Contact-type rubber seals assure positive retention for lubricant and full protection against dirt, dust and foreign matter.



- All units are non-relubricatable. Special features include smoothly rolled-over edges, eliminating belt chafing and scuffing. The "weep holes" on the rivet circle allow water drainage when the pulley is mounted in a horizontal position.

TO ORDER, SPECIFY PULLEY NUMBER. Example: 008-10853 Idler Pulley.

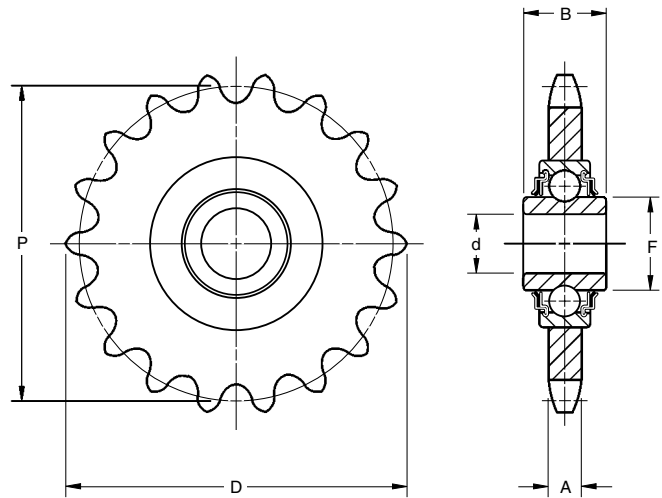
| Pulley Number             | α Included Angle Degrees | Bearing Number | Bore                               |                 | A               | D <sub>1</sub> | W                  | Belt Pitch Dia. |               |                | Wt.           |
|---------------------------|--------------------------|----------------|------------------------------------|-----------------|-----------------|----------------|--------------------|-----------------|---------------|----------------|---------------|
|                           |                          |                | d                                  | D               |                 |                |                    | A Section       | B Section     | C Section      |               |
|                           |                          |                | mm in.                             | mm in.          | mm in.          | mm in.         | mm in.             | mm in.          | mm in.        | mm in.         | kg lbs.       |
| <b>V IDLERS</b>           |                          |                |                                    |                 |                 |                |                    |                 |               |                |               |
| 006-11520A <sup>(1)</sup> | 32                       | WS3NPP3        | 10.01 / 9.78<br>0.394 / 0.385      | 76.2<br>3       | 19<br>3/4       | 76.2           | 22.45<br>.049      |                 | 63.5<br>2 1/2 |                | 0.145<br>0.32 |
| 10874 <sup>(2)</sup>      | 34                       | 203NPP         | 17.000 / 16.993<br>0.6693 / 0.6690 | 101.6<br>4      | 22.2<br>7/8     | 101.6          | 22.7<br>0.5        |                 | 92.1<br>3 5/8 |                | 0.417<br>0.92 |
| 010-10874                 | 34                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 101.6<br>4      | 22.2<br>7.8     | 101.6          | 12.7<br>0.5        |                 | 92.1<br>3 5/8 |                | 0.435<br>0.96 |
| 008-10482                 | 32                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 128.6<br>5 1/16 | 31.8<br>1 1/4   | 128.6          | 22.15<br>0.872     |                 | 95.2<br>3 3/4 | 114.3<br>4 1/2 | 0.572<br>1.26 |
| 010-10482                 | 32                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 128.6<br>5 1/16 | 31.8<br>1 1/4   | 128.6          | 22.15<br>0.872     |                 | 95.2<br>3 3/4 | 114.3<br>4 1/2 | 0.558<br>1.23 |
| 008-10853                 | 32                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 185.7<br>7 5/16 | 31.8<br>1 1/4   | 185.7          | 22.15<br>0.872     |                 | 152.4<br>6    | 171.4<br>6 3/4 | 1.134<br>2.5  |
| 010-10853                 | 32                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 185.7<br>7 5/16 | 31.8<br>1 1/4   | 185.7          | 22.15<br>0.872     |                 | 152.4<br>6    | 171.4<br>6 3/4 | 1.12<br>2.47  |
| <b>FLAT IDLERS</b>        |                          |                |                                    |                 |                 |                |                    |                 |               |                |               |
| 006-11581A <sup>(1)</sup> | 10                       | WS3NPP3        | 10.01 / 9.78<br>0.394 / 0.385      | 92.1<br>3 5/8   | 30.6<br>1 7/32  | 92.1           | 22.2<br>3<br>7/8   |                 |               |                | 0.259<br>0.57 |
| 008-10601                 | 10                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 117.5<br>4 5/8  | 36.5<br>1 7/16  | 117.5          | 25.4<br>4<br>1     |                 |               |                | 0.503<br>1.11 |
| 010-10601                 | 10                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 117.5<br>4 5/8  | 36.5<br>1 7/16  | 117.5          | 25.4<br>4<br>1     |                 |               |                | 0.49<br>1.08  |
| 008-10483                 | 10                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 158.8<br>6 1/4  | 36.5<br>1 7/16  | 158.8          | 25.4<br>139.7<br>1 |                 |               |                | 0.803<br>1.77 |
| 010-10483                 | 10                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 158.8<br>6 1/4  | 36.5<br>1 7/16  | 158.8          | 25.4<br>139.7<br>1 |                 |               |                | 0.789<br>1.74 |
| 008-10650                 | 50                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 158.8<br>6 1/4  | 36.5<br>1 7/16  | 158.8          | 25.4<br>139.7<br>1 |                 |               |                | 0.785<br>1.73 |
| 010-10650                 | 50                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 158.8<br>6 1/4  | 41.3<br>1 7/16  | 158.8          | 25.4<br>139.7<br>1 |                 |               |                | 0.771<br>1.7  |
| 008-11515                 | 10                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 222.2<br>8 3/4  | 35.7<br>1 13/32 | 222.2          | 25.4<br>8<br>1     |                 |               |                | 1.238<br>2.73 |
| 010-11515                 | 10                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 222.2<br>8 3/4  | 35.7<br>1 13/32 | 222.2          | 25.4<br>8<br>1     |                 |               |                | 1.225<br>2.7  |
| 008-10731                 | 10                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 222.2<br>8 3/4  | 48.4<br>1 29/32 | 222.2          | 38.1<br>8<br>1 1/2 |                 |               |                | 1.488<br>3.38 |
| 010-10731                 | 10                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 222.2<br>8 3/4  | 48.4<br>1 29/32 | 222.2          | 38.1<br>8<br>1 1/2 |                 |               |                | 1.474<br>3.25 |
| <b>CHAIN IDLERS</b>       |                          |                |                                    |                 |                 |                |                    |                 |               |                |               |
| 008-10927                 | 10                       | 203KRR5        | 13.08 / 12.95<br>0.515 / 0.510     | 117.5<br>4 5/8  | 36.5<br>1 7/16  | 117.5          | 25.4<br>1<br>1     |                 |               |                | 0.576<br>1.27 |
| 010-10927                 | 10                       | 203KRR2        | 16.13 / 16.26<br>0.635 / 0.640     | 117.5<br>4 5/8  | 36.5<br>1 7/16  | 117.5          | 25.4<br>1<br>1     |                 |               |                | 0.562<br>1.24 |

<sup>(1)</sup> Inner ring width 13.891 mm - 13.764 mm; .5469" - .5419"

<sup>(2)</sup> 12 mm Inner ring width .4724" - .4674"

## ROLLER CHAIN IDLER SPROCKETS

- Sintered steel sprockets are hardened and provide an economical means of suitability.
- Replaces the hardened plate steel sprockets on most applications.
- All units are non-relubricatable.



TO ORDER, SPECIFY SPROCKET NUMBER. Example: 010-5017S Idler Sprocket.

| Sprocket Number | Bearing Number | Bore d               |        | A.S.A. Chain No. | No. of Teeth | Pitch | P     | D      | A     | F     | B     | Bearing Radial Load Rating @ 500 RPM | Wt.   |
|-----------------|----------------|----------------------|--------|------------------|--------------|-------|-------|--------|-------|-------|-------|--------------------------------------|-------|
|                 |                | mm in.               | mm in. |                  |              |       |       |        |       |       |       |                                      |       |
| 008-4018-S      | 203KRR5        | 13.08 / 12.95        |        | 40               | 18           | 12.7  | 73.13 | 79.88  | 7.21  | 24.43 | 18.29 | 3550                                 | 0.2   |
|                 | E8728          | 0.515 / 0.500        |        |                  |              | 1/2   | 2.879 | 3.145  | 0.284 | 0.962 | 0.72  | 800                                  | 0.44  |
| 008-5017-S      | 203KRR5        | 13.08 / 12.95        |        | 50               | 17           | 15.9  | 86.36 | 94.72  | 8.71  | 24.43 | 18.29 | 3550                                 | 0.299 |
|                 | E8728          | 0.515 / 0.500        |        |                  |              | 5/8   | 3.4   | 3.729  | 0.343 | 0.962 | 0.72  | 800                                  | 0.66  |
| 008-6015-S      | 203KRR5        | 13.08 / 12.95        |        | 60               | 15           | 19    | 91.62 | 101.32 | 11.66 | 24.43 | 18.29 | 3550                                 | 0.417 |
|                 | E8728          | 0.515 / 0.500        |        |                  |              | 3/4   | 3.607 | 3.989  | 0.459 | 0.962 | 0.72  | 800                                  | 0.92  |
| 010-4018-S      | 203KRR2        | 16.26 / 16.13        |        | 40               | 18           | 12.7  | 73.13 | 79.88  | 7.21  | 24.43 | 18.29 | 3550                                 | 0.2   |
|                 | E8728          | 0.640 / 0.635        |        |                  |              | 1/2   | 2.879 | 3.145  | 0.284 | 0.962 | 0.72  | 800                                  | 0.44  |
| 010-5017-S      | 203KRR2        | 16.26 / 16.13        |        | 50               | 17           | 15.9  | 86.36 | 94.72  | 8.71  | 24.43 | 18.29 | 3550                                 | 0.299 |
|                 | E8728          | 0.640 / 0.635        |        |                  |              | 5/8   | 3.4   | 3.729  | 0.343 | 0.962 | 0.72  | 800                                  | 0.66  |
| 010-6015-S      | 203KRR2        | 16.26 / 16.13        |        | 60               | 15           | 19    | 91.62 | 101.32 | 11.66 | 24.43 | 18.29 | 3550                                 | 0.417 |
|                 | E8728          | 0.640 / 0.635        |        |                  |              | 3/4   | 3.607 | 3.989  | 0.459 | 0.962 | 0.72  | 800                                  | 0.92  |
| 011H-5017-S     | 204KRR2        | 17.65 / 17.52        |        | 50               | 17           | 15.9  | 86.36 | 94.72  | 8.71  | 28.73 | 18.29 | 3550                                 | 0.299 |
|                 | E8728          | HEX<br>0.695 / 0.690 |        |                  |              | 5/8   | 3.4   | 3.729  | 0.343 | 1.131 | 0.72  | 800                                  | 0.66  |
| 011H-6015-S     | 204RR2         | 17.65 / 17.52        |        | 60               | 15           | 19    | 91.62 | 101.32 | 11.66 | 24.43 | 18.29 | 3550                                 | 0.417 |
|                 | E8728          | HEX<br>0.695 / 0.690 |        |                  |              | 3/4   | 3.607 | 3.989  | 0.459 | 0.962 | 0.72  | 800                                  | 0.92  |
| 012-8012-S      | 204RR6         | 19.18 / 19.05        |        | 80               | 12           | 25.4  | 98.15 | 110.41 | 14.6  | 26.62 | 15.49 | 4800                                 | 0.676 |
|                 | E8728          | 0.7500 / 0.7505      |        |                  |              | 1     | 3.864 | 4.347  | 0.575 | 1.048 | 0.61  | 1080                                 | 1.49  |

D







# BALL BEARINGS

## HOUSED UNITS REPLACEMENT CHART

| Housed Units                      | Replacement Bearing Assembly   | Features                                                                         | Part Number                                                                                                             |
|-----------------------------------|--------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| C                                 | MUB replaced by 1000KRB & Col. | Standard Series (SM) wide inner ring (B-Type), collar, caps, and wire            | Example: 2 1 <sup>1</sup> / <sub>16</sub> inch (uses MUB 2 1 <sup>1</sup> / <sub>16</sub> inch)                         |
| DRNR                              | 1000KR & Col. (Two)            | Single R-Seal (A-Type), complete bearing number marked on seal                   | Example: DRNR 1 3 <sup>1</sup> / <sub>16</sub> inch (uses two 1103KR & Col.)                                            |
| FLCT                              | RA000RRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Bearing identification marked on seal.                                                                                  |
| GRFD, GRFDR, GRFTD, GRFTDR        | G1000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Complete bearing number marked on seal.<br>Example: GRFD 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KRRB & col.)  |
| GRKD, GRSD                        | G1000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Complete bearing number marked on seal.<br>Example: GRKD 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KRRB & Col.)  |
| GVFD, GVFDR, GVFTD, GVFTDR        | GRA000RRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Bearing identification marked on seal.                                                                                  |
| GVKD, GVSD                        | GRA000RRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Bearing identification marked on seal.                                                                                  |
| LAK, LAS                          | G1000KLLB & Col.               | G-Relubricatable; B-Spherical outer ring; LL-Double Mechani-Seal                 | Complete bearing number marked on seal.<br>Example: LAK 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KLLB & Col.)   |
| LAKHL                             | 1000KLS & Col.                 | L-Single Mechani-Seal; S-External self-aligning                                  | Complete bearing number marked on seal.<br>Example: LAKHL 1 3 <sup>1</sup> / <sub>16</sub> inch (uses 1103KLS & Col.)   |
| LAO, LSAO                         | GN000KLLB & Col.               | G-Relubricatable; B-Spherical outer ring; LL-Double Mechani-Seal                 | Complete bearing number marked on seal.<br>Example: LAO 1 3 <sup>1</sup> / <sub>16</sub> inch (uses GN103KLLB & Col.)   |
| LCJ, LCJT                         | G1000KLLB & Col.               | G-Relubricatable; B-Spherical outer ring; LL-Double Mechani-Seal                 | Complete bearing number marked on seal.<br>Example: LCJ 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KLLB & Col.)   |
| LCJO                              | GN000KLLB                      | G-Relubricatable; N-Heavy Series; B-Spherical outer ring; LL-Double Mechani-Seal | Complete bearing number marked on seal.<br>Example: LCJO 1 3 <sup>1</sup> / <sub>16</sub> inch (uses GN103KLLB & Col.)  |
| PB, PBS, VKD, VSD                 | RA000RRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Bearing identification marked on seal.                                                                                  |
| RA Flangette, RAT Flangette       | RA000RRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Bearing identification marked on seal.                                                                                  |
| RA Relubricatable Flangette       | GRA000RRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | To order, specify bearings & markings, Example: 1-GRA103RRB & Col., 1-G62MSA marking, 1-G62MSB marking                  |
| RAK, RAS, RAKH, RSA               | G1000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Complete bearing number marked on seal.<br>Example: RAK 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KRRB & Col.)   |
| RAKHL                             | 1000KRS & Col                  | R-Single R-Seal; S-External self-aligning                                        | Complete bearing number marked on seal.<br>Example: RAKHL 1 3 <sup>1</sup> / <sub>16</sub> inch (uses 1103KRS & Col.)   |
| RAKN, RASN                        | 1000KRRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Complete bearing number marked on seal.<br>Example: RAKN 1 3 <sup>1</sup> / <sub>16</sub> inch (uses 1103KRRB & Col.)   |
| RAO, RSAO                         | GN000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Complete bearing number marked on seal.<br>Example: RSAO 3 3 <sup>1</sup> / <sub>16</sub> inch (uses GN303KRRB & Col.)  |
| RASC                              | GC1000KRRB & Col.              | G-Relubricatable; C-Concentric collar; B-Spherical outer ring; RR-Double R-Seal  | Complete bearing number marked on seal.<br>Example: RASC 1 3 <sup>1</sup> / <sub>16</sub> inch (uses GC1103KRRB & Col.) |
| RCJ, RCJT, RC                     | G1000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                       | Complete bearing number marked on seal.<br>Example: RCJ 1 3 <sup>1</sup> / <sub>16</sub> inch (uses G1103KRRB & Col.)   |
| RCJN, RR Flangette, RRT Flangette | 1000KRRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Complete bearing number marked on seal.<br>Example: RCJN 1 3 <sup>1</sup> / <sub>16</sub> inch (uses 1103KRRB & Col.)   |
| RFC, RCJC, RCJTC                  | GC1000KRRB & Col.              | G-Relubricatable; C-Concentric collar; B-Spherical outer ring; RR-Double R-Seal  | Complete bearing number marked on seal.<br>Example: 1 3 <sup>1</sup> / <sub>16</sub> inch (uses GC1103KRRB & Col.)      |
| RFD, RFDR, RFTD, RFTDR            | 1000KRRB & Col.                | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                     | Complete bearing number marked on seal.<br>Example: RFD: 1 3 <sup>1</sup> / <sub>16</sub> inch (uses 1103KRRB & Col.)   |

D

| Housed Units                     | Replacement Bearing Assembly    | Features                                                                                | Part Number                                                                                                    |
|----------------------------------|---------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| RKD, RSD                         | 1000KRRB & Col.                 | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                            | Complete bearing number marked on seal.<br>Example: RKD 1 3/16 inch (uses 1103KRRB & Col.)                     |
| RPB                              | RABR (Shaft Size)               | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                            | RA000RRB FS-450 Bearing & Col. mounted in rubber interliner.<br>Example: RPB 1 3/16 (uses an RABR 1 3/16 inch) |
| RR Relubricatable Flangette      | G1000KRRB & Col.                | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                              | To order, specify bearing & markings,<br>Example: 1-G1100KRRB & Col., 1-G52MSA marking, 1-G52MSB marking       |
| SA                               | MUB replaced by 1000KRB & Col.  | Standard Series (SM) wide inner ring bearing (B-Type), collar, caps and wire            | Example: SA 1 3/16 inch (uses MUB 1 3/16 inch)                                                                 |
| SAD                              | MUBD replaced by 1000KRB & Col. | Standard Series (SM) wide inner ring bearing (B-Type), dust seal, collar, caps and wire | Example: SA 1 3/16 inch (uses MUB 1 3/16 inch)                                                                 |
| SADD                             | MUBD replaced by N000KRB & Col. | Rear dust seal, otherwise same as SAD                                                   |                                                                                                                |
| SAL                              | SM1000KS & Col.                 | S-External self-aligning ring                                                           | Example: SAL 1 3/16 inch (uses SM1103KS & Col.)                                                                |
| SAO                              | MUOB replaced by 100KRB & Col.  | Heavy Series (SMN) wide inner ring bearing (B-Type), collar, caps and wire              | Example: SAO 1 3/16 inch (uses MUOB 1 3/16 inch)                                                               |
| SAOD                             | MUOBD (Shaft Size)              | Heavy Series (SMN) wide inner ring bearing (B-Type), dust seal, collar, caps and wire   | Example: SAOD 1 3/16 inch (uses MUOBD 1 3/16 inch)                                                             |
| SAODD                            | MUOBD (Shaft Size)              | Rear dust seal, otherwise same as SAOD                                                  |                                                                                                                |
| SAOL                             | SMN000KS & Col.                 | S-External self-aligning ring Heavy Series                                              | Example: SAOL 1 3/16 inch (uses SMN103KS & Col.)                                                               |
| SAS, SAK                         | GYA000RRB                       | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                              | Bearing identification marked on seal.                                                                         |
| SCJ, SCJT                        | GYA00RRB                        | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                              | Bearing identification marked on seal.                                                                         |
| TAK, TAS                         | G1000KPPB & Col.                | G-Relubricatable; B-Spherical outer ring; PP-Double Tri-Ply-Seal                        | Complete bearing number marked on seal.<br>Example: TAK 1 3/16 inch (uses G1103KPPB3 & Col.)                   |
| TCJ, TCJT                        | G1000KPPB & Col.                | G-Relubricatable; B-Spherical outer ring; PP-Double Tri-Ply Seal                        | Complete bearing number marked on seal.<br>Example: TCJ 1 3/16 inch (uses G1103KPPB3 & Col.)                   |
| VAK, VAS                         | GRA000RRB & Col.                | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                              | Bearing identification marked on seal.                                                                         |
| VCJ, VCJT                        | GRA000RRB & Col.                | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                              | Bearing identification marked on seal.                                                                         |
| VFD, VFDR, VFTD, VFTDR           | RA000RRB & Col.                 | Non-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                            | Bearing identification marked on seal.                                                                         |
| YAS, YAK, YASM<br>YCJ, YCJT, YTU | GY-KRRB                         | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal<br>Y-Series wide inner ring  | Bearing identification marked on seal.                                                                         |

### OTHER TYPES

|                  |                                |                                                                                                         |                                                                                             |
|------------------|--------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| LTU Take-Up      | G1000KLLB & Col.               | G-Relubricatable; B-Spherical outer ring; LL-Double Mechani-Seal                                        | Complete bearing number marked on seal.<br>Example: LTU 1 3/16 inch (uses G1103KLLB & Col.) |
| RHC, RHCM Hanger | GC1000KRRB & Col.              | G-Relubricatable; C-Concentric collar; B-Spherical outer ring; RR-Double R-Seal                         | Complete bearing number marked on seal.<br>Example: RCH 1 1/2 inch (uses GC1108KRRB & Col.) |
| RTU Take-Up      | G1000KRRB & Col.               | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                                              | Complete bearing number marked on seal.<br>Example: RTU 1 3/16 inch (uses G1103KRRB & Col.) |
| STU Take-Up      | GYA-RRB                        | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal                                              | Complete bearing number marked on seal.<br>Example: STU 1 3/16 inch (uses GYA103RRB)        |
| TU Take-Up       | MUB replaced by 1000KRB & Col. | Standard Series (SM) wide inner ring bearing (B-Type), collar, caps and wire                            | Example: TU 2 11/16 inch (uses MUB 2 11/16 & Col.)                                          |
| YTU Take-Up      | GY-KRRB                        | G-Relubricatable; B-Spherical outer ring; RR-Double R-Seal; Y-Series wide inner ring with setscrew lock | Complete bearing number marked on seal.<br>Example: YTU 1 3/16 inch (uses GY1103KRRB)       |



## BALL BEARINGS

### MACHINE UNITS

A complete machine unit consists of either a standard (SM) or heavy (SMN) Series wide inner ring bearing, an inner and outer sealing cap, a retaining wire and self-locking collar – or an integrally sealed bearing and collar. These units are available as bearing replacements for Timken power transmission units such as the SA, SAO, DSA and DSAO pillow blocks, C and Co cylindrical cartridges or special housings.

The “caps” are two steel members which comprise a non-integral frictionless labyrinth seal. The inner member is pressed on

the inner ring and rotates with it. The outer member is pressed in the housing against the face of the outer ring and is held in place by the round retaining wire.

The A-Type unit is designated MUA (standard series) or MUOA (heavy series); the B-Type MUB (standard series) or MUOB (heavy series). The B-Type bearing is mounted in the spherical housing seat by means of two slots milled diametrically opposite each other in the housing. The bearing can be inserted at right angles and swiveled into position.

#### A-TYPE

Figure 1 shows a machine unit with an A-Type bearing carrying the designation MUA (standard series) and MUOA (heavy series). It consists of a wide inner ring, open type or one-piece R-seal bearing, collar, caps and wire. The “caps” are two steel members which comprise a non-integral frictionless labyrinth seal. The inner member is pressed on the inner ring and rotates with it. The outer member is pressed in the housing against the face of the outer ring and is held in place by the round retaining wire.

**A-Type units are being converted to a KR-Type bearing with collar, B-Type cap and wire.**

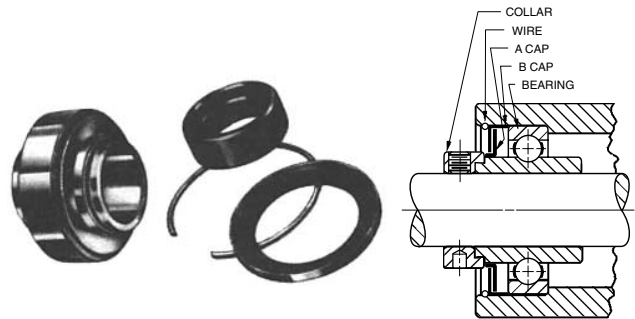


Figure 1 – MUA, MUOA

#### B-TYPE

Figure 2 is the same as Figure 1, except that the bearing is B-Type and seal on collar side is either a labyrinth seal (as shown) or a one-piece R-Seal. In the latter case no wire is supplied. The designation of the machine unit is MUB (standard series) or MUOB (heavy series). The B-Type bearing is mounted in the spherical housing seat by means of two slots milled diametrically opposite each other in the housing. The bearing can be inserted at right angles and swiveled into position. No additional shoulders or snap rings are required to locate this type.

**B-Type units are being converted to a KRB-Type bearing and collar.**

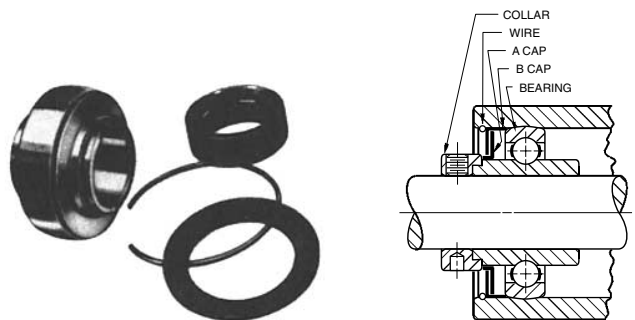


Figure 2 – MUB, MUOB

## TIMKEN® SAFETY END CAPS MAKE WORKPLACE PROTECTION A SNAP

Easy-to-install Timken Safety End Caps protect exposed rotating shafts, reducing hazards around many types of equipment. The patent-pending design meets all applicable OSHA requirements.

The Timken safety product line consists of a mounting ring and snap-on cover, both molded in durable, bright yellow polymer. The end cap snaps into the adhesive-backed ring that adheres to the outboard face of most flanged bearing housings. The secure 360 degree fit makes for a rugged unit that also provides basic protection and washdown.

Factory retrofits are a snap with everything provided in a handy kit. The cost-effective end covers are simple to install on Timken and most other flanged units. Current sizes range from 3/4 in. to 1 15/16 in. (20 mm to 50 mm) shaft sizes for two or four-bolt flanged cast iron, malleable iron, and other selected housing styles and sizes.

### KIT CONTENTS

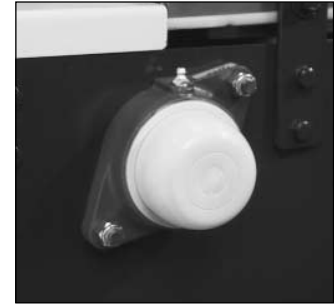
Timken safety end caps come in a convenient kit that contains everything required for a safe and durable mounting:

- Polymer end cap
- Adhesive-backed polymer mounting ring
- Scuffing pad
- Cleaning cloth

### INSTALLATION

Steps in the simple mounting procedure include:

1. Use the scuffing pad on housing's mating surface where the mounting ring will be placed.
2. Clean off mounting area.
3. Attach adhesive-backed mounting ring.
4. Hold mounting ring in place with pressure for 60 seconds.
5. Allow adhesive to set for minimum of one hour.
6. Snap end cap into place.



Safety end caps protect against rotating stub shafts.

### ORDERING INFORMATION

| Kit *       | Shaft Sizes                           |
|-------------|---------------------------------------|
| 204 ECY Kit | 3/4, 20 mm                            |
| 205 ECY KIT | 7/8, 15/16, 1, 25 mm                  |
| 206 ECY KIT | 1 1/16, 1 1/8, 1 3/16, 1 1/4 S, 30 mm |
| 207 ECY KIT | 1 1/4, 1 5/16, 1 3/8, 1 7/16, 35 mm   |
| 208 ECY KIT | 1 1/2, 40 mm                          |
| 209 ECY KIT | 1 5/8, 1 11/16, 1 3/4, 45 mm          |
| 210 ECY KIT | 1 15/16, 2 S, 50 mm                   |

\* Kits are designed to fit the following housed units -  
 4-Bolt: YCJ, RCJ, RCJC, TCJ, LCJ, SCJ, VCJ  
 2-Bolt: YCJT, RCJT, RCJTC, TCJT, LCJT, SCJT, VCJT

## TIMKEN BALL BEARING PILLOW BLOCK GREASE

Timken Ball Bearing Pillow Block grease is a NLGI No. 2 polyurea-thickened grease. It provides outstanding long-life, moderately high-temperature lubrication to ball bearings. This grease maintains its mechanical shear stability and provides corrosion resistance, even in the presence of salt water. Timken Ball Bearing Pillow Grease features low-noise characteristics and excellent pumpability. This grease does not contain extreme-pressure additives but is inhibited against rust and oxidation. Operating temperatures range from -40° F to 400° F (-40° C to 163° C). This grease is typically used in lightly loaded ball bearings in pillow blocks and conveyors that operate in high-temperature environments, including kiln and glasswork applications, electric motors, chemical manufacturing and noise-sensitive environments.

### SINGLE-POINT AND CENTRALIZED MULTI-POINT LUBRICATORS

Proper lubrication is critical to bearing and machine performance. To help prevent damage, Timken G-Power and M-Power single-point lubricators deliver periodic grease to bearings, chains, guideways and other industrial equipment components. You can choose from gas-powered or electromechanical varieties to meet your operating specifications. C-Power multi-point lubricators are a centralized lubrication system capable of delivering grease to up to six lubrication points. Oil is not an option for this unit.

G-Power and M-Power and C-Power canisters can be filled with Timken-formulated lubricants or many other types of commercial lubricants. A full line of accessories—including brackets, clamps, brushes, fittings and hose extensions—ease installation and offer a host of mounting options for hard-to-reach locations.





## **BALL BEARINGS**

### **LUBRICATION**

The Timken Company understands the importance of friction management. Our line of application- and environment-specific lubricants have been developed by leveraging our knowledge of tribology and anti-friction bearings and how these two elements affect overall system performance.

Timken lubricants help bearings and related components operate effectively in demanding industrial operations. High temperature, anti-wear and water-resistant additives offer superior protection in challenging environments.

Similar to our bearings, all Timken lubricants are backed by highly trained customer service and technical support. Industrial customers turn to Timken for comprehensive friction management solutions, and we help customers analyze performance and suggest options that make sense for their unique operating conditions and maintenance intervals.

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## SUPER PRECISION MACHINE TOOL BEARINGS

**Overview:** Timken is a premier manufacturer of Fafnir® super precision machine tool ball bearings. From standard catalog ABMA/ISO designs to custom sizes and features, Timken has the super precision ball bearing to meet your needs.

- **Sizes:** 10 mm - 300 mm (.3937 in. - 11.8110 in.) bore.  
26 mm - 400 mm (1.0236 in. - 15.7480 in.) O.D.
- **Markets:** High speed machine tool spindles, high stiffness ball screw support systems, low noise “quiet” bearings, aircraft generator, defense.
- **Features:** ABMA ABEC 7/9 (ISO P4/P2) precision level angular contact 15°, 25°, 60°; single and double-row ball screw; high speed seals’ ceramic balls; advanced materials.
- **Benefits:** Very high speed; high accuracy; high stiffness; low operating temperature; low noise; low vibration.





## Super Precision Ball Bearings Angular Contact

### Contact Angle:

- 2 = 15°
- 3 = 25°

### Construction:

- K** Conrad
- WI** angular contact; low shoulder on outer ring
- WO** angular contact; low shoulder on inner ring
- WN** angular contact; low shoulder on both rings
- HX** angular contact; low shoulder on both rings

### Precision Class:

- MM/MMV** super high precision between ABEC 7 (ISO P4) and ABEC 9 (ISO P2)
- MMX** ultra precision • ABEC 9 (ISO P2)

### Retainer: No retainer callout implies Timken® Fafnir® PRC

- PRB** molded nylon cage
- PRC** molded reinforced nylon cage
- CR** phenolic (composition) – Timken Fafnir standard
- MBR** machined bronze

**VV**

high speed seals

**2 MM C 91 04 WI CR DUL A3188**

Hybrid  
Ceramic

### Series:

- 9300** ultra-light
- 9100** extra-light
- 99100** extra-light
- 200** light
- 300** medium

### Bore Size:

- (04 and up, multiply these last two numbers by 5 to get bore in millimeters:)
- 00** 10 mm
  - 01** 12 mm
  - 02** 15 mm
  - 03** 17 mm
  - 04** 20 mm

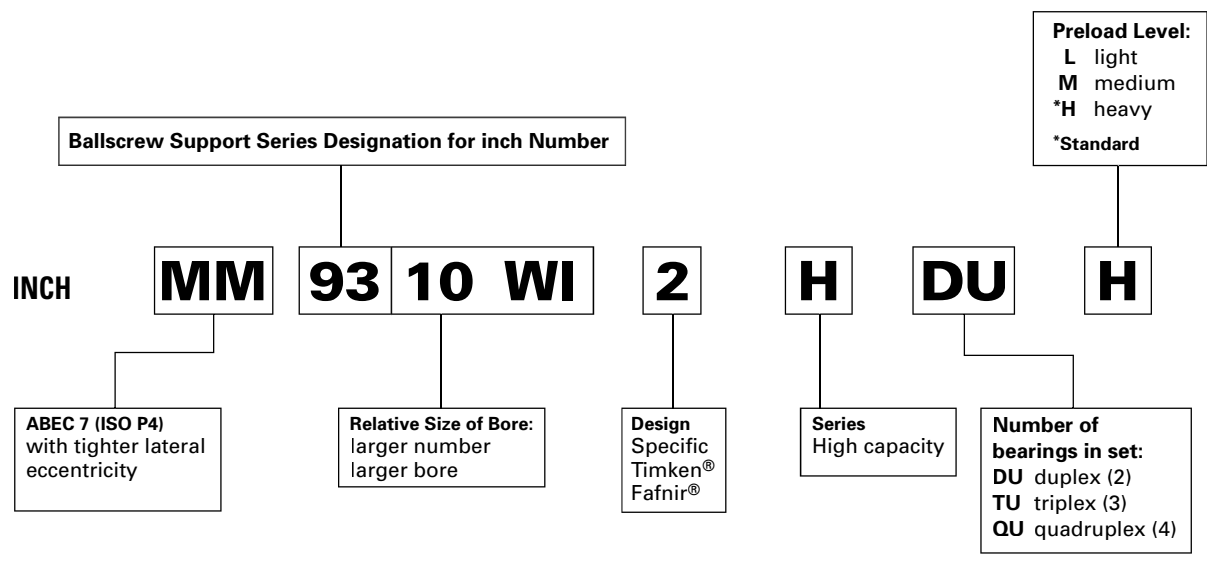
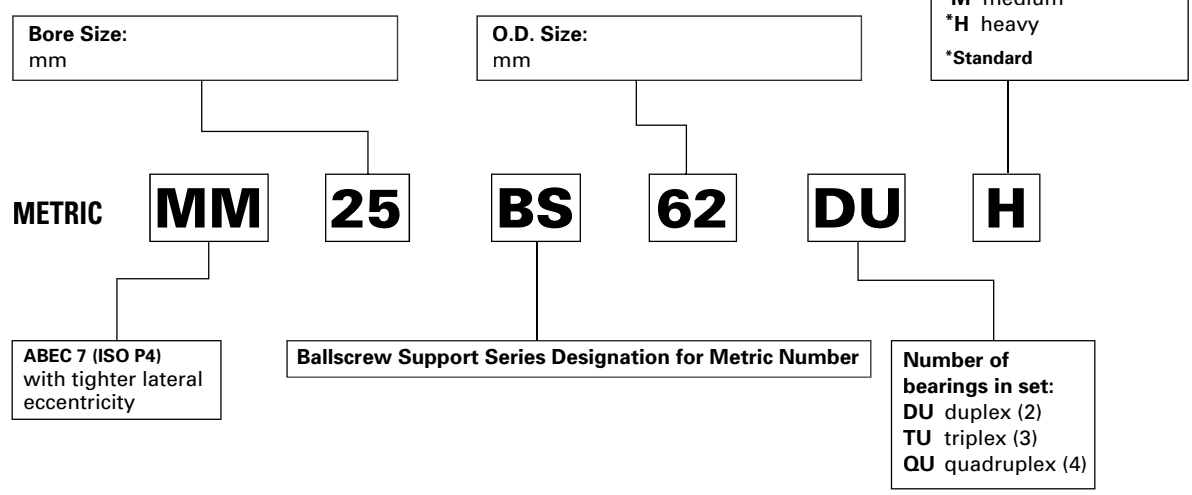
### Preload: Universal Flush Ground :

- \*SUX** single bearing, extra-light
- \*SUL** single bearing, light
- \*SUM** single bearing, medium
- \*SUH** single bearing, heavy
- DUX** duplex pairs of bearings, extra-light
- DUL** duplex pairs of bearings, light
- DUM** duplex pairs of bearings, medium
- DUH** duplex pairs of bearings, heavy
- TUX** triplex set of bearings, extra-light
- TUL** triplex set of bearings, light
- TUM** triplex set of bearings, medium
- TUH** triplex set of bearings, heavy
- QUX** quadruplex set of bearings, extra-light
- QUL** quadruplex set of bearings, light
- QUM** quadruplex set of bearings, medium
- QUH** quadruplex set of bearings, heavy

An example of a specification number for other than standard

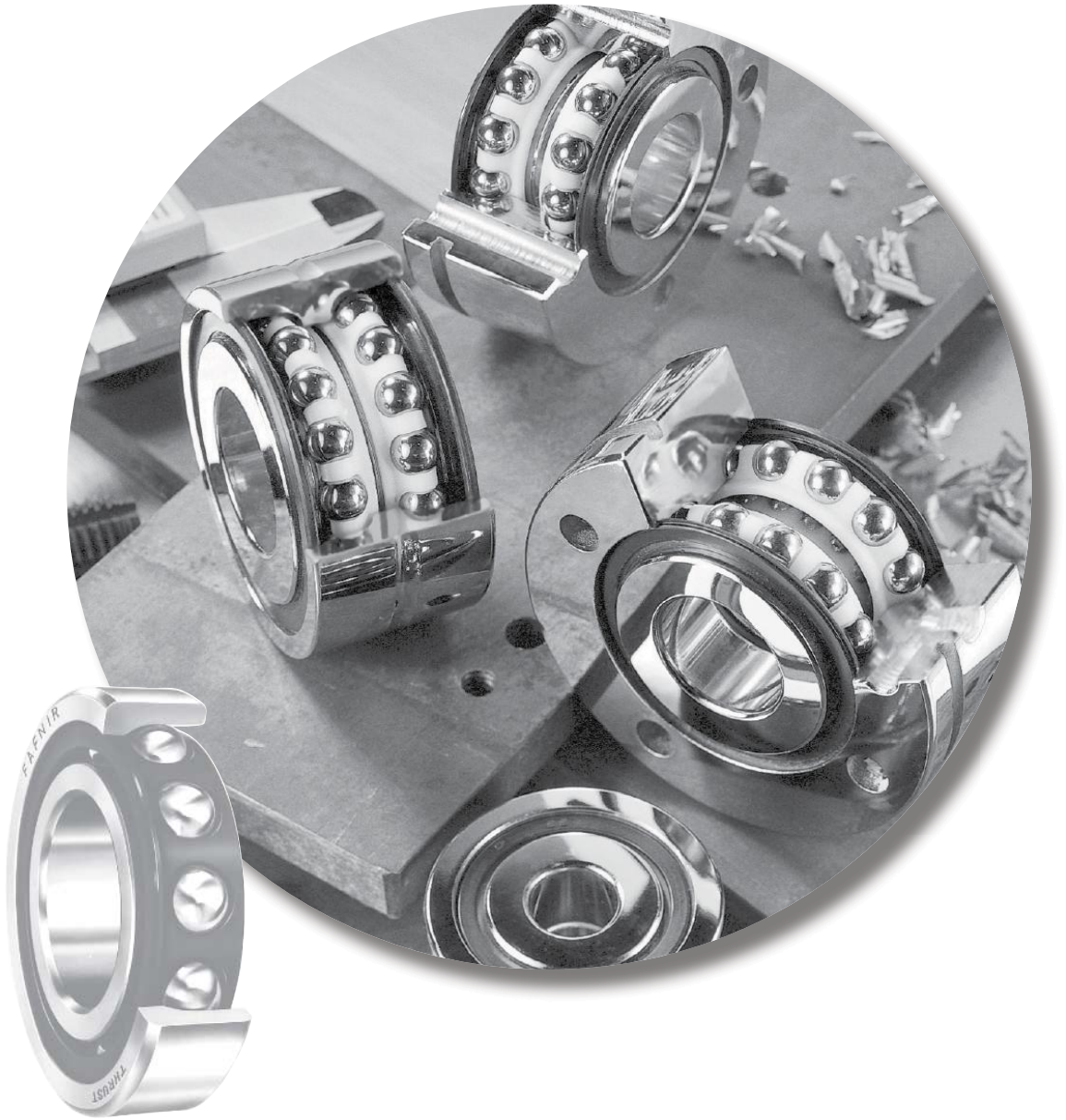


### Super Precision Ball Bearings Ballscrew Support Bearings





D



# Super Precision Ball Bearings

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| Ultra-Light 2(3)MMV9300HX . . . . .  | D162        | BSBU D . . . . .                     | D208        |
| Extra-Light 2(3)MMV99100WN . . . . . | D170        | BSBU Q . . . . .                     | D209        |
| Extra-Light 3MMV99100HX . . . . .    | D175        | BSPB D . . . . .                     | D210        |
| Extra-Light 2MMV99100WN . . . . .    | D176        | BSPB Q . . . . .                     | D211        |
| Extra-Light 3MMV99100WN . . . . .    | D177        |                                      |             |
| Ultra-Light MM9100K . . . . .        | D178        | <b><i>PILLOW BLOCK UNITS</i></b>     |             |
| Extra-Light MM9100K . . . . .        | D180        | MMF Series . . . . .                 | D212        |
| Light 2(3)MM200WI . . . . .          | D182        | MMN Series . . . . .                 | D213        |
| Light MM200K . . . . .               | D190        | Ex-Cell-O Spindle Bearings . . . . . | D214        |
| Medium 2(3)MM300WI . . . . .         | D194        | MM XWO . . . . .                     | D215        |





## INTRODUCTION

### MEANINGS OF PREFIXES AND SUFFIXES

In the Timken® Fafnir® numbering system the basic number which denotes the size and series is always retained. When special variations are made, as in the case of precision bearings, prefixes and suffixes are added which have definite meanings as follows:

#### PREFIXES

- MM** • Super Precision • ABEC 7/ABEC 9 (ISO P4/P2)
- 2MM/2MMV** • Super Precision between ABEC 7 and ABEC 9 (ISO P4/P2) • low contact angle - 15°
- 3MM/3MMV** • Super Precision between ABEC 7 and ABEC 9 (ISO P4/P2) • high contact angle - 25°
- MMX** • Ultra Precision • ABEC 9 • (ISO P2)

#### SUFFIXES

- K** • Deep groove radial
- WI** • Angular contact-low shoulder on outer
- WO** • Angular contact-low shoulder on inner
- WN** • Angular contact-low shoulder on both inner and outer
- HX** • Angular contact-low shoulder on both inner and outer
- CR** • Composition cage (non-metallic)
- MBR** • Machined bronze cage
- SR** • Machined steel cage
- PRB** • Molded nylon cage
- PRC** • Molded nylon cage (reinforced)
- PRF, PRG** • Special high performance material
- SUL** • Flush-ground single bearing • Light preload
- SUM** • Flush-ground single bearing • Medium preload
- SUH** • Flush-ground single bearing • Heavy preload
- DUL** • Flush-ground duplex bearings • Light preload
- DUM** • Flush-ground duplex bearings • Medium preload
- DUH** • Flush-ground duplex bearings • Heavy preload
- TUL** • Flush-ground triplex bearings • Light preload
- TUM** • Flush-ground triplex bearings • Medium preload
- TUH** • Flush-ground triplex bearings • Heavy preload
- QUL** • Flush-ground quadruplex bearings • Light preload
- QUM** • Flush-ground quadruplex bearings • Medium preload
- QUH** • Flush-ground quadruplex bearings • Heavy preload

### PERFORMANCE

The performance of a super precision bearing is not completely defined by the ABEC/ISO classes. The latitude of these classes allows for a significant range of variability in product performance among bearing manufacturers. Characteristics such as raceway curvature and uniformity; the balls' conformance to sphericity; race and ball surface finish; waviness of contact areas; preload offset tolerance; cleanliness; calibration of envelope dimensions; matching of bearings within a set; cage design and material; lubricant; radial play; contact angle and precision of ball complement are not defined by ABEC/ISO. All have a direct impact on the service life and performance of a bearing. The lack of a comprehensive standard allows inferior bearings to be marketed as ABEC 7 or 9 (ISO P4 or P2) without the ability to produce superior performance. All Timken MM, MMV, and MMX precision grade comply with strict controls over these non-specified parameters, to provide premium performance.

## OPTIMIZED GRADES OF PRECISION

### MM, MMV – SUPER PRECISION, SUPER HIGH PRECISION (ABEC 7/9, ISO P4/P2)

Super precision bearings manufactured to the MM(V) tolerance class operate with running accuracy and performance levels meeting ABEC 9 (ISO P2) yet maintain non-critical features at ABEC 7 (ISO P4) level for cost-effectiveness. Bore and O.D. surfaces are coded in micron units for the convenience of the discriminating machine tool builder striving for optimum fitting of crucial spindle components.

### MMX – ULTRAPRECISION (ABEC 9, ISO P2)

Super precision bearings with closer tolerances and running accuracies than ABEC 7 (ISO P4) bearings are made to ABEC 9 (ISO P2) tolerances. Bearings produced to these tolerances are generally used on ultra-high-speed grinding spindles designed for tight dimensional tolerances and super-fine surface finishes. Contact your Timken representative for availability of product range.

## BEARING TYPES

### ANGULAR-CONTACT BEARINGS

2MM-WI types with 15 degree initial contact angle are designed to meet the needs of machine builders for precision bearings which will operate at as low a temperature as possible for a wide range of speeds and operating loads. In order for machines to produce more accurate work at a higher production rate, the bearings must provide a high degree of rigidity in both axial and radial directions while operating at minimum temperatures. For example, precision machining or cutting tools impose heavier loads on bearings than those encountered in precision grinding. In the former, speeds are slower and loads heavier than the latter, where speeds are high and loads light. The 2MM-WI Type gives the machine builder the flexibility required to meet such variations in applications.

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**3MM-WI** manufactured with 25 degree contact angle, are for use on applications where the loading on the bearings is predominately thrust – and a high degree of axial rigidity is a definite requirement. Typical applications for these are large vertical rotary surface grinders, horizontal and vertical disc grinders, and thrust bearing applications for heavy-duty lathes where the bearings must directly carry extremely high tail stock or chucking pressure.

**2MM-WO** with 15 degree initial contact angle are designed for extremely high-speed applications where centrifugal force of the balls is the principal load on the bearing. Unlike the MM-WI Type, which has a low shoulder outer ring, the 2MM-WO Type has full shoulders on both sides of the outer race and a low shoulder on one side of the inner ring. This design permits assembly with a maximum complement of balls and a one-piece cage which pilots against the precision-ground lands of the outer ring. Generally this bearing series is supplied with a separable inner ring and ball retaining cage along with special race geometry for extremely high-speed operation.

**2MMV and 3MMV-HX** are dimensionally interchangeable with equivalent 9100, 99100, 9300 and ISO Series-10 and 19 bearings. These designs enable spindle heads to remove more material in less time while maintaining superior machining tolerances. This is achieved through a proven combination of unique ball complements with precision engineering raceway geometries.

**2MMV and 3MMV-HX VV** possess all of the high-speed advantages of the HX but with true high speed seals. These bearing seals protect lubricant from outside contaminants while ensuring internal lubricant retention, extending service life significantly.

**2MMV and 3MMV 99100WN** are available with 15 degree or 25 degree contact angle variations and have been developed to operate under the demanding requirements of high-speed machine tools. They incorporate design features which permit operation at higher speeds than standard angular contact ball bearings. The bore, outside diameter and width are the same as the MM9100 Series.

### BALL SCREW SUPPORT BEARINGS

To meet the demands of the servo-controlled machinery field, the Timken® Fafnir® ball screw support bearings are specially designed with steep contact angles and offer high levels of stiffness for ball screw application requirements. Timken's most recent product offering in this area is a series of double-row, sealed, flanged (or cartridge) units that use an integral double-row outer ring to help simplify installation procedures. Timken offers the following ball screw support bearing products:

- Inch Series bearings (MM9300)
- Metric Series bearings (MMBS)
- Flanged Cylindrical Cartridge housings (BSBU)
- Pillow Block housings (BSPB)
- Integral Double-Row units (MMN, MMF)



2MM-WI &  
3MM-WI Types



HXVV Types



2MMV99100 Types



MM9300WI DUH (Inch)  
MM...BS...DUH (Metric)

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## BALL BEARINGS

### INTRODUCTION

Workhead and tool spindles are the most important components of machine tools. Consequently, to reach the requirements for spindle speed, work accuracy and finish, selection of the proper size and type of ball bearings to support these spindles is a critical design problem.

Of all the anti-friction bearing types, super precision ball bearings have proved to be the best value for the wide variety of bearing applications covering broad ranges of operating loads, speeds and lubrication conditions. Duplexed, preloaded, angular contact bearings with one-piece composition retainers, have excellent capacity and provide maximum spindle rigidity. These bearings are widely used in achieving faster speeds, greater accuracy, smoother finishes and higher production rates.

Many considerations are involved in the choice of bearings for precision applications. Among those which influence the performance of machine tool spindles are the internal fit-up and geometry of the bearings, the mounting arrangement, the shaft and housing mounting fits, the balance and alignment of the rotating parts, and last, but equally important, the lubrication. While many of these factors are significant in slow-speed applications, all of them must be considered for high-speed spindles.

To minimize deflection under load, shafts for machine tool spindles are designed to have a minimum unsupported length and maximum cross-section. For the same reason, spindle housings are designed heavy enough to carry the work load. Their cross-sections are made as uniform as possible to reduce stress concentration during uneven deflection of the frame due to thermal changes. In addition, heavy, well-proportioned housings can function as sinks to conduct heat away from ball bearings.

### SELECTIVE ASSEMBLY

Under certain conditions it may be desirable to control fits more accurately without the added expense of using closer tolerance bearings and assembly parts. This can be accomplished by selective assembly of the bearings, shafts, and housings, after they have been sized and sorted according to bores and outside diameters. Timken provides bore and O.D. micron coding as standard practice for super precision angular contact radial ball bearings. This improved fit-up at assembly provides a higher degree of precision from the spindle.

### SUCCESSFUL APPLICATIONS

Detailed assembly drawings on the following pages are representative of successful applications of Timken® Fafnir® super precision bearings on such equipment; high-cycle wheel heads; high-speed internal grinding spindles; super precision work heads; and high-speed router spindles. It is hoped that these arrangements will stimulate questions regarding your particular application problems which will promptly be addressed by your Timken representative.

### SPECIAL REQUIREMENTS

High-speed grease-lubricated spindles and heavy precision workheads requiring unusual rigidity and running accuracy are a few of the many special problems involving super precision bearings. These and many other applications generally require design features that can be reviewed by your Timken representative.

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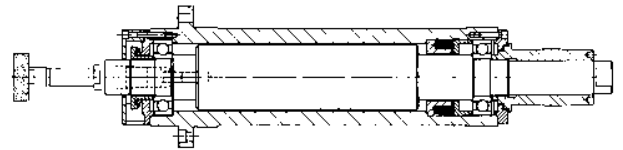




## APPLICATIONS

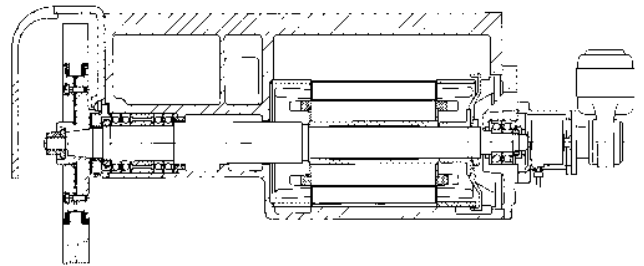
### HIGH-SPEED INTERNAL GRINDING SPINDLE

Designed for internal precision grinding, this spindle incorporates 2MM9106W0-CR super precision bearings, preloaded by a nest of coiled helical springs mounted in a cartridge. Thrust load exerted by the springs assures intimate contact of the balls with the bearing raceways under all operating conditions. The sealed construction provides highly effective protection against intrusion of coolant and foreign matter. Grease, packed in each bearing prior to assembly, is sealed-in for life. Operating speed of this spindle is 25000 RPM.



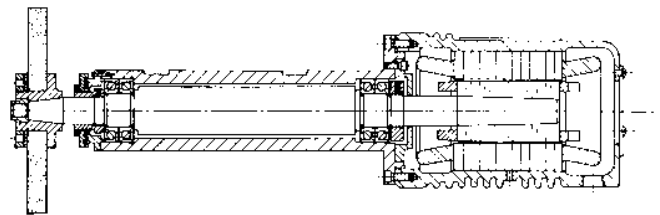
### ULTRA PRECISION SURFACE GRINDING SPINDLE

2MMX9122W1-DUM super precision bearings, produced to ABEC9 tolerances, are employed in this horizontal surface grinding spindle for maximum rigidity and accuracy. A back-to-back pair of 2MM312W1-CR-DUL super precision bearings is used at the floating location. This spindle grinds surfaces that are accurate within .000025 inch, flat and parallel, are square within .000010 inch, and to a surface finish of 5 rms, or better. The spindle, driven by a 30 hp motor, operates at 900 RPM. Bearings are packed with grease prior to assembly.



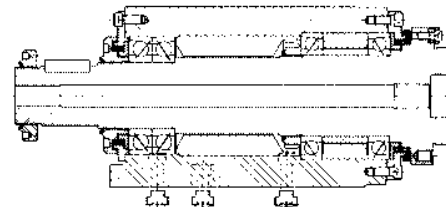
### PRECISION SURFACE GRINDING SPINDLE

This motorized surface grinding spindle, operating at 3600 RPM, uses 2MM9107W1-DUM duplex super precision preloaded bearings at both locations, mounted back-to-back, with one pair floating. Labyrinth slinger-type sealing prevents entry of contaminants and seals in the lubrication. Bearings are grease lubricated for life.



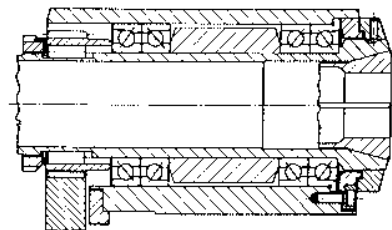
### HEAVY-DUTY PRECISION BORING SPINDLE

Super precision, duplexed, preloaded bearings mounted back-to-back are used at each location in this boring spindle to assure smooth performance and a high degree of radial and axial rigidity. Operating speeds vary between 200 and 3000 RPM. Equal-length spacers between the bearings at the work end increase spindle rigidity. When the bearings are properly positioned on the shaft and the respective rings securely clamped, the preload is reproduced and no subsequent adjustment is required. Just prior to assembly, each bearing is packed with grease for life.



### SIX-SPINDLE AUTOMATIC SCREW MACHINE

This bearing arrangement meets the demand for a high-speed, heavy-duty, multiple-spindle screw machine to operate with constant accuracy at maximum production. Because of the hollow shaft construction and the short distance between bearings, extra-light series duplex pairs are used at each location. This affords a high degree of radial rigidity and adds stiffness to the shaft. By mounting a duplex pair of flanged (3MMF) bearings with a 2MM super precision bearing, back-to-back, under a predetermined preload at the front end, accuracy and rigidity of the spindle are assured and permit a straight housing bore. The rear pair of back-to-back bearings is allowed to float in the housing, making an outer-ring spacer unnecessary. Lubrication is by pressure-feed oil circulation.



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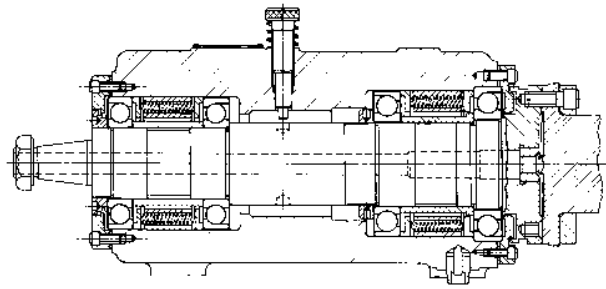




## BALL BEARINGS

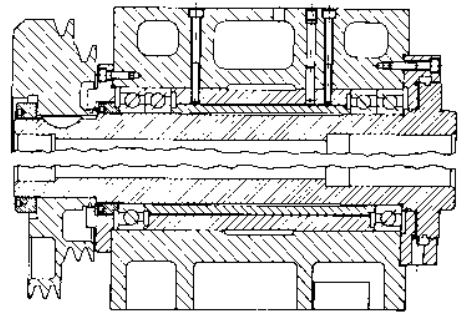
### HIGH-SPEED PRECISION BORING HEAD

This high-speed boring head operates at 2500 to 3000 RPM, employing angular-contact, super precision bearings. The front bearings are of different sizes. The outer ring of the larger bearing abuts and is clamped against the housing shoulder. The inboard bearing is permitted to move axially in its housing under spring load. At the rear location two bearings, of the same size and spring loaded, are allowed to float in the housing as temperature differentials occur in the operation spindle. With this head, interference shafts may be permitted without affecting bearing preload. Excessive heat generation is prevented, resulting in low operating temperatures. Bearings are grease lubricated.



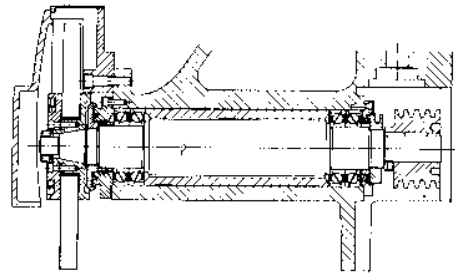
### ULTRA PRECISION GRINDING WORKHEAD

This workhead must maintain straightness and roundness accuracy within ten millionths (.000010) of an inch. To meet such rigid requirements for extremely close dimensional control, ultra precision ball bearings and a shaft of extra stiffness are used. The bearings for such applications are manufactured to tolerances closer than those for ABEC 9 (ISO P2) specifications. Equally important is the high degree of workmanship and accuracy with which the shaft, housing and component parts of the workhead must be made. Upper section shows a four-bearing arrangement for heavy work. Lower half shows a two-bearing mounting for lighter work. In either case, the bearings are packed with grease, prior to mounting.



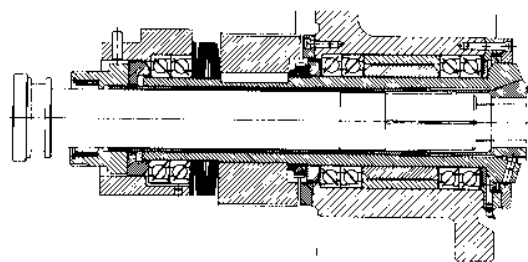
### PRECISION TOOLROOM SURFACE GRINDER SPINDLE

Timken® Fafnir® duplexed, super precision, preloaded bearings used in this spindle provide the high degree of rigidity in both directions necessary to meet requirements for modern surface grinding and to assure efficient performance at a low operating temperature. The housing is bored straight-through to assure true alignment – the housing shoulders are eliminated. The precision ground outer sleeve is doweled to the housing to provide the means for stabilizing the spindle axially at the work end bearing location. The rear pair of bearings floats to compensate for thermal changes. Bearings are grease lubricated for life just prior to assembly.



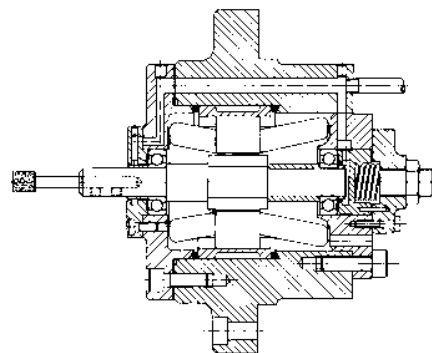
### SINGLE BAR MACHINE

This spindle is supported by two pairs of 2MM9124WI-DUM super precision bearings, mounted back-to-back in tandem pairs. Operating speeds vary from 78 to 1500 RPM. A pair of 2MM9122WI-DUM bearings mounted in tandem carries a 25000 pound thrust load during the unchucking operation. The bearings are grease packed for life prior to assembly.



### 100,000 RPM HIGH-CYCLE WHEELHEAD

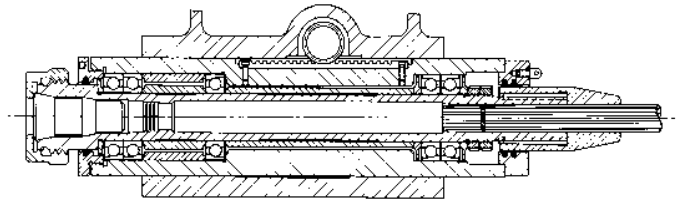
Super precision 2MMX9101WO-CR bearings produced to ABEC 9 (ISO P2) RPM tolerances are spring-loaded in this wheelhead which operates at 100,000 RPM. Oil mist lubrication is employed and the motor is water cooled.



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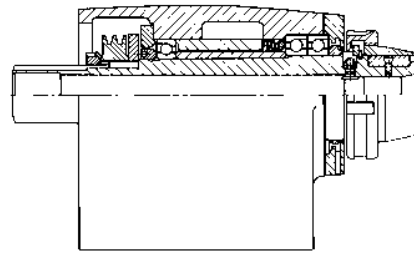
### PRECISION JIG-BORING SPINDLE

This jig-boring spindle delivers extreme accuracy over a wide range of speeds. Excellently designed, it is supported with 2MM210WI-DUM grease-lubricated super precision bearings. With this spindle, holes located to an accuracy of one ten-thousandth (.0001) of an inch are bore ground straight and to size limits of better than two ten-thousandths (.0002) of an inch.



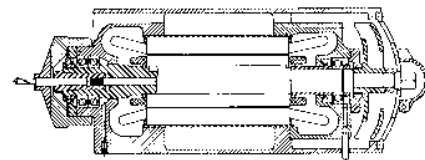
### SUPER PRECISION LATHE HEADSTOCK

This lathe spindle produces work held to a roundness of 35 millionths (.000035) of an inch. Maximum operating speed is 4800 RPM. Tandem pair of 3MM9114WI-DUL bearings is opposed by a spring-loaded 3MM9113WI bearing, resulting in excellent spindle rigidity. Bearings are prelubricated with grease.



### HIGH-SPEED MOTORIZED ROUTER

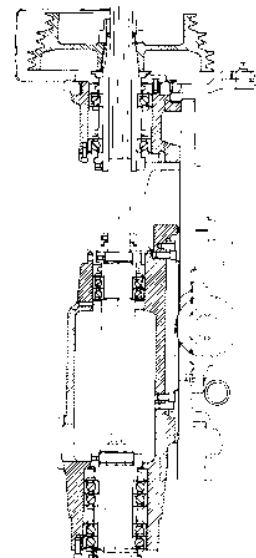
A specially matched duplex pair of Timken® Fafnir® 2MM210WI-DU-FS223 super precision ball bearings, mounted back-to-back at the work end, affords the necessary bearing rigidity to permit routing through aluminum plate one inch thick with a single pass. The upper bearing is spring-loaded and permitted to float. Router is driven by a 30 hp motor at speeds up to 15000 RPM, and uses oil mist lubrication.



### PRECISION VERTICAL MILLING SPINDLE

This spindle operates at 12 different speeds ranging from 260 to 6200 rpm under a wide variety of conditions. At the work end, two duplex pairs of Timken Fafnir 2MM212WI-DUL preloaded bearings are mounted in tandem in a back-to-back arrangement, separated by spacers of equal length. This affords extremely high radial and axial rigidity. At the center, a pair of Timken Fafnir 2MM210WI-DUL bearings mounted back-to-back permits axial float of the spindle to compensate for thermal changes.

The driving pulley shaft is rigidly supported by a widely spaced duplex pair of Timken Fafnir 2MM212WI-DUL preloaded bearings. All bearings are grease packed for life.



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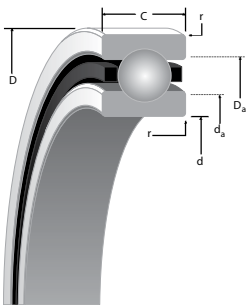




# BALL BEARINGS

## ULTRA-LIGHT 2(3)MM9300WI (ISO 19) SERIES

### DIMENSIONAL SERIES METRIC



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#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore   | D<br>O.D.   | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>kg | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                  |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                  |                                |
|------------------------------|-------------|-------------|---------------------------|---------------------|-----------|---------------------------------------------------|------------------|--------------------------------|---------------------------------------------------|------------------|--------------------------------|
|                              |             |             |                           |                     |           | Co (stat)                                         | Ce (dyn)         | Limiting Speed <sup>(Ng)</sup> | Co (stat)                                         | Ce (dyn)         | Limiting Speed <sup>(Ng)</sup> |
|                              |             |             |                           |                     |           | N                                                 | N                | RPM                            | N                                                 | N                | RPM                            |
| 9300WI                       | 10<br>(4)   | 22<br>(5)   | 6<br>(40)                 | 12 x 3.2            | 0.01      | 1640<br>1460                                      | 3510<br>3510     | 77500<br>93000                 | 1580<br>1410                                      | 3380<br>3380     | 69800<br>83760                 |
| 9301WI                       | 12<br>(4)   | 24<br>(5)   | 6<br>(80)                 | 13 x 3.2            | 0.01      | 1840<br>1640                                      | 3690<br>3690     | 67200<br>80640                 | 1770<br>1580                                      | 3550<br>3550     | 66500<br>79800                 |
| 9302WI                       | 15<br>(4)   | 28<br>(5)   | 7<br>(80)                 | 13 x 3.6            | 0.02      | 2370<br>2110                                      | 4560<br>4560     | 55600<br>66720                 | 2280<br>2030                                      | 4360<br>4360     | 50000<br>60000                 |
| 9303WI                       | 17<br>(4)   | 30<br>(5)   | 7<br>(80)                 | 14 x 3.6            | 0.02      | 2800<br>2500                                      | 4970<br>4970     | 50100<br>60120                 | 2680<br>2380                                      | 4740<br>4740     | 45100<br>5120                  |
| 9304WI                       | 20<br>(5)   | 37<br>(6)   | 9<br>(120)                | 14 x 4.8            | 0.04      | 4560<br>4050                                      | 8080<br>8080     | 42100<br>50520                 | 4360<br>3880                                      | 7700<br>7700     | 41600<br>49920                 |
| 9305WI                       | 25<br>(5)   | 42<br>(6)   | 9<br>(120)                | 17 x 4.8            | 0.04      | 5750<br>5120                                      | 9040<br>9040     | 34800<br>41760                 | 5470<br>4860                                      | 8590<br>8590     | 31300<br>37500                 |
| 9306WI                       | 30<br>(5)   | 47<br>(6)   | 9<br>(120)                | 19 x 4.8            | 0.05      | 6610<br>5890                                      | 9540<br>9540     | 29700<br>35640                 | 6270<br>5580                                      | 9040<br>9040     | 26700<br>32000                 |
| 9307WI                       | 35<br>(6)   | 55<br>(7)   | 10<br>(120)               | 19 x 5.6            | 0.08      | 9020<br>8020                                      | 12600<br>12600   | 25400<br>30480                 | 8530<br>7590                                      | 11600<br>11600   | 22900<br>27500                 |
| 9308WI                       | 40<br>(6)   | 62<br>(7)   | 12<br>(120)               | 19 x 6.4            | 0.11      | 11700<br>10400                                    | 16000<br>16000   | 22400<br>26880                 | 11100<br>9890                                     | 15100<br>15100   | 20200<br>2250                  |
| 9309WI                       | 45<br>(6)   | 68<br>(7)   | 12<br>(120)               | 21 x 6.4            | 0.13      | 13200<br>11700                                    | 16800<br>16800   | 20000<br>24000                 | 12500<br>11100                                    | 15900<br>15900   | 18000<br>21600                 |
| 9310WI                       | 50<br>(6)   | 72<br>(7)   | 12<br>(120)               | 23 x 6.4            | 0.14      | 14600<br>13000                                    | 17600<br>17600   | 18300<br>21960                 | 13800<br>12300                                    | 16600<br>16600   | 16500<br>14800                 |
| 9311WI                       | 55<br>(7)   | 80<br>(7)   | 13<br>(150)               | 23 x 7.1            | 0.19      | 18500<br>16400                                    | 21800<br>21800   | 16600<br>19920                 | 17400<br>15500                                    | 20600<br>20600   | 14900<br>17900                 |
| 9312WI                       | 60<br>(7)   | 85<br>(8)   | 13<br>(150)               | 25 x 7.1            | 0.20      | 20200<br>18000                                    | 22700<br>22700   | 15300<br>18360                 | 19000<br>16900                                    | 21400<br>21400   | 13800<br>16500                 |
| 9313WI                       | 65<br>(7)   | 90<br>(8)   | 13<br>(150)               | 27 x 7.1            | 0.22      | 21900<br>19500                                    | 23600<br>23600   | 14200<br>17040                 | 20400<br>18100                                    | 22200<br>22200   | 12800<br>15300                 |
| 9314WI                       | 70<br>(7)   | 100<br>(8)  | 16<br>(150)               | 24 x 8.7            | 0.34      | 29000<br>25800                                    | 32000<br>32000   | 13100<br>15720                 | 27300<br>24300                                    | 30200<br>30200   | 11800<br>14100                 |
| 9315WI                       | 75<br>(7)   | 105<br>(8)  | 16<br>(150)               | 25 x 8.7            | 0.36      | 30300<br>26900                                    | 32500<br>32500   | 12300<br>14760                 | 28400<br>25200                                    | 30600<br>30600   | 11100<br>13300                 |
| 9316WI                       | 80<br>(7)   | 110<br>(8)  | 16<br>(150)               | 27 x 8.7            | 0.39      | 32700<br>29100                                    | 33800<br>33800   | 11600<br>13920                 | 30500<br>27100                                    | 31900<br>31900   | 10400<br>12500                 |
| 9317WI                       | 85<br>(8)   | 120<br>(8)  | 18<br>(200)               | 26 x 9.5            | 0.56      | 37500<br>33400                                    | 38700<br>38700   | 10800<br>12960                 | 35000<br>31200                                    | 36500<br>36500   | 9700<br>11600                  |
| 9318WI                       | 90<br>(8)   | 125<br>(9)  | 18<br>(200)               | 26 x 10.3           | 0.57      | 44000<br>39200                                    | 45000<br>45000   | 10300<br>12360                 | 41200<br>36700                                    | 42400<br>42400   | 9300<br>11100                  |
| 9319WI                       | 95<br>(8)   | 130<br>(9)  | 18<br>(200)               | 28 x 10.3           | 0.60      | 47400<br>42200                                    | 46800<br>46800   | 9800<br>11760                  | 44200<br>39300                                    | 44100<br>44100   | 8800<br>10500                  |
| 9320WI                       | 100<br>(8)  | 140<br>(9)  | 20<br>(200)               | 29 x 10.3           | 0.85      | 48800<br>43400                                    | 47200<br>47200   | 9100<br>10920                  | 45500<br>40500                                    | 44400<br>44400   | 8200<br>9800                   |
| 9322WI                       | 110<br>(8)  | 150<br>(9)  | 20<br>(200)               | 31 x 10.3           | 0.92      | 51700<br>46000                                    | 48400<br>48400   | 8400<br>10080                  | 48200<br>42900                                    | 45600<br>45600   | 7600<br>9100                   |
| 9324WI                       | 120<br>(8)  | 165<br>(10) | 22<br>(200)               | 30 x 11.9           | 1.24      | 66900<br>59500                                    | 62000<br>62000   | 7700<br>9240                   | 62300<br>55500                                    | 58300<br>58300   | 6900<br>8300                   |
| 9326WI                       | 130<br>(10) | 180<br>(10) | 24<br>(250)               | 30 x 13.5           | 1.65      | 86400<br>76900                                    | 78500<br>78500   | 7100<br>8520                   | 80500<br>71700                                    | 73900<br>73900   | 6400<br>7700                   |
| 9328WI                       | 140<br>(10) | 190<br>(10) | 24<br>(250)               | 32 x 13.5           | 1.75      | 91600<br>81500                                    | 80700<br>80700   | 6600<br>7920                   | 85400<br>76000                                    | 76000<br>76000   | 5900<br>7000                   |
| 9330WI                       | 150<br>(10) | 210<br>(10) | 28<br>(250)               | 27 x 17.5           | 2.61      | 130800<br>116400                                  | 119200<br>119200 | 6200<br>7440                   | 122700<br>109200                                  | 112400<br>112400 | 5600<br>6700                   |
| 9332WI                       | 160<br>(10) | 220<br>(10) | 28<br>(250)               | 27 x 18.3           | 2.75      | 143100<br>127300                                  | 128900<br>128900 | 5800<br>6960                   | 134100<br>119300                                  | 121600<br>121600 | 5800<br>6690                   |
| 9334WI                       | 170<br>(10) | 230<br>(11) | 28<br>(250)               | 29 x 18.3           | 2.88      | 153600<br>13670                                   | 133700<br>133700 | 5500<br>6600                   | 143200<br>127500                                  | 126000<br>126000 | 5000<br>6000                   |
| 9340WI                       | 200<br>(12) | 280<br>(13) | 38<br>(300)               | 27 x 23.8           | 6.29      | 243300<br>216300                                  | 209400<br>209400 | 4600<br>5520                   | 228800<br>203600                                  | 19700<br>19700   | 4100<br>4900                   |

<sup>(Ng)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |       |                          |       | Shaft Diameter |         | Mounting Fits |       | FIXED                        |         |               |       | FLOATING                     |         |                   |       | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|-------|--------------------------|-------|----------------|---------|---------------|-------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |       | D <sub>a</sub> (Housing) |       | Min.           | Max.    | Loose         | Tight | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |                                    |
|                          | Max.                            | Min.  | Max.                     | Min.  |                |         |               |       | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |                                    |
| mm                       | mm                              | mm    | mm                       | mm    | mm             | mm      | mm            | mm    | mm                           | mm      | mm            | mm    | mm                           | mm      | mm                | mm    |                                    |
| 0.3                      | 13.2                            | 13    | 19.6                     | 19.3  | 9.995          | 10.000  | 0.005         | 0.004 | 22                           | 22.005  | 0.000         | 0.010 | 22.010                       | 22.005  | 0.015             | 0.005 | 9300WI                             |
| 0.3                      | 15.2                            | 14.9  | 21.6                     | 21.3  | 11.995         | 12.000  | 0.005         | 0.004 | 24                           | 24.005  | 0.000         | 0.010 | 24.010                       | 24.005  | 0.015             | 0.005 | 9301WI                             |
| 0.3                      | 18.3                            | 18.1  | 25.5                     | 25.2  | 14.995         | 15.000  | 0.005         | 0.004 | 28                           | 28.005  | 0.000         | 0.010 | 28.010                       | 28.005  | 0.015             | 0.005 | 9302WI                             |
| 0.3                      | 20.3                            | 20    | 27.5                     | 27.2  | 16.995         | 17.000  | 0.005         | 0.004 | 30                           | 30.005  | 0.000         | 0.010 | 30.010                       | 30.005  | 0.015             | 0.005 | 9303WI                             |
| 0.3                      | 24.1                            | 23.9  | 33.7                     | 33.4  | 19.995         | 20.000  | 0.005         | 0.005 | 37                           | 37.006  | 0.000         | 0.012 | 37.010                       | 37.005  | 0.016             | 0.005 | 9304WI                             |
| 0.3                      | 29.1                            | 28.9  | 38.7                     | 38.4  | 24.995         | 25.000  | 0.005         | 0.005 | 42                           | 42.006  | 0.000         | 0.012 | 42.010                       | 42.005  | 0.016             | 0.005 | 9305WI                             |
| 0.3                      | 34.1                            | 33.9  | 43.7                     | 43.4  | 29.995         | 30.000  | 0.005         | 0.005 | 47                           | 47.006  | 0.000         | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | 9306WI                             |
| 0.6                      | 40                              | 39.5  | 51.1                     | 50.6  | 34.995         | 35.000  | 0.005         | 0.006 | 55                           | 55.008  | 0.000         | 0.015 | 55.012                       | 55.007  | 0.019             | 0.007 | 9307WI                             |
| 0.6                      | 45.1                            | 44.6  | 57.9                     | 57.4  | 39.995         | 40.000  | 0.005         | 0.006 | 62                           | 62.008  | 0.000         | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | 9308WI                             |
| 0.6                      | 50.7                            | 50.1  | 63.4                     | 62.9  | 44.995         | 45.000  | 0.005         | 0.006 | 68                           | 68.008  | 0.000         | 0.015 | 68.012                       | 68.007  | 0.019             | 0.007 | 9309WI                             |
| 0.6                      | 55.1                            | 54.6  | 67.9                     | 67.4  | 49.995         | 50.000  | 0.005         | 0.006 | 72                           | 72.008  | 0.000         | 0.015 | 72.011                       | 72.007  | 0.019             | 0.007 | 9310WI                             |
| 1                        | 60.9                            | 60.4  | 75.2                     | 74.7  | 54.995         | 55.000  | 0.005         | 0.007 | 80                           | 80.008  | 0.000         | 0.015 | 80.012                       | 80.008  | 0.020             | 0.008 | 9311WI                             |
| 1                        | 65.8                            | 65.3  | 80.2                     | 79.7  | 59.995         | 60.000  | 0.005         | 0.007 | 85                           | 85.008  | 0.000         | 0.016 | 85.016                       | 85.009  | 0.024             | 0.009 | 9312WI                             |
| 1                        | 70.8                            | 70.3  | 85.2                     | 84.7  | 64.995         | 65.000  | 0.005         | 0.007 | 90                           | 90.008  | 0.000         | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | 9313WI                             |
| 1                        | 76.8                            | 76.3  | 94.3                     | 93.8  | 69.995         | 70.000  | 0.005         | 0.007 | 100                          | 100.008 | 0.000         | 0.016 | 100.018                      | 100.010 | 0.025             | 0.010 | 9314WI                             |
| 1                        | 81.9                            | 81.1  | 99.4                     | 98.6  | 74.995         | 75.005  | 0.005         | 0.012 | 105                          | 105.008 | 0.000         | 0.016 | 105.019                      | 105.011 | 0.026             | 0.011 | 9315WI                             |
| 1                        | 86.9                            | 86.1  | 104.4                    | 103.6 | 79.995         | 80.005  | 0.005         | 0.012 | 110                          | 110.008 | 0.000         | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | 9316WI                             |
| 1                        | 93.6                            | 92.8  | 112.7                    | 111.9 | 84.995         | 85.005  | 0.005         | 0.012 | 120                          | 120.008 | 0.000         | 0.016 | 120.018                      | 120.010 | 0.025             | 0.010 | 9317WI                             |
| 1                        | 97.8                            | 97    | 118.5                    | 117.7 | 89.995         | 90.005  | 0.005         | 0.013 | 125                          | 125.008 | 0.000         | 0.017 | 125.021                      | 125.011 | 0.030             | 0.011 | 9318WI                             |
| 1                        | 102.8                           | 102   | 123.5                    | 122.7 | 94.995         | 95.005  | 0.005         | 0.013 | 130                          | 130.009 | 0.000         | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | 9319WI                             |
| 1                        | 110.3                           | 109.5 | 131                      | 130.2 | 99.995         | 100.005 | 0.005         | 0.013 | 140                          | 140.009 | 0.000         | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | 9320WI                             |
| 1                        | 120.3                           | 119.5 | 141                      | 140.2 | 109.995        | 110.005 | 0.005         | 0.013 | 150                          | 150.009 | 0.000         | 0.018 | 150.023                      | 150.012 | 0.032             | 0.012 | 9322WI                             |
| 1                        | 131.2                           | 130.4 | 155                      | 154.3 | 119.995        | 120.005 | 0.005         | 0.013 | 165                          | 165.01  | 0.000         | 0.020 | 165.022                      | 165.012 | 0.032             | 0.012 | 9324WI                             |
| 1.5                      | 142.1                           | 141.4 | 169.2                    | 168.4 | 129.995        | 130.005 | 0.005         | 0.015 | 180                          | 180.01  | 0.000         | 0.020 | 180.022                      | 180.012 | 0.032             | 0.012 | 9326WI                             |
| 1.5                      | 152.1                           | 151.4 | 179.2                    | 178.4 | 139.995        | 140.005 | 0.005         | 0.015 | 190                          | 190.01  | 0.000         | 0.021 | 190.022                      | 190.012 | 0.033             | 0.012 | 9328WI                             |
| 2                        | 163.1                           | 162.4 | 198.2                    | 197.4 | 149.995        | 150.005 | 0.005         | 0.015 | 210                          | 210.011 | 0.000         | 0.022 | 210.025                      | 210.015 | 0.036             | 0.015 | 9330WI                             |
| 2                        | 173.2                           | 172.4 | 208.2                    | 207.4 | 159.995        | 160.005 | 0.005         | 0.015 | 220                          | 220.011 | 0.000         | 0.022 | 220.025                      | 220.015 | 0.036             | 0.015 | 9332WI                             |
| 2                        | 185.4                           | 184.7 | 216.1                    | 215.4 | 169.995        | 170.005 | 0.005         | 0.015 | 230                          | 230.011 | 0.000         | 0.022 | 230.025                      | 230.015 | 0.036             | 0.015 | 9334WI                             |
| 2.1                      | 216.8                           | 216   | 264.5                    | 263.7 | 199.993        | 200.008 | 0.007         | 0.019 | 280                          | 280.013 | 0.000         | 0.026 | 280.031                      | 280.018 | 0.044             | 0.018 | 9340WI                             |

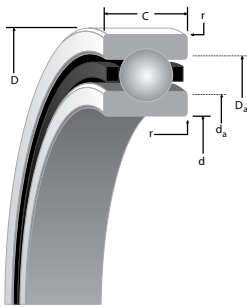




# BALL BEARINGS

## ULTRA-LIGHT 2(3)MM9300WI (ISO 19) SERIES

### DIMENSIONAL SERIES INCHES



D

### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore       | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.   | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                |                                |
|------------------------------|-----------------|-----------------|---------------------------|---------------------|-------|---------------------------------------------------|----------------|--------------------------------|---------------------------------------------------|----------------|--------------------------------|
|                              |                 |                 |                           |                     |       | Co (stat)                                         | Ce (dyn)       | Limiting Speed <sup>(N9)</sup> | Co (stat)                                         | Ce (dyn)       | Limiting Speed <sup>(N9)</sup> |
|                              |                 |                 |                           |                     |       | lbs.                                              | lbs.           | RPM                            | lbs.                                              | lbs.           | RPM                            |
| 9300WI                       | 0.3937<br>(1.5) | 0.8661<br>(2)   | 0.2362<br>(16)            | 12 x 1/8            | 0.02  | 370<br>330                                        | 790<br>790     | 77500<br>93000                 | 360<br>320                                        | 760<br>760     | 69800<br>83760                 |
| 9301WI                       | 0.4724<br>(1.5) | 0.9449<br>(2)   | 0.2362<br>(31)            | 13 x 1/8            | 0.03  | 410<br>370                                        | 830<br>830     | 67200<br>80640                 | 400<br>350                                        | 800<br>800     | 60500<br>79800                 |
| 9302WI                       | 0.5906<br>(1.5) | 1.1024<br>(2)   | 0.2756<br>(31)            | 13 x 9/64           | 0.04  | 530<br>470                                        | 1030<br>1030   | 55600<br>66720                 | 510<br>460                                        | 980<br>980     | 50000<br>60000                 |
| 9303WI                       | 0.6693<br>(1.5) | 1.1811<br>(2)   | 0.2756<br>(31)            | 14 x 9/64           | 0.04  | 630<br>560                                        | 1120<br>1120   | 50100<br>60120                 | 600<br>540                                        | 1070<br>1070   | 45100<br>54120                 |
| 9304WI                       | 0.7874<br>(2)   | 1.4567<br>(2.5) | 0.3543<br>(47)            | 14 x 3/16           | 0.08  | 1020<br>910                                       | 1820<br>1820   | 42100<br>50520                 | 920<br>870                                        | 1730<br>1730   | 37900<br>49920                 |
| 9305WI                       | 0.9843<br>(2)   | 1.6535<br>(2.5) | 0.3543<br>(47)            | 17 x 3/16           | 0.1   | 1290<br>1150                                      | 2030<br>2030   | 34800<br>41760                 | 1230<br>1090                                      | 1930<br>1930   | 31300<br>37560                 |
| 9306WI                       | 1.1811<br>(2)   | 1.8504<br>(2.5) | 0.3543<br>(47)            | 19 x 3/16           | 0.11  | 1490<br>1320                                      | 2150<br>2150   | 29700<br>35640                 | 1410<br>1260                                      | 2030<br>2030   | 26700<br>32040                 |
| 9307WI                       | 1.378<br>(2.5)  | 2.1654<br>(3)   | 0.3937<br>(47)            | 19 x 7/32           | 0.17  | 2030<br>1800                                      | 2830<br>2830   | 25400<br>30480                 | 1920<br>1710                                      | 2680<br>2680   | 22900<br>27480                 |
| 9308WI                       | 1.5748<br>(2.5) | 2.4409<br>(3)   | 0.4724<br>(47)            | 19 x 1/4            | 0.25  | 2640<br>2350                                      | 3600<br>3600   | 22400<br>26880                 | 2500<br>2220                                      | 3400<br>3400   | 20200<br>24240                 |
| 9309WI                       | 1.7717<br>(2.5) | 2.6772<br>(3)   | 0.4724<br>(47)            | 21 x 1/4            | 0.29  | 2960<br>2640                                      | 3785<br>3785   | 20000<br>24000                 | 2810<br>2500                                      | 3560<br>3560   | 18000<br>21600                 |
| 9310WI                       | 1.9685<br>(2.5) | 2.8346<br>(3)   | 0.4724<br>(47)            | 23 x 1/4            | 0.3   | 3290<br>2930                                      | 3950<br>3950   | 18300<br>21960                 | 3100<br>2760                                      | 3730<br>3730   | 16500<br>19800                 |
| 9311WI                       | 2.1654<br>(3)   | 3.1496<br>(3)   | 0.5118<br>(59)            | 23 x 9/32           | 0.41  | 4150<br>3700                                      | 4900<br>4900   | 16600<br>19920                 | 3920<br>3490                                      | 4620<br>4620   | 14900<br>17880                 |
| 9312WI                       | 2.3622<br>(3)   | 3.3465<br>(3)   | 0.5118<br>(59)            | 25 x 9/32           | 0.44  | 4540<br>4040                                      | 5100<br>5100   | 15300<br>18360                 | 4270<br>3800                                      | 4820<br>4820   | 13800<br>16560                 |
| 9313WI                       | 2.5591<br>(3)   | 3.5433<br>(3)   | 0.5118<br>(59)            | 27 x 9/32           | 0.47  | 4910<br>4370                                      | 5290<br>5290   | 14200<br>17040                 | 4580<br>4080                                      | 4990<br>4990   | 12800<br>15360                 |
| 9314WI                       | 2.7559<br>(3)   | 3.937<br>(3)    | 0.6299<br>(59)            | 24 x 11/32          | 0.76  | 6510<br>5800                                      | 7200<br>7200   | 13100<br>15720                 | 6130<br>5450                                      | 6790<br>6790   | 11800<br>14160                 |
| 9315WI                       | 2.9528<br>(3)   | 4.1339<br>(3)   | 0.6299<br>(59)            | 25 x 11/32          | 0.80  | 6810<br>6060                                      | 7310<br>7310   | 12300<br>14760                 | 6380<br>5670                                      | 6890<br>6890   | 11100<br>13320                 |
| 9316WI                       | 3.1496<br>(3)   | 4.3307<br>(3)   | 0.6299<br>(59)            | 27 x 11/32          | 0.85  | 7350<br>6540                                      | 7600<br>7600   | 11600<br>13920                 | 6860<br>6100                                      | 7170<br>7170   | 10400<br>12480                 |
| 9317WI                       | 3.3465<br>(3)   | 4.7244<br>(3)   | 0.7087<br>(79)            | 26 x 3/8            | 1.23  | 8440<br>7510                                      | 8700<br>8700   | 10800<br>12960                 | 7880<br>7010                                      | 8200<br>8200   | 9700<br>11640                  |
| 9318WI                       | 3.5433<br>(3)   | 4.9213<br>(3.5) | 0.7087<br>(79)            | 26 x 13/32          | 1.26  | 9900<br>8810                                      | 10100<br>10100 | 10300<br>12360                 | 9270<br>8250                                      | 9540<br>9540   | 9300<br>11160                  |
| 9319WI                       | 3.7402<br>(3)   | 5.1181<br>(3.5) | 0.7087<br>(79)            | 28 x 13/32          | 1.33  | 10700<br>9480                                     | 10500<br>10500 | 9800<br>11760                  | 9930<br>8840                                      | 9910<br>9910   | 8800<br>10560                  |
| 9320WI                       | 3.937<br>(3)    | 5.5118<br>(3.5) | 0.7874<br>(79)            | 29 x 13/32          | 1.87  | 11000<br>9760                                     | 10600<br>10600 | 9100<br>10920                  | 10200<br>9100                                     | 9900<br>9900   | 8200<br>9840                   |
| 9322WI                       | 4.3307<br>(3)   | 5.9055<br>(3.5) | 0.7874<br>(79)            | 31 x 13/32          | 2.02  | 11600<br>10300                                    | 10900<br>10900 | 8400<br>10080                  | 10800<br>9650                                     | 10200<br>10200 | 7600<br>9120                   |
| 9324WI                       | 4.7244<br>(3)   | 6.4961<br>(4)   | 0.8661<br>(79)            | 30 x 15/32          | 2.74  | 15000<br>13400                                    | 13900<br>13900 | 7700<br>9240                   | 14000<br>12500                                    | 13100<br>13100 | 6900<br>8280                   |
| 9326WI                       | 5.1181<br>(4)   | 7.0866<br>(4)   | 0.9449<br>(98)            | 30 x 17/32          | 3.63  | 19400<br>17300                                    | 17600<br>17600 | 7100<br>8520                   | 18100<br>16100                                    | 16600<br>16600 | 6400<br>7680                   |
| 9328WI                       | 5.5118<br>(4)   | 7.4803<br>(4.5) | 0.9449<br>(98)            | 32 x 17/32          | 3.85  | 20600<br>18300                                    | 18200<br>18200 | 6600<br>7920                   | 19200<br>17100                                    | 17100<br>17100 | 5900<br>7080                   |
| 9330WI                       | 5.9055<br>(4)   | 8.2677<br>(4.5) | 1.1024<br>(98)            | 27 x 11/16          | 5.75  | 20400<br>26200                                    | 26805<br>26805 | 6200<br>7440                   | 21600<br>24500                                    | 25300<br>25300 | 5600<br>6720                   |
| 9332WI                       | 6.2992<br>(4)   | 8.6614<br>(4.5) | 1.1024<br>(98)            | 27 x 23/32          | 6.06  | 32200<br>28600                                    | 29000<br>29000 | 5800<br>6960                   | 30100<br>26800                                    | 27300<br>27300 | 5800<br>6960                   |
| 9334WI                       | 6.6929<br>(4)   | 9.0551<br>(4.5) | 1.1024<br>(98)            | 29 x 23/32          | 6.34  | 34500<br>30700                                    | 30100<br>30100 | 5500<br>6600                   | 32200<br>28700                                    | 28300<br>28300 | 5000<br>6000                   |
| 9340WI                       | 7.874<br>(4.5)  | 11.0236<br>(5)  | 1.4961<br>(118)           | 27 x 15/16          | 13.87 | 54600<br>48600                                    | 47100<br>47100 | 4600<br>5520                   | 51400<br>45800                                    | 44400<br>44400 | 4100<br>4920                   |

(N9) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. (2) | Suggested<br>Shoulder Diameters |      |                          |       | Shaft Diameter |        | Mounting Fits |         | FIXED                        |         |               |        | FLOATING                     |          |                   |         |        |
|---------------|---------------------------------|------|--------------------------|-------|----------------|--------|---------------|---------|------------------------------|---------|---------------|--------|------------------------------|----------|-------------------|---------|--------|
|               | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |       | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |         | Mounting Fits |        | Housing Bore<br>(Stationary) |          | Housing Clearance |         |        |
|               | Max.                            | Min. | Max.                     | Min.  |                |        |               |         | Min.                         | Max.    | Tight         | Loose  | Max.                         | Min.     | Max.              | Min.    |        |
| in.           | in.                             | in.  | in.                      | in.   | in.            | in.    | in.           | in.     | in.                          | in.     | in.           | in.    | in.                          | in.      | in.               | in.     |        |
| 0.012         | 0.52                            | 0.51 | 0.77                     | 0.76  | 0.3935         | 0.3937 | 0.0002        | 0.00015 | 0.8661                       | 0.8663  | 0.0000        | 0.0004 | 0.86650                      | 0.86630  | 0.00060           | 0.00020 | 9300WI |
| 0.012         | 0.60                            | 0.59 | 0.85                     | 0.84  | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 0.9449                       | 0.9451  | 0.0000        | 0.0004 | 0.94530                      | 0.94510  | 0.00060           | 0.00020 | 9301WI |
| 0.012         | 0.72                            | 0.71 | 1.00                     | 0.99  | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.0236                       | 1.0238  | 0.0000        | 0.0004 | 1.02400                      | 1.02380  | 0.00060           | 0.00020 | 9302WI |
| 0.012         | 0.80                            | 0.79 | 1.08                     | 1.07  | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.1811                       | 1.1813  | 0.0000        | 0.0004 | 1.18150                      | 1.18130  | 0.00060           | 0.00020 | 9303WI |
| 0.012         | 0.95                            | 0.94 | 1.33                     | 1.32  | 0.7872         | 0.7874 | 0.0002        | 0.0002  | 1.4567                       | 1.4570  | 0.0000        | 0.0005 | 1.45710                      | 1.45690  | 0.00070           | 0.00020 | 9304WI |
| 0.012         | 1.15                            | 1.14 | 1.52                     | 1.51  | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 1.6535                       | 1.6538  | 0.0000        | 0.0005 | 1.65390                      | 1.65370  | 0.00070           | 0.00020 | 9305WI |
| 0.012         | 1.34                            | 1.33 | 1.72                     | 1.71  | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 1.8504                       | 1.8507  | 0.0000        | 0.0005 | 1.85090                      | 1.85070  | 0.00080           | 0.00030 | 9306WI |
| 0.024         | 1.57                            | 1.55 | 2.01                     | 1.99  | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 2.1654                       | 2.1657  | 0.0000        | 0.0006 | 2.16590                      | 2.16570  | 0.00080           | 0.00030 | 9307WI |
| 0.024         | 1.78                            | 1.76 | 2.28                     | 2.26  | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 2.4409                       | 2.4412  | 0.0000        | 0.0006 | 2.44140                      | 2.44120  | 0.00080           | 0.00030 | 9308WI |
| 0.024         | 1.99                            | 1.97 | 2.50                     | 2.48  | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 2.6772                       | 2.6775  | 0.0000        | 0.0006 | 2.67770                      | 2.67750  | 0.00080           | 0.00030 | 9309WI |
| 0.024         | 2.17                            | 2.15 | 2.67                     | 2.65  | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 2.8346                       | 2.8349  | 0.0000        | 0.0006 | 2.83510                      | 2.83490  | 0.00080           | 0.00030 | 9310WI |
| 0.039         | 2.40                            | 2.38 | 2.96                     | 2.94  | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 3.1496                       | 3.1499  | 0.0000        | 0.0006 | 3.15010                      | 3.14990  | 0.00080           | 0.00030 | 9311WI |
| 0.039         | 2.59                            | 2.57 | 3.16                     | 3.14  | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 3.3465                       | 3.3468  | 0.0000        | 0.0006 | 3.34710                      | 3.34680  | 0.00090           | 0.00030 | 9312WI |
| 0.039         | 2.79                            | 2.77 | 3.35                     | 3.33  | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 3.5433                       | 3.5436  | 0.0000        | 0.0006 | 3.54390                      | 3.54360  | 0.00090           | 0.00030 | 9313WI |
| 0.039         | 3.02                            | 3.00 | 3.71                     | 3.69  | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 3.9370                       | 3.9373  | 0.0000        | 0.0006 | 3.93770                      | 3.93740  | 0.00100           | 0.00040 | 9314WI |
| 0.039         | 3.22                            | 3.19 | 3.91                     | 3.88  | 2.9526         | 2.9530 | 0.0002        | 0.0005  | 4.1339                       | 4.1342  | 0.0000        | 0.0006 | 4.13460                      | 4.13430  | 0.00100           | 0.00040 | 9315WI |
| 0.039         | 3.42                            | 3.39 | 4.11                     | 4.08  | 3.1494         | 3.1498 | 0.0002        | 0.0005  | 4.3307                       | 4.3310  | 0.0000        | 0.0006 | 4.33140                      | 4.33110  | 0.00100           | 0.00040 | 9316WI |
| 0.039         | 3.69                            | 3.66 | 4.44                     | 4.41  | 3.3463         | 3.3467 | 0.0002        | 0.0005  | 4.7244                       | 4.7247  | 0.0000        | 0.0006 | 4.72510                      | 4.72480  | 0.00100           | 0.00040 | 9317WI |
| 0.039         | 3.85                            | 3.82 | 4.66                     | 4.63  | 3.5431         | 3.5435 | 0.0002        | 0.0005  | 4.9213                       | 4.9216  | 0.0000        | 0.0007 | 4.92210                      | 4.92170  | 0.00120           | 0.00040 | 9318WI |
| 0.039         | 4.05                            | 4.02 | 4.86                     | 4.83  | 3.7400         | 3.7404 | 0.0002        | 0.0005  | 5.1181                       | 5.1185  | 0.0000        | 0.0007 | 5.11890                      | 5.11850  | 0.00110           | 0.00040 | 9319WI |
| 0.039         | 4.34                            | 4.31 | 5.16                     | 5.13  | 3.9368         | 3.9372 | 0.0002        | 0.0005  | 5.5118                       | 5.5122  | 0.0000        | 0.0007 | 5.51260                      | 5.51220  | 0.00110           | 0.00040 | 9320WI |
| 0.039         | 4.74                            | 4.71 | 5.55                     | 5.52  | 4.3305         | 4.3309 | 0.0002        | 0.0005  | 5.9055                       | 5.9059  | 0.0000        | 0.0007 | 5.90640                      | 5.90600  | 0.00120           | 0.00050 | 9322WI |
| 0.039         | 5.16                            | 5.13 | 6.10                     | 6.07  | 4.7242         | 4.7246 | 0.0002        | 0.0005  | 6.4961                       | 6.4965  | 0.0000        | 0.0008 | 6.49700                      | 6.49660  | 0.00130           | 0.00050 | 9324WI |
| 0.059         | 5.60                            | 5.57 | 6.66                     | 6.63  | 5.1179         | 5.1183 | 0.0002        | 0.0006  | 7.0866                       | 7.0870  | 0.0000        | 0.0008 | 7.08750                      | 7.08710  | 0.00130           | 0.00050 | 9326WI |
| 0.059         | 5.99                            | 5.96 | 7.05                     | 7.02  | 5.5116         | 5.5120 | 0.0002        | 0.0006  | 7.4803                       | 7.4807  | 0.0000        | 0.0008 | 7.48120                      | 7.48080  | 0.00140           | 0.00050 | 9328WI |
| 0.079         | 6.42                            | 6.39 | 7.80                     | 7.77  | 5.9053         | 5.9057 | 0.0002        | 0.0006  | 8.2677                       | 8.2682  | 0.0000        | 0.0009 | 8.26870                      | 8.26830  | 0.00150           | 0.00060 | 9330WI |
| 0.079         | 6.82                            | 6.79 | 8.20                     | 8.17  | 6.2990         | 6.2994 | 0.0002        | 0.0006  | 8.6614                       | 8.6619  | 0.0000        | 0.0009 | 8.6624                       | 8.6620   | 0.00150           | 0.00060 | 9332WI |
| 0.079         | 7.30                            | 7.27 | 8.51                     | 8.48  | 6.6927         | 6.6931 | 0.0002        | 0.0006  | 9.0551                       | 9.0556  | 0.0000        | 0.0009 | 9.05610                      | 9.05570  | 0.00150           | 0.00060 | 9334WI |
| 0.083         | 8.54                            | 8.51 | 10.41                    | 10.38 | 7.8737         | 7.8743 | 0.0003        | 0.0008  | 11.0236                      | 11.0241 | 0.0000        | 0.0010 | 11.02490                     | 11.02440 | 0.00180           | 0.00080 | 9340WI |



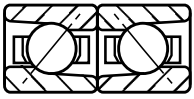


# BALL BEARINGS

## ULTRA-LIGHT 2MM9300WI (ISO 19) SERIES

### DUPLEX PERFORMANCE DATA

### MOUNTING ARRANGEMENTS



Suggested  
DB



Tandem  
DT



Special Applications  
DF

| Bearing Number                                         | PRELOAD |             |      |      | AXIAL STIFFNESS <sup>(1)</sup> |                               |        |        | RADIAL STIFFNESS <sup>(1)</sup> |                               |         | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|--------------------------------------------------------|---------|-------------|------|------|--------------------------------|-------------------------------|--------|--------|---------------------------------|-------------------------------|---------|-------------------------------|-----------------|-----------------|
|                                                        | DUX     | DUL         | DUM  | DUH  | X-light                        | Light                         | Medium | Heavy  | Light                           | Medium                        | Heavy   | X-Light to Light              | Light to Medium | Medium to Heavy |
|                                                        | N       |             |      |      | N/μm                           |                               |        |        | N/μm                            |                               |         | μm                            |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 2MM9300WI SERIES</b> |         |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                 |                 |
| 2MM9300WI                                              | —       | 15          | 25   | 55   | 14.17                          | 16.44                         | 21.69  | 29.21  | 73.11                           | 92.17                         | 115.43  | 1.3                           | 2.8             | 4.1             |
| 2MM9301WI                                              | —       | 15          | 25   | 55   | 14.87                          | 17.32                         | 22.74  | 30.61  | 76.96                           | 97.42                         | 121.91  | 1.0                           | 2.5             | 4.1             |
| 2MM9302WI                                              | —       | 20          | 45   | 90   | 16.44                          | 20.11                         | 26.76  | 36.55  | 98.12                           | 123.30                        | 153.91  | 2.0                           | 3.8             | 5.6             |
| 2MM9303WI                                              | —       | 20          | 65   | 130  | 17.84                          | 21.86                         | 34.63  | 47.75  | 107.91                          | 154.96                        | 192.74  | 1.8                           | 6.4             | 6.4             |
| 2MM9304WI                                              | —       | 45          | 90   | 160  | 18.19                          | 26.41                         | 35.68  | 46.17  | 148.32                          | 186.09                        | 222.47  | 4.8                           | 5.8             | 6.6             |
| 2MM9305WI                                              | —       | 45          | 110  | 180  | 20.64                          | 29.56                         | 43.90  | 54.57  | 168.78                          | 228.24                        | 265.15  | 4.3                           | 7.4             | 5.3             |
| 2MM9306WI                                              | —       | 45          | 110  | 180  | 22.04                          | 31.48                         | 46.52  | 57.89  | 181.55                          | 246.08                        | 286.14  | 4.1                           | 6.9             | 5.1             |
| 2MM9307WI                                              | —       | 45          | 110  | 240  | 25.36                          | 33.06                         | 48.27  | 68.74  | 189.42                          | 258.68                        | 333.53  | 3.0                           | 6.6             | 9.1             |
| 2MM9308WI                                              | 30      | 65          | 160  | 310  | 27.28                          | 39.00                         | 55.44  | 76.08  | 229.12                          | 304.68                        | 380.76  | 4.8                           | 7.6             | 9.4             |
| 2MM9309WI                                              | 30      | 90          | 180  | 360  | 30.78                          | 46.35                         | 62.26  | 85.35  | 270.22                          | 340.18                        | 425.53  | 5.8                           | 6.6             | 9.7             |
| 2MM9310WI                                              | 40      | 90          | 200  | 400  | 34.28                          | 48.97                         | 68.91  | 94.80  | 286.84                          | 376.21                        | 469.96  | 5.1                           | 7.6             | 9.7             |
| 2MM9311WI                                              | 40      | 110         | 240  | 490  | 38.83                          | 55.27                         | 76.96  | 105.46 | 320.24                          | 416.96                        | 521.03  | 5.6                           | 8.1             | 10.7            |
| 2MM9312WI                                              | 40      | 110         | 240  | 510  | 43.73                          | 58.24                         | 80.63  | 112.64 | 338.08                          | 441.10                        | 559.51  | 4.6                           | 7.6             | 10.9            |
| 2MM9313WI                                              | 70      | 130         | 270  | 530  | 50.02                          | 65.59                         | 87.62  | 119.63 | 378.83                          | 478.00                        | 597.63  | 4.6                           | 6.9             | 10.4            |
| 2MM9314WI                                              | 70      | 180         | 360  | 710  | 49.67                          | 69.44                         | 93.05  | 127.50 | 416.61                          | 525.40                        | 656.75  | 6.9                           | 8.6             | 13.0            |
| 2MM9315WI                                              | 90      | 180         | 380  | 760  | 53.17                          | 71.18                         | 97.77  | 134.15 | 427.81                          | 550.94                        | 688.58  | 6.1                           | 9.4             | 13.0            |
| 2MM9316WI                                              | 90      | 200         | 400  | 800  | 57.89                          | 78.18                         | 104.59 | 143.59 | 468.73                          | 591.16                        | 738.95  | 6.4                           | 8.6             | 13.0            |
| 2MM9317WI                                              | 110     | 270         | 530  | 1070 | 61.39                          | 85.88                         | 115.78 | 160.03 | 521.20                          | 655.00                        | 817.48  | 8.1                           | 10.7            | 15.5            |
| 2MM9318WI                                              | 110     | 270         | 530  | 1070 | 65.06                          | 90.25                         | 120.51 | 164.93 | 528.37                          | 666.72                        | 833.75  | 7.9                           | 10.2            | 15.0            |
| 2MM9319WI                                              | 130     | 290         | 580  | 1160 | 70.13                          | 97.42                         | 130.13 | 178.05 | 570.17                          | 719.36                        | 899.51  | 7.9                           | 10.2            | 15.0            |
| 2MM9320WI                                              | 130     | 360         | 710  | 1470 | 75.38                          | 108.26                        | 145.52 | 203.23 | 626.49                          | 788.27                        | 993.43  | 9.1                           | 11.2            | 17.3            |
| 2MM9322WI                                              | 180     | 400         | 800  | 1600 | 88.15                          | 125.75                        | 169.48 | 234.19 | 681.41                          | 856.84                        | 1068.81 | 9.1                           | 11.4            | 17.0            |
| 2MM9324WI                                              | 200     | 490         | 980  | 1960 | 97.77                          | 144.47                        | 192.74 | 265.50 | 752.94                          | 947.08                        | 1181.97 | 10.7                          | 13.2            | 19.3            |
| 2MM9326WI                                              | 220     | 620         | 1220 | 2450 | 106.69                         | 150.06                        | 201.48 | 280.36 | 846.52                          | 1058.84                       | 1322.07 | 13.0                          | 14.2            | 21.3            |
| 2MM9328WI                                              | 270     | 620         | 1250 | 2560 | 105.11                         | 159.68                        | 214.43 | 297.33 | 883.59                          | 1112.54                       | 1401.30 | 11.2                          | 14.2            | 21.8            |
| 2MM9330WI                                              | 290     | 850         | 1690 | 3450 | 119.98                         | 181.72                        | 243.99 | 332.14 | 954.95                          | 1203.31                       | 1512.71 | 16.8                          | 18.0            | 27.4            |
| 2MM9332WI                                              | 489     | 980         | 1980 | 3960 | 131.9                          | 173.6                         | 234.1  | 322.1  | 1013.5                          | 1281.0                        | 1600.0  | 12.70                         | 19.80           | 28.45           |
| 2MM9334WI                                              | 360     | 1020        | 2050 | 4000 | 163.36                         | 215.13                        | 288.76 | 397.02 | 1085.95                         | 1367.72                       | 1696.36 | 17.5                          | 19.3            | 27.2            |
| 2MM9340WI                                              | 778     | 1560        | 3110 | 6230 | 164.93                         | 217.05                        | 291.03 | 399.82 | 1296.71                         | 1634.27                       | 2042.83 | 16.3                          | 24.4            | 36.1            |
|                                                        |         | <b>lbs.</b> |      |      |                                | <b>10<sup>6</sup>lbs./in.</b> |        |        |                                 | <b>10<sup>6</sup>lbs./in.</b> |         |                               | <b>in.</b>      |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 2MM9300WI SERIES</b>   |         |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                 |                 |
| 2MM9300WI                                              | —       | 3           | 6    | 12   | 0.081                          | 0.094                         | 0.124  | 0.167  | 0.418                           | 0.527                         | 0.66    | 0.00005                       | 0.00011         | 0.00016         |
| 2MM9301WI                                              | —       | 3           | 6    | 12   | 0.085                          | 0.099                         | 0.13   | 0.175  | 0.44                            | 0.557                         | 0.697   | 0.00004                       | 0.0001          | 0.00016         |
| 2MM9302WI                                              | —       | 5           | 10   | 20   | 0.094                          | 0.115                         | 0.153  | 0.209  | 0.561                           | 0.705                         | 0.88    | 0.00008                       | 0.00015         | 0.00022         |
| 2MM9303WI                                              | —       | 5           | 15   | 30   | 0.102                          | 0.125                         | 0.198  | 0.273  | 0.617                           | 0.886                         | 1.102   | 0.00007                       | 0.00025         | 0.00025         |
| 2MM9304WI                                              | —       | 10          | 20   | 35   | 0.104                          | 0.151                         | 0.204  | 0.264  | 0.848                           | 1.064                         | 1.272   | 0.00019                       | 0.00023         | 0.00026         |
| 2MM9305WI                                              | —       | 10          | 25   | 40   | 0.118                          | 0.169                         | 0.251  | 0.312  | 0.965                           | 1.305                         | 1.516   | 0.00017                       | 0.00029         | 0.00021         |
| 2MM9306WI                                              | —       | 10          | 25   | 40   | 0.126                          | 0.18                          | 0.266  | 0.331  | 1.038                           | 1.407                         | 1.636   | 0.00016                       | 0.00027         | 0.00020         |
| 2MM9307WI                                              | —       | 10          | 25   | 55   | 0.145                          | 0.189                         | 0.276  | 0.393  | 1.083                           | 1.479                         | 1.907   | 0.00012                       | 0.00026         | 0.00036         |
| 2MM9308WI                                              | 5       | 15          | 35   | 70   | 0.156                          | 0.223                         | 0.317  | 0.435  | 1.31                            | 1.742                         | 2.177   | 0.00019                       | 0.00030         | 0.00037         |
| 2MM9309WI                                              | 10      | 20          | 40   | 80   | 0.176                          | 0.265                         | 0.356  | 0.488  | 1.545                           | 1.945                         | 2.433   | 0.00023                       | 0.00026         | 0.00038         |
| 2MM9310WI                                              | 10      | 20          | 45   | 90   | 0.196                          | 0.28                          | 0.394  | 0.542  | 1.64                            | 2.151                         | 2.687   | 0.00020                       | 0.0003          | 0.00038         |
| 2MM9311WI                                              | 10      | 25          | 55   | 110  | 0.222                          | 0.316                         | 0.44   | 0.603  | 1.831                           | 2.384                         | 2.979   | 0.00022                       | 0.00032         | 0.00042         |
| 2MM9312WI                                              | 10      | 25          | 55   | 115  | 0.25                           | 0.333                         | 0.461  | 0.644  | 1.933                           | 2.522                         | 3.199   | 0.00018                       | 0.0003          | 0.00043         |
| 2MM9313WI                                              | 15      | 30          | 60   | 120  | 0.286                          | 0.375                         | 0.501  | 0.684  | 2.166                           | 2.733                         | 3.417   | 0.00018                       | 0.00027         | 0.00041         |
| 2MM9314WI                                              | 15      | 40          | 80   | 160  | 0.284                          | 0.397                         | 0.532  | 0.729  | 2.382                           | 3.004                         | 3.755   | 0.00027                       | 0.00034         | 0.00051         |
| 2MM9315WI                                              | 20      | 40          | 85   | 170  | 0.304                          | 0.407                         | 0.559  | 0.767  | 2.446                           | 3.15                          | 3.937   | 0.00024                       | 0.00037         | 0.00051         |
| 2MM9316WI                                              | 20      | 45          | 90   | 180  | 0.331                          | 0.447                         | 0.598  | 0.821  | 2.68                            | 3.38                          | 4.225   | 0.00025                       | 0.00034         | 0.00051         |
| 2MM9317WI                                              | 25      | 60          | 120  | 240  | 0.351                          | 0.491                         | 0.662  | 0.915  | 2.98                            | 3.745                         | 4.674   | 0.00032                       | 0.00042         | 0.00061         |
| 2MM9318WI                                              | 25      | 60          | 120  | 240  | 0.372                          | 0.516                         | 0.689  | 0.943  | 3.021                           | 3.812                         | 4.767   | 0.00031                       | 0.00040         | 0.00059         |
| 2MM9319WI                                              | 30      | 65          | 130  | 260  | 0.401                          | 0.557                         | 0.744  | 1.018  | 3.26                            | 4.113                         | 5.143   | 0.00031                       | 0.00040         | 0.00059         |
| 2MM9320WI                                              | 30      | 80          | 160  | 330  | 0.431                          | 0.619                         | 0.832  | 1.162  | 3.582                           | 4.507                         | 5.68    | 0.00036                       | 0.00044         | 0.00068         |
| 2MM9322WI                                              | 40      | 90          | 180  | 360  | 0.504                          | 0.719                         | 0.969  | 1.339  | 3.896                           | 4.899                         | 6.111   | 0.00036                       | 0.00045         | 0.00067         |
| 2MM9324WI                                              | 45      | 110         | 220  | 440  | 0.559                          | 0.826                         | 1.102  | 1.518  | 4.305                           | 5.415                         | 6.758   | 0.00042                       | 0.00052         | 0.00076         |
| 2MM9326WI                                              | 50      | 140         | 275  | 550  | 0.61                           | 0.858                         | 1.152  | 1.603  | 4.84                            | 6.054                         | 7.559   | 0.00051                       | 0.00056         | 0.00084         |
| 2MM9328WI                                              | 60      | 140         | 280  | 575  | 0.601                          | 0.913                         | 1.226  | 1.7    | 5.052                           | 6.361                         | 8.012   | 0.00044                       | 0.00056         | 0.00086         |
| 2MM9330WI                                              | 65      | 190         | 380  | 775  | 0.686                          | 1.039                         | 1.395  | 1.899  | 5.46                            | 6.88                          | 8.649   | 0.00066                       | 0.00071         | 0.00108         |
| 2MM9332WI                                              | 110     | 220         | 445  | 890  | 0.753                          | 0.991                         | 1.337  | 1.839  | 5.787                           | 7.315                         | 9.135   | 0.00050                       | 0.00078         | 0.00112         |
| 2MM9334WI                                              | 80      | 230         | 460  | 900  | 0.934                          | 1.23                          | 1.651  | 2.27   | 6.209                           | 7.82                          | 9.699   | 0.00069                       | 0.00076         | 0.00107         |
| 2MM9340WI                                              | 175     | 350         | 700  | 1400 | 0.943                          | 1.241                         | 1.664  | 2.286  | 7.414                           | 9.344                         | 11.68   | 0.00064                       | 0.00096         | 0.00142         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.

**ULTRA-LIGHT  
3MM9300WI  
(ISO 19) SERIES**

**DUPLEX  
PERFORMANCE DATA**

**MOUNTING ARRANGEMENTS**



**Suggested  
DB**



**Tandem  
DT**



**Special Applications  
DF**

| Bearing Number                                         | PRELOAD     |      |      | AXIAL STIFFNESS <sup>(1)</sup> |                               |        | RADIAL STIFFNESS <sup>(1)</sup> |                               |        | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|--------------------------------------------------------|-------------|------|------|--------------------------------|-------------------------------|--------|---------------------------------|-------------------------------|--------|-------------------------------|-----------------|-----------------|
|                                                        | DUX         | DUL  | DUM  | DUH                            | Light                         | Medium | Heavy                           | Light                         | Medium | Heavy                         | Light to Medium | Medium to Heavy |
|                                                        | N           |      |      |                                | N/μm                          |        |                                 | N/μm                          |        |                               | μm              |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 3MM9300WI SERIES</b> |             |      |      |                                |                               |        |                                 |                               |        |                               |                 |                 |
| 3MM9300WI                                              | —           | 20   | 45   | 90                             | 32.7                          | 42.3   | 55.3                            | 70.5                          | 88.7   | 110.9                         | 2.54            | 3.81            |
| 3MM9301WI                                              | —           | 20   | 45   | 90                             | 34.5                          | 44.5   | 58.14                           | 74.4                          | 93.7   | 117.3                         | 2.03            | 3.81            |
| 3MM9302WI                                              | —           | 45   | 90   | 160                            | 46.4                          | 60.2   | 75.2                            | 96.9                          | 121.6  | 145.2                         | 3.30            | 4.06            |
| 3MM9303WI                                              | —           | 45   | 130  | 240                            | 50.7                          | 77.0   | 98.6                            | 106.5                         | 152.5  | 184.5                         | 5.59            | 5.08            |
| 3MM9304WI                                              | —           | 45   | 155  | 265                            | 51.8                          | 82.7   | 102.4                           | 112.4                         | 170.6  | 202.6                         | 6.60            | 5.08            |
| 3MM9305WI                                              | —           | 65   | 180  | 310                            | 67.9                          | 97.9   | 122.4                           | 146.7                         | 202.9  | 242.8                         | 5.33            | 4.83            |
| 3MM9306WI                                              | —           | 70   | 180  | 310                            | 72.9                          | 105.3  | 130.7                           | 157.8                         | 218.8  | 262.0                         | 5.08            | 4.57            |
| 3MM9307WI                                              | 45          | 90   | 240  | 420                            | 84.6                          | 123.3  | 152.5                           | 182.8                         | 255.7  | 304.9                         | 5.84            | 5.08            |
| 3MM9308WI                                              | 65          | 130  | 310  | 560                            | 101.8                         | 139.4  | 174.9                           | 218.8                         | 289.8  | 349.3                         | 5.84            | 6.10            |
| 3MM9309WI                                              | 90          | 160  | 360  | 670                            | 114.7                         | 156.2  | 199.7                           | 246.3                         | 323.9  | 396.3                         | 5.84            | 6.86            |
| 3MM9310WI                                              | 90          | 160  | 400  | 670                            | 121.5                         | 174.6  | 210.9                           | 261.5                         | 357.8  | 419.6                         | 6.60            | 5.59            |
| 3MM9311WI                                              | 90          | 200  | 490  | 850                            | 138.7                         | 193.8  | 239.8                           | 294.5                         | 396.3  | 472.6                         | 6.86            | 6.60            |
| 3MM9312WI                                              | 90          | 200  | 510  | 890                            | 146.7                         | 207.6  | 257.5                           | 311.1                         | 425.4  | 508.4                         | 6.86            | 6.60            |
| 3MM9313WI                                              | 110         | 220  | 530  | 1070                           | 159.7                         | 221.2  | 290.0                           | 339.3                         | 454.4  | 599.2                         | 6.60            | 8.38            |
| 3MM9314WI                                              | 130         | 290  | 710  | 1290                           | 171.6                         | 239.4  | 301.7                           | 366.4                         | 494.8  | 599.2                         | 8.13            | 8.64            |
| 3MM9315WI                                              | 155         | 310  | 760  | 1330                           | 180.8                         | 251.3  | 313.4                           | 385.7                         | 518.8  | 622.8                         | 8.13            | 8.13            |
| 3MM9316WI                                              | 180         | 330  | 800  | 1380                           | 194.8                         | 269.3  | 332.7                           | 415.7                         | 556.7  | 663.4                         | 7.87            | 7.62            |
| 3MM9317WI                                              | 220         | 440  | 1070 | 1870                           | 214.9                         | 298.2  | 371.8                           | 462.1                         | 617.0  | 738.3                         | 9.65            | 9.65            |
| 3MM9318WI                                              | 220         | 400  | 930  | 1670                           | 212.7                         | 290.5  | 363.1                           | 455.3                         | 605.2  | 730.2                         | 8.38            | 8.89            |
| 3MM9319WI                                              | 220         | 470  | 1160 | 2000                           | 235.8                         | 329.9  | 408.0                           | 504.1                         | 682.1  | 814.2                         | 9.65            | 9.14            |
| 3MM9320WI                                              | 310         | 600  | 1470 | 2560                           | 264.3                         | 369.2  | 459.8                           | 562.0                         | 754.7  | 901.4                         | 10.92           | 10.41           |
| 3MM9322WI                                              | 330         | 670  | 1600 | 2780                           | 286.5                         | 397.9  | 494.8                           | 608.7                         | 812.1  | 968.6                         | 10.92           | 10.41           |
| 3MM9324WI                                              | 400         | 800  | 1960 | 3450                           | 311.7                         | 421.3  | 543.9                           | 663.7                         | 891.8  | 1,069.2                       | 12.19           | 12.19           |
| 3MM9326WI                                              | 510         | 1020 | 2450 | 4340                           | 352.6                         | 488.3  | 611.5                           | 751.2                         | 1002.2 | 1198.9                        | 13.46           | 13.72           |
| 3MM9328WI                                              | 530         | 1070 | 2560 | 4450                           | 373.1                         | 516.8  | 642.1                           | 795.4                         | 1062.2 | 1268.5                        | 13.21           | 13.21           |
| 3MM9330WI                                              | 710         | 1450 | 3450 | 6000                           | 401.1                         | 551.1  | 688.2                           | 854.6                         | 1144.0 | 1363.0                        | 16.76           | 16.26           |
| 3MM9332WI                                              | 800         | 1580 | 3950 | 6940                           | 418.2                         | 588.9  | 734.1                           | 876.5                         | 1215.9 | 1455.7                        | 18.80           | 17.78           |
| 3MM9334WI                                              | 800         | 1600 | 4000 | 6940                           | 440.0                         | 618.2  | 760.4                           | 944.3                         | 1280.7 | 1519.0                        | 18.29           | 16.26           |
| 3MM9340WI                                              | 1250        | 3110 | 6230 | 12460                          | 580.1                         | 751.0  | 985.0                           | 1222.0                        | 1537.0 | 1920.4                        | 18.80           | 28.70           |
|                                                        | <b>lbs.</b> |      |      |                                | <b>10<sup>6</sup>lbs./in.</b> |        |                                 | <b>10<sup>6</sup>lbs./in.</b> |        |                               | <b>in.</b>      |                 |

| <b>INCH DUPLEX PERFORMANCE DATA 3MM9300WI SERIES</b> |     |     |      |      |                         |        |       |                         |        |        |                 |                 |
|------------------------------------------------------|-----|-----|------|------|-------------------------|--------|-------|-------------------------|--------|--------|-----------------|-----------------|
| Bearing Number                                       | DUX | DUL | DUM  | DUH  | Light                   | Medium | Heavy | Light                   | Medium | Heavy  | Light to Medium | Medium to Heavy |
|                                                      | in. |     |      |      | 10 <sup>6</sup> in./in. |        |       | 10 <sup>6</sup> in./in. |        |        | in.             |                 |
| 3MM9300WI                                            | —   | 5   | 10   | 20   | 0.187                   | 0.242  | 0.316 | 0.403                   | 0.507  | 0.634  | 0.0010          | 0.0015          |
| 3MM9301WI                                            | —   | 5   | 10   | 20   | 0.197                   | 0.254  | 0.332 | 0.425                   | 0.535  | 0.670  | 0.0008          | 0.0015          |
| 3MM9302WI                                            | —   | 10  | 20   | 35   | 0.265                   | 0.344  | 0.430 | 0.554                   | 0.695  | 0.830  | 0.0013          | 0.0016          |
| 3MM9303WI                                            | —   | 10  | 30   | 55   | 0.290                   | 0.440  | 0.564 | 0.609                   | 0.872  | 1.055  | 0.0022          | 0.0020          |
| 3MM9304WI                                            | —   | 10  | 35   | 60   | 0.296                   | 0.472  | 0.585 | 0.642                   | 0.974  | 1.157  | 0.0026          | 0.0020          |
| 3MM9305WI                                            | —   | 15  | 40   | 70   | 0.388                   | 0.560  | 0.700 | 0.839                   | 1.160  | 1.388  | 0.0021          | 0.0019          |
| 3MM9306WI                                            | —   | 15  | 40   | 70   | 0.417                   | 0.602  | 0.747 | 0.902                   | 1.251  | 1.498  | 0.0020          | 0.0018          |
| 3MM9307WI                                            | 10  | 20  | 55   | 95   | 0.484                   | 0.705  | 0.872 | 1.045                   | 1.462  | 1.743  | 0.0023          | 0.0020          |
| 3MM9308WI                                            | 15  | 30  | 70   | 125  | 0.582                   | 0.797  | 1.000 | 1.251                   | 1.657  | 1.997  | 0.0023          | 0.0024          |
| 3MM9309WI                                            | 20  | 35  | 80   | 150  | 0.656                   | 0.893  | 1.142 | 1.408                   | 1.852  | 2.266  | 0.0023          | 0.0027          |
| 3MM9310WI                                            | 20  | 35  | 90   | 150  | 0.695                   | 0.998  | 1.206 | 1.495                   | 2.046  | 2.399  | 0.0026          | 0.0022          |
| 3MM9311WI                                            | 20  | 45  | 110  | 190  | 0.793                   | 1.108  | 1.371 | 1.684                   | 2.266  | 2.702  | 0.0027          | 0.0026          |
| 3MM9312WI                                            | 20  | 45  | 115  | 200  | 0.839                   | 1.187  | 1.472 | 1.779                   | 2.432  | 2.907  | 0.0027          | 0.0026          |
| 3MM9313WI                                            | 25  | 50  | 120  | 240  | 0.913                   | 1.265  | 1.658 | 1.940                   | 2.598  | 3.426  | 0.0026          | 0.0033          |
| 3MM9314WI                                            | 30  | 65  | 160  | 290  | 0.981                   | 1.369  | 1.725 | 2.095                   | 2.829  | 3.426  | 0.0032          | 0.0034          |
| 3MM9315WI                                            | 35  | 70  | 170  | 300  | 1.034                   | 1.437  | 1.792 | 2.205                   | 2.966  | 3.561  | 0.0032          | 0.0032          |
| 3MM9316WI                                            | 40  | 75  | 180  | 310  | 1.114                   | 1.540  | 1.902 | 2.377                   | 3.183  | 3.793  | 0.0031          | 0.0030          |
| 3MM9317WI                                            | 50  | 100 | 240  | 420  | 1.229                   | 1.705  | 2.126 | 2.642                   | 3.528  | 4.221  | 0.0038          | 0.0038          |
| 3MM9318WI                                            | 50  | 90  | 210  | 375  | 1.216                   | 1.661  | 2.076 | 2.603                   | 3.460  | 4.175  | 0.0033          | 0.0035          |
| 3MM9319WI                                            | 50  | 105 | 260  | 450  | 1.348                   | 1.886  | 2.333 | 2.882                   | 3.900  | 4.655  | 0.0038          | 0.0036          |
| 3MM9320WI                                            | 70  | 135 | 330  | 575  | 1.511                   | 2.111  | 2.629 | 3.213                   | 4.315  | 5.154  | 0.0043          | 0.0041          |
| 3MM9322WI                                            | 75  | 150 | 360  | 625  | 1.638                   | 2.275  | 2.829 | 3.480                   | 4.643  | 5.538  | 0.0043          | 0.0041          |
| 3MM9324WI                                            | 90  | 180 | 440  | 775  | 1.782                   | 2.409  | 3.110 | 3.795                   | 5.099  | 6.113  | 0.0048          | 0.0048          |
| 3MM9326WI                                            | 115 | 230 | 550  | 975  | 2.016                   | 2.792  | 3.496 | 4.295                   | 5.730  | 6.855  | 0.0053          | 0.0054          |
| 3MM9328WI                                            | 120 | 240 | 575  | 1000 | 2.130                   | 2.950  | 3.660 | 4.548                   | 6.073  | 7.253  | 0.0052          | 0.0052          |
| 3MM9330WI                                            | 160 | 325 | 775  | 1350 | 2.296                   | 3.172  | 3.939 | 4.886                   | 6.519  | 7.793  | 0.0066          | 0.0064          |
| 3MM9332WI                                            | 180 | 355 | 890  | 1560 | 2.388                   | 3.363  | 4.192 | 5.119                   | 6.943  | 8.312  | 0.0074          | 0.0070          |
| 3MM9334WI                                            | 180 | 360 | 900  | 1560 | 2.512                   | 3.530  | 4.342 | 5.392                   | 7.313  | 8.674  | 0.0072          | 0.0064          |
| 3MM9340WI                                            | 280 | 700 | 1400 | 2800 | 3.317                   | 4.294  | 5.632 | 6.987                   | 8.788  | 10.980 | 0.0074          | 0.0113          |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.



# BALL BEARINGS

## ULTRA-LIGHT 2MM9300WI (ISO 19) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |       | Kluber Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |        |         |       |
|----------------|-----------------|-------|----------------|-------|--------------------------------------------------------------|------------|-------|--------|---------|-------|
|                | NBU15           |       | NBU15          |       | DUL                                                          | Grease DUM | DUH   | DUL    | Oil DUM | DUH   |
|                | 25%             | 40%   | 15%            | 20%   |                                                              |            |       |        |         |       |
| 2MM9300WI      | 0.09            | 0.15  | 0.06           | 0.08  | 62000                                                        | 46500      | 31000 | 105400 | 79100   | 52700 |
| 2MM9301WI      | 0.11            | 0.17  | 0.07           | 0.10  | 53800                                                        | 40300      | 26900 | 91500  | 68500   | 45700 |
| 2MM9302WI      | 0.17            | 0.28  | 0.12           | 0.15  | 44500                                                        | 33400      | 22200 | 75700  | 56800   | 37700 |
| 2MM9303WI      | 0.19            | 0.30  | 0.12           | 0.16  | 40100                                                        | 30100      | 20000 | 68200  | 51200   | 34000 |
| 2MM9304WI      | 0.40            | 0.60  | 0.25           | 0.34  | 33700                                                        | 25300      | 16800 | 57300  | 43000   | 28600 |
| 2MM9305WI      | 0.40            | 0.70  | 0.29           | 0.39  | 27800                                                        | 20900      | 13900 | 47300  | 35500   | 23600 |
| 2MM9306WI      | 0.50            | 0.80  | 0.34           | 0.45  | 23800                                                        | 17800      | 11900 | 40500  | 30300   | 20200 |
| 2MM9307WI      | 0.80            | 1.20  | 0.51           | 0.68  | 20300                                                        | 15200      | 10200 | 34500  | 25800   | 17300 |
| 2MM9308WI      | 1.20            | 1.90  | 0.80           | 1.07  | 17900                                                        | 13400      | 9000  | 30400  | 22800   | 15300 |
| 2MM9309WI      | 1.30            | 2.10  | 0.88           | 1.18  | 16000                                                        | 12000      | 8000  | 27200  | 20400   | 13600 |
| 2MM9310WI      | 1.40            | 2.30  | 0.95           | 1.27  | 14600                                                        | 11000      | 7300  | 24800  | 18700   | 12400 |
| 2MM9311WI      | 1.90            | 3.00  | 1.30           | 1.70  | 13300                                                        | 10000      | 6600  | 22600  | 17000   | 11200 |
| 2MM9312WI      | 2.00            | 3.20  | 1.40           | 1.80  | 12200                                                        | 9200       | 6100  | 20700  | 15600   | 10400 |
| 2MM9313WI      | 2.10            | 3.40  | 1.40           | 1.90  | 11400                                                        | 8500       | 5700  | 19400  | 14500   | 9700  |
| 2MM9314WI      | 3.60            | 5.70  | 2.40           | 3.20  | 10500                                                        | 7900       | 5200  | 17900  | 13400   | 8800  |
| 2MM9315WI      | 3.80            | 6.10  | 2.50           | 3.40  | 9800                                                         | 7400       | 4900  | 16700  | 12600   | 8300  |
| 2MM9316WI      | 4.00            | 6.40  | 2.70           | 3.50  | 9300                                                         | 7000       | 4600  | 15800  | 11900   | 7800  |
| 2MM9317WI      | 5.30            | 8.60  | 3.60           | 4.80  | 8600                                                         | 6500       | 4300  | 14600  | 11100   | 7300  |
| 2MM9318WI      | 5.90            | 9.40  | 3.90           | 5.20  | 8200                                                         | 6200       | 4100  | 13900  | 10500   | 7000  |
| 2MM9319WI      | 6.10            | 9.70  | 4.10           | 5.40  | 7800                                                         | 5900       | 3900  | 13300  | 10000   | 6600  |
| 2MM9320WI      | 7.50            | 12.00 | 5.00           | 6.70  | 7300                                                         | 5500       | 3600  | 12400  | 9400    | 6100  |
| 2MM9322WI      | 8.10            | 13.00 | 5.40           | 7.30  | 6700                                                         | 5000       | 3400  | 11400  | 8500    | 5800  |
| 2MM9324WI      | 11.10           | 17.80 | 7.40           | 9.90  | 6200                                                         | 4600       | 3100  | 10500  | 7800    | 5300  |
| 2MM9326WI      | 14.60           | 23.30 | 9.70           | 13.00 | 5700                                                         | 4300       | 2800  | 9700   | 7300    | 4800  |
| 2MM9328WI      | 15.50           | 24.80 | 10.40          | 13.80 | 5300                                                         | 4000       | 2600  | 9000   | 6800    | 4400  |
| 2MM9330WI      | 24.80           | 39.70 | 16.60          | 22.10 | 5000                                                         | 3700       | 2500  | 8500   | 6300    | 4300  |
| 2MM9332WI      | 26.20           | 41.90 | 17.50          | 23.30 | 4600                                                         | 3500       | 2300  | 7900   | 5900    | 3900  |
| 2MM9334WI      | 28.20           | 45.20 | 18.90          | 25.10 | 4400                                                         | 3300       | 2200  | 7500   | 5600    | 3700  |
| 2MM9340WI      | 56.80           | 90.90 | 37.90          | 50.60 | 3700                                                         | 2800       | 1800  | 6300   | 4700    | 3100  |

(1) For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

(2) For ceramic ball complements use 120% of speeds shown.

D



## ULTRA-LIGHT 3MM9300WI (ISO 19) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |       | Kluber Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |       |         |       |
|----------------|-----------------|-------|----------------|-------|--------------------------------------------------------------|------------|-------|-------|---------|-------|
|                | NBU15           |       | NBU15          |       | DUL                                                          | Grease DUM | DUH   | DUL   | Oil DUM | DUH   |
|                | 25%             | 40%   | 15%            | 20%   |                                                              |            |       |       |         |       |
| 3MM9300WI      | 0.09            | 0.15  | 0.06           | 0.08  | 55800                                                        | 41850      | 27900 | 94860 | 71190   | 47430 |
| 3MM9301WI      | 0.11            | 0.17  | 0.07           | 0.10  | 48420                                                        | 36270      | 24210 | 82350 | 61650   | 41130 |
| 3MM9302WI      | 0.17            | 0.28  | 0.12           | 0.15  | 40050                                                        | 30060      | 19980 | 68130 | 51120   | 33930 |
| 3MM9303WI      | 0.19            | 0.30  | 0.12           | 0.16  | 36090                                                        | 27090      | 18000 | 61380 | 46080   | 30600 |
| 3MM9304WI      | 0.40            | 0.60  | 0.25           | 0.34  | 30330                                                        | 22770      | 15120 | 51570 | 38700   | 25740 |
| 3MM9305WI      | 0.40            | 0.70  | 0.29           | 0.39  | 25020                                                        | 18810      | 12510 | 42570 | 31950   | 21240 |
| 3MM9306WI      | 0.50            | 0.80  | 0.34           | 0.45  | 21420                                                        | 16020      | 10710 | 36450 | 27270   | 18180 |
| 3MM9307WI      | 0.80            | 1.20  | 0.51           | 0.68  | 18270                                                        | 13680      | 9180  | 31050 | 23220   | 15570 |
| 3MM9308WI      | 1.20            | 1.90  | 0.80           | 1.07  | 16110                                                        | 12060      | 8100  | 27360 | 20520   | 3770  |
| 3MM9309WI      | 1.30            | 2.10  | 0.88           | 1.18  | 14400                                                        | 10800      | 7200  | 24480 | 18360   | 12240 |
| 3MM9310WI      | 1.40            | 2.30  | 0.95           | 1.27  | 13140                                                        | 9900       | 6570  | 22320 | 16830   | 11160 |
| 3MM9311WI      | 1.90            | 3.00  | 1.30           | 1.70  | 11970                                                        | 9000       | 5940  | 20340 | 15300   | 10080 |
| 3MM9312WI      | 2.00            | 3.20  | 1.40           | 1.80  | 10980                                                        | 8280       | 5490  | 18630 | 14040   | 9360  |
| 3MM9313WI      | 2.10            | 3.40  | 1.40           | 1.90  | 10260                                                        | 7650       | 5130  | 17460 | 13050   | 8730  |
| 3MM9314WI      | 3.60            | 5.70  | 2.40           | 3.20  | 9450                                                         | 7110       | 4680  | 16110 | 12060   | 7920  |
| 3MM9315WI      | 3.80            | 6.10  | 2.50           | 3.40  | 8820                                                         | 6660       | 4410  | 15030 | 11340   | 7470  |
| 3MM9316WI      | 4.00            | 6.40  | 2.70           | 3.50  | 8370                                                         | 6300       | 4140  | 14220 | 10710   | 7020  |
| 3MM9317WI      | 5.30            | 8.60  | 3.60           | 4.80  | 7740                                                         | 5850       | 3870  | 13140 | 9990    | 6570  |
| 3MM9318WI      | 5.90            | 9.40  | 3.90           | 5.20  | 7380                                                         | 5580       | 3690  | 12510 | 9450    | 6300  |
| 3MM9319WI      | 6.10            | 9.70  | 4.10           | 5.40  | 7020                                                         | 5310       | 3510  | 11970 | 9000    | 5940  |
| 3MM9320WI      | 7.50            | 12.00 | 5.00           | 6.70  | 6570                                                         | 4950       | 3240  | 11160 | 8460    | 5490  |
| 3MM9322WI      | 8.10            | 13.00 | 5.40           | 7.30  | 6030                                                         | 4500       | 3060  | 10260 | 7650    | 5220  |
| 3MM9324WI      | 11.10           | 17.80 | 7.40           | 9.90  | 5580                                                         | 4140       | 2790  | 9450  | 7020    | 4770  |
| 3MM9326WI      | 14.60           | 23.30 | 9.70           | 13.00 | 5130                                                         | 3870       | 2520  | 8730  | 6570    | 4320  |
| 3MM9328WI      | 15.50           | 24.80 | 10.40          | 13.80 | 4770                                                         | 3600       | 2340  | 8100  | 6120    | 3960  |
| 3MM9330WI      | 24.80           | 39.70 | 16.60          | 22.10 | 4500                                                         | 3330       | 2250  | 7650  | 5670    | 3870  |
| 3MM9332WI      | 26.20           | 41.90 | 17.50          | 23.30 | 4140                                                         | 3150       | 2070  | 7110  | 5310    | 3510  |
| 3MM9334WI      | 28.20           | 45.20 | 18.90          | 25.10 | 3960                                                         | 2970       | 1980  | 6750  | 5040    | 3330  |
| 3MM9340WI      | 56.80           | 90.90 | 37.90          | 50.60 | 3330                                                         | 2520       | 1620  | 5670  | 4230    | 2790  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.



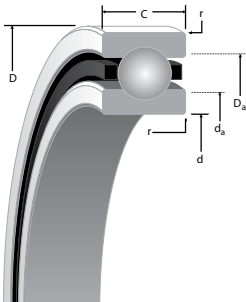




# BALL BEARINGS

## ULTRA-LIGHT 2(3)MMV9300HX (ISO 19) SERIES

### DIMENSIONAL SERIES METRIC



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore         | D<br>O.D.   | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>kg | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           |
|------------------------------|-------------------|-------------|---------------------------|---------------------|-----------|---------------------------------------------------|----------------------|-------------------------------------------|---------------------------------------------------|----------------------|-------------------------------------------|
|                              |                   |             |                           |                     |           | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> |
|                              | mm/tol: +0; -(µm) |             |                           | mm                  | kg        | N                                                 |                      | RPM                                       | N                                                 |                      | RPM                                       |
| 9300HX                       | 10<br>(4)         | 22<br>(5)   | 6<br>(40)                 | 12 x 3.2            | 0.01      | 534<br>489                                        | 1468<br>1468         | 91700<br>110040                           | 534<br>489                                        | 1379<br>1379         | 82500<br>99000                            |
| 9301HX                       | 12<br>(4)         | 24<br>(5)   | 6<br>(80)                 | 14 x 3.2            | 0.01      | 610<br>540                                        | 1500<br>1500         | 80000<br>96000                            | 580<br>520                                        | 1420<br>1420         | 72000<br>86400                            |
| 9302HX                       | 15<br>(4)         | 28<br>(5)   | 7<br>(80)                 | 13 x 3.6            | 0.02      | 979<br>890                                        | 2091<br>2091         | 66800<br>80160                            | 890<br>801                                        | 2046<br>2046         | 60100<br>72120                            |
| 9303HX                       | 17<br>(4)         | 30<br>(5)   | 7<br>(80)                 | 14 x 3.6            | 0.02      | 1023<br>934                                       | 2224<br>2224         | 60400<br>72480                            | 979<br>890                                        | 2091<br>2091         | 54400<br>65280                            |
| 9304HX                       | 20<br>(5)         | 37<br>(6)   | 9<br>(120)                | 14 x 4.8            | 0.04      | 1690<br>1512                                      | 3514<br>3514         | 50200<br>60240                            | 1601<br>1423                                      | 3336<br>3336         | 45200<br>54240                            |
| 9305HX                       | 25<br>(5)         | 42<br>(6)   | 9<br>(120)                | 17 x 4.8            | 0.04      | 2046<br>1824                                      | 3781<br>3781         | 41800<br>50160                            | 1913<br>1735                                      | 3603<br>3603         | 37600<br>45120                            |
| 9306HX                       | 30<br>(5)         | 47<br>(6)   | 9<br>(120)                | 19 x 4.8            | 0.05      | 2402<br>2135                                      | 4048<br>4048         | 35900<br>43080                            | 2224<br>1957                                      | 3825<br>3825         | 32300<br>38760                            |
| 9307HX                       | 35<br>(6)         | 55<br>(7)   | 10<br>(120)               | 19 x 5.6            | 0.08      | 3158<br>2847                                      | 5115<br>5115         | 30500<br>36600                            | 2980<br>2624                                      | 4804<br>4804         | 27500<br>33000                            |
| 9308HX                       | 40<br>(6)         | 62<br>(7)   | 12<br>(120)               | 19 x 6.4            | 0.11      | 6005<br>5338                                      | 10675<br>10675       | 28000<br>33600                            | 5693<br>5071                                      | 10097<br>10097       | 25200<br>30240                            |
| 9309HX                       | 45<br>(6)         | 68<br>(7)   | 12<br>(120)               | 21 x 6.4            | 0.13      | 6716<br>6005                                      | 11164<br>11164       | 25000<br>30000                            | 6405<br>5693                                      | 10586<br>10586       | 22500<br>27000                            |
| 9310HX                       | 50<br>(6)         | 72<br>(7)   | 12<br>(120)               | 23 x 6.4            | 0.14      | 7473<br>6672                                      | 11698<br>11698       | 22900<br>27480                            | 7072<br>6405                                      | 11031<br>11031       | 20600<br>24720                            |
| 9311HX                       | 55<br>(7)         | 80<br>(7)   | 13<br>(150)               | 23 x 7.1            | 0.19      | 9430<br>8407                                      | 14500<br>14500       | 20700<br>24840                            | 8896<br>7917                                      | 13700<br>13700       | 18600<br>22320                            |
| 9312HX                       | 60<br>(7)         | 85<br>(8)   | 13<br>(150)               | 25 x 7.1            | 0.2       | 10319<br>9207                                     | 15123<br>15123       | 19200<br>23040                            | 9697<br>8629                                      | 14278<br>14278       | 17300<br>20760                            |
| 9313HX                       | 65<br>(7)         | 90<br>(8)   | 13<br>(150)               | 27 x 7.1            | 0.22      | 11164<br>9919                                     | 15701<br>15701       | 17800<br>21360                            | 10400<br>9250                                     | 14800<br>14800       | 16000<br>19200                            |
| 9314HX                       | 70<br>(7)         | 100<br>(8)  | 16<br>(150)               | 24 x 8.7            | 0.34      | 14767<br>13166                                    | 21306<br>21306       | 16400<br>19680                            | 13922<br>12365                                    | 20105<br>20105       | 14800<br>17760                            |
| 9315HX                       | 75<br>(7)         | 105<br>(8)  | 16<br>(150)               | 25 x 8.7            | 0.36      | 15435<br>13744                                    | 21617<br>21617       | 15400<br>18480                            | 14500<br>12899                                    | 20416<br>20416       | 13900<br>16680                            |
| 9316HX                       | 80<br>(7)         | 110<br>(8)  | 16<br>(150)               | 27 x 8.7            | 0.39      | 16680<br>14856                                    | 22507<br>22507       | 14500<br>17400                            | 15568<br>13833                                    | 21217<br>21217       | 13100<br>15720                            |
| 9317HX                       | 85<br>(8)         | 120<br>(8)  | 18<br>(200)               | 26 x 9.5            | 0.56      | 19171<br>17036                                    | 25754<br>25754       | 13500<br>16200                            | 17836<br>15879                                    | 24242<br>24242       | 12200<br>14640                            |
| 9318HX                       | 90<br>(8)         | 125<br>(9)  | 18<br>(200)               | 26 x 10.3           | 0.57      | 22462<br>19972                                    | 29935<br>29935       | 12900<br>15480                            | 20995<br>18682                                    | 28200<br>28200       | 11600<br>13920                            |
| 9319HX                       | 95<br>(8)         | 130<br>(9)  | 18<br>(200)               | 28 x 10.3           | 0.6       | 24197<br>21528                                    | 31136<br>31136       | 12300<br>14760                            | 22507<br>20060                                    | 29312<br>29312       | 10300<br>12360                            |
| 9320HX                       | 100<br>(8)        | 140<br>(9)  | 20<br>(200)               | 29 x 10.3           | 0.85      | 24864<br>22151                                    | 31403<br>31403       | 11400<br>13680                            | 23174<br>20639                                    | 29535<br>29535       | 9900<br>11800                             |
| 9322HX                       | 110<br>(8)        | 150<br>(9)  | 20<br>(200)               | 31 x 10.3           | 0.92      | 26377<br>23485                                    | 32204<br>32204       | 10500<br>12600                            | 24597<br>21884                                    | 30291<br>30291       | 9500<br>11400                             |
| 9324HX                       | 120<br>(8)        | 165<br>(10) | 22<br>(200)               | 30 x 11.9           | 1.24      | 34,161<br>30424                                   | 41277<br>41277       | 9600<br>11520                             | 31803<br>28334                                    | 38831<br>38831       | 8600<br>10320                             |
| 9326HX                       | 130<br>(10)       | 180<br>(10) | 24<br>(250)               | 30 x 13.5           | 1.65      | 44035<br>39187                                    | 52042<br>52042       | 8900<br>10680                             | 41055<br>36518                                    | 48928<br>48928       | 8000<br>9600                              |
| 9328HX                       | 140<br>(10)       | 190<br>(10) | 24<br>(250)               | 32 x 13.5           | 1.75      | 46704<br>41544                                    | 53821<br>53821       | 8300<br>9960                              | 43501<br>38742                                    | 50707<br>50707       | 7500<br>9000                              |
| 9330HX                       | 150<br>(10)       | 210<br>(10) | 28<br>(250)               | 27 x 17.5           | 2.61      | 66720<br>59603                                    | 79174<br>79174       | 7700<br>9240                              | 62717<br>55600                                    | 74726<br>74726       | 6900<br>8280                              |

(N<sub>g</sub>) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |       |                          |       | Shaft Diameter |         | Mounting Fits |        | FIXED                        |         |               |       | FLOATING                     |         |                   |       | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|-------|--------------------------|-------|----------------|---------|---------------|--------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |       | D <sub>a</sub> (Housing) |       | Min.           | Max.    | Loose         | Tight  | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |                                    |
|                          | Max.                            | Min.  | Max.                     | Min.  |                |         |               |        | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |                                    |
| mm                       | mm                              | mm    | mm                       | mm    | mm             | mm      | mm            | mm     | mm                           | mm      | mm            | mm    | mm                           | mm      | mm                | mm    |                                    |
| 0.3                      | 13.2                            | 13    | 19.6                     | 19.3  | 9.995          | 10.000  | 0.005         | 0.004  | 22.000                       | 22.005  | 0.0000        | 0.010 | 22.010                       | 22.005  | 0.015             | 0.005 | 9300HX                             |
| 0.3                      | 15.2                            | 14.9  | 21.6                     | 21.3  | 11.995         | 12.000  | 0.005         | 0.004  | 24.000                       | 24.005  | 0.000         | 0.010 | 24.010                       | 24.005  | 0.015             | 0.005 | 9301HX                             |
| 0.3                      | 18.3                            | 18.1  | 25.5                     | 25.2  | 14.995         | 15.000  | 0.005         | 0.004  | 28.000                       | 28.005  | 0.000         | 0.010 | 28.010                       | 28.005  | 0.015             | 0.005 | 9302HX                             |
| 0.3                      | 20.3                            | 20    | 27.5                     | 27.2  | 16.995         | 17.000  | 0.005         | 0.004  | 30.000                       | 30.005  | 0.000         | 0.010 | 30.010                       | 30.005  | 0.015             | 0.005 | 9303HX                             |
| 0.3                      | 24.1                            | 23.9  | 33.7                     | 33.4  | 19.995         | 20.000  | 0.005         | 0.005  | 37.000                       | 37.006  | 0.000         | 0.012 | 37.010                       | 37.005  | 0.016             | 0.005 | 9304HX                             |
| 0.3                      | 29.1                            | 28.9  | 38.7                     | 38.4  | 24.995         | 25.000  | 0.005         | 0.005  | 42.000                       | 42.006  | 0.000         | 0.012 | 42.010                       | 42.005  | 0.016             | 0.005 | 9305HX                             |
| 0.3                      | 34.1                            | 33.9  | 43.7                     | 43.4  | 29.995         | 30.000  | 0.005         | 0.005  | 47.000                       | 47.006  | 0.000         | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | 9306HX                             |
| 0.6                      | 40                              | 39.5  | 51.1                     | 50.6  | 34.995         | 35.000  | 0.005         | 0.006  | 55.000                       | 55.008  | 0.000         | 0.015 | 55.012                       | 55.007  | 0.019             | 0.007 | 9307HX                             |
| 0.6                      | 45.1                            | 44.6  | 57.9                     | 57.4  | 39.995         | 40.000  | 0.005         | 0.006  | 62.000                       | 62.008  | 0.000         | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | 9308HX                             |
| 0.6                      | 50.7                            | 50.1  | 63.4                     | 62.9  | 44.995         | 45.000  | 0.005         | 0.006  | 68.000                       | 68.008  | 0.000         | 0.015 | 68.012                       | 68.007  | 0.019             | 0.007 | 9309HX                             |
| 0.6                      | 55.1                            | 54.6  | 67.9                     | 67.4  | 49.995         | 50.000  | 0.005         | 0.006  | 72.000                       | 72.008  | 0.000         | 0.015 | 72.011                       | 72.007  | 0.019             | 0.007 | 9310HX                             |
| 1.0                      | 60.9                            | 60.4  | 75.2                     | 74.7  | 54.995         | 55.000  | 0.005         | 0.007  | 80.000                       | 80.008  | 0.000         | 0.015 | 80.012                       | 80.008  | 0.020             | 0.008 | 9311HX                             |
| 1.0                      | 65.8                            | 65.3  | 80.2                     | 79.7  | 59.995         | 60.000  | 0.005         | 0.007  | 85.000                       | 85.008  | 0.000         | 0.016 | 85.016                       | 85.009  | 0.024             | 0.009 | 9312HX                             |
| 1.0                      | 70.8                            | 70.3  | 85.2                     | 84.7  | 64.995         | 65.000  | 0.005         | 0.007  | 90.000                       | 90.008  | 0.0000        | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | 9313HX                             |
| 1.0                      | 76.8                            | 76.3  | 94.3                     | 93.8  | 69.995         | 70.000  | 0.005         | 0.007  | 100.000                      | 100.008 | 0.0000        | 0.016 | 100.018                      | 100.010 | 0.025             | 0.010 | 9314HX                             |
| 1.0                      | 81.9                            | 81.1  | 99.4                     | 98.6  | 74.995         | 75.005  | 0.005         | 0.012  | 105.000                      | 105.008 | 0.0000        | 0.016 | 105.019                      | 105.011 | 0.026             | 0.011 | 9315HX                             |
| 1.0                      | 86.9                            | 86.1  | 104.4                    | 103.6 | 79.995         | 80.005  | 0.005         | 0.012  | 110.000                      | 110.008 | 0.0000        | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | 9316HX                             |
| 1.0                      | 93.6                            | 92.8  | 112.7                    | 111.9 | 84.995         | 85.005  | 0.005         | 0.012  | 120.000                      | 120.008 | 0.0000        | 0.016 | 120.018                      | 120.010 | 0.025             | 0.010 | 9317HX                             |
| 1.0                      | 97.8                            | 97.0  | 118.5                    | 117.7 | 89.995         | 90.005  | 0.005         | 0.013  | 125.000                      | 125.008 | 0.0000        | 0.017 | 125.021                      | 125.011 | 0.030             | 0.011 | 9318HX                             |
| 1.0                      | 102.8                           | 102.0 | 123.5                    | 122.7 | 94.995         | 95.005  | 0.005         | 0.013  | 130.000                      | 130.009 | 0.0000        | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | 9319HX                             |
| 1.0                      | 110.3                           | 109.5 | 131                      | 130.2 | 99.995         | 100.005 | 0.005         | 0.013  | 140.000                      | 140.009 | 0.0000        | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | 9320HX                             |
| 1.0                      | 120.3                           | 119.5 | 141                      | 140.2 | 109.995        | 110.005 | 0.005         | 0.013  | 150.000                      | 150.009 | 0.0000        | 0.018 | 150.023                      | 150.012 | 0.032             | 0.012 | 9322HX                             |
| 1.0                      | 131.2                           | 130.4 | 155                      | 154.3 | 119.995        | 120.005 | 0.005         | 0.013  | 165.000                      | 165.010 | 0.0000        | 0.020 | 165.022                      | 165.012 | 0.032             | 0.012 | 9324HX                             |
| 1.5                      | 142.1                           | 141.4 | 169.2                    | 168.4 | 129.995        | 130.005 | 0.005         | 0.015  | 180.000                      | 180.010 | 0.0000        | 0.020 | 180.022                      | 180.012 | 0.032             | 0.012 | 9326HX                             |
| 1.5                      | 152.1                           | 151.4 | 179.2                    | 178.4 | 139.995        | 140.005 | 0.005         | 0.0150 | 190.000                      | 190.010 | 0.0000        | 0.021 | 190.022                      | 190.012 | 0.033             | 0.012 | 9328HX                             |
| 2.0                      | 163.1                           | 162.4 | 198.2                    | 197.4 | 149.995        | 150.005 | 0.005         | 0.015  | 210.000                      | 210.011 | 0.0000        | 0.022 | 210.025                      | 210.015 | 0.036             | 0.015 | 9330HX                             |

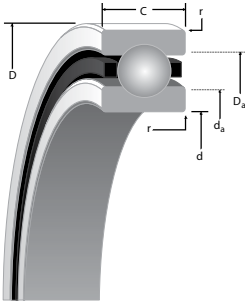




# BALL BEARINGS

## ULTRA-LIGHT 2(3)MMV9300HX (ISO 19) SERIES

### DIMENSIONAL SERIES INCHES



D

### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore             | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>lbs. | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                |                                |
|------------------------------|-----------------------|-----------------|---------------------------|---------------------|-------------|---------------------------------------------------|----------------|--------------------------------|---------------------------------------------------|----------------|--------------------------------|
|                              |                       |                 |                           |                     |             | Co (stat)                                         | Ce (dyn)       | Limiting Speed <sup>(N9)</sup> | Co (stat)                                         | Ce (dyn)       | Limiting Speed <sup>(N9)</sup> |
|                              | in./tol: +0; -0.00(X) |                 |                           | in.                 | lbs.        | lbs.                                              |                | RPM                            | lbs.                                              |                | RPM                            |
| 9300HX                       | 0.3937<br>(1.5)       | 0.8661<br>(2)   | 0.2362<br>(16)            | 13 x 3/32           | 0.02        | 120<br>110                                        | 330<br>330     | 91700<br>110040                | 120<br>110                                        | 310<br>310     | 82500<br>99000                 |
| 9301HX                       | 0.4724<br>(1.5)       | 0.9449<br>(2)   | 0.2362<br>(31)            | 14 x 3/32           | 0.03        | 140<br>120                                        | 340<br>340     | 80000<br>96000                 | 130<br>120                                        | 320<br>320     | 72000<br>86400                 |
| 9302HX                       | 0.5906<br>(1.5)       | 1.1024<br>(2)   | 0.2756<br>(31)            | 16 x 7/64           | 0.04        | 220<br>200                                        | 470<br>470     | 66800<br>80160                 | 200<br>180                                        | 460<br>460     | 60100<br>72120                 |
| 9303HX                       | 0.6693<br>(1.5)       | 1.1811<br>(2)   | 0.2756<br>(31)            | 17 x 7/64           | 0.04        | 230<br>210                                        | 500<br>500     | 60400<br>72480                 | 220<br>200                                        | 470<br>470     | 54400<br>65280                 |
| 9304HX                       | 0.7874<br>(2)         | 1.4567<br>(2.5) | 0.3543<br>(47)            | 17 x 9/64           | 0.08        | 380<br>340                                        | 790<br>790     | 50200<br>60240                 | 360<br>320                                        | 750<br>750     | 45200<br>54240                 |
| 9305HX                       | 0.9843<br>(2)         | 1.6535<br>(2.5) | 0.3543<br>(47)            | 20 x 9/64           | 0.1         | 460<br>410                                        | 850<br>850     | 41800<br>50160                 | 430<br>390                                        | 810<br>810     | 37600<br>45120                 |
| 9306HX                       | 1.1811<br>(2)         | 1.8504<br>(2.5) | 0.3543<br>(47)            | 23 x 9/64           | 0.11        | 540<br>480                                        | 910<br>910     | 35900<br>43080                 | 500<br>440                                        | 860<br>860     | 32300<br>38760                 |
| 9307HX                       | 1.378<br>(2.5)        | 2.1654<br>(3)   | 0.3937<br>(47)            | 25 x 5/32           | 0.18        | 710<br>640                                        | 1150<br>1150   | 30500<br>36600                 | 670<br>590                                        | 1080<br>1080   | 27500<br>33000                 |
| 9308HX                       | 1.5748<br>(2.5)       | 2.4409<br>(3)   | 0.4724<br>(47)            | 19 x 1/4            | 0.25        | 1350<br>1200                                      | 2400<br>2400   | 28000<br>33600                 | 1280<br>1140                                      | 2270<br>2270   | 25200<br>30240                 |
| 9309HX                       | 1.7717<br>(2.5)       | 2.6772<br>(3)   | 0.4724<br>(47)            | 21 x 1/4            | 0.29        | 1510<br>1350                                      | 2510<br>2510   | 25000<br>30000                 | 1440<br>1280                                      | 2380<br>2380   | 22500<br>27000                 |
| 9310HX                       | 1.9685<br>(2.5)       | 2.8346<br>(3)   | 0.4724<br>(47)            | 23 x 1/4            | 0.3         | 1680<br>1500                                      | 2630<br>2630   | 22900<br>27480                 | 1590<br>1440                                      | 2480<br>2480   | 20600<br>24720                 |
| 9311HX                       | 2.1654<br>(3)         | 3.1496<br>(3)   | 0.5118<br>(59)            | 23 x 9/32           | 0.39        | 2120<br>1890                                      | 3260<br>3260   | 20700<br>24840                 | 2000<br>1780                                      | 3080<br>3080   | 18600<br>22320                 |
| 9312HX                       | 2.3622<br>(3)         | 3.3465<br>(3)   | 0.5118<br>(59)            | 25 x 9/32           | 0.43        | 2320<br>2070                                      | 3400<br>3400   | 19200<br>23040                 | 2180<br>1940                                      | 3210<br>3210   | 17300<br>20760                 |
| 9313HX                       | 2.5591<br>(3)         | 3.5433<br>(3)   | 0.5118<br>(59)            | 27 x 9/32           | 0.45        | 2510<br>2230                                      | 3530<br>3530   | 17800<br>21360                 | 2340<br>2080                                      | 3320<br>3320   | 16000<br>19200                 |
| 9314HX                       | 2.7559<br>(3)         | 3.937<br>(3)    | 0.6299<br>(59)            | 24 x 11/32          | 0.75        | 3320<br>2960                                      | 4790<br>4790   | 16400<br>19680                 | 3130<br>2780                                      | 4520<br>4520   | 14800<br>17760                 |
| 9315HX                       | 2.9528<br>(3)         | 4.1339<br>(3)   | 0.6299<br>(59)            | 25 x 11/32          | 0.8         | 3470<br>3090                                      | 4860<br>4860   | 15400<br>18480                 | 3260<br>2900                                      | 4590<br>4590   | 13900<br>16680                 |
| 9316HX                       | 3.1496<br>(3)         | 4.3307<br>(3)   | 0.6299<br>(59)            | 27 x 11/32          | 0.8         | 3750<br>3340                                      | 5060<br>5060   | 14500<br>17400                 | 3500<br>3110                                      | 4770<br>4770   | 13100<br>15720                 |
| 9317HX                       | 3.3465<br>(3)         | 4.7244<br>(3)   | 0.7087<br>(79)            | 26 x 3/8            | 1.16        | 4310<br>3830                                      | 5790<br>5790   | 13500<br>16200                 | 4010<br>3570                                      | 5450<br>5450   | 12200<br>14640                 |
| 9318HX                       | 3.5433<br>(3)         | 4.9213<br>(3.5) | 0.7087<br>(79)            | 26 x 13/32          | 1.2         | 5050<br>4490                                      | 6730<br>6730   | 12900<br>15480                 | 4720<br>4200                                      | 6340<br>6340   | 11600<br>13920                 |
| 9319HX                       | 3.7402<br>(3)         | 5.1181<br>(3.5) | 0.7087<br>(79)            | 28 x 13/32          | 1.26        | 5440<br>4840                                      | 7000<br>7000   | 12300<br>14760                 | 5060<br>4510                                      | 6590<br>6590   | 10300<br>12360                 |
| 9320HX                       | 3.937<br>(3)          | 5.5118<br>(3.5) | 0.7874<br>(79)            | 29 x 13/32          | 1.8         | 5590<br>4980                                      | 7060<br>7060   | 11400<br>13680                 | 5210<br>4640                                      | 6640<br>6640   | 10000<br>12000                 |
| 9322HX                       | 4.3307<br>(3)         | 5.9055<br>(3.5) | 0.7874<br>(79)            | 31 x 13/32          | 1.92        | 5930<br>5280                                      | 7240<br>7240   | 10500<br>12600                 | 5530<br>4920                                      | 6810<br>6810   | 9500<br>11400                  |
| 9324HX                       | 4.7244<br>(3)         | 6.4961<br>(4)   | 0.8661<br>(79)            | 30 x 15/32          | 2.6         | 7680<br>6840                                      | 9280<br>9280   | 9600<br>11520                  | 7150<br>6370                                      | 8730<br>8730   | 8600<br>10320                  |
| 9326HX                       | 5.1181<br>(4)         | 7.0866<br>(4)   | 0.9449<br>(98)            | 30 x 17/32          | 3.63        | 9900<br>8810                                      | 11700<br>11700 | 8900<br>10680                  | 9230<br>8210                                      | 11000<br>11000 | 8000<br>9600                   |
| 9328HX                       | 5.5118<br>(4)         | 7.4803<br>(4.5) | 0.9449<br>(98)            | 32 x 17/32          | 3.85        | 10500<br>9340                                     | 12100<br>12100 | 8300<br>9960                   | 9780<br>8710                                      | 11400<br>11400 | 7500<br>9000                   |
| 9330HX                       | 5.9055<br>(4)         | 8.2677<br>(4.5) | 1.1024<br>(98)            | 27 x 11/16          | 5.75        | 15000<br>13400                                    | 17800<br>17800 | 7700<br>9240                   | 14100<br>12500                                    | 16800<br>16800 | 6900<br>8200                   |

(N9) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |        |               |        | FLOATING                     |        |                   |        | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|------|--------------------------|------|----------------|--------|---------------|---------|------------------------------|--------|---------------|--------|------------------------------|--------|-------------------|--------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |      | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |        | Mounting Fits |        | Housing Bore<br>(Stationary) |        | Housing Clearance |        |                                    |
|                          | Max.                            | Min. | Max.                     | Min. |                |        |               |         | Min.                         | Max.   | Tight         | Loose  | Max.                         | Min.   | Max.              | Min.   |                                    |
| in.                      | in.                             | in.  | in.                      | in.  | in.            | in.    | in.           | in.     | in.                          | in.    | in.           | in.    | in.                          | in.    | in.               | in.    |                                    |
| 0.012                    | 0.52                            | 0.51 | 0.77                     | 0.76 | 0.3935         | 0.3937 | 0.0002        | 0.00015 | 0.8661                       | 0.8663 | 0.0000        | 0.0004 | 0.8665                       | 0.8663 | 0.0006            | 0.0002 | 9300HX                             |
| 0.012                    | 0.6                             | 0.59 | 0.85                     | 0.84 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 0.9449                       | 0.9451 | 0.0000        | 0.0004 | 0.9453                       | 0.9451 | 0.0006            | 0.0002 | 9301HX                             |
| 0.012                    | 0.72                            | 0.71 | 1                        | 0.99 | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.0236                       | 1.0238 | 0.0000        | 0.0004 | 1.0240                       | 1.0238 | 0.0006            | 0.0002 | 9302HX                             |
| 0.012                    | 0.8                             | 0.79 | 1.08                     | 1.07 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.1811                       | 1.1813 | 0.0000        | 0.0004 | 1.1815                       | 1.1813 | 0.0006            | 0.0002 | 9303HX                             |
| 0.012                    | 0.95                            | 0.94 | 1.33                     | 1.32 | 0.7872         | 0.7874 | 0.0002        | 0.0002  | 1.4567                       | 1.4570 | 0.0000        | 0.0005 | 1.4571                       | 1.4569 | 0.0007            | 0.0002 | 9304HX                             |
| 0.012                    | 1.15                            | 1.14 | 1.52                     | 1.51 | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 1.6535                       | 1.6538 | 0.0000        | 0.0005 | 1.6539                       | 1.6537 | 0.0007            | 0.0002 | 9305HX                             |
| 0.012                    | 1.34                            | 1.33 | 1.72                     | 1.71 | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 1.8504                       | 1.8507 | 0.0000        | 0.0005 | 1.8509                       | 1.8507 | 0.0008            | 0.0003 | 9306HX                             |
| 0.024                    | 1.57                            | 1.55 | 2.01                     | 1.99 | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 2.1654                       | 2.1657 | 0.0000        | 0.0006 | 2.1659                       | 2.1657 | 0.0008            | 0.0003 | 9307HX                             |
| 0.024                    | 1.78                            | 1.76 | 2.28                     | 2.26 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 2.4409                       | 2.4412 | 0.0000        | 0.0006 | 2.4414                       | 2.4412 | 0.0008            | 0.0003 | 9308HX                             |
| 0.024                    | 1.99                            | 1.97 | 2.5                      | 2.48 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 2.6772                       | 2.6775 | 0.0000        | 0.0006 | 2.6777                       | 2.6775 | 0.0008            | 0.0003 | 9309HX                             |
| 0.024                    | 2.17                            | 2.15 | 2.67                     | 2.65 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 2.8346                       | 2.8349 | 0.0000        | 0.0006 | 2.8351                       | 2.8349 | 0.0008            | 0.0003 | 9310HX                             |
| 0.039                    | 2.4                             | 2.38 | 2.96                     | 2.94 | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 3.1496                       | 3.1499 | 0.0000        | 0.0006 | 3.1501                       | 3.1499 | 0.0008            | 0.0003 | 9311HX                             |
| 0.039                    | 2.59                            | 2.57 | 3.16                     | 3.14 | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 3.3465                       | 3.3468 | 0.0000        | 0.0006 | 3.3471                       | 3.3468 | 0.0009            | 0.0003 | 9312HX                             |
| 0.039                    | 2.79                            | 2.77 | 3.35                     | 3.33 | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 3.5433                       | 3.5436 | 0.0000        | 0.0006 | 3.5439                       | 3.5436 | 0.0009            | 0.0003 | 9313HX                             |
| 0.039                    | 3.02                            | 3    | 3.71                     | 3.69 | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 3.9370                       | 3.9373 | 0.0000        | 0.0006 | 3.9377                       | 3.9374 | 0.0010            | 0.0004 | 9314HX                             |
| 0.039                    | 3.22                            | 3.19 | 3.91                     | 3.88 | 2.9526         | 2.9530 | 0.0002        | 0.0005  | 4.1339                       | 4.1342 | 0.0000        | 0.0006 | 4.1346                       | 4.1343 | 0.0010            | 0.0004 | 9315HX                             |
| 0.039                    | 3.42                            | 3.39 | 4.11                     | 4.08 | 3.1494         | 3.1498 | 0.0002        | 0.0005  | 4.3307                       | 4.3310 | 0.0000        | 0.0006 | 4.3314                       | 4.3311 | 0.0010            | 0.0004 | 9316HX                             |
| 0.039                    | 3.69                            | 3.66 | 4.44                     | 4.41 | 3.3463         | 3.3467 | 0.0002        | 0.0005  | 4.7244                       | 4.7247 | 0.0000        | 0.0006 | 4.7251                       | 4.7248 | 0.0010            | 0.0004 | 9317HX                             |
| 0.039                    | 3.85                            | 3.82 | 4.66                     | 4.63 | 3.5431         | 3.5435 | 0.0002        | 0.0005  | 4.9213                       | 4.9216 | 0.0000        | 0.0007 | 4.9221                       | 4.9217 | 0.0012            | 0.0004 | 9318HX                             |
| 0.039                    | 4.05                            | 4.02 | 4.86                     | 4.83 | 3.7400         | 3.7404 | 0.0002        | 0.0005  | 5.1181                       | 5.1185 | 0.0000        | 0.0007 | 5.1189                       | 5.1185 | 0.0011            | 0.0004 | 9319HX                             |
| 0.039                    | 4.34                            | 4.31 | 5.16                     | 5.13 | 3.9368         | 3.9372 | 0.0002        | 0.0005  | 5.5118                       | 5.5122 | 0.0000        | 0.0007 | 5.5126                       | 5.5122 | 0.0011            | 0.0004 | 9320HX                             |
| 0.039                    | 4.74                            | 4.71 | 5.55                     | 5.52 | 4.3305         | 4.3309 | 0.0002        | 0.0005  | 5.9055                       | 5.9059 | 0.0000        | 0.0007 | 5.9064                       | 5.9060 | 0.0012            | 0.0005 | 9322HX                             |
| 0.039                    | 5.16                            | 5.13 | 6.1                      | 6.07 | 4.7242         | 4.7246 | 0.0002        | 0.0005  | 6.4961                       | 6.4965 | 0.0000        | 0.0008 | 6.4970                       | 6.4966 | 0.0013            | 0.0005 | 9324HX                             |
| 0.059                    | 5.6                             | 5.57 | 6.66                     | 6.63 | 5.1179         | 5.1183 | 0.0002        | 0.0006  | 7.0866                       | 7.0870 | 0.0000        | 0.0008 | 7.0875                       | 7.0871 | 0.0013            | 0.0005 | 9326HX                             |
| 0.059                    | 5.99                            | 5.96 | 7.05                     | 7.02 | 5.5116         | 5.5120 | 0.0002        | 0.0006  | 7.4803                       | 7.4807 | 0.0000        | 0.0008 | 7.4812                       | 7.4808 | 0.0014            | 0.0005 | 9328HX                             |
| 0.079                    | 6.42                            | 6.39 | 7.8                      | 7.77 | 5.9053         | 5.9057 | 0.0002        | 0.0006  | 8.2677                       | 8.2682 | 0.0000        | 0.0009 | 8.2687                       | 8.2683 | 0.0015            | 0.0006 | 9330HX                             |



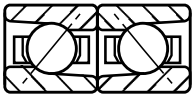


# BALL BEARINGS

## ULTRA-LIGHT 2MMV9300HX (ISO 19) SERIES

### DUPLEX PERFORMANCE DATA

### MOUNTING ARRANGEMENTS



Suggested  
DB



Tandem  
DT



Special Applications  
DF

| Bearing Number                                          | PRELOAD |        |       | AXIAL STIFFNESS <sup>(1)</sup> |        |        | RADIAL STIFFNESS <sup>(1)</sup> |        |        | SPACER OFFSETS <sup>(1)</sup> |                 |
|---------------------------------------------------------|---------|--------|-------|--------------------------------|--------|--------|---------------------------------|--------|--------|-------------------------------|-----------------|
|                                                         | Light   | Medium | Heavy | Light                          | Medium | Heavy  | Light                           | Medium | Heavy  | Light to Medium               | Medium to Heavy |
|                                                         | N       |        |       | N/μm                           |        |        | N/μm                            |        |        | μm                            |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 2MMV9300HX SERIES</b> |         |        |       |                                |        |        |                                 |        |        |                               |                 |
| 2MMV9300HX                                              | 9       | 25     | 55    | 10.2                           | 15.6   | 21.0   | 61.0                            | 88.5   | 110.8  | 5.6                           | 5.6             |
| 2MMV9301HX                                              | 9       | 25     | 55    | 10.7                           | 16.7   | 22.8   | 61.3                            | 88.2   | 110.2  | 5.1                           | 5.6             |
| 2MMV9302HX                                              | 20      | 45     | 85    | 17.0                           | 22.7   | 31.0   | 96.4                            | 120.9  | 150.9  | 4.6                           | 6.6             |
| 2MMV9303HX                                              | 20      | 45     | 85    | 16.9                           | 22.3   | 30.0   | 100.9                           | 127.1  | 159.1  | 4.6                           | 6.6             |
| 2MMV9304HX                                              | 20      | 65     | 135   | 18.2                           | 28.5   | 38.7   | 109.6                           | 157.9  | 197.3  | 7.6                           | 8.1             |
| 2MMV9305HX                                              | 20      | 65     | 135   | 20.2                           | 31.3   | 42.3   | 122.0                           | 176.3  | 220.5  | 7.1                           | 7.1             |
| 2MMV9306HX                                              | 20      | 65     | 135   | 22.0                           | 33.9   | 45.7   | 133.7                           | 193.6  | 242.6  | 6.1                           | 6.6             |
| 2MMV9307HX                                              | 45      | 110    | 225   | 30.8                           | 44.6   | 60.5   | 185.7                           | 251.7  | 314.6  | 7.1                           | 8.6             |
| 2MMV9308HX                                              | 45      | 135    | 265   | 29.5                           | 45.1   | 60.1   | 177.9                           | 259.6  | 325.7  | 9.7                           | 10.2            |
| 2MMV9309HX                                              | 45      | 155    | 310   | 31.5                           | 50.9   | 68.0   | 189.4                           | 292.1  | 366.4  | 10.7                          | 10.7            |
| 2MMV9310HX                                              | 65      | 175    | 355   | 38.7                           | 56.7   | 75.9   | 232.6                           | 324.6  | 407.0  | 9.1                           | 10.7            |
| 2MMV9311HX                                              | 65      | 200    | 400   | 39.5                           | 60.3   | 80.5   | 241.2                           | 352.2  | 442.0  | 10.7                          | 11.2            |
| 2MMV9312HX                                              | 65      | 225    | 445   | 41.7                           | 66.2   | 88.3   | 254.1                           | 385.7  | 483.9  | 11.7                          | 11.7            |
| 2MMV9313HX                                              | 65      | 225    | 445   | 43.7                           | 69.3   | 92.3   | 266.7                           | 406.1  | 509.8  | 11.2                          | 11.2            |
| 2MMV9314HX                                              | 110     | 335    | 665   | 51.0                           | 78.1   | 104.5  | 316.6                           | 461.2  | 578.4  | 13.7                          | 14.7            |
| 2MMV9315HX                                              | 110     | 335    | 665   | 52.3                           | 80.0   | 107.0  | 325.0                           | 474.0  | 594.7  | 13.2                          | 14.2            |
| 2MMV9316HX                                              | 110     | 335    | 665   | 54.9                           | 83.8   | 111.8  | 341.2                           | 499.0  | 626.5  | 12.7                          | 13.7            |
| 2MMV9317HX                                              | 135     | 400    | 800   | 58.4                           | 89.3   | 119.3  | 365.2                           | 533.1  | 669.2  | 14.2                          | 15.2            |
| 2MMV9318HX                                              | 135     | 400    | 800   | 59.4                           | 90.4   | 120.2  | 373.1                           | 548.1  | 688.9  | 14.2                          | 15.2            |
| 2MMV9319HX                                              | 135     | 400    | 800   | 62.2                           | 94.5   | 125.5  | 390.6                           | 575.9  | 724.3  | 13.7                          | 14.7            |
| 2MMV9320HX                                              | 155     | 490    | 975   | 67.4                           | 104.6  | 139.5  | 423.4                           | 630.5  | 791.8  | 15.2                          | 15.7            |
| 2MMV9322HX                                              | 175     | 535    | 1065  | 73.8                           | 112.7  | 150.4  | 464.0                           | 678.6  | 851.9  | 15.2                          | 16.3            |
| 2MMV9324HX                                              | 225     | 665    | 1335  | 80.9                           | 123.4  | 164.7  | 513.7                           | 752.1  | 944.3  | 17.3                          | 18.3            |
| 2MMV9326HX                                              | 245     | 735    | 1465  | 87.9                           | 133.4  | 177.0  | 545.9                           | 805.2  | 1012.7 | 17.8                          | 18.8            |
| 2MMV9328HX                                              | 265     | 800    | 1600  | 94.6                           | 143.6  | 190.6  | 587.5                           | 865.4  | 1088.2 | 17.8                          | 19.3            |
| 2MMV9330HX                                              | 355     | 1065   | 2135  | 99.6                           | 151.1  | 200.6  | 630.0                           | 930.8  | 1170.8 | 22.4                          | 24.4            |
|                                                         | lbs.    |        |       | 10 <sup>6</sup> lbs./in.       |        |        | 10 <sup>6</sup> lbs./in.        |        |        | in.                           |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 2MMV9300HX SERIES</b>   |         |        |       |                                |        |        |                                 |        |        |                               |                 |
| 2MMV9300HX                                              | 2       | 6      | 12    | 0.0581                         | 0.0894 | 0.1202 | 0.3489                          | 0.5059 | 0.6337 | 0.00022                       | 0.00022         |
| 2MMV9301HX                                              | 2       | 6      | 12    | 0.0614                         | 0.0957 | 0.1301 | 0.3506                          | 0.5044 | 0.6300 | 0.00020                       | 0.00022         |
| 2MMV9302HX                                              | 5       | 10     | 20    | 0.0972                         | 0.1297 | 0.1770 | 0.5509                          | 0.6912 | 0.8627 | 0.00018                       | 0.00026         |
| 2MMV9303HX                                              | 5       | 10     | 20    | 0.0966                         | 0.1275 | 0.1718 | 0.5769                          | 0.7266 | 0.9097 | 0.00018                       | 0.00026         |
| 2MMV9304HX                                              | 5       | 15     | 30    | 0.1043                         | 0.1627 | 0.2213 | 0.6269                          | 0.9029 | 1.1280 | 0.00030                       | 0.00032         |
| 2MMV9305HX                                              | 5       | 15     | 30    | 0.1154                         | 0.1787 | 0.2417 | 0.6977                          | 1.0080 | 1.2610 | 0.00028                       | 0.00028         |
| 2MMV9306HX                                              | 5       | 15     | 30    | 0.1258                         | 0.1940 | 0.2611 | 0.7644                          | 1.1070 | 1.3870 | 0.00024                       | 0.00026         |
| 2MMV9307HX                                              | 10      | 25     | 50    | 0.1759                         | 0.2550 | 0.3460 | 1.0620                          | 1.4390 | 1.7990 | 0.00028                       | 0.00034         |
| 2MMV9308HX                                              | 10      | 30     | 60    | 0.1688                         | 0.2576 | 0.3437 | 1.0170                          | 1.4840 | 1.8620 | 0.00038                       | 0.00040         |
| 2MMV9309HX                                              | 10      | 35     | 70    | 0.1799                         | 0.2910 | 0.3889 | 1.0830                          | 1.6700 | 2.0950 | 0.00042                       | 0.00042         |
| 2MMV9310HX                                              | 15      | 40     | 80    | 0.2214                         | 0.3243 | 0.4340 | 1.3300                          | 1.8560 | 2.3270 | 0.00036                       | 0.00042         |
| 2MMV9311HX                                              | 15      | 45     | 90    | 0.2260                         | 0.3449 | 0.4603 | 1.3790                          | 2.0140 | 2.5270 | 0.00042                       | 0.00044         |
| 2MMV9312HX                                              | 15      | 50     | 100   | 0.2382                         | 0.3783 | 0.5051 | 1.4530                          | 2.2050 | 2.7670 | 0.00046                       | 0.00046         |
| 2MMV9313HX                                              | 15      | 50     | 100   | 0.2501                         | 0.3962 | 0.5278 | 1.5250                          | 2.3220 | 2.9150 | 0.00044                       | 0.00044         |
| 2MMV9314HX                                              | 25      | 75     | 150   | 0.2915                         | 0.4465 | 0.5977 | 1.8100                          | 2.6370 | 3.3070 | 0.00054                       | 0.00058         |
| 2MMV9315HX                                              | 25      | 75     | 150   | 0.2991                         | 0.4575 | 0.6117 | 1.8580                          | 2.7100 | 3.4000 | 0.00052                       | 0.00056         |
| 2MMV9316HX                                              | 25      | 75     | 150   | 0.3140                         | 0.4790 | 0.6390 | 1.9510                          | 2.8530 | 3.5820 | 0.00050                       | 0.00054         |
| 2MMV9317HX                                              | 30      | 90     | 180   | 0.3339                         | 0.5104 | 0.6820 | 2.0880                          | 3.0480 | 3.8260 | 0.00056                       | 0.00060         |
| 2MMV9318HX                                              | 30      | 90     | 180   | 0.3396                         | 0.5167 | 0.6874 | 2.1330                          | 3.1340 | 3.9390 | 0.00056                       | 0.00060         |
| 2MMV9319HX                                              | 30      | 90     | 180   | 0.3559                         | 0.5403 | 0.7174 | 2.2330                          | 3.2930 | 4.1410 | 0.00054                       | 0.00058         |
| 2MMV9320HX                                              | 35      | 110    | 220   | 0.3852                         | 0.5978 | 0.7975 | 2.4210                          | 3.6050 | 4.5270 | 0.00060                       | 0.00062         |
| 2MMV9322HX                                              | 40      | 120    | 240   | 0.4221                         | 0.6444 | 0.8601 | 2.6530                          | 3.8800 | 4.8710 | 0.00060                       | 0.00064         |
| 2MMV9324HX                                              | 50      | 150    | 300   | 0.4624                         | 0.7057 | 0.9418 | 2.9370                          | 4.3000 | 5.3990 | 0.00068                       | 0.00072         |
| 2MMV9326HX                                              | 55      | 165    | 330   | 0.5028                         | 0.7627 | 1.0120 | 3.1210                          | 4.6040 | 5.7900 | 0.00070                       | 0.00074         |
| 2MMV9328HX                                              | 60      | 180    | 360   | 0.5408                         | 0.8209 | 1.0900 | 3.3590                          | 4.9480 | 6.2220 | 0.00070                       | 0.00076         |
| 2MMV9330HX                                              | 80      | 240    | 480   | 0.5694                         | 0.8640 | 1.1470 | 3.6020                          | 5.3220 | 6.6940 | 0.00088                       | 0.00096         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.

**ULTRA-LIGHT  
3MMV9300HX  
(ISO 19) SERIES**

**DUPLEX  
PERFORMANCE DATA**

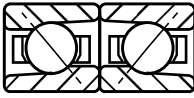
**MOUNTING ARRANGEMENTS**



**Suggested  
DB**



**Tandem  
DT**



**Special Applications  
DF**

| Bearing Number                                          | PRELOAD |        |       | AXIAL STIFFNESS <sup>(1)</sup> |        |        | RADIAL STIFFNESS <sup>(1)</sup> |        |         | SPACER OFFSETS <sup>(1)</sup> |                 |
|---------------------------------------------------------|---------|--------|-------|--------------------------------|--------|--------|---------------------------------|--------|---------|-------------------------------|-----------------|
|                                                         | Light   | Medium | Heavy | Light                          | Medium | Heavy  | Light                           | Medium | Heavy   | Light to Medium               | Medium to Heavy |
|                                                         | N       |        |       | N/μm                           |        |        | N/μm                            |        |         | μm                            |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 3MMV9300HX SERIES</b> |         |        |       |                                |        |        |                                 |        |         |                               |                 |
| 3MMV9300HX                                              | 22      | 45     | 90    | 28.53                          | 36.82  | 48.06  | 60.22                           | 75.61  | 94.48   | 2.79                          | 4.06            |
| 3MMV9301HX                                              | 22      | 45     | 90    | 29.93                          | 38.58  | 50.28  | 63.30                           | 79.51  | 99.41   | 2.54                          | 4.06            |
| 3MMV9302HX                                              | 22      | 65     | 135   | 34.07                          | 50.72  | 66.06  | 72.78                           | 104.78 | 131.04  | 4.06                          | 4.57            |
| 3MMV9303HX                                              | 22      | 65     | 135   | 35.45                          | 52.71  | 68.60  | 75.75                           | 109.14 | 136.54  | 4.06                          | 4.32            |
| 3MMV9304HX                                              | 45      | 110    | 225   | 48.76                          | 67.98  | 88.46  | 103.86                          | 140.69 | 175.95  | 4.57                          | 5.59            |
| 3MMV9305HX                                              | 45      | 110    | 225   | 54.17                          | 75.33  | 97.75  | 115.68                          | 156.99 | 196.59  | 4.06                          | 5.08            |
| 3MMV9306HX                                              | 45      | 110    | 225   | 59.33                          | 82.33  | 106.58 | 126.87                          | 172.47 | 216.18  | 3.56                          | 4.57            |
| 3MMV9307HX                                              | 65      | 175    | 355   | 74.51                          | 106.06 | 137.72 | 159.18                          | 220.72 | 276.34  | 5.08                          | 5.59            |
| 3MMV9308HX                                              | 65      | 225    | 445   | 70.62                          | 108.04 | 139.41 | 154.45                          | 233.67 | 293.31  | 7.11                          | 7.11            |
| 3MMV9309HX                                              | 90      | 245    | 490   | 83.32                          | 119.21 | 153.84 | 182.60                          | 257.80 | 323.74  | 6.10                          | 7.11            |
| 3MMV9310HX                                              | 90      | 265    | 535   | 88.43                          | 130.41 | 168.25 | 193.61                          | 282.11 | 354.17  | 6.60                          | 7.11            |
| 3MMV9311HX                                              | 110     | 335    | 665   | 99.24                          | 146.29 | 188.72 | 216.70                          | 315.69 | 396.50  | 7.11                          | 8.13            |
| 3MMV9312HX                                              | 110     | 335    | 665   | 104.80                         | 154.33 | 198.86 | 228.59                          | 333.88 | 419.41  | 6.60                          | 7.62            |
| 3MMV9313HX                                              | 110     | 335    | 665   | 110.22                         | 162.15 | 208.66 | 239.96                          | 351.37 | 441.80  | 6.60                          | 7.11            |
| 3MMV9314HX                                              | 155     | 490    | 980   | 122.31                         | 183.12 | 235.94 | 265.50                          | 394.05 | 495.14  | 8.64                          | 9.14            |
| 3MMV9315HX                                              | 155     | 490    | 980   | 125.63                         | 187.84 | 242.06 | 272.49                          | 404.89 | 508.96  | 8.64                          | 9.14            |
| 3MMV9316HX                                              | 155     | 490    | 980   | 132.14                         | 197.46 | 254.13 | 285.96                          | 426.23 | 536.07  | 8.13                          | 8.64            |
| 3MMV9317HX                                              | 200     | 625    | 1245  | 144.52                         | 215.48 | 277.74 | 313.42                          | 463.66 | 582.59  | 9.14                          | 10.16           |
| 3MMV9318HX                                              | 200     | 625    | 1245  | 148.32                         | 220.72 | 283.69 | 319.72                          | 475.73 | 598.51  | 9.14                          | 9.65            |
| 3MMV9319HX                                              | 200     | 625    | 1245  | 155.70                         | 231.57 | 297.33 | 334.58                          | 499.86 | 629.12  | 8.64                          | 9.14            |
| 3MMV9320HX                                              | 245     | 735    | 1465  | 170.75                         | 251.16 | 323.04 | 369.04                          | 540.62 | 679.84  | 9.14                          | 10.16           |
| 3MMV9322HX                                              | 265     | 800    | 1600  | 183.82                         | 270.40 | 348.05 | 397.55                          | 581.89 | 731.61  | 9.14                          | 10.16           |
| 3MMV9324HX                                              | 310     | 935    | 1870  | 198.51                         | 291.73 | 374.99 | 427.46                          | 628.07 | 790.37  | 10.16                         | 11.18           |
| 3MMV9326HX                                              | 355     | 1065   | 2135  | 216.35                         | 317.27 | 407.34 | 462.79                          | 684.21 | 861.73  | 10.67                         | 11.68           |
| 3MMV9328HX                                              | 400     | 1200   | 2400  | 235.07                         | 344.90 | 443.02 | 504.06                          | 743.15 | 935.54  | 10.67                         | 12.19           |
| 3MMV9330HX                                              | 535     | 1600   | 3200  | 249.06                         | 365.54 | 469.26 | 540.62                          | 799.12 | 1006.55 | 13.72                         | 15.24           |
|                                                         | lbs.    |        |       | 10 <sup>6</sup> lbs./in.       |        |        | 10 <sup>6</sup> lbs./in.        |        |         | in.                           |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 3MMV9300HX SERIES</b>   |         |        |       |                                |        |        |                                 |        |         |                               |                 |
| 3MMV9300HX                                              | 5       | 10     | 20    | 0.163                          | 0.211  | 0.275  | 0.344                           | 0.432  | 0.540   | .00011                        | .00016          |
| 3MMV9301HX                                              | 5       | 10     | 20    | 0.171                          | 0.221  | 0.288  | 0.362                           | 0.455  | 0.568   | .00010                        | .00016          |
| 3MMV9302HX                                              | 5       | 15     | 30    | 0.195                          | 0.290  | 0.378  | 0.416                           | 0.599  | 0.749   | .00016                        | .00018          |
| 3MMV9303HX                                              | 5       | 15     | 30    | 0.203                          | 0.301  | 0.392  | 0.433                           | 0.624  | 0.781   | .00016                        | .00017          |
| 3MMV9304HX                                              | 10      | 25     | 50    | 0.279                          | 0.389  | 0.506  | 0.594                           | 0.804  | 1.006   | .00018                        | .00022          |
| 3MMV9305HX                                              | 10      | 25     | 50    | 0.310                          | 0.431  | 0.559  | 0.661                           | 0.898  | 1.124   | .00016                        | .00020          |
| 3MMV9306HX                                              | 10      | 25     | 50    | 0.339                          | 0.471  | 0.609  | 0.725                           | 0.986  | 1.236   | .00014                        | .00018          |
| 3MMV9307HX                                              | 15      | 40     | 80    | 0.426                          | 0.606  | 0.787  | 0.910                           | 1.262  | 1.580   | .00020                        | .00022          |
| 3MMV9308HX                                              | 15      | 50     | 100   | 0.404                          | 0.618  | 0.797  | 0.883                           | 1.336  | 1.677   | .00028                        | .00028          |
| 3MMV9309HX                                              | 20      | 55     | 110   | 0.476                          | 0.682  | 0.880  | 1.044                           | 1.474  | 1.851   | .00024                        | .00028          |
| 3MMV9310HX                                              | 20      | 60     | 120   | 0.506                          | 0.746  | 0.962  | 1.107                           | 1.613  | 2.025   | .00026                        | .00028          |
| 3MMV9311HX                                              | 25      | 75     | 150   | 0.567                          | 0.836  | 1.079  | 1.239                           | 1.805  | 2.267   | .00028                        | .00032          |
| 3MMV9312HX                                              | 25      | 75     | 150   | 0.599                          | 0.882  | 1.137  | 1.307                           | 1.909  | 2.398   | .00026                        | .00030          |
| 3MMV9313HX                                              | 25      | 75     | 150   | 0.630                          | 0.927  | 1.193  | 1.372                           | 2.009  | 2.526   | .00026                        | .00028          |
| 3MMV9314HX                                              | 35      | 110    | 220   | 0.699                          | 1.047  | 1.349  | 1.518                           | 2.253  | 2.831   | .00034                        | .00036          |
| 3MMV9315HX                                              | 35      | 110    | 220   | 0.718                          | 1.074  | 1.384  | 1.558                           | 2.315  | 2.910   | .00034                        | .00036          |
| 3MMV9316HX                                              | 35      | 110    | 220   | 0.756                          | 1.129  | 1.453  | 1.635                           | 2.437  | 3.065   | .00032                        | .00034          |
| 3MMV9317HX                                              | 45      | 140    | 280   | 0.826                          | 1.232  | 1.588  | 1.792                           | 2.651  | 3.331   | .00036                        | .00040          |
| 3MMV9318HX                                              | 45      | 140    | 280   | 0.848                          | 1.262  | 1.622  | 1.828                           | 2.720  | 3.422   | .00036                        | .00038          |
| 3MMV9319HX                                              | 45      | 140    | 280   | 0.890                          | 1.324  | 1.700  | 1.913                           | 2.858  | 3.597   | .00034                        | .00036          |
| 3MMV9320HX                                              | 55      | 165    | 330   | 0.976                          | 1.436  | 1.847  | 2.110                           | 3.091  | 3.887   | .00036                        | .00040          |
| 3MMV9322HX                                              | 60      | 180    | 360   | 1.051                          | 1.546  | 1.990  | 2.273                           | 3.327  | 4.183   | .00036                        | .00040          |
| 3MMV9324HX                                              | 70      | 210    | 420   | 1.135                          | 1.668  | 2.144  | 2.444                           | 3.591  | 4.519   | .00040                        | .00044          |
| 3MMV9326HX                                              | 80      | 240    | 480   | 1.237                          | 1.814  | 2.329  | 2.646                           | 3.912  | 4.927   | .00042                        | .00046          |
| 3MMV9328HX                                              | 90      | 270    | 540   | 1.344                          | 1.972  | 2.533  | 2.882                           | 4.249  | 5.349   | .00042                        | .00048          |
| 3MMV9330HX                                              | 120     | 360    | 720   | 1.424                          | 2.090  | 2.683  | 3.091                           | 4.569  | 5.755   | .00054                        | .00060          |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.



# BALL BEARINGS

## ULTRA-LIGHT 2MMV9300HX (ISO 19) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |       | Klubers Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |        |         |       |
|----------------|-----------------|-------|-----------------|-------|--------------------------------------------------------------|------------|-------|--------|---------|-------|
|                | NBU15           |       | NBU15           |       | DUL                                                          | Grease DUM | DUH   | DUL    | Oil DUM | DUH   |
|                | 25%             | 40%   | 15%             | 20%   |                                                              |            |       |        |         |       |
| 2MMV9300HX     | 0.11            | 0.18  | 0.06            | 0.09  | 73360                                                        | 55020      | 36680 | 123795 | 93534   | 62310 |
| 2MMV9301HX     | 0.13            | 0.20  | 0.07            | 0.11  | 64000                                                        | 48000      | 32000 | 108000 | 81600   | 54360 |
| 2MMV9302HX     | 0.20            | 0.33  | 0.12            | 0.17  | 53440                                                        | 40080      | 26720 | 90180  | 68136   | 45391 |
| 2MMV9303HX     | 0.23            | 0.36  | 0.12            | 0.18  | 48320                                                        | 36240      | 24160 | 81540  | 61608   | 41042 |
| 2MMV9304HX     | 0.48            | 0.71  | 0.25            | 0.39  | 40160                                                        | 30120      | 20080 | 67770  | 51204   | 34111 |
| 2MMV9305HX     | 0.48            | 0.83  | 0.29            | 0.44  | 33440                                                        | 25080      | 16720 | 56430  | 42636   | 28403 |
| 2MMV9306HX     | 0.60            | 0.95  | 0.34            | 0.51  | 28720                                                        | 21540      | 14360 | 48465  | 36618   | 24394 |
| 2MMV9307HX     | 0.95            | 1.43  | 0.51            | 0.77  | 24400                                                        | 18300      | 12200 | 41175  | 31110   | 20725 |
| 2MMV9308HX     | 1.43            | 2.26  | 0.8             | 1.22  | 22400                                                        | 16800      | 11200 | 37800  | 28560   | 19026 |
| 2MMV9309HX     | 1.55            | 2.50  | 0.88            | 1.34  | 20000                                                        | 15000      | 10000 | 33750  | 25500   | 16988 |
| 2MMV9310HX     | 1.67            | 2.74  | 0.95            | 1.44  | 18320                                                        | 13740      | 9160  | 30915  | 23358   | 15561 |
| 2MMV9311HX     | 2.26            | 3.57  | 1.3             | 1.93  | 16560                                                        | 12420      | 8280  | 27945  | 21114   | 14066 |
| 2MMV9312HX     | 2.38            | 3.81  | 1.4             | 2.05  | 15360                                                        | 11520      | 7680  | 25920  | 19584   | 13046 |
| 2MMV9313HX     | 2.50            | 4.05  | 1.4             | 2.16  | 14240                                                        | 10680      | 7120  | 24030  | 18156   | 12095 |
| 2MMV9314HX     | 4.29            | 6.79  | 2.4             | 3.64  | 13120                                                        | 9840       | 6560  | 22140  | 16728   | 11144 |
| 2MMV9315HX     | 4.52            | 7.26  | 2.5             | 3.86  | 12320                                                        | 9240       | 6160  | 20790  | 15708   | 10464 |
| 2MMV9316HX     | 4.76            | 7.62  | 2.7             | 3.98  | 11600                                                        | 8700       | 5800  | 19575  | 14790   | 9853  |
| 2MMV9317HX     | 6.31            | 10.24 | 3.6             | 5.45  | 10800                                                        | 8100       | 5400  | 18225  | 13770   | 9173  |
| 2MMV9318HX     | 7.02            | 11.19 | 3.9             | 5.91  | 10320                                                        | 7740       | 5160  | 17415  | 13158   | 8766  |
| 2MMV9319HX     | 7.26            | 11.55 | 4.1             | 6.14  | 9840                                                         | 7380       | 4920  | 16605  | 12546   | 8358  |
| 2MMV9320HX     | 8.93            | 14.29 | 5               | 7.61  | 9120                                                         | 6840       | 4560  | 15390  | 11628   | 7746  |
| 2MMV9322HX     | 9.64            | 15.48 | 5.4             | 8.30  | 8,400                                                        | 6300       | 4200  | 14175  | 10710   | 7135  |
| 2MMV9324HX     | 13.21           | 21.19 | 7.4             | 11.25 | 7680                                                         | 5760       | 3840  | 12960  | 9792    | 6523  |
| 2MMV9326HX     | 17.38           | 27.74 | 9.7             | 14.77 | 7088                                                         | 5316       | 3540  | 11960  | 9037    | 6020  |
| 2MMV9328HX     | 18.45           | 29.52 | 10.4            | 15.68 | 6616                                                         | 4962       | 3300  | 11165  | 8435    | 5619  |
| 2MMV9330HX     | 29.52           | 47.26 | 16.6            | 25.11 | 6168                                                         | 4626       | 3080  | 10410  | 7864    | 5239  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.

## ULTRA-LIGHT 3MMV9300HX (ISO 19) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |       | Klubers Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |        |         |       |
|----------------|-----------------|-------|-----------------|-------|--------------------------------------------------------------|------------|-------|--------|---------|-------|
|                | NBU15           |       | NBU15           |       | DUL                                                          | Grease DUM | DUH   | DUL    | Oil DUM | DUH   |
|                | 25%             | 40%   | 15%             | 20%   |                                                              |            |       |        |         |       |
| 3MMV9300HX     | 0.11            | 0.18  | 0.06            | 0.08  | 66080                                                        | 49560      | 33040 | 111510 | 84250   | 56125 |
| 3MMV9301HX     | 0.13            | 0.20  | 0.07            | 0.10  | 57600                                                        | 43200      | 28800 | 97200  | 73440   | 48900 |
| 3MMV9302HX     | 0.20            | 0.33  | 0.12            | 0.15  | 48080                                                        | 36060      | 24040 | 81135  | 61300   | 40850 |
| 3MMV9303HX     | 0.23            | 0.36  | 0.12            | 0.16  | 43440                                                        | 32580      | 21720 | 73305  | 55390   | 36900 |
| 3MMV9304HX     | 0.48            | 0.71  | 0.25            | 0.34  | 36160                                                        | 27120      | 18080 | 61020  | 46100   | 30700 |
| 3MMV9305HX     | 0.48            | 0.83  | 0.29            | 0.39  | 30080                                                        | 22560      | 15040 | 50760  | 38350   | 25550 |
| 3MMV9306HX     | 0.60            | 0.95  | 0.34            | 0.45  | 25840                                                        | 19380      | 12920 | 43605  | 32950   | 21950 |
| 3MMV9307HX     | 0.95            | 1.43  | 0.51            | 0.69  | 22000                                                        | 16500      | 11000 | 37125  | 28050   | 18690 |
| 3MMV9308HX     | 1.43            | 2.26  | 0.8             | 1.08  | 20160                                                        | 15120      | 10080 | 34020  | 25700   | 17125 |
| 3MMV9309HX     | 1.55            | 2.50  | 0.88            | 1.19  | 18000                                                        | 13500      | 9000  | 30375  | 22950   | 15290 |
| 3MMV9310HX     | 1.67            | 2.74  | 0.95            | 1.28  | 16480                                                        | 12360      | 8240  | 27810  | 21000   | 14000 |
| 3MMV9311HX     | 2.26            | 3.57  | 1.3             | 1.72  | 14960                                                        | 11220      | 7480  | 25245  | 19075   | 12700 |
| 3MMV9312HX     | 2.38            | 3.81  | 1.4             | 1.82  | 13760                                                        | 10320      | 6880  | 23220  | 17500   | 11690 |
| 3MMV9313HX     | 2.50            | 4.05  | 1.4             | 1.92  | 12800                                                        | 9600       | 6400  | 21600  | 16320   | 10875 |
| 3MMV9314HX     | 4.29            | 6.79  | 2.4             | 3.23  | 11840                                                        | 8880       | 5920  | 19980  | 15100   | 10060 |
| 3MMV9315HX     | 4.52            | 7.26  | 2.5             | 3.43  | 11120                                                        | 8340       | 5560  | 18765  | 14175   | 9450  |
| 3MMV9316HX     | 4.76            | 7.62  | 2.7             | 3.54  | 10480                                                        | 7860       | 5240  | 17685  | 13360   | 8900  |
| 3MMV9317HX     | 6.31            | 10.24 | 3.6             | 4.85  | 9680                                                         | 7260       | 4840  | 16335  | 12350   | 8225  |
| 3MMV9318HX     | 7.02            | 11.19 | 3.9             | 5.25  | 9280                                                         | 6960       | 4640  | 15660  | 11825   | 7880  |
| 3MMV9319HX     | 7.26            | 11.55 | 4.1             | 5.45  | 8800                                                         | 6600       | 4400  | 14850  | 11220   | 7475  |
| 3MMV9320HX     | 8.93            | 14.29 | 5               | 6.77  | 8240                                                         | 6180       | 4120  | 13905  | 10500   | 7000  |
| 3MMV9322HX     | 9.64            | 15.48 | 5.4             | 7.37  | 7544                                                         | 5658       | 3772  | 12731  | 9620    | 6400  |
| 3MMV9324HX     | 13.21           | 21.19 | 7.4             | 10.00 | 6912                                                         | 5184       | 3456  | 11664  | 8810    | 5875  |
| 3MMV9326HX     | 17.38           | 27.74 | 9.7             | 13.13 | 6376                                                         | 4782       | 3188  | 10760  | 8130    | 5415  |
| 3MMV9328HX     | 18.45           | 29.52 | 10.4            | 13.94 | 5960                                                         | 4470       | 2980  | 10058  | 7600    | 5050  |
| 3MMV9330HX     | 29.52           | 47.26 | 16.6            | 22.32 | 5552                                                         | 4164       | 2776  | 9369   | 7080    | 4710  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.



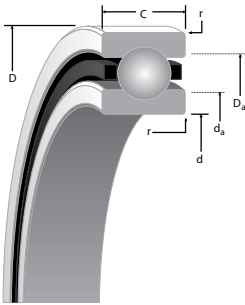




# BALL BEARINGS

## EXTRA-LIGHT 2(3)MMV99100WN (ISO 10) SERIES

### DIMENSIONAL SERIES METRIC



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WN CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer and inner rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number | 2MM or 3MM        | d Bore      | D O.D.      | C Width <sup>(1)</sup> | Ball Qty. x Dia. | Wt.            | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           |
|----------------|-------------------|-------------|-------------|------------------------|------------------|----------------|---------------------------------------------------|----------------------|-------------------------------------------|---------------------------------------------------|----------------------|-------------------------------------------|
|                |                   |             |             |                        |                  |                | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> |
| METRIC         | mm/tol: +0; -(µm) | mm          | kg.         | N                      | RPM              | N              | RPM                                               | N                    | RPM                                       | N                                                 | RPM                  |                                           |
| 99101WN        | 12<br>(4)         | 28<br>(5)   | 8<br>(80)   | 9 x 4.76               | 0.019            | 1740<br>1550   | 4540<br>4540                                      | 75800<br>90960       | 1670<br>1490                              | 4360<br>4360                                      | 68200<br>81840       |                                           |
| 99102WN        | 15<br>(4)         | 32<br>(6)   | 9<br>(80)   | 11 x 4.76              | 0.028            | 2240<br>1990   | 5220<br>5220                                      | 64300<br>77160       | 2140<br>1900                              | 5000<br>5000                                      | 57900<br>69480       |                                           |
| 99103WN        | 17<br>(4)         | 35<br>(6)   | 10<br>(80)  | 13 x 4.76              | 0.038            | 2510<br>2230   | 5530<br>5530                                      | 56900<br>68280       | 2400<br>2140                              | 5280<br>5280                                      | 51200<br>61440       |                                           |
| 99104WN        | 20<br>(5)         | 42<br>(6)   | 12<br>(120) | 11 x 6.35              | 0.064            | 4690<br>4180   | 9760<br>9760                                      | 43800<br>52200       | 4470<br>3980                              | 9310<br>9310                                      | 39400<br>47280       |                                           |
| 99105WN        | 25<br>(5)         | 47<br>(6)   | 12<br>(120) | 13 x 6.35              | 0.074            | 5800<br>5160   | 10900<br>10900                                    | 36500<br>43800       | 5510<br>4900                              | 10300<br>10300                                    | 32900<br>39480       |                                           |
| 99106WN        | 30<br>(5)         | 55<br>(7)   | 13<br>(120) | 16 x 6.35              | 0.116            | 7460<br>6640   | 12300<br>12300                                    | 29500<br>35400       | 7060<br>6280                              | 11600<br>11600                                    | 26600<br>31920       |                                           |
| 99107WN        | 35<br>(6)         | 62<br>(7)   | 14<br>(120) | 21 x 5.56              | 0.167            | 7840<br>6980   | 11100<br>11100                                    | 25300<br>30360       | 7440<br>6620                              | 10500<br>10500                                    | 22800<br>27360       |                                           |
| 99108WN        | 40<br>(6)         | 68<br>(7)   | 15<br>(120) | 24 x 5.56              | 0.207            | 9150<br>8140   | 11900<br>11900                                    | 22000<br>26400       | 8590<br>7650                              | 11200<br>11200                                    | 19800<br>23760       |                                           |
| 99109WN        | 45<br>(6)         | 75<br>(7)   | 16<br>(120) | 23 x 6.35              | 0.259            | 11400<br>10200 | 14800<br>14800                                    | 20200<br>24240       | 10700<br>9560                             | 14000<br>14000                                    | 18200<br>21840       |                                           |
| 99110WN        | 50<br>(6)         | 80<br>(7)   | 16<br>(120) | 25 x 6.35              | 0.281            | 12500<br>11100 | 15400<br>15400                                    | 18500<br>22200       | 11700<br>10400                            | 14500<br>14500                                    | 16700<br>20040       |                                           |
| 99111WN        | 55<br>(7)         | 90<br>(8)   | 18<br>(150) | 25 x 7.14              | 0.417            | 15800<br>14100 | 19100<br>19100                                    | 16600<br>19920       | 14800<br>13200                            | 18000<br>18000                                    | 14900<br>17880       |                                           |
| 99112WN        | 60<br>(7)         | 95<br>(8)   | 18<br>(150) | 26 x 7.14              | 0.445            | 16400<br>14600 | 19300<br>19300                                    | 15400<br>18480       | 15300<br>13600                            | 18200<br>18200                                    | 13900<br>16680       |                                           |
| 99113WN        | 65<br>(7)         | 100<br>(8)  | 18<br>(150) | 28 x 7.14              | 0.474            | 17600<br>15700 | 20000<br>20000                                    | 14400<br>17280       | 16400<br>14600                            | 18800<br>18800                                    | 13000<br>15600       |                                           |
| 99114WN        | 70<br>(7)         | 110<br>(8)  | 20<br>(150) | 28 x 7.94              | 0.665            | 21700<br>19300 | 24300<br>24300                                    | 13200<br>15840       | 20300<br>18000                            | 22900<br>22900                                    | 11900<br>14280       |                                           |
| 99115WN        | 75<br>(7)         | 115<br>(8)  | 20<br>(150) | 30 x 7.94              | 0.699            | 23100<br>20600 | 25000<br>25000                                    | 12300<br>14760       | 21600<br>19200                            | 23500<br>23500                                    | 11100<br>13320       |                                           |
| 99116WN        | 80<br>(7)         | 125<br>(9)  | 22<br>(150) | 29 x 8.73              | 0.944            | 27200<br>24200 | 29300<br>29300                                    | 11600<br>13920       | 25300<br>22500                            | 27500<br>27500                                    | 10400<br>12480       |                                           |
| 99117WN        | 85<br>(8)         | 130<br>(9)  | 22<br>(200) | 31 x 8.73              | 0.991            | 28900<br>25700 | 30200<br>30200                                    | 11000<br>13200       | 26900<br>23900                            | 28400<br>28400                                    | 9900<br>11880        |                                           |
| 99118WN        | 90<br>(8)         | 140<br>(9)  | 24<br>(200) | 28 x 10.32             | 1.266            | 36100<br>32700 | 39000<br>39000                                    | 10400<br>12480       | 34400<br>30600                            | 36800<br>36800                                    | 9400<br>11280        |                                           |
| 99119WN        | 95<br>(8)         | 145<br>(9)  | 24<br>(200) | 29 x 10.32             | 1.303            | 37900<br>33800 | 39600<br>39600                                    | 9900<br>11880        | 35400<br>31500                            | 37300<br>37300                                    | 8900<br>10680        |                                           |
| 99120WN        | 100<br>(8)        | 150<br>(9)  | 24<br>(200) | 31 x 10.32             | 1.374            | 40400<br>35900 | 40900<br>40900                                    | 9400<br>11280        | 37700<br>33600                            | 38500<br>38500                                    | 8500<br>10200        |                                           |
| 99121WN        | 105<br>(8)        | 160<br>(10) | 26<br>(200) | 30 x 11.11             | 1.729            | 45400<br>40400 | 45900<br>45900                                    | 8900<br>10680        | 42400<br>37800                            | 43400<br>43400                                    | 8000<br>9600         |                                           |
| 99122WN        | 110<br>(8)        | 170<br>(10) | 28<br>(200) | 30 x 11.91             | 2.188            | 52100<br>46400 | 52200<br>52200                                    | 8500<br>10200        | 48800<br>43400                            | 49300<br>49300                                    | 7700<br>8880         |                                           |
| 99124WN        | 120<br>(8)        | 180<br>(10) | 28<br>(200) | 32 x 11.91             | 2.343            | 55200<br>49200 | 53500<br>53500                                    | 7900<br>9480         | 51700<br>46000                            | 50600<br>50600                                    | 7100<br>8520         |                                           |
| 99126WN        | 130<br>(10)       | 200<br>(11) | 33<br>(250) | 32 x 13.49             | 3.563            | 71200<br>63400 | 67500<br>67500                                    | 7100<br>8520         | 66600<br>59200                            | 63700<br>63700                                    | 6400<br>7680         |                                           |
| 99128WN        | 140<br>(10)       | 210<br>(11) | 33<br>(250) | 34 x 13.49             | 3.776            | 75200<br>67000 | 69300<br>69300                                    | 6600<br>7920         | 70300<br>62600                            | 65300<br>65300                                    | 5900<br>7080         |                                           |
| 99130WN        | 150<br>(10)       | 225<br>(11) | 35<br>(250) | 34 x 15.08             | 4.509            | 91500<br>81400 | 83800<br>83800                                    | 6200<br>7440         | 85600<br>76200                            | 79100<br>79100                                    | 5600<br>6720         |                                           |

(N<sub>g</sub>) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |        |                          |        | Shaft Diameter |         | Mounting Fits |       | FIXED                        |         |               |       | FLOATING                     |         |                   |       | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|--------|--------------------------|--------|----------------|---------|---------------|-------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |        | D <sub>a</sub> (Housing) |        | Min.           | Max.    | Loose         | Tight | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |                                    |
|                          | Max.                            | Min.   | Max.                     | Min.   |                |         |               |       | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |                                    |
| mm                       | mm                              | mm     | mm                       | mm     | mm             | mm      | mm            | mm    | mm                           | mm      | mm            | mm    | mm                           | mm      | mm                | mm    |                                    |
| 0.3                      | 15.64                           | 15.44  | 24.56                    | 24.36  | 11.995         | 12.000  | 0.005         | 0.004 | 28                           | 28.005  | 0.0000        | 0.010 | 28.010                       | 28.005  | 0.015             | 0.005 | 99101WN                            |
| 0.3                      | 19.14                           | 18.94  | 28.06                    | 27.86  | 14.995         | 15.000  | 0.005         | 0.004 | 32                           | 32.005  | 0.0000        | 0.011 | 32.010                       | 32.005  | 0.016             | 0.005 | 99102WN                            |
| 0.3                      | 21.64                           | 21.44  | 30.56                    | 30.36  | 16.995         | 17.000  | 0.005         | 0.004 | 35                           | 35.006  | 0.0000        | 0.012 | 35.010                       | 35.005  | 0.016             | 0.005 | 99103WN                            |
| 0.6                      | 25.05                           | 24.85  | 37.15                    | 36.95  | 19.995         | 20.000  | 0.005         | 0.005 | 42                           | 42.006  | 0.0000        | 0.012 | 42.010                       | 42.005  | 0.016             | 0.005 | 99104WN                            |
| 0.6                      | 30.05                           | 29.85  | 42.15                    | 41.95  | 24.995         | 25.000  | 0.005         | 0.005 | 47                           | 47.006  | 0.0000        | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | 99105WN                            |
| 1                        | 36.55                           | 36.35  | 48.65                    | 48.45  | 29.995         | 30.000  | 0.005         | 0.005 | 55                           | 55.008  | 0.0000        | 0.015 | 55.012                       | 55.007  | 0.019             | 0.007 | 99106WN                            |
| 1                        | 43.34                           | 43.14  | 53.86                    | 53.66  | 34.995         | 35.000  | 0.005         | 0.006 | 62                           | 62.008  | 0.0000        | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | 99107WN                            |
| 1                        | 48.84                           | 48.64  | 59.36                    | 59.16  | 39.995         | 40.000  | 0.005         | 0.006 | 68                           | 68.008  | 0.0000        | 0.015 | 68.012                       | 68.007  | 0.019             | 0.007 | 99108WN                            |
| 1                        | 54.05                           | 53.85  | 66.15                    | 65.95  | 44.995         | 45.000  | 0.005         | 0.006 | 75                           | 75.008  | 0.0000        | 0.015 | 75.014                       | 75.009  | 0.022             | 0.009 | 99109WN                            |
| 1                        | 59.05                           | 58.85  | 71.15                    | 70.95  | 49.995         | 50.000  | 0.005         | 0.006 | 80                           | 80.008  | 0.0000        | 0.015 | 80.012                       | 80.008  | 0.020             | 0.008 | 99110WN                            |
| 1                        | 65.76                           | 65.56  | 79.44                    | 79.24  | 54.995         | 55.000  | 0.005         | 0.007 | 90                           | 90.008  | 0.0000        | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | 99111WN                            |
| 1                        | 70.76                           | 70.56  | 84.44                    | 84.24  | 59.995         | 60.000  | 0.005         | 0.007 | 95                           | 95.008  | 0.0000        | 0.016 | 95.016                       | 95.009  | 0.024             | 0.009 | 99112WN                            |
| 1                        | 75.76                           | 75.56  | 89.44                    | 89.24  | 64.995         | 65.000  | 0.005         | 0.007 | 100                          | 100.008 | 0.0000        | 0.016 | 100.016                      | 100.009 | 0.024             | 0.009 | 99113WN                            |
| 1                        | 82.46                           | 82.26  | 97.74                    | 97.54  | 69.995         | 70.000  | 0.005         | 0.007 | 110                          | 110.008 | 0.0000        | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | 99114WN                            |
| 1                        | 87.46                           | 87.26  | 102.74                   | 102.54 | 74.995         | 75.005  | 0.005         | 0.012 | 115                          | 115.008 | 0.0000        | 0.016 | 115.019                      | 115.011 | 0.026             | 0.010 | 99115WN                            |
| 1                        | 94.17                           | 93.97  | 111.03                   | 110.83 | 79.995         | 80.005  | 0.005         | 0.012 | 125                          | 125.008 | 0.0000        | 0.017 | 125.021                      | 125.011 | 0.030             | 0.011 | 99116WN                            |
| 1                        | 99.17                           | 98.97  | 116.03                   | 115.83 | 84.995         | 85.005  | 0.005         | 0.012 | 130                          | 130.009 | 0.0000        | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | 99117WN                            |
| 1.5                      | 105.08                          | 104.88 | 125.12                   | 124.92 | 89.995         | 90.005  | 0.005         | 0.013 | 140                          | 140.009 | 0.0000        | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | 99118WN                            |
| 1.5                      | 110.08                          | 109.88 | 130.12                   | 129.92 | 94.995         | 95.005  | 0.005         | 0.013 | 145                          | 145.009 | 0.0000        | 0.018 | 145.021                      | 145.011 | 0.030             | 0.011 | 99119WN                            |
| 1.5                      | 115.08                          | 114.88 | 135.12                   | 134.92 | 99.995         | 100.005 | 0.005         | 0.013 | 150                          | 150.009 | 0.0000        | 0.018 | 150.023                      | 150.012 | 0.032             | 0.012 | 99120WN                            |
| 2                        | 121.79                          | 121.59 | 143.41                   | 143.21 | 104.995        | 105.005 | 0.005         | 0.013 | 160                          | 160.009 | 0.0000        | 0.022 | 160.022                      | 160.012 | 0.033             | 0.012 | 99121WN                            |
| 2                        | 128.49                          | 128.29 | 151.71                   | 151.51 | 109.995        | 110.005 | 0.005         | 0.013 | 170                          | 170.010 | 0.0000        | 0.020 | 170.022                      | 170.012 | 0.032             | 0.012 | 99122WN                            |
| 2                        | 138.49                          | 138.29 | 161.71                   | 161.51 | 119.995        | 120.005 | 0.005         | 0.013 | 180                          | 180.010 | 0.0000        | 0.020 | 180.022                      | 180.012 | 0.032             | 0.012 | 99124WN                            |
| 2                        | 151.91                          | 151.71 | 178.29                   | 178.09 | 129.995        | 130.005 | 0.005         | 0.015 | 200                          | 200.011 | 0.0000        | 0.022 | 200.025                      | 200.015 | 0.036             | 0.015 | 99126WN                            |
| 2                        | 161.91                          | 161.71 | 188.29                   | 188.09 | 139.995        | 140.005 | 0.005         | 0.015 | 210                          | 210.011 | 0.0000        | 0.022 | 210.025                      | 210.015 | 0.036             | 0.015 | 99128WN                            |
| 2                        | 172.82                          | 172.62 | 202.38                   | 202.18 | 149.995        | 150.005 | 0.005         | 0.015 | 225                          | 225.011 | 0.0000        | 0.022 | 225.025                      | 225.015 | 0.036             | 0.015 | 99130WN                            |

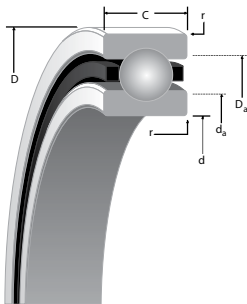




# BALL BEARINGS

## EXTRA-LIGHT 2(3)MMV99100WN (ISO 10) SERIES

### DIMENSIONAL SERIES INCHES



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WN CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer and inner rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number | 2MM or 3MM            |                 |                        | Ball Qty. x Dia. | Wt.  | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                |
|----------------|-----------------------|-----------------|------------------------|------------------|------|---------------------------------------------------|----------------------|--------------------------------|---------------------------------------------------|----------------------|--------------------------------|
|                | d Bore                | D O.D.          | C Width <sup>(1)</sup> |                  |      | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N9)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N9)</sup> |
| INCH           | in/tol: +0; -.000(μm) |                 |                        | in.              | lbs. | lbs.                                              |                      | RPM                            | lbs.                                              |                      | RPM                            |
| 99101WN        | 0.4724<br>(1.5)       | 1.1024<br>(2)   | 0.315<br>(31)          | 9 x 3/16         | 0.04 | 390<br>360                                        | 1020<br>1020         | 75800<br>90960                 | 380<br>340                                        | 980<br>980           | 68200<br>81840                 |
| 99102WN        | 0.5906<br>(1.5)       | 1.2598<br>(2.5) | 0.3543<br>(31)         | 11 x 3/16        | 0.06 | 500<br>450                                        | 1170<br>1170         | 64300<br>77160                 | 480<br>430                                        | 1120<br>1120         | 57900<br>69480                 |
| 99103WN        | 0.6693<br>(1.5)       | 1.378<br>(2.5)  | 0.3937<br>(31)         | 13 x 3/16        | 0.08 | 560<br>500                                        | 1240<br>1240         | 56900<br>68280                 | 540<br>480                                        | 1190<br>1190         | 51200<br>61440                 |
| 99104WN        | 0.7874<br>(2)         | 1.6535<br>(2.5) | 0.4724<br>(47)         | 11 x 1/4         | 0.14 | 1050<br>940                                       | 2190<br>2190         | 43800<br>52560                 | 1000<br>890                                       | 2090<br>2090         | 39400<br>47280                 |
| 99105WN        | 0.9843<br>(2)         | 1.8504<br>(2.5) | 0.4724<br>(47)         | 13 x 1/4         | 0.16 | 1300<br>1160                                      | 2450<br>2450         | 36500<br>43800                 | 1240<br>1100                                      | 2330<br>2330         | 32900<br>39480                 |
| 99106WN        | 1.1811<br>(2)         | 2.1654<br>(3)   | 0.5118<br>(47)         | 16 x 1/4         | 0.25 | 1680<br>1490                                      | 2770<br>2770         | 29500<br>35400                 | 1590<br>1410                                      | 2620<br>2620         | 26600<br>31920                 |
| 99107WN        | 1.378<br>(2.5)        | 2.4409<br>(3)   | 0.5512<br>(47)         | 21 x 7/32        | 0.37 | 1760<br>1570                                      | 2510<br>2510         | 25300<br>30360                 | 1670<br>1490                                      | 2360<br>2360         | 22800<br>27360                 |
| 99108WN        | 1.5748<br>(2.5)       | 2.6772<br>(3)   | 0.5906<br>(47)         | 24 x 7/32        | 0.46 | 2060<br>1830                                      | 2670<br>2670         | 22000<br>26400                 | 1930<br>1720                                      | 2510<br>2510         | 19800<br>23760                 |
| 99109WN        | 1.7717<br>(2.5)       | 2.9528<br>(3)   | 0.6299<br>(47)         | 23 x 1/4         | 0.57 | 2570<br>2280                                      | 3340<br>3340         | 20200<br>24240                 | 2410<br>2150                                      | 3140<br>3140         | 18200<br>21840                 |
| 99110WN        | 1.9685<br>(2.5)       | 3.1496<br>(3)   | 0.6299<br>(47)         | 25 x 1/4         | 0.62 | 2810<br>2500                                      | 3470<br>3470         | 18500<br>22200                 | 2630<br>2340                                      | 3260<br>3260         | 16700<br>20040                 |
| 99111WN        | 2.1654<br>(3)         | 3.5433<br>(3)   | 0.7087<br>(59)         | 25 x 9/32        | 0.92 | 3550<br>3160                                      | 4290<br>4290         | 16600<br>19920                 | 3330<br>2960                                      | 4040<br>4040         | 14900<br>17880                 |
| 99112WN        | 2.3622<br>(3)         | 3.7402<br>(3)   | 0.7087<br>(59)         | 26 x 9/32        | 0.98 | 3700<br>3290                                      | 4340<br>4340         | 15400<br>18480                 | 3440<br>3060                                      | 4080<br>4080         | 13900<br>16680                 |
| 99113WN        | 2.5591<br>(3)         | 3.937<br>(3)    | 0.7087<br>(59)         | 28 x 9/32        | 1.05 | 3960<br>3520                                      | 4500<br>4500         | 14400<br>17280                 | 3680<br>3280                                      | 4230<br>4230         | 13000<br>15600                 |
| 99114WN        | 2.7559<br>(3)         | 4.3307<br>(3)   | 0.7874<br>(59)         | 28 x 5/16        | 1.47 | 4890<br>4350                                      | 5450<br>5540         | 13200<br>15840                 | 4569<br>4060                                      | 5140<br>5140         | 11900<br>14280                 |
| 99115WN        | 2.9528<br>(3)         | 4.5276<br>(3)   | 0.7874<br>(59)         | 30 x 5/16        | 1.54 | 5200<br>4630                                      | 5620<br>5620         | 12300<br>14760                 | 4850<br>4320                                      | 5290<br>5290         | 11100<br>13320                 |
| 99116WN        | 3.1496<br>(3)         | 4.9213<br>(3.5) | 0.8661<br>(59)         | 29 x 11/32       | 2.08 | 6110<br>5440                                      | 6580<br>6580         | 11600<br>13920                 | 5690<br>5070                                      | 6190<br>6190         | 10400<br>12480                 |
| 99117WN        | 3.3465<br>(3)         | 5.1181<br>(3.5) | 0.8661<br>(79)         | 31 x 11/32       | 2.18 | 6490<br>5770                                      | 6780<br>6780         | 11000<br>13200                 | 6040<br>5380                                      | 6380<br>6380         | 9900<br>11880                  |
| 99118WN        | 3.5433<br>(3)         | 5.5118<br>(3.5) | 0.9449<br>(79)         | 28 x 13/32       | 2.79 | 8270<br>7360                                      | 8780<br>8780         | 10400<br>13480                 | 7720<br>6870                                      | 8280<br>8280         | 9400<br>11280                  |
| 99119WN        | 3.7402<br>(3)         | 5.7087<br>(3.5) | 0.9449<br>(79)         | 29 x 13/32       | 2.87 | 8530<br>7590                                      | 8890<br>8890         | 9900<br>11880                  | 7970<br>7090                                      | 8390<br>8390         | 8900<br>10680                  |
| 99120WN        | 3.937<br>(3)          | 5.9055<br>(3.5) | 0.9449<br>(79)         | 31 x 13/32       | 3.03 | 9070<br>8080                                      | 9190<br>9190         | 9400<br>11280                  | 8480<br>7540                                      | 8660<br>8660         | 8500<br>10200                  |
| 99121WN        | 4.1339<br>(3)         | 6.2992<br>(4)   | 1.0236<br>(79)         | 30 x 7/16        | 3.81 | 10200<br>9080                                     | 10300<br>10300       | 8900<br>10680                  | 9540<br>8490                                      | 9750<br>9750         | 8000<br>9600                   |
| 99122WN        | 4.3307<br>(3)         | 6.6929<br>(4)   | 1.1024<br>(79)         | 30 x 15/32       | 4.82 | 11700<br>10400                                    | 11700<br>11700       | 8500<br>10200                  | 11000<br>9760                                     | 11100<br>11100       | 7700<br>8880                   |
| 99124WN        | 4.7244<br>(3)         | 7.0866<br>(4)   | 1.1024<br>(79)         | 32 x 15/32       | 5.17 | 12400<br>11100                                    | 12000<br>12000       | 7900<br>9480                   | 11600<br>10300                                    | 11400<br>11400       | 7100<br>8520                   |
| 99126WN        | 5.1181<br>(4)         | 7.874<br>(4.5)  | 1.2992<br>(98)         | 32 x 17/32       | 7.85 | 16000<br>14300                                    | 15200<br>15200       | 7100<br>8520                   | 15000<br>13300                                    | 14300<br>14300       | 6400<br>7680                   |
| 99128WN        | 5.5118<br>(4)         | 8.2677<br>(4.5) | 1.2992<br>(98)         | 34 x 17/32       | 8.32 | 16900<br>15100                                    | 15600<br>15600       | 6600<br>7920                   | 15800<br>14100                                    | 14700<br>14700       | 5900<br>7080                   |
| 99130WN        | 5.9055<br>(4)         | 8.8583<br>(4.5) | 1.378<br>(98)          | 34 x 19/32       | 9.94 | 20600<br>18300                                    | 18800<br>18800       | 6200<br>7440                   | 19300<br>17100                                    | 17800<br>17800       | 5600<br>6720                   |

(N9) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |             |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |        |               |         | FLOATING                     |        |                   |        | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|------|-------------|------|----------------|--------|---------------|---------|------------------------------|--------|---------------|---------|------------------------------|--------|-------------------|--------|------------------------------------|
|                          | d <sub>s</sub> (Shaft)          |      | D (Housing) |      | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |        | Mounting Fits |         | Housing Bore<br>(Stationary) |        | Housing Clearance |        |                                    |
|                          | Max.                            | Min. | Max.        | Min. |                |        |               |         | Min.                         | Max.   | Tight         | Loose   | Max.                         | Min.   | Max.              | Min.   |                                    |
| in.                      | in.                             | in.  | in.         | in.  | in.            | in.    | in.           | in.     | in.                          | in.    | in.           | in.     | in.                          | in.    | in.               | in.    |                                    |
| 0.012                    | 0.62                            | 0.61 | 0.99        | 0.98 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 1.1024                       | 1.1026 | 0.0000        | 0.0004  | 1.1028                       | 1.1026 | 0.0006            | 0.0002 | 99101WN                            |
| 0.012                    | 0.76                            | 0.75 | 1.13        | 1.12 | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.2598                       | 1.2600 | 0.0000        | 0.00045 | 1.2602                       | 1.2600 | 0.0007            | 0.0002 | 99102WN                            |
| 0.012                    | 0.86                            | 0.85 | 1.23        | 1.22 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.3780                       | 1.3783 | 0.0000        | 0.0005  | 1.3784                       | 1.3782 | 0.0007            | 0.0002 | 99103WN                            |
| 0.024                    | 0.99                            | 0.98 | 1.49        | 1.48 | 0.7872         | 0.7874 | 0.0002        | 0.00020 | 1.6535                       | 1.6538 | 0.0000        | 0.0005  | 1.6539                       | 1.6537 | 0.0007            | 0.0002 | 99104WN                            |
| 0.024                    | 1.19                            | 1.18 | 1.69        | 1.68 | 0.9841         | 0.9843 | 0.0002        | 0.00020 | 1.8504                       | 1.8507 | 0.0000        | 0.0005  | 1.8509                       | 1.8507 | 0.0008            | 0.0003 | 99105WN                            |
| 0.039                    | 1.44                            | 1.43 | 1.94        | 1.93 | 1.1809         | 1.1811 | 0.0002        | 0.00020 | 2.1654                       | 2.1657 | 0.0000        | 0.0006  | 2.1659                       | 2.1657 | 0.0008            | 0.0003 | 99106WN                            |
| 0.039                    | 1.71                            | 1.70 | 2.15        | 2.14 | 1.3778         | 1.378  | 0.0002        | 0.00025 | 2.4409                       | 2.4412 | 0.0000        | 0.0006  | 2.4414                       | 2.4412 | 0.0008            | 0.0003 | 99107WN                            |
| 0.039                    | 1.93                            | 1.92 | 2.36        | 2.35 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 2.6772                       | 2.6775 | 0.0000        | 0.0006  | 2.6777                       | 2.6775 | 0.0008            | 0.0003 | 99108WN                            |
| 0.039                    | 2.13                            | 2.12 | 2.63        | 2.62 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 2.9528                       | 2.9531 | 0.0000        | 0.0006  | 2.9533                       | 2.9531 | 0.0008            | 0.0003 | 99109WN                            |
| 0.039                    | 2.33                            | 2.32 | 2.83        | 2.82 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 3.1496                       | 3.1499 | 0.0000        | 0.0006  | 3.1501                       | 3.1499 | 0.0008            | 0.0003 | 99110WN                            |
| 0.039                    | 2.59                            | 2.58 | 3.16        | 3.15 | 2.1652         | 2.1654 | 0.0002        | 0.00030 | 3.5433                       | 3.5436 | 0.0000        | 0.0006  | 3.5439                       | 3.5436 | 0.0009            | 0.0003 | 99111WN                            |
| 0.039                    | 2.79                            | 2.78 | 3.35        | 3.34 | 2.362          | 2.3622 | 0.0002        | 0.00030 | 3.7402                       | 3.7405 | 0.0000        | 0.0006  | 3.7408                       | 3.7405 | 0.0009            | 0.0003 | 99112WN                            |
| 0.039                    | 2.99                            | 2.98 | 3.55        | 3.54 | 2.5589         | 2.5591 | 0.0002        | 0.00030 | 3.9370                       | 3.9373 | 0.0000        | 0.0006  | 3.9377                       | 3.9374 | 0.0010            | 0.0004 | 99113WN                            |
| 0.039                    | 3.25                            | 3.24 | 3.88        | 3.87 | 2.7557         | 2.7559 | 0.0002        | 0.00030 | 4.3307                       | 4.3310 | 0.0000        | 0.0006  | 4.3314                       | 4.3311 | 0.0010            | 0.0004 | 99114WN                            |
| 0.039                    | 3.45                            | 3.44 | 4.07        | 4.06 | 2.9526         | 2.9530 | 0.0002        | 0.00050 | 4.5276                       | 4.5279 | 0.0000        | 0.0006  | 4.5283                       | 4.5280 | 0.0010            | 0.0004 | 99115WN                            |
| 0.039                    | 3.71                            | 3.70 | 4.40        | 4.39 | 3.1494         | 3.1498 | 0.0002        | 0.00050 | 4.9213                       | 4.9216 | 0.0000        | 0.0007  | 4.9221                       | 4.9217 | 0.0012            | 0.0004 | 99116WN                            |
| 0.039                    | 3.91                            | 3.90 | 4.60        | 4.59 | 3.3463         | 3.3467 | 0.0002        | 0.00050 | 5.1181                       | 5.1185 | 0.0000        | 0.0007  | 5.1189                       | 5.1185 | 0.0011            | 0.0004 | 99117WN                            |
| 0.059                    | 4.14                            | 4.13 | 4.95        | 4.94 | 3.5431         | 3.5435 | 0.0002        | 0.00050 | 5.5118                       | 5.5122 | 0.0000        | 0.0007  | 5.5126                       | 5.5122 | 0.0011            | 0.0004 | 99118WN                            |
| 0.059                    | 4.34                            | 4.33 | 5.15        | 5.14 | 3.7400         | 3.7404 | 0.0002        | 0.00050 | 5.7087                       | 5.7091 | 0.0000        | 0.0007  | 5.7095                       | 5.7091 | 0.0011            | 0.0004 | 99119WN                            |
| 0.059                    | 4.54                            | 4.53 | 5.35        | 5.34 | 3.9368         | 3.9372 | 0.0002        | 0.00050 | 5.9055                       | 5.9059 | 0.0000        | 0.0007  | 5.9064                       | 5.9060 | 0.0012            | 0.0005 | 99120WN                            |
| 0.079                    | 4.80                            | 4.79 | 5.67        | 5.66 | 4.1337         | 4.1341 | 0.0002        | 0.00050 | 6.2992                       | 6.2996 | 0.0000        | 0.0008  | 6.3001                       | 6.2997 | 0.0013            | 0.0005 | 99121WN                            |
| 0.079                    | 5.06                            | 5.05 | 6.00        | 5.99 | 4.3305         | 4.3309 | 0.0002        | 0.00050 | 6.6929                       | 6.6933 | 0.0000        | 0.0008  | 6.6938                       | 6.6934 | 0.0013            | 0.0005 | 99122WN                            |
| 0.079                    | 5.46                            | 5.45 | 6.39        | 6.38 | 4.7242         | 4.7246 | 0.0002        | 0.00050 | 7.0866                       | 7.0870 | 0.0000        | 0.0008  | 7.0875                       | 7.0871 | 0.0013            | 0.0005 | 99124WN                            |
| 0.079                    | 5.98                            | 5.97 | 7.05        | 7.04 | 5.1179         | 5.1183 | 0.0002        | 0.00060 | 7.8740                       | 7.8745 | 0.0000        | 0.0009  | 7.8750                       | 7.8746 | 0.0015            | 0.0006 | 99126WN                            |
| 0.079                    | 6.38                            | 6.37 | 7.44        | 7.43 | 5.5116         | 5.512  | 0.0002        | 0.00060 | 8.2677                       | 8.2682 | 0.0000        | 0.0009  | 8.2687                       | 8.2683 | 0.0015            | 0.0006 | 99128WN                            |
| 0.079                    | 6.81                            | 6.80 | 8.00        | 7.99 | 5.9053         | 5.9057 | 0.0002        | 0.00060 | 8.8583                       | 8.8588 | 0.0000        | 0.0009  | 8.8593                       | 8.8589 | 0.0015            | 0.0006 | 99130WN                            |





# BALL BEARINGS

## EXTRA-LIGHT 2MMV99100WN (ISO 10) SERIES

### DUPLEX PERFORMANCE DATA

### MOUNTING ARRANGEMENTS



Suggested  
DB



Tandem  
DT



Special Applications  
DF

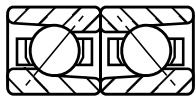
| Bearing Number                                           | PRELOAD     |     |      |      | AXIAL STIFFNESS <sup>(1)</sup>           |                               |        |        | RADIAL STIFFNESS <sup>(1)</sup>          |                               |         | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|----------------------------------------------------------|-------------|-----|------|------|------------------------------------------|-------------------------------|--------|--------|------------------------------------------|-------------------------------|---------|-------------------------------|-----------------|-----------------|
|                                                          | DUX         | DUL | DUM  | DUH  | X-light                                  | Light                         | Medium | Heavy  | Light                                    | Medium                        | Heavy   | X-Light to Light              | Light to Medium | Medium to Heavy |
| N (= lbs x 4.448)                                        |             |     |      |      | N/μm (= 10 <sup>6</sup> lbs/in x 175.12) |                               |        |        | N/μm (= 10 <sup>6</sup> lbs/in x 175.12) |                               |         | μm                            |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 2MMV99100WN SERIES</b> |             |     |      |      |                                          |                               |        |        |                                          |                               |         |                               |                 |                 |
| 2MMV99101WN                                              | -           | 20  | 40   | 90   | -                                        | 13.47                         | 17.84  | 24.14  | 60.69                                    | 78.71                         | 99.52   | —                             | 5.59            | 8.38            |
| 2MMV99102WN                                              | -           | 20  | 40   | 90   | -                                        | 15.22                         | 20.11  | 27.11  | 89.72                                    | 113.86                        | 139.92  | —                             | 5.08            | 7.62            |
| 2MMV99103WN                                              | -           | 20  | 40   | 90   | -                                        | 16.97                         | 22.21  | 29.73  | 99.69                                    | 127.15                        | 156.71  | —                             | 4.57            | 6.86            |
| 2MMV99104WN                                              | 20          | 40  | 90   | 180  | 17.14                                    | 22.39                         | 29.91  | 40.75  | 125.75                                   | 155.84                        | 195.54  | 4.57                          | 6.86            | 10.16           |
| 2MMV99105WN                                              | 20          | 70  | 130  | 270  | 21.51                                    | 29.21                         | 39.18  | 53.87  | 140.09                                   | 174.20                        | 218.97  | 5.59                          | 7.87            | 11.43           |
| 2MMV99106WN                                              | 20          | 70  | 130  | 270  | 24.49                                    | 33.06                         | 44.07  | 60.17  | 173.50                                   | 220.20                        | 276.52  | 4.83                          | 6.86            | 10.16           |
| 2MMV99107WN                                              | 40          | 90  | 180  | 360  | 33.41                                    | 44.07                         | 59.12  | 81.15  | 209.71                                   | 269.00                        | 337.03  | 4.57                          | 6.86            | 10.16           |
| 2MMV99108WN                                              | 70          | 110 | 220  | 440  | 39.00                                    | 52.12                         | 70.13  | 96.72  | 247.13                                   | 312.37                        | 391.25  | 5.08                          | 7.37            | 10.67           |
| 2MMV99109WN                                              | 70          | 130 | 270  | 530  | 41.45                                    | 54.74                         | 73.81  | 101.79 | 279.67                                   | 352.95                        | 441.80  | 5.59                          | 8.38            | 12.19           |
| 2MMV99110WN                                              | 70          | 130 | 270  | 530  | 43.55                                    | 57.54                         | 77.31  | 106.34 | 295.41                                   | 373.24                        | 467.51  | 5.33                          | 7.87            | 11.68           |
| 2MMV99111WN                                              | 90          | 180 | 360  | 710  | 51.07                                    | 67.16                         | 90.25  | 124.35 | 349.45                                   | 440.40                        | 550.94  | 6.10                          | 9.14            | 13.21           |
| 2MMV99112WN                                              | 90          | 180 | 360  | 710  | 52.30                                    | 68.74                         | 92.35  | 126.80 | 358.55                                   | 452.29                        | 565.80  | 5.84                          | 8.89            | 12.95           |
| 2MMV99113WN                                              | 110         | 220 | 440  | 890  | 59.64                                    | 78.71                         | 106.16 | 146.74 | 376.38                                   | 475.38                        | 595.18  | 6.35                          | 9.65            | 13.97           |
| 2MMV99114WN                                              | 110         | 220 | 440  | 890  | 62.26                                    | 81.68                         | 109.14 | 149.36 | 426.58                                   | 538.17                        | 626.14  | 6.10                          | 9.40            | 13.72           |
| 2MMV99115WN                                              | 130         | 270 | 530  | 1070 | 69.61                                    | 91.65                         | 122.95 | 168.95 | 446.34                                   | 563.70                        | 705.90  | 6.60                          | 9.91            | 14.73           |
| 2MMV99116WN                                              | 160         | 310 | 620  | 1250 | 0.17                                     | 95.67                         | 128.55 | 177.00 | 489.55                                   | 617.57                        | 772.53  | 7.37                          | 11.18           | 11.18           |
| 2MMV99117WN                                              | 180         | 360 | 710  | 1420 | 79.58                                    | 105.11                        | 141.67 | 195.36 | 511.41                                   | 645.73                        | 808.56  | 7.62                          | 11.43           | 16.76           |
| 2MMV99118WN                                              | 200         | 400 | 800  | 1600 | 80.63                                    | 106.16                        | 142.54 | 196.06 | 537.12                                   | 678.61                        | 850.01  | 8.64                          | 12.95           | 18.80           |
| 2MMV99119WN                                              | 200         | 400 | 800  | 1600 | 82.38                                    | 108.44                        | 145.34 | 199.74 | 549.54                                   | 694.70                        | 870.65  | 8.38                          | 12.70           | 12.70           |
| 2MMV99120WN                                              | 220         | 440 | 890  | 1780 | 89.37                                    | 117.71                        | 158.11 | 217.58 | 605.50                                   | 764.49                        | 957.05  | 8.64                          | 12.95           | 19.05           |
| 2MMV99121WN                                              | 240         | 490 | 980  | 1960 | 94.10                                    | 123.83                        | 165.81 | 229.99 | 631.91                                   | 797.72                        | 823.60  | 8.89                          | 13.46           | 20.57           |
| 2MMV99122WN                                              | 270         | 530 | 1070 | 2140 | 99.87                                    | 131.00                        | 175.07 | 244.34 | 642.58                                   | 813.11                        | 1019.49 | 9.14                          | 13.97           | 22.10           |
| 2MMV99124WN                                              | 310         | 620 | 1250 | 2490 | 110.19                                   | 144.99                        | 194.31 | 264.45 | 724.26                                   | 914.03                        | 1144.20 | 9.65                          | 14.73           | 20.83           |
| 2MMV99126WN                                              | 400         | 800 | 1600 | 3200 | 121.56                                   | 160.21                        | 215.30 | 292.43 | 810.49                                   | 1023.51                       | 1281.67 | 11.43                         | 17.02           | 23.88           |
| 2MMV99128WN                                              | 420         | 850 | 1690 | 3380 | 128.73                                   | 169.65                        | 228.07 | 311.85 | 889.19                                   | 1121.46                       | 1395.00 | 11.18                         | 17.02           | 24.38           |
| 2MMV99130WN                                              | 440         | 890 | 1780 | 3560 | 135.20                                   | 177.35                        | 236.99 | 323.74 | 937.99                                   | 1184.25                       | 1490.15 | 11.43                         | 17.02           | 25.40           |
|                                                          | <b>lbs.</b> |     |      |      |                                          | <b>10<sup>6</sup>lbs./in.</b> |        |        |                                          | <b>10<sup>6</sup>lbs./in.</b> |         |                               | <b>in.</b>      |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 2MMV9100WN SERIES</b>    |             |     |      |      |                                          |                               |        |        |                                          |                               |         |                               |                 |                 |
| 2MMV99101WN                                              | —           | 5   | 10   | 20   | —                                        | 0.077                         | 0.102  | 0.138  | 0.347                                    | 0.450                         | 0.569   | —                             | 0.00022         | 0.00033         |
| 2MMV99102WN                                              | —           | 5   | 10   | 20   | —                                        | 0.087                         | 0.115  | 0.155  | 0.513                                    | 0.651                         | 0.800   | —                             | 0.00020         | 0.00030         |
| 2MMV99103WN                                              | —           | 5   | 10   | 20   | —                                        | 0.097                         | 0.127  | 0.170  | 0.570                                    | 0.727                         | 0.896   | —                             | 0.00018         | 0.00027         |
| 2MMV99104WN                                              | 5           | 10  | 20   | 40   | 0.098                                    | 0.128                         | 0.171  | 0.233  | 0.719                                    | 0.891                         | 1.118   | 0.00018                       | 0.00027         | 0.00040         |
| 2MMV99105WN                                              | 5           | 15  | 30   | 60   | 0.123                                    | 0.167                         | 0.224  | 0.308  | 0.801                                    | 0.996                         | 1.252   | 0.00022                       | 0.00031         | 0.00045         |
| 2MMV99106WN                                              | 5           | 15  | 30   | 60   | 0.140                                    | 0.189                         | 0.252  | 0.344  | 0.992                                    | 1.259                         | 1.581   | 0.00019                       | 0.00027         | 0.00040         |
| 2MMV99107WN                                              | 10          | 20  | 40   | 80   | 0.191                                    | 0.252                         | 0.338  | 0.464  | 1.199                                    | 1.538                         | 1.927   | 0.00018                       | 0.00027         | 0.00040         |
| 2MMV99108WN                                              | 15          | 25  | 50   | 100  | 0.223                                    | 0.298                         | 0.401  | 0.553  | 1.413                                    | 1.786                         | 2.237   | 0.00020                       | 0.00029         | 0.00042         |
| 2MMV99109WN                                              | 15          | 30  | 60   | 120  | 0.237                                    | 0.313                         | 0.422  | 0.582  | 1.599                                    | 2.018                         | 2.526   | 0.00022                       | 0.00033         | 0.00048         |
| 2MMV99110WN                                              | 15          | 30  | 60   | 120  | 0.249                                    | 0.329                         | 0.442  | 0.608  | 1.689                                    | 2.134                         | 2.673   | 0.00021                       | 0.00031         | 0.00046         |
| 2MMV99111WN                                              | 20          | 40  | 80   | 160  | 0.292                                    | 0.384                         | 0.516  | 0.711  | 1.998                                    | 2.518                         | 3.150   | 0.00024                       | 0.00036         | 0.00052         |
| 2MMV99112WN                                              | 20          | 40  | 80   | 160  | 0.299                                    | 0.393                         | 0.528  | 0.725  | 2.050                                    | 2.586                         | 3.235   | 0.00023                       | 0.00035         | 0.00051         |
| 2MMV99113WN                                              | 25          | 50  | 100  | 200  | 0.341                                    | 0.450                         | 0.607  | 0.839  | 2.152                                    | 2.718                         | 3.403   | 0.00025                       | 0.00038         | 0.00055         |
| 2MMV99114WN                                              | 25          | 50  | 100  | 200  | 0.356                                    | 0.467                         | 0.624  | 0.854  | 2.439                                    | 3.077                         | 3.580   | 0.00024                       | 0.00037         | 0.00054         |
| 2MMV99115WN                                              | 30          | 60  | 120  | 240  | 0.398                                    | 0.524                         | 0.703  | 0.966  | 2.552                                    | 3.223                         | 4.036   | 0.00026                       | 0.00039         | 0.00058         |
| 2MMV99116WN                                              | 35          | 70  | 140  | 280  | 0.001                                    | 0.547                         | 0.735  | 1.012  | 2.799                                    | 3.531                         | 4.417   | 0.00029                       | 0.00044         | 0.00044         |
| 2MMV99117WN                                              | 40          | 80  | 160  | 320  | 0.455                                    | 0.601                         | 0.810  | 1.117  | 2.924                                    | 3.692                         | 4.623   | 0.00030                       | 0.00045         | 0.00066         |
| 2MMV99118WN                                              | 45          | 90  | 180  | 360  | 0.461                                    | 0.607                         | 0.815  | 1.121  | 3.071                                    | 3.880                         | 4.860   | 0.00034                       | 0.00051         | 0.00074         |
| 2MMV99119WN                                              | 45          | 90  | 180  | 360  | 0.471                                    | 0.620                         | 0.831  | 1.142  | 3.142                                    | 3.972                         | 4.978   | 0.00033                       | 0.00050         | 0.00050         |
| 2MMV99120WN                                              | 50          | 100 | 200  | 400  | 0.511                                    | 0.673                         | 0.904  | 1.244  | 3.462                                    | 4.371                         | 5.472   | 0.00034                       | 0.00051         | 0.00075         |
| 2MMV99121WN                                              | 55          | 110 | 220  | 440  | 0.538                                    | 0.708                         | 0.948  | 1.315  | 3.613                                    | 4.561                         | 4.709   | 0.00035                       | 0.00053         | 0.00081         |
| 2MMV99122WN                                              | 60          | 120 | 240  | 480  | 0.571                                    | 0.749                         | 1.001  | 1.397  | 3.674                                    | 4.649                         | 5.829   | 0.00036                       | 0.00055         | 0.00087         |
| 2MMV99124WN                                              | 70          | 140 | 280  | 560  | 0.630                                    | 0.829                         | 1.111  | 1.512  | 4.141                                    | 5.226                         | 6.542   | 0.00038                       | 0.00058         | 0.00082         |
| 2MMV99126WN                                              | 90          | 180 | 360  | 720  | 0.695                                    | 0.916                         | 1.231  | 1.672  | 4.634                                    | 5.852                         | 7.328   | 0.00045                       | 0.00067         | 0.00094         |
| 2MMV99128WN                                              | 95          | 190 | 380  | 760  | 0.736                                    | 0.970                         | 1.304  | 1.783  | 5.084                                    | 6.412                         | 7.976   | 0.00044                       | 0.00067         | 0.00096         |
| 2MMV99130WN                                              | 100         | 200 | 400  | 800  | 0.773                                    | 1.014                         | 1.355  | 1.851  | 5.363                                    | 6.771                         | 8.520   | 0.00045                       | 0.00067         | 0.00100         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.

**EXTRA-LIGHT  
3MMV99100HX  
(ISO 10) SERIES**

**DUPLEX  
PERFORMANCE DATA**

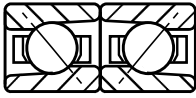
**MOUNTING ARRANGEMENTS**



**Suggested  
DB**



**Tandem  
DT**



**Special Applications  
DF**

| Bearing Number                                           | PRELOAD     |      |      | AXIAL STIFFNESS <sup>(1)</sup> |                               |        |        | RADIAL STIFFNESS <sup>(1)</sup> |                               |         | SPACER OFFSETS <sup>(1)</sup> |                  |                 |                 |
|----------------------------------------------------------|-------------|------|------|--------------------------------|-------------------------------|--------|--------|---------------------------------|-------------------------------|---------|-------------------------------|------------------|-----------------|-----------------|
|                                                          | DUX         | DUL  | DUM  | DUH                            | X-light                       | Light  | Medium | Heavy                           | Light                         | Medium  | Heavy                         | X-Light to Light | Light to Medium | Medium to Heavy |
|                                                          | N           |      |      |                                | N/μm                          |        |        |                                 | N/μm                          |         |                               | μm               |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 3MMV99100WN SERIES</b> |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                  |                 |                 |
| 3MMV99101WN                                              | —           | 40   | 90   | 180                            | —                             | 35.85  | 46.00  | 59.99                           | 58.77                         | 75.03   | 92.52                         | —                | 4.32            | 6.60            |
| 3MMV99102WN                                              | —           | 40   | 90   | 180                            | —                             | 40.75  | 52.30  | 67.86                           | 85.70                         | 105.99  | 132.92                        | —                | 3.81            | 5.84            |
| 3MMV99103WN                                              | —           | 40   | 90   | 180                            | —                             | 45.30  | 58.07  | 75.21                           | 95.50                         | 118.41  | 148.84                        | —                | 3.30            | 5.33            |
| 3MMV99104WN                                              | 40          | 90   | 180  | 360                            | 47.92                         | 61.39  | 79.23  | 103.37                          | 115.26                        | 145.52  | 182.60                        | 3.30             | 5.08            | 7.87            |
| 3MMV99105WN                                              | 70          | 130  | 270  | 530                            | 61.74                         | 79.05  | 102.49 | 134.32                          | 128.55                        | 162.83  | 204.46                        | 3.81             | 5.84            | 8.89            |
| 3MMV99106WN                                              | 70          | 130  | 270  | 530                            | 70.48                         | 90.25  | 116.66 | 152.16                          | 162.66                        | 205.86  | 258.15                        | 3.30             | 5.08            | 7.87            |
| 3MMV99107WN                                              | 90          | 180  | 360  | 710                            | 90.07                         | 115.61 | 149.89 | 196.76                          | 200.79                        | 253.26  | 317.09                        | 3.56             | 5.33            | 8.13            |
| 3MMV99108WN                                              | 110         | 220  | 440  | 890                            | 106.34                        | 136.60 | 177.17 | 233.14                          | 233.32                        | 294.01  | 368.16                        | 3.56             | 5.59            | 8.64            |
| 3MMV99109WN                                              | 130         | 270  | 530  | 1070                           | 114.03                        | 146.39 | 189.94 | 249.76                          | 262.00                        | 329.86  | 412.76                        | 4.06             | 6.35            | 9.65            |
| 3MMV99110WN                                              | 130         | 270  | 530  | 1070                           | 120.33                        | 154.44 | 200.09 | 262.52                          | 276.69                        | 348.75  | 436.73                        | 3.81             | 6.10            | 9.14            |
| 3MMV99111WN                                              | 180         | 360  | 710  | 1420                           | 137.12                        | 176.12 | 228.42 | 300.13                          | 330.56                        | 415.91  | 519.98                        | 4.57             | 7.11            | 10.67           |
| 3MMV99112WN                                              | 180         | 360  | 710  | 1420                           | 140.62                        | 180.50 | 234.02 | 307.30                          | 339.31                        | 426.93  | 533.97                        | 4.32             | 6.86            | 10.41           |
| 3MMV99113WN                                              | 220         | 440  | 890  | 1780                           | 159.68                        | 205.33 | 266.72 | 351.55                          | 356.27                        | 448.79  | 561.60                        | 4.83             | 7.62            | 11.43           |
| 3MMV99114WN                                              | 220         | 440  | 890  | 1780                           | 163.53                        | 210.05 | 271.97 | 356.80                          | 407.17                        | 512.46  | 640.83                        | 4.83             | 7.37            | 11.18           |
| 3MMV99115WN                                              | 270         | 530  | 1070 | 2220                           | 182.42                        | 234.54 | 304.33 | 406.99                          | 426.23                        | 536.77  | 671.62                        | 5.08             | 7.87            | 12.95           |
| 3MMV99116WN                                              | 310         | 620  | 1250 | 2450                           | 193.96                        | 249.23 | 323.22 | 422.03                          | 464.18                        | 584.17  | 745.48                        | 5.59             | 8.64            | 12.95           |
| 3MMV99117WN                                              | 360         | 710  | 1420 | 2670                           | 212.33                        | 273.02 | 354.52 | 454.91                          | 485.00                        | 610.93  | 764.31                        | 5.84             | 9.14            | 12.19           |
| 3MMV99118WN                                              | 400         | 800  | 1600 | 3110                           | 216.18                        | 277.74 | 360.29 | 468.21                          | 510.36                        | 643.11  | 805.06                        | 6.35             | 9.91            | 14.48           |
| 3MMV99119WN                                              | 400         | 800  | 1600 | 3110                           | 221.25                        | 284.04 | 368.16 | 478.00                          | 522.43                        | 658.50  | 824.48                        | 6.35             | 9.91            | 14.22           |
| 3MMV99120WN                                              | 440         | 890  | 1780 | 3560                           | 239.79                        | 308.00 | 399.47 | 525.05                          | 575.25                        | 724.44  | 901.08                        | 6.35             | 9.91            | 15.24           |
| 3MMV99121WN                                              | 490         | 980  | 2000 | 4000                           | 246.61                        | 316.74 | 414.34 | 544.99                          | 603.75                        | 760.12  | 955.48                        | 6.86             | 11.18           | 16.51           |
| 3MMV99122WN                                              | 530         | 1070 | 2220 | 4450                           | 259.55                        | 333.18 | 438.47 | 576.30                          | 617.75                        | 779.00  | 980.49                        | 7.11             | 11.94           | 17.53           |
| 3MMV99124WN                                              | 620         | 1250 | 2450 | 4890                           | 285.79                        | 367.29 | 473.28 | 622.47                          | 695.40                        | 875.20  | 1094.70                       | 7.62             | 11.43           | 17.78           |
| 3MMV99126WN                                              | 800         | 1600 | 3110 | 6230                           | 323.91                        | 416.44 | 534.49 | 702.75                          | 771.31                        | 971.39  | 1211.71                       | 8.64             | 12.70           | 20.07           |
| 3MMV99128WN                                              | 850         | 1690 | 3340 | 6670                           | 343.33                        | 441.27 | 569.82 | 749.27                          | 845.82                        | 1057.97 | 1323.29                       | 8.64             | 12.95           | 20.07           |
| 3MMV99130WN                                              | 890         | 1780 | 3560 | 7120                           | 352.25                        | 451.94 | 585.39 | 767.81                          | 900.39                        | 1139.47 | 1425.44                       | 8.89             | 13.72           | 21.08           |
|                                                          | <b>lbs.</b> |      |      |                                | <b>10<sup>6</sup>lbs./in.</b> |        |        |                                 | <b>10<sup>6</sup>lbs./in.</b> |         |                               | <b>in.</b>       |                 |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 3MMV99100WN SERIES</b>   |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                  |                 |                 |
| 3MMV99101WN                                              | —           | 10   | 20   | 40                             | —                             | 0.205  | 0.263  | 0.343                           | 0.336                         | 0.429   | 0.529                         | —                | 0.00017         | 0.00026         |
| 3MMV99102WN                                              | —           | 10   | 20   | 40                             | —                             | 0.233  | 0.299  | 0.388                           | 0.490                         | 0.606   | 0.760                         | —                | 0.00015         | 0.00023         |
| 3MMV99103WN                                              | —           | 10   | 20   | 40                             | —                             | 0.259  | 0.332  | 0.430                           | 0.546                         | 0.677   | 0.851                         | —                | 0.00013         | 0.00021         |
| 3MMV99104WN                                              | 10          | 20   | 40   | 80                             | 0.274                         | 0.351  | 0.453  | 0.591                           | 0.659                         | 0.832   | 1.044                         | 0.00013          | 0.0002          | 0.00031         |
| 3MMV99105WN                                              | 15          | 30   | 60   | 120                            | 0.353                         | 0.452  | 0.586  | 0.768                           | 0.735                         | 0.931   | 1.169                         | 0.00015          | 0.00023         | 0.00035         |
| 3MMV99106WN                                              | 15          | 30   | 60   | 120                            | 0.403                         | 0.516  | 0.667  | 0.870                           | 0.93                          | 1.177   | 1.476                         | 0.00013          | 0.0002          | 0.00031         |
| 3MMV99107WN                                              | 20          | 40   | 80   | 160                            | 0.515                         | 0.661  | 0.857  | 1.125                           | 1.148                         | 1.448   | 1.813                         | 0.00014          | 0.00021         | 0.00032         |
| 3MMV99108WN                                              | 25          | 50   | 100  | 200                            | 0.608                         | 0.781  | 1.013  | 1.333                           | 1.334                         | 1.681   | 2.105                         | 0.00014          | 0.00022         | 0.00034         |
| 3MMV99109WN                                              | 30          | 60   | 120  | 240                            | 0.652                         | 0.837  | 1.086  | 1.428                           | 1.498                         | 1.886   | 2.360                         | 0.00016          | 0.00025         | 0.00038         |
| 3MMV99110WN                                              | 30          | 60   | 120  | 240                            | 0.688                         | 0.883  | 1.144  | 1.501                           | 1.582                         | 1.994   | 2.497                         | 0.00015          | 0.00024         | 0.00036         |
| 3MMV99111WN                                              | 40          | 80   | 160  | 320                            | 0.784                         | 1.007  | 1.306  | 1.716                           | 1.890                         | 2.378   | 2.973                         | 0.00018          | 0.00028         | 0.00042         |
| 3MMV99112WN                                              | 40          | 80   | 160  | 320                            | 0.804                         | 1.032  | 1.338  | 1.757                           | 1.940                         | 2.441   | 3.053                         | 0.00017          | 0.00027         | 0.00041         |
| 3MMV99113WN                                              | 50          | 100  | 200  | 400                            | 0.913                         | 1.174  | 1.525  | 2.010                           | 2.037                         | 2.566   | 3.211                         | 0.00019          | 0.0003          | 0.00045         |
| 3MMV99114WN                                              | 50          | 100  | 200  | 400                            | 0.935                         | 1.201  | 1.555  | 2.040                           | 2.328                         | 2.930   | 3.664                         | 0.00019          | 0.00029         | 0.00044         |
| 3MMV99115WN                                              | 60          | 120  | 240  | 500                            | 1.043                         | 1.341  | 1.740  | 2.327                           | 2.437                         | 3.069   | 3.840                         | 0.0002           | 0.00031         | 0.00051         |
| 3MMV99116WN                                              | 70          | 140  | 280  | 550                            | 1.109                         | 1.425  | 1.848  | 2.413                           | 2.654                         | 3.340   | 3.176                         | 0.00022          | 0.00034         | 0.00051         |
| 3MMV99117WN                                              | 80          | 160  | 320  | 600                            | 1.214                         | 1.561  | 2.027  | 2.601                           | 2.773                         | 3.493   | 4.370                         | 0.00023          | 0.00036         | 0.00048         |
| 3MMV99118WN                                              | 90          | 180  | 360  | 700                            | 1.236                         | 1.588  | 2.060  | 2.677                           | 2.918                         | 3.677   | 4.603                         | 0.00025          | 0.00039         | 0.00057         |
| 3MMV99119WN                                              | 90          | 180  | 360  | 700                            | 1.265                         | 1.624  | 2.105  | 2.733                           | 2.987                         | 3.765   | 4.714                         | 0.00025          | 0.00039         | 0.00056         |
| 3MMV99120WN                                              | 100         | 200  | 400  | 800                            | 1.371                         | 1.761  | 2.284  | 3.002                           | 3.289                         | 4.142   | 5.152                         | 0.00025          | 0.00039         | 0.00060         |
| 3MMV99121WN                                              | 110         | 220  | 450  | 900                            | 1.410                         | 1.811  | 2.369  | 3.116                           | 3.452                         | 4.346   | 5.463                         | 0.00027          | 0.00044         | 0.00065         |
| 3MMV99122WN                                              | 120         | 240  | 500  | 1000                           | 1.484                         | 1.905  | 2.507  | 3.295                           | 3.532                         | 4.454   | 5.606                         | 0.00028          | 0.00047         | 0.00069         |
| 3MMV99124WN                                              | 140         | 280  | 550  | 1100                           | 1.634                         | 2.100  | 2.706  | 3.559                           | 3.976                         | 5.004   | 6.259                         | 0.0003           | 0.00045         | 0.00070         |
| 3MMV99126WN                                              | 180         | 360  | 700  | 1400                           | 1.852                         | 2.381  | 3.056  | 4.018                           | 4.410                         | 5.554   | 6.928                         | 0.00034          | 0.00050         | 0.00079         |
| 3MMV99128WN                                              | 190         | 380  | 750  | 1500                           | 1.963                         | 2.523  | 3.258  | 4.284                           | 4.836                         | 6.049   | 7.566                         | 0.00034          | 0.00051         | 0.00079         |
| 3MMV99130WN                                              | 200         | 400  | 800  | 1600                           | 2.014                         | 2.584  | 3.347  | 4.390                           | 5.148                         | 6.515   | 8.150                         | 0.00035          | 0.00054         | 0.00083         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.



**EXTRA-LIGHT 2MMV99100WN  
(ISO 10) SERIES**

**SPEED CAPABILITY DATA**

| Bearing Number | Grease Capacity |      | Kluber Isoflex |      | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |        |         |       |
|----------------|-----------------|------|----------------|------|--------------------------------------------------------------|------------|-------|--------|---------|-------|
|                | NBU15           |      | NBU15          |      | DUL                                                          | Grease DUM | DUH   | DUL    | Oil DUM | DUH   |
|                | 25%             | 40%  | 15%            | 20%  |                                                              |            |       |        |         |       |
| 2MMV99101WN    | 0.3             | 0.5  | 0.2            | 0.27 | 68200                                                        | 60600      | 45500 | 116000 | 103000  | 77400 |
| 2MMV99102WN    | 0.4             | 0.6  | 0.24           | 0.32 | 57900                                                        | 51400      | 38600 | 98400  | 98400   | 65600 |
| 2MMV99103WN    | 0.5             | 0.7  | 0.31           | 0.41 | 51200                                                        | 45500      | 34100 | 87100  | 87100   | 58000 |
| 2MMV99104WN    | 0.9             | 1.4  | 0.58           | 0.77 | 39400                                                        | 35000      | 26300 | 67000  | 67000   | 44700 |
| 2MMV99105WN    | 1               | 1.6  | 0.67           | 0.9  | 32900                                                        | 29200      | 21900 | 55800  | 55800   | 37200 |
| 2MMV99106WN    | 1.3             | 2.1  | 0.87           | 1.17 | 26600                                                        | 23600      | 17700 | 45100  | 45100   | 30100 |
| 2MMV99107WN    | 1.4             | 2.2  | 0.91           | 1.22 | 22800                                                        | 20200      | 15200 | 38700  | 38700   | 25800 |
| 2MMV99108WN    | 1.7             | 2.7  | 1.14           | 1.52 | 19800                                                        | 17600      | 13200 | 33700  | 33700   | 22400 |
| 2MMV99109WN    | 2.2             | 3.5  | 1.47           | 1.96 | 18200                                                        | 16200      | 12100 | 30900  | 30900   | 20600 |
| 2MMV99110WN    | 2.4             | 3.8  | 1.58           | 2.11 | 16700                                                        | 14800      | 11100 | 28300  | 28300   | 18900 |
| 2MMV99111WN    | 3.4             | 5.4  | 2.2            | 3    | 14900                                                        | 13300      | 10000 | 25400  | 25400   | 17000 |
| 2MMV99112WN    | 3.6             | 5.8  | 2.4            | 3.2  | 13900                                                        | 12300      | 9200  | 23600  | 23600   | 15600 |
| 2MMV99113WN    | 3.8             | 6.1  | 2.6            | 3.4  | 13000                                                        | 11500      | 8600  | 22000  | 22000   | 14600 |
| 2MMV99114WN    | 5.1             | 8.2  | 3.4            | 4.6  | 11900                                                        | 10600      | 7900  | 20200  | 20200   | 13400 |
| 2MMV99115WN    | 5.5             | 8.8  | 3.7            | 4.9  | 11100                                                        | 9800       | 7400  | 18800  | 18800   | 12600 |
| 2MMV99116WN    | 7.1             | 11.3 | 4.7            | 6.3  | 10400                                                        | 9300       | 7000  | 17700  | 17700   | 11900 |
| 2MMV99117WN    | 7.4             | 11.8 | 4.9            | 6.6  | 9900                                                         | 8800       | 6600  | 16800  | 16800   | 11200 |
| 2MMV99118WN    | 9.7             | 15.6 | 6.5            | 8.7  | 9400                                                         | 8300       | 6200  | 15900  | 15900   | 10500 |
| 2MMV99119WN    | 13.3            | 21.3 | 7.1            | 9.5  | 8900                                                         | 7900       | 5900  | 15100  | 15100   | 10000 |
| 2MMV99120WN    | 10.6            | 17   | 7.4            | 9.9  | 8500                                                         | 7500       | 5600  | 14400  | 14400   | 9500  |
| 2MMV99121WN    | 17.1            | 27.4 | 9.1            | 12.2 | 8000                                                         | 7100       | 5300  | 13600  | 13600   | 9000  |
| 2MMV99122WN    | 16              | 25.6 | 10.7           | 14.2 | 7700                                                         | 6800       | 5100  | 13000  | 13000   | 8700  |
| 2MMV99124WN    | 17.1            | 27.4 | 11.4           | 15.3 | 7100                                                         | 6300       | 4700  | 12100  | 12100   | 8000  |
| 2MMV99126WN    | 25.8            | 41.3 | 17.2           | 23   | 6400                                                         | 5700       | 4300  | 10900  | 10900   | 7300  |
| 2MMV99128WN    | 27.5            | 43.9 | 18.3           | 24.4 | 5900                                                         | 5300       | 4000  | 10100  | 10100   | 6800  |
| 2MMV99130WN    | 43.9            | 70.3 | 29.3           | 39.1 | 5600                                                         | 5000       | 3700  | 9500   | 9500    | 6300  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.



## EXTRA-LIGHT 3MMV99100WN (ISO 10) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |      | Kluber Isoflex |      | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |       |         |       |
|----------------|-----------------|------|----------------|------|--------------------------------------------------------------|------------|-------|-------|---------|-------|
|                | NBU15           |      | NBU15          |      | DUL                                                          | Grease DUM | DUH   | DUL   | Oil DUM | DUH   |
|                | 25%             | 40%  | 15%            | 20%  |                                                              |            |       |       |         |       |
| 3MMV99101WN    | 0.3             | 0.5  | 0.2            | 0.3  | 58000                                                        | 47700      | 34100 | 86900 | 71600   | 51100 |
| 3MMV99102WN    | 0.4             | 0.6  | 0.2            | 0.3  | 49000                                                        | 40500      | 28900 | 73800 | 60800   | 43400 |
| 3MMV99103WN    | 0.5             | 0.7  | 0.3            | 0.4  | 43500                                                        | 35800      | 25600 | 65300 | 53800   | 38400 |
| 3MMV99104WN    | 0.9             | 1.4  | 0.6            | 0.8  | 33500                                                        | 27600      | 19700 | 50200 | 41400   | 29500 |
| 3MMV99105WN    | 1.0             | 1.6  | 0.7            | 0.9  | 27900                                                        | 23000      | 16400 | 41800 | 34400   | 24600 |
| 3MMV99106WN    | 1.3             | 2.1  | 0.9            | 1.2  | 22500                                                        | 18500      | 13200 | 33800 | 27800   | 19900 |
| 3MMV99107WN    | 1.4             | 2.2  | 0.9            | 1.2  | 19300                                                        | 15900      | 11300 | 28900 | 23800   | 17000 |
| 3MMV99108WN    | 1.7             | 2.7  | 1.1            | 1.5  | 16800                                                        | 13900      | 9900  | 25200 | 20800   | 14800 |
| 3MMV99109WN    | 2.2             | 3.5  | 1.5            | 2.0  | 15500                                                        | 12700      | 9100  | 23200 | 19100   | 13600 |
| 3MMV99110WN    | 2.4             | 3.8  | 1.6            | 2.1  | 14200                                                        | 11700      | 8300  | 21300 | 17500   | 12500 |
| 3MMV99111WN    | 3.4             | 5.4  | 2.2            | 3.0  | 12700                                                        | 10400      | 7400  | 19000 | 15600   | 11200 |
| 3MMV99112WN    | 3.6             | 5.8  | 2.4            | 3.2  | 11800                                                        | 9700       | 6900  | 17700 | 14600   | 10400 |
| 3MMV99113WN    | 3.8             | 6.1  | 2.6            | 3.4  | 11000                                                        | 9100       | 6500  | 16600 | 13600   | 9700  |
| 3MMV99114WN    | 5.1             | 8.2  | 3.4            | 4.6  | 10100                                                        | 8300       | 5900  | 15200 | 12500   | 8900  |
| 3MMV99115WN    | 5.5             | 8.8  | 3.7            | 4.9  | 9400                                                         | 7800       | 5500  | 14100 | 11700   | 8300  |
| 3MMV99116WN    | 7.1             | 11.3 | 4.7            | 6.3  | 8800                                                         | 7300       | 5200  | 13300 | 10900   | 7800  |
| 3MMV99117WN    | 7.4             | 11.8 | 4.9            | 6.6  | 8400                                                         | 6900       | 4900  | 12600 | 10400   | 7400  |
| 3MMV99118WN    | 9.7             | 15.6 | 6.5            | 8.7  | 7900                                                         | 6500       | 4700  | 11900 | 9800    | 7000  |
| 3MMV99119WN    | 13.3            | 21.3 | 7.1            | 9.5  | 7600                                                         | 6200       | 4500  | 11400 | 9400    | 6700  |
| 3MMV99120WN    | 10.6            | 17.0 | 7.4            | 9.9  | 7200                                                         | 5900       | 4200  | 10800 | 8900    | 6300  |
| 3MMV99121WN    | 17.1            | 27.4 | 9.1            | 12.2 | 6800                                                         | 5600       | 4000  | 10300 | 8500    | 6000  |
| 3MMV99122WN    | 16.0            | 25.6 | 10.7           | 14.2 | 6500                                                         | 5300       | 3800  | 9700  | 8000    | 5700  |
| 3MMV99124WN    | 17.1            | 27.4 | 11.4           | 15.3 | 6000                                                         | 4900       | 3500  | 9000  | 7400    | 5300  |
| 3MMV99126WN    | 25.8            | 41.3 | 17.2           | 23.0 | 5400                                                         | 4500       | 3200  | 8100  | 6700    | 4800  |
| 3MMV99128WN    | 27.5            | 43.9 | 18.3           | 24.4 | 5100                                                         | 4200       | 3000  | 7600  | 6300    | 4500  |
| 3MMV99130WN    | 43.9            | 70.3 | 29.3           | 39.1 | 4800                                                         | 3900       | 2800  | 7200  | 5900    | 4200  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.



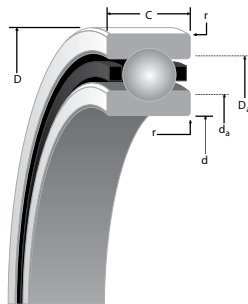




## BALL BEARINGS

### ULTRA-LIGHT MM9100K (ISO 10) SERIES

#### DIMENSIONAL SIZES METRIC



#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### CONRAD CONSTRUCTION:

- Maximum complement of balls separated by two-piece land piloted cage

| Bearing Number | d<br>Bore        | D<br>O.D.   | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>kg | LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                  |
|----------------|------------------|-------------|---------------------------|---------------------|-----------|---------------------------------------------|----------------------|----------------------------------|
|                |                  |             |                           |                     |           | C <sub>0</sub> (stat)                       | C <sub>0</sub> (dyn) | Limiting Speed (N <sub>g</sub> ) |
| METRIC         | mm/tol: +0; (µm) |             |                           | mm                  | kg        | N                                           |                      | RPM                              |
| MM9101K        | 12<br>(4)        | 28<br>(5)   | 8<br>(80)                 | 8 x 4.76            | 0.020     | 2400<br>2130                                | 5670<br>5670         | 52800<br>63400                   |
| MM9103K        | 17<br>(4)        | 35<br>(6)   | 10<br>(80)                | 10 x 4.76           | 0.038     | 3300<br>2890                                | 6660<br>6660         | 39600<br>47500                   |
| MM9104K        | 20<br>(5)        | 42<br>(6)   | 12<br>(120)               | 8 x 6.35            | 0.064     | 4400<br>3980                                | 9620<br>9620         | 34000<br>40800                   |
| MM9105K        | 25<br>(5)        | 47<br>(6)   | 12<br>(120)               | 10 x 6.35           | 0.074     | 5900<br>5210                                | 11200<br>11200       | 28300<br>34000                   |
| MM9106K        | 30<br>(5)        | 55<br>(7)   | 13<br>(120)               | 11 x 7.14           | 0.109     | 8300<br>7390                                | 14700<br>14700       | 23300<br>28000                   |
| MM9107K        | 35<br>(6)        | 62<br>(7)   | 14<br>(120)               | 11 x 7.94           | 0.144     | 10300<br>9150                               | 17700<br>17700       | 20700<br>24800                   |
| MM9108K        | 40<br>(6)        | 68<br>(7)   | 15<br>(120)               | 12 x 7.94           | 0.180     | 11600<br>10300                              | 18600<br>18600       | 18200<br>21800                   |
| MM9109K        | 45<br>(6)        | 75<br>(7)   | 16<br>(120)               | 13 x 8.73           | 0.230     | 15100<br>13500                              | 23300<br>23300       | 16300<br>19600                   |
| MM9110K        | 50<br>(6)        | 80<br>(7)   | 16<br>(120)               | 14 x 8.73           | 0.248     | 16700<br>14700                              | 24200<br>24200       | 14900<br>17900                   |
| MM9111K        | 55<br>(7)        | 90<br>(8)   | 18<br>(150)               | 13 x 10.32          | 0.362     | 21400<br>18900                              | 31400<br>31400       | 13500<br>16200                   |
| MM9112K        | 60<br>(7)        | 95<br>(8)   | 18<br>(150)               | 14 x 10.32          | 0.430     | 23200<br>20600                              | 32600<br>32600       | 12500<br>15000                   |
| MM9113K        | 65<br>(7)        | 100<br>(8)  | 18<br>(150)               | 15 x 10.32          | 0.450     | 25200<br>22400                              | 33900<br>33900       | 11600<br>13900                   |
| MM9114K        | 70<br>(7)        | 110<br>(8)  | 20<br>(150)               | 14 x 11.91          | 0.620     | 30900<br>27500                              | 42200<br>42200       | 10700<br>12800                   |
| MM9115K        | 75<br>(7)        | 115<br>(8)  | 20<br>(150)               | 15 x 11.91          | 0.606     | 33400<br>29800                              | 43800<br>43800       | 10100<br>12100                   |
| MM9116K        | 80<br>(7)        | 125<br>(9)  | 22<br>(150)               | 14 x 13.49          | 0.804     | 40000<br>35300                              | 52800<br>52800       | 9420<br>11300                    |
| MM9117K        | 85<br>(8)        | 130<br>(9)  | 22<br>(200)               | 15 x 13.49          | 0.845     | 42900<br>38300                              | 54900<br>54900       | 8900<br>10700                    |
| MM9118K        | 90<br>(9)        | 140<br>(9)  | 24<br>(200)               | 14 x 15.08          | 1.092     | 49800<br>44100                              | 64500<br>64500       | 8390<br>10100                    |
| MM9120K        | 100<br>(8)       | 150<br>(9)  | 24<br>(200)               | 15 x 15.08          | 1.208     | 54300<br>48200                              | 66700<br>66700       | 7630<br>9160                     |
| MM9122K        | 110<br>(8)       | 170<br>(10) | 28<br>(200)               | 14 x 17.46          | 1.882     | 66700<br>59900                              | 83400<br>83400       | 6840<br>8240                     |
| MM9124K        | 120<br>(8)       | 180<br>(10) | 28<br>(200)               | 15 x 17.46          | 2.019     | 72500<br>65000                              | 86300<br>86300       | 6320<br>7500                     |
| MM9126K        | 130<br>(10)      | 200<br>(11) | 33<br>(250)               | 14 x 20.64          | 3.041     | 94300<br>83600                              | 112600<br>112600     | 5810<br>6975                     |

(N<sub>g</sub>) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (S<sub>p</sub>) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |       |                          |       | Shaft Diameter |         | Mounting Fits |       | FIXED                        |         |               |       | FLOATING                     |         |                   |       |         |
|--------------------------|---------------------------------|-------|--------------------------|-------|----------------|---------|---------------|-------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|---------|
|                          | d <sub>a</sub> (Shaft)          |       | D <sub>a</sub> (Housing) |       | Min.           | Max.    | Loose         | Tight | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |         |
|                          | Max.                            | Min.  | Max.                     | Min.  |                |         |               |       | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |         |
| mm                       | mm                              | mm    | mm                       | mm    | mm             | mm      | mm            | mm    | mm                           | mm      | mm            | mm    | mm                           | mm      | mm                | mm    |         |
| 0.3                      | 16.1                            | 15.9  | 25.5                     | 25.3  | 11.995         | 12.000  | 0.005         | 0.004 | 28                           | 28.005  | 0.000         | 0.010 | 28.010                       | 28.005  | 0.015             | 0.005 | MM9101K |
| 0.3                      | 21.7                            | 21.5  | 31.1                     | 30.9  | 16.995         | 17.000  | 0.005         | 0.004 | 35                           | 35.006  | 0.000         | 0.012 | 35.010                       | 35.005  | 0.016             | 0.005 | MM9103K |
| 0.6                      | 25.0                            | 24.8  | 37.7                     | 37.5  | 19.995         | 20.000  | 0.005         | 0.005 | 42                           | 42.006  | 0.000         | 0.012 | 42.010                       | 42.005  | 0.016             | 0.005 | MM9104K |
| 0.6                      | 30.1                            | 29.9  | 42.6                     | 42.3  | 24.995         | 25.000  | 0.005         | 0.005 | 47                           | 47.006  | 0.000         | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | MM9105K |
| 1.0                      | 36.2                            | 35.9  | 50.7                     | 50.4  | 29.995         | 30.000  | 0.005         | 0.005 | 55                           | 55.008  | 0.000         | 0.015 | 55.012                       | 55.007  | 0.019             | 0.007 | MM9106K |
| 1.0                      | 41.2                            | 40.6  | 56.6                     | 56.1  | 34.995         | 35.000  | 0.005         | 0.006 | 62                           | 62.008  | 0.000         | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | MM9107K |
| 1.0                      | 46.2                            | 45.7  | 62.2                     | 61.7  | 39.995         | 40.000  | 0.005         | 0.006 | 68                           | 68.008  | 0.000         | 0.015 | 68.012                       | 68.007  | 0.019             | 0.007 | MM9108K |
| 1.0                      | 51.8                            | 51.3  | 69.3                     | 68.8  | 44.995         | 45.000  | 0.005         | 0.006 | 75                           | 75.008  | 0.000         | 0.015 | 75.014                       | 75.009  | 0.022             | 0.009 | MM9109K |
| 1.0                      | 56.6                            | 56.1  | 74.2                     | 73.7  | 49.995         | 50.000  | 0.005         | 0.006 | 80                           | 80.008  | 0.000         | 0.015 | 80.012                       | 80.008  | 0.020             | 0.008 | MM9110K |
| 1.0                      | 62.7                            | 62.2  | 83.3                     | 82.8  | 54.995         | 55.000  | 0.005         | 0.007 | 90                           | 90.008  | 0.000         | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | MM9111K |
| 1.0                      | 67.8                            | 67.3  | 88.1                     | 87.6  | 59.995         | 60.000  | 0.005         | 0.007 | 95                           | 95.008  | 0.000         | 0.016 | 95.016                       | 95.009  | 0.024             | 0.009 | MM9112K |
| 1.0                      | 72.6                            | 72.1  | 93.2                     | 92.7  | 64.995         | 65.000  | 0.005         | 0.007 | 100                          | 100.008 | 0.000         | 0.016 | 100.018                      | 100.010 | 0.025             | 0.010 | MM9113K |
| 1.0                      | 78.2                            | 77.7  | 102.4                    | 101.9 | 69.995         | 70.000  | 0.005         | 0.007 | 110                          | 110.008 | 0.000         | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | MM9114K |
| 1.0                      | 83.4                            | 82.7  | 107.3                    | 106.6 | 74.995         | 75.005  | 0.005         | 0.012 | 115                          | 115.008 | 0.000         | 0.016 | 115.019                      | 115.011 | 0.026             | 0.010 | MM9115K |
| 1.0                      | 89.3                            | 88.5  | 116.5                    | 115.7 | 79.995         | 80.005  | 0.005         | 0.012 | 125                          | 125.008 | 0.000         | 0.017 | 125.021                      | 125.011 | 0.030             | 0.011 | MM9116K |
| 1.0                      | 94.9                            | 94.1  | 122.1                    | 121.3 | 84.995         | 85.005  | 0.005         | 0.012 | 130                          | 130.009 | 0.000         | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | MM9117K |
| 1.5                      | 100.5                           | 99.7  | 130.9                    | 130.2 | 89.995         | 90.005  | 0.005         | 0.013 | 140                          | 140.009 | 0.000         | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | MM9118K |
| 1.5                      | 110.6                           | 109.9 | 140.8                    | 140.1 | 99.995         | 100.005 | 0.005         | 0.013 | 150                          | 150.009 | 0.000         | 0.018 | 150.023                      | 150.012 | 0.032             | 0.012 | MM9120K |
| 2.0                      | 123.1                           | 122.3 | 158.4                    | 157.6 | 109.995        | 110.005 | 0.005         | 0.013 | 170                          | 170.010 | 0.000         | 0.020 | 170.022                      | 170.012 | 0.032             | 0.012 | MM9122K |
| 2.0                      | 133.2                           | 132.5 | 168.3                    | 167.5 | 119.995        | 120.005 | 0.005         | 0.013 | 180                          | 180.010 | 0.000         | 0.020 | 180.022                      | 180.012 | 0.032             | 0.012 | MM9124K |
| 2.0                      | 144.9                           | 144.2 | 186.6                    | 185.8 | 129.995        | 130.005 | 0.005         | 0.015 | 200                          | 200.011 | 0.000         | 0.022 | 200.025                      | 200.015 | 0.036             | 0.015 | MM9126K |

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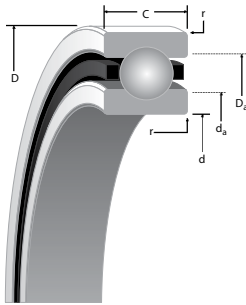




# BALL BEARINGS

## EXTRA-LIGHT MM9100K (ISO 10) SERIES

### DIMENSIONAL SIZES INCHES



#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### CONRAD CONSTRUCTION:

- Maximum complement of balls separated by two-piece land piloted cage.

| Bearing Number | d<br>Bore             | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.  | LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                |
|----------------|-----------------------|-----------------|---------------------------|---------------------|------|---------------------------------------------|----------------------|----------------|
|                |                       |                 |                           |                     |      | C <sub>0</sub> (stat)                       | C <sub>e</sub> (dyn) | Limiting Speed |
| INCH           | in./tol: +0; -0.00(X) |                 |                           | in.                 | lbs. | lbs.                                        |                      | RPM            |
| MM9101K        | 0.4724<br>(1.5)       | 1.1024<br>(2)   | 0.3150<br>(31)            | 8 x 3/16            | 0.04 | 540<br>480                                  | 1280<br>1280         | 5280<br>63400  |
| MM9103K        | 0.6693<br>(1.5)       | 1.3780<br>(2.5) | 0.3937<br>(31)            | 10 x 3/16           | 0.08 | 735<br>650                                  | 1500<br>1500         | 39600<br>47500 |
| MM9104K        | 0.7874<br>(2)         | 1.6535<br>(2.5) | 0.4724<br>(47)            | 8 x 1/4             | 0.14 | 1000<br>890                                 | 2160<br>2160         | 34000<br>40800 |
| MM9105K        | 0.9843<br>(2)         | 1.8504<br>(2.5) | 0.4724<br>(47)            | 10 x 1/4            | 0.16 | 1320<br>1170                                | 2510<br>2510         | 28300<br>34000 |
| MM9106K        | 1.1811<br>(2)         | 2.1654<br>(3)   | 0.5118<br>(47)            | 11 x 9/32           | 0.24 | 1860<br>1660                                | 3300<br>3300         | 23300<br>28000 |
| MM9107K        | 1.3780<br>(2.5)       | 2.4409<br>(3)   | 0.5512<br>(47)            | 11 x 5/16           | 0.32 | 2320<br>2060                                | 3980<br>3980         | 20700<br>24800 |
| MM9108K        | 1.5748<br>(2.5)       | 2.6772<br>(3)   | 0.5906<br>(47)            | 12 x 5/16           | 0.40 | 2600<br>2310                                | 4180<br>4180         | 18300<br>21800 |
| MM9109K        | 1.7717<br>(2.5)       | 2.9528<br>(3)   | 0.6299<br>(47)            | 13 x 11/32          | 0.51 | 3400<br>3030                                | 5230<br>5230         | 16300<br>19600 |
| MM9110K        | 1.9685<br>(2.5)       | 3.1496<br>(3)   | 0.6299<br>(47)            | 14 x 11/32          | 0.55 | 3750<br>3310                                | 5440<br>5440         | 14900<br>17900 |
| MM9111K        | 2.1654<br>(3)         | 3.5433<br>(3)   | 0.7087<br>(59)            | 13 x 13/32          | 0.80 | 4800<br>4250                                | 7050<br>7050         | 13500<br>16200 |
| MM9112K        | 2.3622<br>(3)         | 3.7402<br>(3)   | 0.7087<br>(59)            | 14 x 13/32          | 0.95 | 5210<br>4630                                | 7340<br>7340         | 12500<br>15000 |
| MM9113K        | 2.5591<br>(3)         | 3.9370<br>(3)   | 0.7087<br>(59)            | 15 x 13/32          | 0.99 | 5650<br>5030                                | 7610<br>7610         | 11600<br>13900 |
| MM9114K        | 2.7559<br>(3)         | 4.3307<br>(3)   | 0.7874<br>(59)            | 14 x 15/32          | 1.37 | 6940<br>6180                                | 9490<br>9490         | 10700<br>12800 |
| MM9115K        | 2.9528<br>(3)         | 4.5276<br>(3)   | 0.7874<br>(59)            | 15 x 15/32          | 1.34 | 7500<br>6700                                | 9850<br>9850         | 10100<br>12100 |
| MM9116K        | 3.1496<br>(3)         | 4.9213<br>(3.5) | 0.8661<br>(59)            | 14 x 17/32          | 1.77 | 9000<br>7940                                | 11900<br>11900       | 9420<br>11300  |
| MM9117K        | 3.3465<br>(3)         | 5.1181<br>(3.5) | 0.8661<br>(79)            | 15 x 17/32          | 1.86 | 9650<br>8600                                | 12300<br>12300       | 8900<br>10700  |
| MM9118K        | 3.5433<br>(3)         | 5.5118<br>(3.5) | 0.9449<br>(79)            | 14 x 19/32          | 2.41 | 11200<br>9920                               | 14500<br>14500       | 8390<br>10100  |
| MM9120K        | 3.9370<br>(3)         | 5.9055<br>(3.5) | 0.9449<br>(79)            | 15 x 19/32          | 2.66 | 12200<br>10800                              | 15000<br>15000       | 7630<br>9160   |
| MM9122K        | 4.3307<br>(3)         | 6.6929<br>(4)   | 1.1024<br>(79)            | 14 x 11/16          | 4.15 | 15000<br>13500                              | 18700<br>18700       | 6840<br>8,210  |
| MM9124K        | 4.7244<br>(3)         | 7.0866<br>(4)   | 1.1024<br>(79)            | 15 x 11/16          | 4.45 | 16300<br>14600                              | 19400<br>19400       | 6320<br>7580   |
| MM9126K        | 5.1181<br>(4)         | 7.8740<br>(4.5) | 1.2992<br>(98)            | 14 x 13/16          | 6.70 | 21200<br>18800                              | 25300<br>25300       | 5810<br>6975   |

(N<sub>g</sub>) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (S<sub>p</sub>) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |        |               |        | FLOATING                     |        |                   |         |         |
|--------------------------|---------------------------------|------|--------------------------|------|----------------|--------|---------------|---------|------------------------------|--------|---------------|--------|------------------------------|--------|-------------------|---------|---------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |      | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |        | Mounting Fits |        | Housing Bore<br>(Stationary) |        | Housing Clearance |         |         |
|                          | Max.                            | Min. | Max.                     | Min. |                |        |               |         | Min.                         | Max.   | Tight         | Loose  | Max.                         | Min.   | Max.              | Min.    |         |
| in.                      | in.                             | in.  | in.                      | in.  | in.            | in.    | in.           | in.     | in.                          | in.    | in.           | in.    | in.                          | in.    | in.               | in.     |         |
| 0.012                    | 0.64                            | 0.63 | 1.01                     | 1.00 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 1.1024                       | 1.1026 | 0.0000        | 0.0004 | 1.1028                       | 1.1026 | 0.00060           | 0.00020 | MM9101K |
| 0.012                    | 0.86                            | 0.85 | 1.23                     | 1.22 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.3780                       | 1.3783 | 0.0000        | 0.0005 | 1.3784                       | 1.3782 | 0.00070           | 0.00020 | MM9103K |
| 0.024                    | 0.99                            | 0.98 | 1.49                     | 1.48 | 0.7872         | 0.7874 | 0.0002        | 0.0002  | 1.6535                       | 1.6538 | 0.0000        | 0.0005 | 1.6539                       | 1.6537 | 0.00070           | 0.00020 | MM9104K |
| 0.024                    | 1.19                            | 1.18 | 1.68                     | 1.67 | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 1.8504                       | 1.8507 | 0.0000        | 0.0005 | 1.8509                       | 1.8507 | 0.00080           | 0.00030 | MM9105K |
| 0.039                    | 1.43                            | 1.42 | 2.00                     | 1.99 | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 2.1654                       | 2.1657 | 0.0000        | 0.0006 | 2.1659                       | 2.1657 | 0.00080           | 0.00030 | MM9106K |
| 0.039                    | 1.62                            | 1.60 | 2.23                     | 2.21 | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 2.4409                       | 2.4412 | 0.0000        | 0.0006 | 2.4414                       | 2.4412 | 0.00080           | 0.00030 | MM9107K |
| 0.039                    | 1.82                            | 1.80 | 2.45                     | 2.43 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 2.6772                       | 2.6775 | 0.0000        | 0.0006 | 2.6777                       | 2.6775 | 0.00080           | 0.00030 | MM9108K |
| 0.039                    | 2.04                            | 2.02 | 2.73                     | 2.71 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 2.9528                       | 2.9531 | 0.0000        | 0.0006 | 2.9533                       | 2.9531 | 0.00080           | 0.00030 | MM9109K |
| 0.039                    | 2.23                            | 2.21 | 2.92                     | 2.90 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 3.1496                       | 3.1499 | 0.0000        | 0.0006 | 3.1501                       | 3.1499 | 0.00080           | 0.00030 | MM9110K |
| 0.039                    | 2.47                            | 2.45 | 3.28                     | 3.26 | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 3.5433                       | 3.5436 | 0.0000        | 0.0006 | 3.5439                       | 3.5436 | 0.00090           | 0.00030 | MM9111K |
| 0.039                    | 2.67                            | 2.65 | 3.47                     | 3.45 | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 3.7402                       | 3.7405 | 0.0000        | 0.0006 | 3.7408                       | 3.7405 | 0.00090           | 0.00030 | MM9112K |
| 0.039                    | 2.86                            | 2.84 | 3.67                     | 3.65 | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 3.9370                       | 3.9373 | 0.0000        | 0.0006 | 3.9377                       | 3.9374 | 0.00100           | 0.00040 | MM9113K |
| 0.039                    | 3.08                            | 3.06 | 4.03                     | 4.01 | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 4.3307                       | 4.3310 | 0.0000        | 0.0006 | 4.3314                       | 4.3311 | 0.00100           | 0.00040 | MM9114K |
| 0.039                    | 3.29                            | 3.26 | 4.23                     | 4.20 | 2.9526         | 2.9530 | 0.0002        | 0.0005  | 4.5276                       | 4.5279 | 0.0000        | 0.0006 | 4.5283                       | 4.5280 | 0.00100           | 0.00040 | MM9115K |
| 0.039                    | 3.52                            | 3.49 | 4.59                     | 4.56 | 3.1494         | 3.1498 | 0.0002        | 0.0005  | 4.9213                       | 4.9216 | 0.0000        | 0.0007 | 4.9221                       | 4.9217 | 0.00120           | 0.00040 | MM9116K |
| 0.039                    | 3.74                            | 3.71 | 4.81                     | 4.78 | 3.3463         | 3.3467 | 0.0002        | 0.0005  | 5.1181                       | 5.1185 | 0.0000        | 0.0007 | 5.1189                       | 5.1185 | 0.00110           | 0.00040 | MM9117K |
| 0.059                    | 3.96                            | 3.93 | 5.16                     | 5.13 | 3.5431         | 3.5435 | 0.0002        | 0.0005  | 5.5118                       | 5.5122 | 0.0000        | 0.0007 | 5.5126                       | 5.5122 | 0.00110           | 0.00040 | MM9118K |
| 0.059                    | 4.36                            | 4.33 | 5.55                     | 5.52 | 3.9368         | 3.9372 | 0.0002        | 0.0005  | 5.9055                       | 5.9059 | 0.0000        | 0.0007 | 5.9064                       | 5.9060 | 0.00120           | 0.00050 | MM9120K |
| 0.079                    | 4.85                            | 4.82 | 6.24                     | 6.21 | 4.3305         | 4.3309 | 0.0002        | 0.0005  | 6.6929                       | 6.6933 | 0.0000        | 0.0008 | 6.6938                       | 6.6934 | 0.00130           | 0.00050 | MM9122K |
| 0.079                    | 5.25                            | 5.22 | 6.63                     | 6.60 | 4.7242         | 4.7246 | 0.0002        | 0.0005  | 7.0866                       | 7.0870 | 0.0000        | 0.0008 | 7.0875                       | 7.0871 | 0.00130           | 0.00050 | MM9124K |
| 0.079                    | 5.71                            | 5.68 | 7.35                     | 7.32 | 5.1179         | 5.1183 | 0.0002        | 0.0006  | 7.8740                       | 7.8745 | 0.0000        | 0.0009 | 7.8750                       | 7.8746 | 0.00150           | 0.00060 | MM9126K |

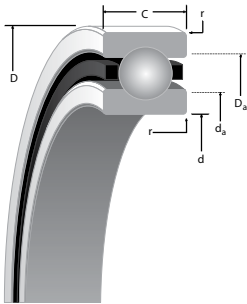




# BALL BEARINGS

## LIGHT 2(3)MM200WI (ISO 02) SERIES

### DIMENSIONAL SERIES METRIC



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore         | D<br>O.D.     | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>kg | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                |
|------------------------------|-------------------|---------------|---------------------------|---------------------|-----------|---------------------------------------------------|----------------------|--------------------------------|---------------------------------------------------|----------------------|--------------------------------|
|                              |                   |               |                           |                     |           | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(Ng)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(Ng)</sup> |
| METRIC                       | mm/tol: +0; -(μm) |               |                           | mm                  | kg        | N                                                 |                      | RPM                            | N                                                 |                      | RPM                            |
| 200WI                        | 10<br>(3.8)       | 30<br>(5.1)   | 9<br>(40)                 | 8 x 5.56            | 0.03      | 2900<br>2610                                      | 7100<br>7100         | 62800<br>75400                 | 2800<br>2540                                      | 6900<br>6900         | 56500<br>67800                 |
| 201WI                        | 12<br>(3.8)       | 32<br>(6.4)   | 10<br>(80)                | 9 x 5.95            | 0.036     | 3800<br>3410                                      | 8760<br>8760         | 56700<br>68000                 | 3700<br>3320                                      | 8500<br>8500         | 51000<br>61200                 |
| 202WI                        | 15<br>(3.8)       | 35<br>(6.4)   | 11<br>(80)                | 10 x 5.95           | 0.044     | 4500<br>4010                                      | 9580<br>9580         | 47800<br>57400                 | 4400<br>3880                                      | 9250<br>9250         | 43000<br>51600                 |
| 203WI                        | 17<br>(3.8)       | 40<br>(6.4)   | 12<br>(80)                | 10 x 6.75           | 0.064     | 5900<br>5170                                      | 12000<br>12000       | 41900<br>50300                 | 5600<br>5000                                      | 11600<br>11600       | 37700<br>45200                 |
| 204WI                        | 20<br>(5.1)       | 47<br>(6.4)   | 14<br>(130)               | 10 x 7.94           | 0.103     | 8100<br>7160                                      | 16100<br>16100       | 35700<br>42800                 | 7700<br>6900                                      | 15500<br>15500       | 32100<br>38500                 |
| 205WI                        | 25<br>(5.1)       | 52<br>(7.7)   | 15<br>(130)               | 12 x 7.94           | 0.127     | 10200<br>9110                                     | 18400<br>18400       | 29800<br>35800                 | 9800<br>8690                                      | 17600<br>17600       | 26800<br>32200                 |
| 206WI                        | 30<br>(5.1)       | 62<br>(7.7)   | 16<br>(130)               | 12 x 9.53           | 0.195     | 14700<br>13100                                    | 25500<br>25500       | 25100<br>30100                 | 14000<br>12500                                    | 24400<br>24400       | 22600<br>27100                 |
| 207WI                        | 35<br>(6.4)       | 72<br>(7.7)   | 17<br>(130)               | 12 x 11.11          | 0.282     | 20000<br>17800                                    | 33700<br>33700       | 21600<br>25900                 | 19100<br>17100                                    | 32200<br>32200       | 19400<br>23300                 |
| 208WI                        | 40<br>(6.4)       | 80<br>(7.7)   | 18<br>(130)               | 11 x 12.70          | 0.352     | 23800<br>21100                                    | 40,400<br>40400      | 19300<br>23100                 | 22700<br>20200                                    | 38700<br>38700       | 17400<br>20900                 |
| 209WI                        | 45<br>(6.4)       | 85<br>(7.7)   | 19<br>(130)               | 13 x 12.70          | 0.408     | 28800<br>25600                                    | 45200<br>45200       | 17500<br>21000                 | 27600<br>24500                                    | 43100<br>43100       | 15800<br>19000                 |
| 210WI                        | 50<br>(6.4)       | 90<br>(7.7)   | 20<br>(130)               | 14 x 12.70          | 0.457     | 31700<br>28200                                    | 47400<br>47400       | 16000<br>19200                 | 30200<br>26900                                    | 45200<br>45200       | 14400<br>17300                 |
| 211WI                        | 55<br>(7.7)       | 100<br>(7.7)  | 21<br>(150)               | 14 x 14.29          | 0.608     | 40000<br>35500                                    | 58700<br>58700       | 14500<br>17400                 | 38500<br>34000                                    | 55900<br>55900       | 13100<br>15700                 |
| 212WI                        | 60<br>(7.7)       | 110<br>(7.7)  | 22<br>(150)               | 14 x 15.88          | 0.787     | 48900<br>43600                                    | 71000<br>71000       | 13200<br>15800                 | 47100<br>41800                                    | 67700<br>67700       | 11900<br>14300                 |
| 213WI                        | 65<br>(7.7)       | 120<br>(7.7)  | 23<br>(150)               | 14 x 16.67          | 0.998     | 54700<br>48700                                    | 77400<br>77400       | 12100<br>14300                 | 52500<br>46500                                    | 73700<br>73700       | 10900<br>13100                 |
| 214WI                        | 70<br>(7.7)       | 125<br>(9)    | 24<br>(150)               | 14 x 17.46          | 1.074     | 60000<br>53600                                    | 84200<br>84200       | 11400<br>13700                 | 57400<br>51100                                    | 80200<br>80200       | 10300<br>12400                 |
| 215WI                        | 75<br>(7.7)       | 130<br>(9)    | 25<br>(150)               | 15 x 17.46          | 1.174     | 64900<br>58200                                    | 87900<br>87900       | 10800<br>13000                 | 62300<br>55600                                    | 83700<br>83700       | 9700<br>11600                  |
| 216WI                        | 80<br>(7.7)       | 140<br>(9)    | 26<br>(150)               | 15 x 19.05          | 1.448     | 77000<br>69000                                    | 102900<br>102900     | 10100<br>12100                 | 73800<br>65800                                    | 98000<br>98000       | 9100<br>10900                  |
| 217WI                        | 85<br>(7.7)       | 150<br>(9)    | 28<br>(200)               | 15 x 20.64          | 1.817     | 90700<br>80,700                                   | 118900<br>118900     | 9400<br>11300                  | 85800<br>76800                                    | 113300<br>113300     | 8500<br>10200                  |
| 218WI                        | 90<br>(7.7)       | 160<br>(10.3) | 30<br>(200)               | 14 x 22.23          | 2.196     | 97900<br>87100                                    | 129900<br>129900     | 8900<br>10700                  | 92500<br>82900                                    | 123700<br>123700     | 8000<br>9600                   |
| 219WI                        | 95<br>(7.7)       | 170<br>(10.3) | 32<br>(200)               | 14 x 23.81          | 2.669     | 111200<br>9600                                    | 147100<br>147100     | 8400<br>10100                  | 106800<br>94900                                   | 140100<br>140100     | 7600<br>9100                   |
| 220WI                        | 100<br>(7.7)      | 180<br>(10.3) | 34<br>(200)               | 14 x 25.40          | 3.209     | 126800<br>112900                                  | 165200<br>165200     | 8000<br>9600                   | 120100<br>107800                                  | 15500<br>157500      | 7200<br>8600                   |
| 222WI                        | 110<br>(7.7)      | 200<br>(11.5) | 38<br>(200)               | 14 x 28.58          | 4.486     | 160100<br>142000                                  | 194900<br>194900     | 7200<br>8600                   | 153500<br>135900                                  | 185800<br>185800     | 6500<br>7800                   |
| 224WI                        | 120<br>(7.7)      | 215<br>(11.5) | 40<br>(200)               | 14 x 30.16          | 5.358     | 180100<br>159600                                  | 210100<br>210100     | 6700<br>8000                   | 173500<br>152400                                  | 200500<br>200500     | 6000<br>7200                   |
| 226WI                        | 130<br>(10.3)     | 230<br>(11.5) | 40<br>(250)               | 17 x 30.16          | 6.468     | 222400<br>197400                                  | 238200<br>238200     | 6100<br>7300                   | 211300<br>188800                                  | 226800<br>226800     | 5500<br>6600                   |
| 230WI                        | 150<br>(10.3)     | 270<br>(12.8) | 45<br>(250)               | 15 x 38.10          | 9.98      | 302500<br>272100                                  | 305200<br>305200     | 5300<br>6400                   | 291300<br>259900                                  | 290900<br>290900     | 4800<br>5800                   |

(Ng) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |       |                          |       | Shaft Diameter |         | Mounting Fits |       | FIXED                        |         |               |       | FLOATING                     |         |                   |       | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|-------|--------------------------|-------|----------------|---------|---------------|-------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |       | D <sub>a</sub> (Housing) |       | Min.           | Max.    | Loose         | Tight | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |                                    |
|                          | Max.                            | Min.  | Max.                     | Min.  |                |         |               |       | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |                                    |
| mm                       | mm                              | mm    | mm                       | mm    | mm             | mm      | mm            | mm    | mm                           | mm      | mm            | mm    | mm                           | mm      | mm                | mm    |                                    |
| 0.6                      | 15.1                            | 14.9  | 26                       | 25.8  | 9.995          | 10.000  | 0.005         | 0.004 | 30                           | 30.005  | 0.000         | 0.010 | 30.010                       | 30.005  | 0.015             | 0.005 | 200WI                              |
| 0.6                      | 16.6                            | 16.4  | 28.1                     | 27.8  | 11.995         | 12.000  | 0.005         | 0.004 | 32                           | 32.005  | 0.000         | 0.011 | 32.010                       | 32.005  | 0.016             | 0.005 | 201WI                              |
| 0.6                      | 19.2                            | 18.9  | 31.1                     | 30.9  | 14.995         | 15.000  | 0.005         | 0.004 | 35                           | 35.006  | 0.000         | 0.012 | 35.010                       | 35.005  | 0.016             | 0.005 | 202WI                              |
| 0.6                      | 21.7                            | 21.5  | 35.7                     | 35.4  | 16.995         | 17.000  | 0.005         | 0.004 | 40                           | 40.006  | 0.000         | 0.012 | 40.010                       | 40.005  | 0.016             | 0.005 | 203WI                              |
| 1                        | 26                              | 25.8  | 41.5                     | 41.3  | 19.995         | 20.000  | 0.005         | 0.005 | 47                           | 47.006  | 0.000         | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | 204WI                              |
| 1                        | 31.1                            | 30.9  | 47.1                     | 46.9  | 24.995         | 25.000  | 0.005         | 0.005 | 52                           | 52.006  | 0.000         | 0.013 | 52.012                       | 52.007  | 0.019             | 0.007 | 205WI                              |
| 1                        | 36.7                            | 36.5  | 56                       | 55.8  | 29.995         | 30.000  | 0.005         | 0.005 | 62                           | 62.008  | 0.000         | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | 206WI                              |
| 1                        | 42.7                            | 42.2  | 65.3                     | 64.8  | 34.995         | 35.000  | 0.005         | 0.006 | 72                           | 72.008  | 0.000         | 0.015 | 72.011                       | 72.007  | 0.019             | 0.007 | 207WI                              |
| 1                        | 47.8                            | 47.2  | 73.2                     | 72.6  | 39.995         | 40.000  | 0.005         | 0.006 | 80                           | 80.008  | 0.000         | 0.015 | 80.012                       | 80.008  | 0.02              | 0.008 | 208WI                              |
| 1                        | 52.8                            | 52.3  | 78.2                     | 77.7  | 44.995         | 45.000  | 0.005         | 0.006 | 85                           | 85.008  | 0.000         | 0.016 | 85.016                       | 85.009  | 0.024             | 0.009 | 209WI                              |
| 1                        | 57.9                            | 57.4  | 83.3                     | 82.8  | 49.995         | 50.000  | 0.005         | 0.006 | 90                           | 90.008  | 0.000         | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | 210WI                              |
| 1.5                      | 63.8                            | 63.3  | 92.2                     | 91.7  | 54.995         | 55.000  | 0.005         | 0.007 | 100                          | 100.008 | 0.000         | 0.016 | 100.018                      | 100.010 | 0.025             | 0.01  | 211WI                              |
| 1.5                      | 69.9                            | 69.3  | 101.4                    | 100.8 | 59.995         | 60.000  | 0.005         | 0.007 | 110                          | 110.008 | 0.000         | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | 212WI                              |
| 1.5                      | 76.2                            | 75.7  | 109.7                    | 109.2 | 64.995         | 65.000  | 0.005         | 0.007 | 120                          | 120.008 | 0.000         | 0.016 | 120.018                      | 120.010 | 0.025             | 0.010 | 213WI                              |
| 1.5                      | 80.8                            | 80.3  | 115.8                    | 115.3 | 69.995         | 70.000  | 0.005         | 0.007 | 125                          | 125.008 | 0.000         | 0.017 | 125.021                      | 125.011 | 0.03              | 0.011 | 214WI                              |
| 1.5                      | 86                              | 85.2  | 120.8                    | 120   | 74.995         | 75.005  | 0.005         | 0.012 | 130                          | 130.009 | 0.000         | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | 215WI                              |
| 2                        | 91.3                            | 90.6  | 129.9                    | 129.2 | 79.995         | 80.005  | 0.005         | 0.012 | 140                          | 140.009 | 0.000         | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | 216WI                              |
| 2                        | 97.4                            | 96.7  | 138.8                    | 138.1 | 84.995         | 85.005  | 0.005         | 0.012 | 150                          | 150.009 | 0.000         | 0.018 | 150.023                      | 150.012 | 0.032             | 0.012 | 217WI                              |
| 2                        | 103.5                           | 102.7 | 148                      | 147.2 | 89.995         | 90.005  | 0.005         | 0.013 | 160                          | 160.009 | 0.000         | 0.022 | 160.022                      | 160.012 | 0.033             | 0.012 | 218WI                              |
| 2.1                      | 109.4                           | 108.6 | 157.1                    | 153.3 | 94.995         | 95.005  | 0.005         | 0.013 | 170                          | 170.010 | 0.000         | 0.02  | 170.022                      | 170.012 | 0.032             | 0.012 | 219WI                              |
| 2.1                      | 115.2                           | 114.4 | 166                      | 165.2 | 99.995         | 100.005 | 0.005         | 0.013 | 180                          | 180.010 | 0.000         | 0.02  | 180.022                      | 180.012 | 0.032             | 0.012 | 220WI                              |
| 2.1                      | 127.1                           | 126.4 | 184.3                    | 183.5 | 109.995        | 110.005 | 0.005         | 0.013 | 200                          | 200.011 | 0.000         | 0.022 | 200.025                      | 200.015 | 0.036             | 0.015 | 222WI                              |
| 2.1                      | 138.1                           | 137.3 | 198.5                    | 197.7 | 119.995        | 120.005 | 0.005         | 0.013 | 215                          | 215.011 | 0.000         | 0.022 | 215.025                      | 215.015 | 0.036             | 0.015 | 224WI                              |
| 2.5                      | 150.5                           | 149.7 | 211                      | 210.2 | 129.995        | 130.005 | 0.005         | 0.015 | 230                          | 230.011 | 0.000         | 0.022 | 230.025                      | 230.015 | 0.036             | 0.015 | 226WI                              |
| 2.5                      | 172.6                           | 171.8 | 248.8                    | 248   | 149.995        | 150.005 | 0.005         | 0.015 | 270                          | 270.013 | 0.000         | 0.026 | 270.031                      | 270.018 | 0.044             | 0.018 | 230WI                              |

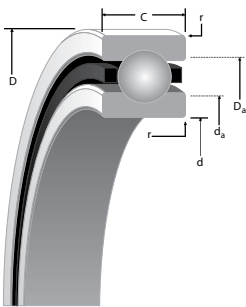




# BALL BEARINGS

## LIGHT 2(3)MM200WI (ISO 02) SERIES

### DIMENSIONAL SERIES INCHES



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore              | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.<br>lbs. | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                  | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                  |
|------------------------------|------------------------|-----------------|---------------------------|---------------------|-------------|---------------------------------------------------|----------------------|----------------------------------|---------------------------------------------------|----------------------|----------------------------------|
|                              |                        |                 |                           |                     |             | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed (N <sub>g</sub> ) | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed (N <sub>g</sub> ) |
| INCHES                       | in./tol: +0; -0.000(X) |                 |                           | in.                 | lbs.        | lbs.                                              | lbs.                 | RPM                              | lbs.                                              | lbs.                 | RPM                              |
| 200WI                        | 0.3937<br>(1.5)        | 1.1811<br>(2)   | 0.3543<br>(16)            | 8 x 7/32            | 0.07        | 660<br>590                                        | 1600<br>1600         | 62800<br>75400                   | 640<br>570                                        | 1550<br>1550         | 56500<br>67800                   |
| 201WI                        | 0.4724<br>(1.5)        | 1.2598<br>(2.5) | 0.3937<br>(31)            | 9 x 15/64           | 0.08        | 860<br>770                                        | 1970<br>1970         | 56700<br>68000                   | 830<br>750                                        | 1910<br>1910         | 51000<br>61200                   |
| 202WI                        | 0.5906<br>(1.5)        | 1.378<br>(2.5)  | 0.4331<br>(31)            | 10 x 15/64          | 0.1         | 1010<br>900                                       | 2200<br>2200         | 47800<br>57400                   | 980<br>870                                        | 2080<br>2080         | 43000<br>51600                   |
| 203WI                        | 0.6693<br>(1.5)        | 1.5748<br>(2.5) | 0.4724<br>(31)            | 10 x 17/64          | 0.14        | 1320<br>1160                                      | 2750<br>2750         | 41900<br>50300                   | 1270<br>1120                                      | 2600<br>2600         | 37700<br>45200                   |
| 204WI                        | 0.7874<br>(2)          | 1.8504<br>(2.5) | 0.5512<br>(47)            | 10 x 5/16           | 0.23        | 1810<br>1610                                      | 3620<br>3620         | 35700<br>42800                   | 1730<br>1550                                      | 3490<br>3490         | 32100<br>38500                   |
| 205WI                        | 0.9843<br>(2)          | 2.0472<br>(3)   | 0.5906<br>(47)            | 12 x 5/16           | 0.28        | 2320<br>2050                                      | 4130<br>4130         | 29800<br>35800                   | 2200<br>1950                                      | 3950<br>3950         | 26800<br>32100                   |
| 206WI                        | 1.1811<br>(2)          | 2.4409<br>(3)   | 0.6299<br>(47)            | 12 x 3/8            | 0.43        | 3310<br>2940                                      | 5740<br>5740         | 25100<br>30100                   | 3150<br>2810                                      | 5490<br>5490         | 22600<br>27100                   |
| 207WI                        | 1.378<br>(2.5)         | 2.8346<br>(3)   | 0.6693<br>(47)            | 12 x 7/16           | 0.62        | 4490<br>4000                                      | 7580<br>7580         | 21600<br>25900                   | 4300<br>3820                                      | 7240<br>7240         | 19400<br>23300                   |
| 208WI                        | 1.5748<br>(2.5)        | 3.1496<br>(3)   | 0.7087<br>(47)            | 11 x 1/2            | 0.78        | 5340<br>4750                                      | 9070<br>9070         | 19300<br>23200                   | 5100<br>4550                                      | 8690<br>8690         | 17400<br>20900                   |
| 209WI                        | 1.7717<br>(2.5)        | 3.3465<br>(3)   | 0.748<br>(47)             | 13 x 1/2            | 0.9         | 6470<br>5760                                      | 10200<br>10200       | 17500<br>21000                   | 6200<br>5500                                      | 9700<br>9700         | 15800<br>19000                   |
| 210WI                        | 1.9685<br>(2.5)        | 3.5433<br>(3)   | 0.7874<br>(47)            | 14 x 1/2            | 1.01        | 7130<br>6340                                      | 10700<br>10700       | 16000<br>19200                   | 6800<br>6050                                      | 10200<br>10200       | 14400<br>17300                   |
| 211WI                        | 2.1654<br>(3)          | 3.937<br>(3)    | 0.8268<br>(59)            | 14 x 9/16           | 1.34        | 9000<br>7980                                      | 13200<br>13200       | 14500<br>17400                   | 8650<br>7640                                      | 12600<br>12600       | 13100<br>15700                   |
| 212WI                        | 2.3622<br>(3)          | 4.3307<br>(3)   | 0.8661<br>(59)            | 14 x 5/8            | 1.74        | 11000<br>9810                                     | 16000<br>16000       | 13200<br>15800                   | 10600<br>9400                                     | 15200<br>15200       | 11900<br>14300                   |
| 213WI                        | 2.5591<br>(3)          | 4.7244<br>(3)   | 0.9055<br>(59)            | 14 x 21/32          | 2.2         | 12300<br>11000                                    | 17400<br>17400       | 12100<br>14500                   | 11800<br>10400                                    | 16600<br>16600       | 10900<br>13100                   |
| 214WI                        | 2.7559<br>(3)          | 4.9213<br>(3.5) | 0.9449<br>(59)            | 14 x 11/16          | 2.37        | 13400<br>12100                                    | 18900<br>18900       | 11400<br>13700                   | 12900<br>11500                                    | 18000<br>18000       | 10300<br>12400                   |
| 215WI                        | 2.9528<br>(3)          | 5.1181<br>(3.5) | 0.9843<br>(59)            | 15 x 11/16          | 2.59        | 14600<br>13100                                    | 19800<br>19800       | 10800<br>13000                   | 14000<br>12500                                    | 18800<br>18800       | 9700<br>11600                    |
| 216WI                        | 3.1496<br>(3)          | 5.5118<br>(3.5) | 1.0236<br>(59)            | 15 x 3/4            | 3.19        | 17300<br>15500                                    | 23100<br>23100       | 10100<br>12100                   | 16600<br>14800                                    | 22000<br>22000       | 9100<br>10900                    |
| 217WI                        | 3.3465<br>(3)          | 5.9055<br>(3.5) | 1.1024<br>(79)            | 15 x 13/16          | 4.01        | 20400<br>18200                                    | 26700<br>26700       | 9400<br>11300                    | 19300<br>17300                                    | 25500<br>25500       | 8500<br>10200                    |
| 218WI                        | 3.5433<br>(3)          | 6.2992<br>(4)   | 1.1811<br>(79)            | 14 x 7/8            | 4.84        | 22000<br>19600                                    | 29200<br>29200       | 8900<br>10700                    | 20800<br>18600                                    | 27800<br>27800       | 8000<br>9600                     |
| 219WI                        | 3.7402<br>(3)          | 6.6929<br>(4)   | 1.2598<br>(79)            | 14 x 15/16          | 5.88        | 25000<br>22400                                    | 33100<br>33100       | 8400<br>10100                    | 24000<br>21300                                    | 31500<br>31500       | 7600<br>9100                     |
| 220WI                        | 3.937<br>(3)           | 7.0866<br>(4)   | 1.3386<br>(79)            | 14 x 1              | 7.07        | 28500<br>25400                                    | 37100<br>37100       | 8000<br>9600                     | 27000<br>24200                                    | 35400<br>35400       | 7200<br>8600                     |
| 222WI                        | 4.3307<br>(3)          | 7.874<br>(4.5)  | 1.4961<br>(79)            | 14 x 1 1/8          | 9.89        | 36000<br>31900                                    | 43800<br>43800       | 7200<br>8600                     | 34500<br>30600                                    | 41800<br>41800       | 6500<br>7800                     |
| 224WI                        | 4.7244<br>(3)          | 8.4646<br>(4.5) | 1.5748<br>(79)            | 14 x 1 3/16         | 11.81       | 40500<br>35900                                    | 47200<br>47200       | 6700<br>8000                     | 39000<br>34300                                    | 45100<br>45100       | 6000<br>7200                     |
| 226WI                        | 5.1181<br>(4)          | 9.0551<br>(4.5) | 1.5748<br>(98)            | 17 x 1 3/16         | 14.26       | 50000<br>44400                                    | 53500<br>53500       | 6100<br>7300                     | 47500<br>42500                                    | 51000<br>51000       | 5500<br>6600                     |
| 230WI                        | 5.9055<br>(4)          | 10.6299<br>(5)  | 1.7717<br>(98)            | 15 x 1 1/2          | 22          | 68000<br>61200                                    | 68600<br>68600       | 5300<br>6400                     | 65500<br>58400                                    | 65400<br>65400       | 4800<br>5800                     |

(N<sub>g</sub>) For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |         |               |         | FLOATING                     |          |                   |         | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|------|--------------------------|------|----------------|--------|---------------|---------|------------------------------|---------|---------------|---------|------------------------------|----------|-------------------|---------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |      | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |         | Mounting Fits |         | Housing Bore<br>(Stationary) |          | Housing Clearance |         |                                    |
|                          | Max.                            | Min. | Max.                     | Min. |                |        |               |         | Min.                         | Max.    | Tight         | Loose   | Max.                         | Min.     | Max.              | Min.    |                                    |
| in.                      | in.                             | in.  | in.                      | in.  | in.            | in.    | in.           | in.     | in.                          | in.     | in.           | in.     | in.                          | in.      | in.               | in.     |                                    |
| 0.024                    | 0.60                            | 0.59 | 1.03                     | 1.02 | 0.3935         | 0.3937 | 0.0002        | 0.00015 | 1.1811                       | 1.1813  | 0.000         | 0.0004  | 1.18150                      | 1.18130  | 0.00060           | 0.00020 | 200WI                              |
| 0.024                    | 0.66                            | 0.65 | 1.11                     | 1.10 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 1.2598                       | 1.2600  | 0.000         | 0.00045 | 1.26020                      | 1.26000  | 0.00070           | 0.00020 | 201WI                              |
| 0.024                    | 0.76                            | 0.75 | 1.23                     | 1.22 | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.3780                       | 1.3783  | 0.000         | 0.0005  | 1.37840                      | 1.37820  | 0.00070           | 0.00020 | 202WI                              |
| 0.024                    | 0.86                            | 0.85 | 1.41                     | 1.40 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.5748                       | 1.5751  | 0.000         | 0.0005  | 1.57520                      | 1.57500  | 0.00070           | 0.00020 | 203WI                              |
| 0.039                    | 1.03                            | 1.02 | 1.64                     | 1.63 | 0.7872         | 0.7874 | 0.0002        | 0.0002  | 1.8504                       | 1.8507  | 0.000         | 0.0005  | 1.85090                      | 1.85070  | 0.00080           | 0.00030 | 204WI                              |
| 0.039                    | 1.23                            | 1.22 | 1.86                     | 1.85 | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 2.0472                       | 2.0475  | 0.000         | 0.00055 | 2.04770                      | 2.04750  | 0.00080           | 0.00030 | 205WI                              |
| 0.039                    | 1.45                            | 1.44 | 2.21                     | 2.20 | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 2.4409                       | 2.4412  | 0.000         | 0.0006  | 2.44140                      | 2.44120  | 0.00080           | 0.00030 | 206WI                              |
| 0.039                    | 1.68                            | 1.66 | 2.57                     | 2.55 | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 2.8346                       | 2.8349  | 0.000         | 0.0006  | 2.83510                      | 2.83490  | 0.00080           | 0.00030 | 207WI                              |
| 0.039                    | 1.88                            | 1.86 | 2.88                     | 2.86 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 3.1496                       | 3.1499  | 0.000         | 0.0006  | 3.15010                      | 3.14990  | 0.00080           | 0.00030 | 208WI                              |
| 0.039                    | 2.08                            | 2.06 | 3.08                     | 3.06 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 3.3465                       | 3.3468  | 0.000         | 0.0006  | 3.34710                      | 3.34680  | 0.00090           | 0.00030 | 209WI                              |
| 0.039                    | 2.28                            | 2.26 | 3.28                     | 3.26 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 3.5433                       | 3.5436  | 0.000         | 0.0006  | 3.54390                      | 3.54360  | 0.00090           | 0.00030 | 210WI                              |
| 0.059                    | 2.51                            | 2.49 | 3.63                     | 3.61 | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 3.9370                       | 3.9373  | 0.000         | 0.0006  | 3.93770                      | 3.93740  | 0.00100           | 0.00040 | 211WI                              |
| 0.059                    | 2.75                            | 2.73 | 3.99                     | 3.97 | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 4.3307                       | 4.3310  | 0.000         | 0.0006  | 4.33140                      | 4.33110  | 0.00100           | 0.00040 | 212WI                              |
| 0.059                    | 3.00                            | 2.98 | 4.32                     | 4.30 | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 4.7244                       | 4.7247  | 0.000         | 0.0006  | 4.72510                      | 4.72480  | 0.00100           | 0.00040 | 213WI                              |
| 0.059                    | 3.18                            | 3.16 | 4.56                     | 4.54 | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 4.9213                       | 4.9216  | 0.000         | 0.0007  | 4.92210                      | 4.92170  | 0.00120           | 0.00040 | 214WI                              |
| 0.059                    | 3.39                            | 3.36 | 4.76                     | 4.73 | 2.9526         | 2.9530 | 0.0002        | 0.0005  | 5.1181                       | 5.1185  | 0.000         | 0.0007  | 5.11890                      | 5.11850  | 0.00110           | 0.00040 | 215WI                              |
| 0.079                    | 3.60                            | 3.57 | 5.12                     | 5.09 | 3.1494         | 3.1498 | 0.0002        | 0.0005  | 5.5118                       | 5.5122  | 0.000         | 0.0007  | 5.51260                      | 5.51220  | 0.00110           | 0.00040 | 216WI                              |
| 0.079                    | 3.84                            | 3.81 | 5.47                     | 5.44 | 3.3463         | 3.3467 | 0.0002        | 0.0005  | 5.9055                       | 5.9059  | 0.000         | 0.0007  | 5.90640                      | 5.9060   | 0.00120           | 0.00050 | 217WI                              |
| 0.079                    | 4.08                            | 4.05 | 5.83                     | 5.8  | 3.5431         | 3.5435 | 0.0002        | 0.0005  | 6.2992                       | 6.2996  | 0.000         | 0.0008  | 6.30010                      | 6.29970  | 0.00130           | 0.00050 | 218WI                              |
| 0.079                    | 4.31                            | 4.28 | 6.19                     | 6.16 | 3.7400         | 3.7404 | 0.0002        | 0.0005  | 6.6929                       | 6.6933  | 0.000         | 0.0008  | 6.69380                      | 6.69340  | 0.00130           | 0.00050 | 219WI                              |
| 0.079                    | 4.54                            | 4.51 | 6.54                     | 6.51 | 3.9368         | 3.9372 | 0.0002        | 0.0005  | 7.0866                       | 7.0870  | 0.000         | 0.0008  | 7.08750                      | 7.08710  | 0.00130           | 0.00050 | 220WI                              |
| 0.079                    | 5.01                            | 4.98 | 7.26                     | 7.23 | 4.3305         | 4.3309 | 0.0002        | 0.0005  | 7.8740                       | 7.8745  | 0.000         | 0.0009  | 7.87500                      | 7.87460  | 0.00150           | 0.00060 | 222WI                              |
| 0.079                    | 5.44                            | 5.41 | 7.82                     | 7.79 | 4.7242         | 4.7246 | 0.0002        | 0.0005  | 8.4646                       | 8.4651  | 0.000         | 0.0009  | 8.46560                      | 8.46520  | 0.00150           | 0.00060 | 224WI                              |
| 0.098                    | 5.93                            | 5.9  | 8.31                     | 8.28 | 5.1179         | 5.1183 | 0.0002        | 0.0006  | 9.0551                       | 9.0556  | 0.000         | 0.0009  | 9.05610                      | 9.05570  | 0.00150           | 0.00060 | 226WI                              |
| 0.098                    | 6.8                             | 6.77 | 9.8                      | 9.77 | 5.9053         | 5.9057 | 0.0002        | 0.0006  | 10.6299                      | 10.6304 | 0.000         | 0.0010  | 10.63120                     | 10.63070 | 0.00180           | 0.00080 | 230WI                              |





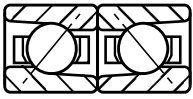


# BALL BEARINGS

## LIGHT 2MM200WI (ISO 02) SERIES

### DUPLEX PERFORMANCE DATA

### MOUNTING ARRANGEMENTS



Suggested  
DB



Tandem  
DT



Special Applications  
DF

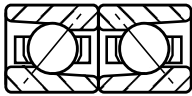
| Bearing Number                                        | PRELOAD |             |      |      | AXIAL STIFFNESS <sup>(1)</sup> |                               |        |        | RADIAL STIFFNESS <sup>(1)</sup> |                               |         | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|-------------------------------------------------------|---------|-------------|------|------|--------------------------------|-------------------------------|--------|--------|---------------------------------|-------------------------------|---------|-------------------------------|-----------------|-----------------|
|                                                       | DUX     | DUL         | DUM  | DUH  | X-light                        | Light                         | Medium | Heavy  | Light                           | Medium                        | Heavy   | X-Light to Light              | Light to Medium | Medium to Heavy |
|                                                       | N       |             |      |      | N/μm                           |                               |        |        | N/μm                            |                               |         | μm                            |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 2MM200WN SERIES</b> |         |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                 |                 |
| 2MM200WI                                              | —       | 20          | 90   | 160  | —                              | 18.54                         | 33.06  | 42.85  | 85.88                           | 136.07                        | 162.13  | —                             | 10.41           | 7.11            |
| 2MM201WI                                              | —       | 20          | 90   | 160  | —                              | 19.24                         | 34.11  | 44.07  | 96.02                           | 153.56                        | 183.30  | —                             | 9.91            | 6.86            |
| 2MM202WI                                              | —       | 20          | 90   | 180  | —                              | 20.64                         | 36.20  | 49.67  | 102.67                          | 164.93                        | 205.51  | —                             | 9.40            | 8.38            |
| 2MM203WI                                              | —       | 40          | 130  | 330  | —                              | 25.54                         | 41.10  | 63.84  | 137.12                          | 197.46                        | 263.05  | —                             | 10.67           | 15.24           |
| 2MM204WI                                              | —       | 70          | 180  | 360  | —                              | 30.08                         | 46.17  | 64.36  | 168.43                          | 232.97                        | 289.81  | —                             | 11.68           | 12.95           |
| 2MM205WI                                              | —       | 90          | 220  | 400  | —                              | 37.60                         | 56.49  | 74.86  | 209.53                          | 283.16                        | 340.88  | —                             | 11.43           | 10.92           |
| 2MM206WI                                              | —       | 90          | 220  | 560  | —                              | 38.30                         | 56.49  | 87.10  | 222.47                          | 303.10                        | 405.77  | —                             | 11.18           | 18.54           |
| 2MM207WI                                              | —       | 130         | 400  | 780  | —                              | 47.22                         | 75.91  | 104.42 | 269.35                          | 388.10                        | 478.70  | —                             | 17.27           | 16.76           |
| 2MM208WI                                              | —       | 130         | 440  | 890  | —                              | 45.30                         | 75.73  | 105.46 | 261.65                          | 392.65                        | 489.20  | —                             | 20.57           | 19.56           |
| 2MM209WI                                              | 110     | 180         | 560  | 1110 | 46.52                          | 56.14                         | 91.82  | 128.20 | 322.87                          | 472.58                        | 588.36  | 5.08                          | 20.32           | 20.32           |
| 2MM210WI                                              | 130     | 220         | 560  | 1220 | 51.60                          | 64.19                         | 95.67  | 139.57 | 366.24                          | 496.89                        | 637.86  | 6.35                          | 16.76           | 22.61           |
| 2MM211WI                                              | 160     | 220         | 780  | 1560 | 54.22                          | 63.31                         | 109.49 | 153.74 | 382.86                          | 582.42                        | 724.61  | 4.83                          | 25.65           | 23.62           |
| 2MM212WI                                              | 180     | 330         | 890  | 1890 | 59.12                          | 77.66                         | 119.11 | 171.40 | 456.31                          | 632.26                        | 802.44  | 9.65                          | 22.61           | 27.69           |
| 2MM213WI                                              | 200     | 440         | 1000 | 2110 | 62.61                          | 88.32                         | 126.28 | 181.20 | 511.76                          | 668.64                        | 846.52  | 13.46                         | 20.83           | 28.96           |
| 2MM214WI                                              | 220     | 440         | 1110 | 2220 | 67.86                          | 89.72                         | 133.97 | 186.97 | 519.80                          | 703.80                        | 876.25  | 11.18                         | 23.88           | 27.69           |
| 2MM215WI                                              | 240     | 560         | 1220 | 2450 | 72.93                          | 102.49                        | 145.34 | 203.06 | 586.96                          | 760.64                        | 946.38  | 14.48                         | 21.59           | 28.19           |
| 2MM216WI                                              | 270     | 670         | 1450 | 2780 | 77.66                          | 113.16                        | 159.16 | 217.75 | 639.96                          | 825.18                        | 1014.59 | 17.02                         | 22.86           | 28.45           |
| 2MM217WI                                              | 290     | 780         | 1670 | 3340 | 80.63                          | 119.28                        | 167.38 | 234.19 | 692.78                          | 890.07                        | 1108.17 | 19.05                         | 24.89           | 33.27           |
| 2MM218WI                                              | 330     | 780         | 1780 | 3560 | 82.55                          | 116.83                        | 168.25 | 235.07 | 678.61                          | 891.47                        | 1109.92 | 18.03                         | 27.94           | 35.31           |
| 2MM219WI                                              | 360     | 890         | 2000 | 4000 | 86.75                          | 126.10                        | 179.97 | 250.98 | 726.88                          | 932.74                        | 1183.02 | 20.07                         | 28.96           | 37.08           |
| 2MM220WI                                              | 380     | 1110        | 2220 | 4450 | 88.85                          | 137.65                        | 187.14 | 261.30 | 795.8                           | 1000.08                       | 1245.99 | 25.91                         | 27.43           | 39.62           |
| 2MM222WI                                              | 440     | 1330        | 2670 | 5340 | 98.64                          | 153.91                        | 208.48 | 289.81 | 881.32                          | 1108.17                       | 1381.36 | 28.19                         | 29.46           | 42.93           |
| 2MM224WI                                              | 490     | 1470        | 2940 | 5870 | 102.84                         | 158.81                        | 215.65 | 300.13 | 926.97                          | 1166.06                       | 1453.59 | 29.46                         | 31.24           | 45.47           |
| 2MM226WI                                              | 560     | 1650        | 3290 | 6580 | 121.21                         | 186.44                        | 252.38 | 350.32 | 1089.45                         | 1372.44                       | 1712.80 | 27.94                         | 29.97           | 43.69           |
| 2MM230WI                                              | 690     | 1890        | 3780 | 7560 | 130.30                         | 192.74                        | 258.85 | 356.10 | 1136.85                         | 1437.33                       | 1797.97 | 29.46                         | 33.53           | 49.28           |
|                                                       |         | <b>lbs.</b> |      |      |                                | <b>10<sup>3</sup>lbs./in.</b> |        |        |                                 | <b>10<sup>3</sup>lbs./in.</b> |         |                               | <b>in.</b>      |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 2MM200WI SERIES</b>   |         |             |      |      |                                |                               |        |        |                                 |                               |         |                               |                 |                 |
| 2MM200WI                                              | —       | 5           | 20   | 35   | —                              | 0.106                         | 0.189  | 0.245  | 0.491                           | 0.778                         | 0.927   | —                             | 0.00041         | 0.00028         |
| 2MM201WI                                              | —       | 5           | 20   | 35   | —                              | 0.110                         | 0.195  | 0.252  | 0.549                           | 0.878                         | 1.048   | —                             | 0.00039         | 0.00027         |
| 2MM202WI                                              | —       | 5           | 20   | 40   | —                              | 0.118                         | 0.207  | 0.284  | 0.587                           | 0.943                         | 1.175   | —                             | 0.00037         | 0.00033         |
| 2MM203WI                                              | —       | 10          | 30   | 75   | —                              | 0.146                         | 0.235  | 0.365  | 0.784                           | 1.129                         | 1.504   | —                             | 0.00042         | 0.0006          |
| 2MM204WI                                              | —       | 15          | 40   | 80   | —                              | 0.172                         | 0.264  | 0.368  | 0.963                           | 1.332                         | 1.657   | —                             | 0.00046         | 0.00051         |
| 2MM205WI                                              | —       | 20          | 50   | 90   | —                              | 0.215                         | 0.323  | 0.428  | 1.198                           | 1.619                         | 1.949   | —                             | 0.00045         | 0.00043         |
| 2MM206WI                                              | —       | 20          | 50   | 125  | —                              | 0.219                         | 0.323  | 0.498  | 1.272                           | 1.733                         | 2.320   | —                             | 0.00044         | 0.00073         |
| 2MM207WI                                              | —       | 30          | 90   | 175  | —                              | 0.270                         | 0.434  | 0.597  | 1.540                           | 2.219                         | 2.737   | —                             | 0.00068         | 0.00066         |
| 2MM208WI                                              | —       | 30          | 100  | 200  | —                              | 0.259                         | 0.433  | 0.603  | 1.496                           | 2.245                         | 2.797   | —                             | 0.00081         | 0.00077         |
| 2MM209WI                                              | 25      | 40          | 125  | 250  | 0.266                          | 0.321                         | 0.525  | 0.733  | 1.846                           | 2.702                         | 3.364   | 0.0002                        | 0.0008          | 0.0008          |
| 2MM210WI                                              | 30      | 50          | 125  | 275  | 0.295                          | 0.367                         | 0.547  | 0.798  | 2.094                           | 2.841                         | 3.647   | 0.00025                       | 0.00066         | 0.00089         |
| 2MM211WI                                              | 35      | 50          | 175  | 350  | 0.310                          | 0.362                         | 0.626  | 0.879  | 2.189                           | 3.330                         | 4.143   | 0.00019                       | 0.00101         | 0.00093         |
| 2MM212WI                                              | 40      | 75          | 200  | 425  | 0.338                          | 0.444                         | 0.681  | 0.980  | 2.609                           | 3.615                         | 4.588   | 0.00038                       | 0.00089         | 0.00109         |
| 2MM213WI                                              | 45      | 100         | 225  | 475  | 0.358                          | 0.505                         | 0.722  | 1.036  | 2.926                           | 3.823                         | 4.840   | 0.00053                       | 0.00082         | 0.00114         |
| 2MM214WI                                              | 50      | 100         | 250  | 500  | 0.388                          | 0.513                         | 0.766  | 1.069  | 2.972                           | 4.024                         | 5.010   | 0.00044                       | 0.00094         | 0.00109         |
| 2MM215WI                                              | 55      | 125         | 275  | 550  | 0.417                          | 0.586                         | 0.831  | 1.161  | 3.356                           | 4.349                         | 5.411   | 0.00057                       | 0.00085         | 0.00111         |
| 2MM216WI                                              | 60      | 150         | 325  | 625  | 0.444                          | 0.647                         | 0.910  | 1.245  | 3.659                           | 4.718                         | 5.801   | 0.00067                       | 0.0009          | 0.00112         |
| 2MM217WI                                              | 65      | 175         | 375  | 750  | 0.461                          | 0.682                         | 0.957  | 1.339  | 3.961                           | 5.089                         | 6.336   | 0.00075                       | 0.00098         | 0.00131         |
| 2MM218WI                                              | 75      | 175         | 400  | 800  | 0.472                          | 0.668                         | 0.962  | 1.344  | 3.880                           | 5.097                         | 6.346   | 0.00071                       | 0.0011          | 0.00139         |
| 2MM219WI                                              | 80      | 200         | 450  | 900  | 0.496                          | 0.721                         | 1.029  | 1.435  | 4.156                           | 5.333                         | 6.764   | 0.00079                       | 0.00114         | 0.00146         |
| 2MM220WI                                              | 85      | 250         | 500  | 1000 | 0.508                          | 0.787                         | 1.070  | 1.494  | 4.550                           | 5.718                         | 7.124   | 0.00102                       | 0.00108         | 0.00156         |
| 2MM222WI                                              | 100     | 300         | 600  | 1200 | 0.564                          | 0.880                         | 1.192  | 1.657  | 5.039                           | 6.336                         | 7.898   | 0.00111                       | 0.00116         | 0.00169         |
| 2MM224WI                                              | 110     | 330         | 660  | 1320 | 0.588                          | 0.908                         | 1.233  | 1.716  | 5.300                           | 6.667                         | 8.311   | 0.00116                       | 0.00123         | 0.00179         |
| 2MM226WI                                              | 125     | 370         | 740  | 1480 | 0.693                          | 1.066                         | 1.443  | 2.003  | 6.229                           | 7.847                         | 9.793   | 0.0011                        | 0.00118         | 0.00172         |
| 2MM230WI                                              | 155     | 425         | 850  | 1700 | 0.745                          | 1.102                         | 1.480  | 2.036  | 6.500                           | 8.218                         | 10.280  | 0.00116                       | 0.00132         | 0.00194         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.

**LIGHT  
3MM200WI  
(ISO 02) SERIES**

**DUPLEX  
PERFORMANCE DATA**

**MOUNTING ARRANGEMENTS**



**Suggested  
DB**



**Tandem  
DT**



**Special Applications  
DF**

| Bearing Number                                        | PRELOAD     |      |      |       | AXIAL STIFFNESS <sup>(1)</sup> |        |        | RADIAL STIFFNESS <sup>(1)</sup> |         |         | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|-------------------------------------------------------|-------------|------|------|-------|--------------------------------|--------|--------|---------------------------------|---------|---------|-------------------------------|-----------------|-----------------|
|                                                       | DUX         | DUL  | DUM  | DUH   | Light                          | Medium | Heavy  | Light                           | Medium  | Heavy   | X-Light to Light              | Light to Medium | Medium to Heavy |
|                                                       | N           |      |      |       | N/μm                           |        |        | N/μm                            |         |         | μm                            |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 3MM200WI SERIES</b> |             |      |      |       |                                |        |        |                                 |         |         |                               |                 |                 |
| 3MM200WI                                              | —           | 40   | 130  | 270   | 39.35                          | 59.99  | 79.75  | 84.65                           | 121.38  | 150.94  | —                             | 7.11            | 7.62            |
| 3MM201WI                                              | —           | 40   | 130  | 270   | 44.77                          | 67.51  | 88.85  | 94.10                           | 135.90  | 169.48  | —                             | 6.35            | 6.86            |
| 3MM202WI                                              | —           | 70   | 180  | 360   | 55.44                          | 80.45  | 106.51 | 115.96                          | 160.21  | 199.39  | —                             | 6.60            | 6.60            |
| 3MM203WI                                              | —           | 90   | 330  | 440   | 63.84                          | 105.99 | 119.28 | 132.92                          | 204.46  | 223.87  | —                             | 11.43           | 4.06            |
| 3MM204WI                                              | —           | 130  | 360  | 560   | 75.21                          | 109.66 | 131.35 | 159.51                          | 220.02  | 253.26  | —                             | 9.65            | 6.60            |
| 3MM205WI                                              | —           | 160  | 400  | 670   | 89.20                          | 128.20 | 157.76 | 189.59                          | 258.50  | 303.98  | —                             | 8.89            | 7.37            |
| 3MM206WI                                              | —           | 220  | 560  | 890   | 106.16                         | 150.76 | 182.42 | 227.02                          | 306.77  | 356.10  | —                             | 10.41           | 7.87            |
| 3MM207WI                                              | 130         | 310  | 780  | 1330  | 126.45                         | 179.62 | 223.52 | 267.42                          | 360.99  | 428.33  | 6.86                          | 12.19           | 12.19           |
| 3MM208WI                                              | 160         | 360  | 890  | 1330  | 132.57                         | 187.84 | 220.90 | 275.64                          | 372.71  | 423.96  | 7.11                          | 13.21           | 8.64            |
| 3MM209WI                                              | 180         | 440  | 1110 | 1780  | 159.86                         | 226.85 | 274.24 | 332.14                          | 448.44  | 520.50  | 7.87                          | 13.72           | 10.67           |
| 3MM210WI                                              | 200         | 490  | 1220 | 2000  | 173.68                         | 246.43 | 300.65 | 360.12                          | 486.22  | 568.25  | 7.62                          | 13.97           | 11.43           |
| 3MM211WI                                              | 220         | 620  | 1560 | 2450  | 193.61                         | 274.94 | 330.21 | 407.34                          | 549.71  | 634.36  | 9.65                          | 15.75           | 11.68           |
| 3MM212WI                                              | 240         | 760  | 1890 | 2890  | 213.73                         | 303.63 | 360.47 | 450.02                          | 607.43  | 695.05  | 11.18                         | 17.53           | 11.94           |
| 3MM213WI                                              | 270         | 850  | 2110 | 3340  | 225.62                         | 320.42 | 385.65 | 474.50                          | 640.48  | 740.18  | 11.94                         | 18.54           | 13.72           |
| 3MM214WI                                              | 290         | 890  | 2220 | 3560  | 231.39                         | 328.46 | 397.37 | 492.87                          | 665.67  | 772.53  | 12.19                         | 19.05           | 14.73           |
| 3MM215WI                                              | 360         | 980  | 2450 | 3780  | 250.28                         | 355.75 | 424.13 | 532.75                          | 719.19  | 825.53  | 11.68                         | 19.30           | 13.72           |
| 3MM216WI                                              | 400         | 1110 | 2780 | 4450  | 269.87                         | 383.03 | 462.79 | 570.35                          | 770.61  | 894.61  | 12.45                         | 20.32           | 15.75           |
| 3MM217WI                                              | 440         | 1200 | 3000 | 4890  | 280.36                         | 397.37 | 483.42 | 600.43                          | 812.41  | 949.18  | 12.45                         | 21.08           | 17.02           |
| 3MM218WI                                              | 490         | 1330 | 3110 | 5560  | 286.14                         | 394.75 | 498.12 | 608.83                          | 805.06  | 968.42  | 13.72                         | 20.83           | 21.84           |
| 3MM219WI                                              | 560         | 1560 | 3110 | 6230  | 310.27                         | 402.97 | 531.00 | 655.70                          | 824.65  | 1029.29 | 15.24                         | 17.27           | 26.67           |
| 3MM220WI                                              | 600         | 1730 | 3470 | 6940  | 328.29                         | 426.41 | 561.60 | 694.18                          | 873.45  | 1090.50 | 16.26                         | 18.29           | 27.94           |
| 3MM222WI                                              | 690         | 2050 | 4082 | 8180  | 359.94                         | 466.81 | 613.90 | 762.39                          | 960.03  | 1199.46 | 17.78                         | 19.81           | 30.23           |
| 3MM224WI                                              | 820         | 2250 | 4480 | 8980  | 377.78                         | 490.07 | 643.98 | 805.76                          | 1014.77 | 1267.85 | 17.53                         | 20.57           | 31.50           |
| 3MM226WI                                              | 980         | 2560 | 5120 | 10230 | 448.09                         | 580.49 | 761.86 | 954.08                          | 1190.72 | 1503.97 | 16.51                         | 19.81           | 30.48           |
| 3MM230WI                                              | 1290        | 3110 | 6230 | 12450 | 473.63                         | 612.32 | 801.04 | 1009.87                         | 1276.25 | 1598.24 | 17.53                         | 22.86           | 35.05           |
|                                                       | <b>lbs.</b> |      |      |       | <b>10<sup>6</sup>lbs./in.</b>  |        |        | <b>10<sup>6</sup>lbs./in.</b>   |         |         | <b>in.</b>                    |                 |                 |
| <b>INCH DUPLEX PERFORMANCE DATA 3MM200WI SERIES</b>   |             |      |      |       |                                |        |        |                                 |         |         |                               |                 |                 |
| 3MM200WI                                              | —           | 10   | 30   | 60    | 0.225                          | 0.343  | 0.456  | 0.484                           | 0.694   | 0.863   | —                             | 0.00028         | 0.00030         |
| 3MM201WI                                              | —           | 10   | 30   | 60    | 0.256                          | 0.386  | 0.508  | 0.538                           | 0.777   | 0.969   | —                             | 0.00025         | 0.00027         |
| 3MM202WI                                              | —           | 15   | 40   | 80    | 0.317                          | 0.460  | 0.609  | 0.663                           | 0.916   | 1.140   | —                             | 0.00026         | 0.00026         |
| 3MM203WI                                              | —           | 20   | 75   | 100   | 0.365                          | 0.606  | 0.682  | 0.76                            | 1.169   | 1.280   | —                             | 0.00045         | 0.00016         |
| 3MM204WI                                              | —           | 30   | 80   | 125   | 0.430                          | 0.627  | 0.751  | 0.912                           | 1.258   | 1.448   | —                             | 0.00038         | 0.00026         |
| 3MM205WI                                              | —           | 35   | 90   | 150   | 0.510                          | 0.733  | 0.902  | 1.084                           | 1.478   | 1.738   | —                             | 0.00035         | 0.00029         |
| 3MM206WI                                              | —           | 50   | 125  | 200   | 0.607                          | 0.862  | 1.043  | 1.298                           | 1.754   | 2.036   | —                             | 0.00041         | 0.00031         |
| 3MM207WI                                              | 30          | 70   | 175  | 300   | 0.723                          | 1.027  | 1.278  | 1.529                           | 2.064   | 2.449   | 0.00027                       | 0.00048         | 0.00048         |
| 3MM208WI                                              | 35          | 80   | 200  | 300   | 0.758                          | 1.074  | 1.263  | 1.576                           | 2.131   | 2.424   | 0.00028                       | 0.00052         | 0.00034         |
| 3MM209WI                                              | 40          | 100  | 250  | 400   | 0.914                          | 1.297  | 1.568  | 1.899                           | 2.564   | 2.976   | 0.00031                       | 0.00054         | 0.00042         |
| 3MM210WI                                              | 45          | 110  | 275  | 450   | 0.993                          | 1.409  | 1.719  | 2.059                           | 2.780   | 3.249   | 0.00030                       | 0.00055         | 0.00045         |
| 3MM211WI                                              | 50          | 140  | 350  | 550   | 1.107                          | 1.572  | 1.888  | 2.329                           | 3.143   | 3.627   | 0.00038                       | 0.00062         | 0.00046         |
| 3MM212WI                                              | 55          | 170  | 425  | 650   | 1.222                          | 1.736  | 2.061  | 2.573                           | 3.473   | 3.974   | 0.00044                       | 0.00069         | 0.00047         |
| 3MM213WI                                              | 60          | 190  | 475  | 750   | 1.290                          | 1.832  | 2.205  | 2.713                           | 3.662   | 4.232   | 0.00047                       | 0.00073         | 0.00054         |
| 3MM214WI                                              | 65          | 200  | 500  | 800   | 1.323                          | 1.878  | 2.272  | 2.818                           | 3.806   | 4.417   | 0.00048                       | 0.00075         | 0.00058         |
| 3MM215WI                                              | 80          | 220  | 550  | 850   | 1.431                          | 2.034  | 2.425  | 3.046                           | 4.112   | 4.720   | 0.00046                       | 0.00076         | 0.00054         |
| 3MM216WI                                              | 90          | 250  | 625  | 1000  | 1.543                          | 2.190  | 2.646  | 3.261                           | 4.406   | 5.115   | 0.00049                       | 0.00080         | 0.00062         |
| 3MM217WI                                              | 100         | 270  | 675  | 1100  | 1.603                          | 2.272  | 2.764  | 3.433                           | 4.645   | 5.427   | 0.00049                       | 0.00083         | 0.00067         |
| 3MM218WI                                              | 110         | 300  | 700  | 1250  | 1.636                          | 2.257  | 2.848  | 3.481                           | 4.603   | 5.537   | 0.00054                       | 0.00082         | 0.00086         |
| 3MM219WI                                              | 125         | 350  | 700  | 1400  | 1.774                          | 2.304  | 3.036  | 3.749                           | 4.715   | 5.885   | 0.00060                       | 0.00068         | 0.00105         |
| 3MM220WI                                              | 135         | 390  | 780  | 1560  | 1.877                          | 2.438  | 3.211  | 3.969                           | 4.994   | 6.235   | 0.00064                       | 0.00072         | 0.00110         |
| 3MM222WI                                              | 155         | 460  | 920  | 1840  | 2.058                          | 2.669  | 3.510  | 4.359                           | 5.489   | 6.858   | 0.00070                       | 0.00078         | 0.00119         |
| 3MM224WI                                              | 185         | 505  | 1010 | 2020  | 2.160                          | 2.802  | 3.682  | 4.607                           | 5.802   | 7.249   | 0.00069                       | 0.00081         | 0.00124         |
| 3MM226WI                                              | 220         | 575  | 1150 | 2300  | 2.562                          | 3.319  | 4.356  | 5.455                           | 6.808   | 8.599   | 0.00065                       | 0.00078         | 0.00120         |
| 3MM230WI                                              | 290         | 700  | 1400 | 2800  | 2.708                          | 3.501  | 4.580  | 5.774                           | 7.297   | 9.138   | 0.00069                       | 0.00090         | 0.00138         |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.



# BALL BEARINGS

## LIGHT 2MM200WI (ISO 02) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |        | Kluber Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |       |         |       |
|----------------|-----------------|--------|----------------|-------|--------------------------------------------------------------|------------|-------|-------|---------|-------|
|                | NBU15           |        | NBU15          |       | DUL                                                          | Grease DUM | DUH   | DUL   | Oil DUM | DUH   |
|                | 25%             | 40%    | 15%            | 20%   |                                                              |            |       |       |         |       |
| 2MM200WI       | 0.30            | 0.50   | 0.20           | 0.27  | 50200                                                        | 37700      | 25100 | 85300 | 64100   | 42700 |
| 2MM201WI       | 0.40            | 0.60   | 0.25           | 0.33  | 45400                                                        | 34000      | 22200 | 79100 | 57800   | 39400 |
| 2MM202WI       | 0.50            | 0.80   | 0.32           | 0.43  | 38200                                                        | 28700      | 19100 | 66300 | 48800   | 33200 |
| 2MM203WI       | 0.70            | 1.10   | 0.45           | 0.59  | 33500                                                        | 25100      | 16500 | 58100 | 42700   | 29100 |
| 2MM204WI       | 1.10            | 1.70   | 0.72           | 0.96  | 28600                                                        | 21400      | 14300 | 48600 | 36400   | 24300 |
| 2MM205WI       | 1.30            | 2.10   | 0.88           | 1.18  | 23800                                                        | 17900      | 11900 | 40500 | 30400   | 20200 |
| 2MM206WI       | 2.00            | 3.10   | 1.31           | 1.74  | 20000                                                        | 15100      | 10000 | 34200 | 25600   | 17000 |
| 2MM207WI       | 2.70            | 4.40   | 1.82           | 2.43  | 17300                                                        | 13,000     | 8600  | 29400 | 22000   | 14600 |
| 2MM208WI       | 3.70            | 6.00   | 2.49           | 3.32  | 15400                                                        | 11600      | 7700  | 26200 | 19700   | 13100 |
| 2MM209WI       | 4.20            | 6.60   | 2.77           | 3.70  | 14000                                                        | 10500      | 7000  | 22800 | 17900   | 11900 |
| 2MM210WI       | 4.80            | 7.60   | 3.20           | 4.30  | 12500                                                        | 9600       | 6400  | 21800 | 16300   | 10900 |
| 2MM211WI       | 6.10            | 9.70   | 4.10           | 5.40  | 11600                                                        | 8700       | 5800  | 19700 | 14800   | 9900  |
| 2MM212WI       | 7.50            | 12.00  | 5.00           | 6.70  | 10600                                                        | 7920       | 5300  | 18000 | 13500   | 9000  |
| 2MM213WI       | 9.20            | 14.60  | 6.10           | 8.10  | 9700                                                         | 7260       | 4800  | 16500 | 12300   | 8200  |
| 2MM214WI       | 10.60           | 16.90  | 7.00           | 9.40  | 9100                                                         | 6840       | 4600  | 15500 | 11600   | 7800  |
| 2MM215WI       | 11.60           | 18.60  | 7.80           | 10.30 | 8600                                                         | 6480       | 4300  | 14600 | 11020   | 7300  |
| 2MM216WI       | 13.70           | 22.00  | 9.20           | 12.20 | 8100                                                         | 6060       | 4000  | 13800 | 10300   | 6800  |
| 2MM217WI       | 16.90           | 27.10  | 11.30          | 15.10 | 7500                                                         | 5640       | 3800  | 12800 | 9590    | 6500  |
| 2MM218WI       | 21.50           | 34.40  | 14.40          | 19.10 | 7100                                                         | 5340       | 3600  | 12100 | 9080    | 6100  |
| 2MM219WI       | 25.80           | 41.40  | 17.30          | 23.00 | 6700                                                         | 5040       | 3400  | 11400 | 8570    | 5800  |
| 2MM220WI       | 30.70           | 49.10  | 20.50          | 27.30 | 6400                                                         | 4800       | 3200  | 10900 | 8160    | 5400  |
| 2MM222WI       | 42.30           | 67.60  | 28.20          | 37.60 | 5800                                                         | 4320       | 2900  | 9900  | 7340    | 4900  |
| 2MM224WI       | 51.40           | 82.30  | 34.30          | 45.80 | 5400                                                         | 4020       | 2700  | 9200  | 6830    | 4600  |
| 2MM226WI       | 50.80           | 81.30  | 33.90          | 45.20 | 4900                                                         | 3660       | 2400  | 8300  | 6220    | 4100  |
| 2MM230WI       | 82.40           | 131.90 | 55.00          | 73.40 | 4200                                                         | 3180       | 2160  | 7100  | 5410    | 3600  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.

D

## LIGHT 3MM200WI (ISO 02) SERIES

### SPEED CAPABILITY DATA

| Bearing Number | Grease Capacity |        | Kluber Isoflex |       | Operating Speeds <sup>(2)</sup> (DB Mounting) <sup>(1)</sup> |            |       |       |         |       |
|----------------|-----------------|--------|----------------|-------|--------------------------------------------------------------|------------|-------|-------|---------|-------|
|                | NBU15           |        | NBU15          |       | DUL                                                          | Grease DUM | DUH   | DUL   | Oil DUM | DUH   |
|                | 25%             | 40%    | 15%            | 20%   |                                                              |            |       |       |         |       |
| 3MM200WI       | 0.30            | 0.50   | 0.20           | 0.27  | 45180                                                        | 33930      | 22590 | 76770 | 57690   | 38430 |
| 3MM201WI       | 0.40            | 0.60   | 0.25           | 0.33  | 40860                                                        | 30600      | 19980 | 71190 | 52020   | 35460 |
| 3MM202WI       | 0.50            | 0.80   | 0.32           | 0.43  | 34380                                                        | 25830      | 17190 | 59670 | 43920   | 29880 |
| 3MM203WI       | 0.70            | 1.10   | 0.45           | 0.59  | 30150                                                        | 22590      | 14850 | 52290 | 38430   | 26190 |
| 3MM204WI       | 1.10            | 1.70   | 0.72           | 0.96  | 25740                                                        | 19260      | 12870 | 43740 | 32760   | 21870 |
| 3MM205WI       | 1.30            | 2.10   | 0.88           | 1.18  | 21420                                                        | 16110      | 10710 | 36450 | 27360   | 18180 |
| 3MM206WI       | 2.00            | 3.10   | 1.31           | 1.74  | 18000                                                        | 13590      | 9000  | 30780 | 23040   | 15300 |
| 3MM207WI       | 2.70            | 4.40   | 1.82           | 2.43  | 15570                                                        | 11700      | 7740  | 26460 | 19800   | 13140 |
| 3MM208WI       | 3.70            | 6.00   | 2.49           | 3.32  | 13860                                                        | 10440      | 6930  | 23580 | 17730   | 11790 |
| 3MM209WI       | 4.20            | 6.60   | 2.77           | 3.70  | 12600                                                        | 9450       | 6300  | 20520 | 16110   | 10710 |
| 3MM210WI       | 4.80            | 7.60   | 3.20           | 4.30  | 11250                                                        | 8640       | 5760  | 19620 | 14670   | 9810  |
| 3MM211WI       | 6.10            | 9.70   | 4.10           | 5.40  | 10440                                                        | 7830       | 5220  | 17730 | 13320   | 8910  |
| 3MM212WI       | 7.50            | 12.00  | 5.00           | 6.70  | 9540                                                         | 7128       | 4770  | 16200 | 12150   | 8100  |
| 3MM213WI       | 9.20            | 14.60  | 6.10           | 8.10  | 8730                                                         | 6534       | 4320  | 14850 | 11070   | 7380  |
| 3MM214WI       | 10.60           | 16.90  | 7.00           | 9.40  | 8190                                                         | 6156       | 4140  | 13950 | 10440   | 7020  |
| 3MM215WI       | 11.60           | 18.60  | 7.80           | 10.30 | 7740                                                         | 5832       | 3870  | 13140 | 9918    | 6570  |
| 3MM216WI       | 13.70           | 22.00  | 9.20           | 12.20 | 7290                                                         | 5454       | 3600  | 12420 | 9270    | 6120  |
| 3MM217WI       | 16.90           | 27.10  | 11.30          | 15.10 | 6750                                                         | 5076       | 3420  | 11520 | 8631    | 5850  |
| 3MM218WI       | 21.50           | 34.40  | 14.40          | 19.10 | 6390                                                         | 4806       | 3240  | 10890 | 8172    | 5490  |
| 3MM219WI       | 25.80           | 41.40  | 17.30          | 23.00 | 6030                                                         | 4536       | 3060  | 10260 | 7713    | 5220  |
| 3MM220WI       | 30.70           | 49.10  | 20.50          | 27.30 | 5760                                                         | 4320       | 2880  | 9810  | 7344    | 4860  |
| 3MM222WI       | 42.30           | 67.60  | 28.20          | 37.60 | 5220                                                         | 3888       | 2610  | 8910  | 6606    | 4410  |
| 3MM224WI       | 51.40           | 82.30  | 34.30          | 45.80 | 4860                                                         | 3618       | 2430  | 8280  | 6147    | 4140  |
| 3MM226WI       | 50.80           | 81.30  | 33.90          | 45.20 | 4410                                                         | 3294       | 2160  | 7470  | 5598    | 3690  |
| 3MM230WI       | 82.40           | 131.90 | 55.00          | 73.40 | 3780                                                         | 2862       | 1944  | 6390  | 4869    | 3240  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.

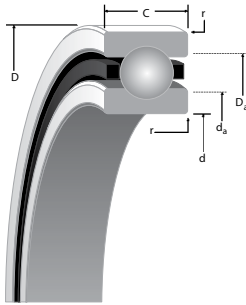




## BALL BEARINGS

### LIGHT MM200K (ISO 02) SERIES

#### DIMENSIONAL SIZES METRIC



#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### CONRAD CONSTRUCTION:

- Maximum complement of balls separated by two-piece land piloted cage.

| Bearing Number | d Bore             | D O.D.     | C Width <sup>(1)</sup> | Ball Qty. x Dia. | Wt. kg | LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                |
|----------------|--------------------|------------|------------------------|------------------|--------|---------------------------------------------|----------------------|--------------------------------|
|                |                    |            |                        |                  |        | C <sub>0</sub> (stat)                       | C <sub>e</sub> (dyn) | Limiting Speed <sup>(Ng)</sup> |
| METRIC         | mm/tol: +0; - (µm) |            |                        | mm               | kg     | N                                           | RPM                  |                                |
| MM201K         | 12<br>(4)          | 32<br>(6)  | 10<br>(80)             | 7 x 5.95         | 0.035  | 3000<br>2710                                | 7550<br>7550         | 52200<br>62600                 |
| MM202K         | 15<br>(4)          | 35<br>(6)  | 11<br>(80)             | 8 x 5.95         | 0.043  | 3700<br>3290                                | 8450<br>8450         | 44000<br>52800                 |
| MM203K         | 17<br>(4)          | 40<br>(6)  | 12<br>(80)             | 8 x 6.75         | 0.062  | 4700<br>4230                                | 10600<br>10600       | 38500<br>46200                 |
| MM204K         | 20<br>(5)          | 47<br>(6)  | 14<br>(130)            | 8 x 7.94         | 0.1    | 6500<br>5860                                | 14200<br>14200       | 32800<br>39400                 |
| MM205K         | 25<br>(5)          | 52<br>(7)  | 15<br>(130)            | 9 x 7.94         | 0.122  | 7800<br>6980                                | 15500<br>15500       | 27400<br>32900                 |
| MM206K         | 30<br>(5)          | 62<br>(7)  | 16<br>(130)            | 9 x 9.53         | 0.185  | 11300<br>10000                              | 21600<br>21600       | 23000<br>27600                 |
| MM207K         | 35<br>(6)          | 72<br>(7)  | 17<br>(130)            | 9 x 11.11        | 0.267  | 15300<br>13600                              | 28500<br>28500       | 19800<br>23800                 |
| MM208K         | 40<br>(6)          | 80<br>(7)  | 18<br>(130)            | 9 x 12.70        | 0.337  | 20000<br>17700                              | 36200<br>36200       | 17700<br>21200                 |
| MM209K         | 45<br>(6)          | 85<br>(8)  | 19<br>(130)            | 9 x 12.70        | 0.377  | 20200<br>18200                              | 36300<br>36300       | 16000<br>19200                 |
| MM210K         | 50<br>(6)          | 90<br>(8)  | 20<br>(130)            | 10 x 12.70       | 0.425  | 23100<br>20600                              | 38900<br>38900       | 14600<br>17500                 |
| MM211K         | 55<br>(7)          | 100<br>(8) | 21<br>(150)            | 10 x 14.29       | 0.564  | 29100<br>26000                              | 48100<br>48100       | 13300<br>16000                 |
| MM212K         | 60<br>(7)          | 110<br>(8) | 22<br>(150)            | 10 x 15.88       | 0.727  | 36300<br>32000                              | 58200<br>58200       | 12100<br>14500                 |
| MM213K         | 65<br>(7)          | 120<br>(8) | 23<br>(150)            | 10 x 16.67       | 0.928  | 40000<br>35600                              | 63400<br>63400       | 11100<br>13300                 |
| MM214K         | 70<br>(7)          | 125<br>(9) | 24<br>(150)            | 10 x 17.46       | 0.994  | 43600<br>39200                              | 69000<br>69000       | 10500<br>12600                 |
| MM215K         | 75<br>(7)          | 130<br>(9) | 25<br>(150)            | 10 x 17.46       | 1.074  | 44500<br>39900                              | 68900<br>68900       | 9900<br>11900                  |
| MM216K         | 80<br>(7)          | 140<br>(9) | 26<br>(150)            | 10 x 19.05       | 1.317  | 53400<br>47200                              | 80600<br>80600       | 9200<br>11000                  |

<sup>(Ng)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |       | Shaft Diameter |        | Mounting Fits |       | FIXED                        |         |               |       | FLOATING                     |         |                   |       |        |
|--------------------------|---------------------------------|------|--------------------------|-------|----------------|--------|---------------|-------|------------------------------|---------|---------------|-------|------------------------------|---------|-------------------|-------|--------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |       | Min.           | Max.   | Loose         | Tight | Housing Bore<br>(Stationary) |         | Mounting Fits |       | Housing Bore<br>(Stationary) |         | Housing Clearance |       |        |
|                          | Max.                            | Min. | Max.                     | Min.  |                |        |               |       | Min.                         | Max.    | Tight         | Loose | Max.                         | Min.    | Max.              | Min.  |        |
| mm                       | mm                              | mm   | mm                       | mm    | mm             | mm     | in.           | in.   | in.                          | in.     | in.           | in.   | in.                          | in.     | in.               | in.   |        |
| 0.6                      | 16.6                            | 16.4 | 28.1                     | 27.8  | 11.9950        | 12.000 | 0.005         | 0.004 | 32                           | 32.005  | 0.000         | 0.011 | 32.010                       | 32.005  | 0.016             | 0.005 | MM201K |
| 0.6                      | 19.2                            | 18.9 | 31.1                     | 30.9  | 14.9950        | 15.000 | 0.005         | 0.004 | 35                           | 35.006  | 0.000         | 0.012 | 35.010                       | 35.005  | 0.016             | 0.005 | MM202K |
| 0.6                      | 21.7                            | 21.5 | 35.7                     | 35.4  | 16.9950        | 17.000 | 0.005         | 0.004 | 40                           | 40.006  | 0.000         | 0.012 | 40.010                       | 40.005  | 0.016             | 0.005 | MM203K |
| 1                        | 26                              | 25.8 | 41.5                     | 41.3  | 19.9950        | 20.000 | 0.005         | 0.005 | 47                           | 47.006  | 0.000         | 0.012 | 47.012                       | 47.007  | 0.018             | 0.007 | MM204K |
| 1                        | 31.1                            | 30.9 | 47.1                     | 46.9  | 24.9950        | 25.000 | 0.005         | 0.005 | 52                           | 52.006  | 0.000         | 0.013 | 52.012                       | 52.007  | 0.019             | 0.007 | MM205K |
| 1                        | 36.7                            | 36.5 | 56                       | 55.8  | 29.9950        | 30.000 | 0.005         | 0.005 | 62                           | 62.008  | 0.000         | 0.015 | 62.012                       | 62.007  | 0.019             | 0.007 | MM206K |
| 1                        | 42.7                            | 42.2 | 65.3                     | 64.8  | 34.9950        | 35.000 | 0.005         | 0.006 | 72                           | 72.008  | 0.000         | 0.015 | 72.011                       | 72.007  | 0.019             | 0.007 | MM207K |
| 1                        | 47.8                            | 47.2 | 73.2                     | 72.6  | 39.9950        | 40.000 | 0.005         | 0.006 | 80                           | 80.008  | 0.000         | 0.015 | 80.012                       | 80.008  | 0.020             | 0.008 | MM208K |
| 1                        | 52.8                            | 52.3 | 78.2                     | 77.7  | 44.9950        | 45.000 | 0.005         | 0.006 | 85                           | 85.008  | 0.000         | 0.016 | 85.016                       | 85.009  | 0.024             | 0.009 | MM209K |
| 1                        | 57.9                            | 57.4 | 83.3                     | 82.8  | 49.9950        | 50.000 | 0.005         | 0.006 | 90                           | 90.008  | 0.000         | 0.016 | 90.015                       | 90.007  | 0.023             | 0.007 | MM210K |
| 1.5                      | 63.8                            | 63.3 | 92.2                     | 91.7  | 54.9950        | 55.000 | 0.005         | 0.007 | 100                          | 100.008 | 0.000         | 0.016 | 100.018                      | 100.010 | 0.025             | 0.010 | MM211K |
| 1.5                      | 69.9                            | 69.3 | 101.4                    | 100.8 | 59.9950        | 60.000 | 0.005         | 0.007 | 110                          | 110.008 | 0.000         | 0.016 | 110.018                      | 110.010 | 0.025             | 0.010 | MM212K |
| 1.5                      | 76.2                            | 75.7 | 109.7                    | 109.2 | 64.9950        | 65.000 | 0.005         | 0.007 | 120                          | 120.008 | 0.000         | 0.016 | 120.018                      | 120.010 | 0.025             | 0.010 | MM213K |
| 1.5                      | 80.8                            | 80.3 | 115.8                    | 115.3 | 69.9950        | 70.000 | 0.005         | 0.007 | 125                          | 125.008 | 0.000         | 0.017 | 125.021                      | 125.011 | 0.030             | 0.011 | MM214K |
| 1.5                      | 86                              | 85.2 | 120.8                    | 120   | 74.9950        | 75.005 | 0.005         | 0.012 | 130                          | 130.009 | 0.000         | 0.018 | 130.020                      | 130.010 | 0.029             | 0.010 | MM215K |
| 2                        | 91.3                            | 90.6 | 129.9                    | 129.2 | 79.9950        | 80.005 | 0.005         | 0.012 | 140                          | 140.009 | 0.000         | 0.018 | 140.020                      | 140.010 | 0.029             | 0.010 | MM216K |

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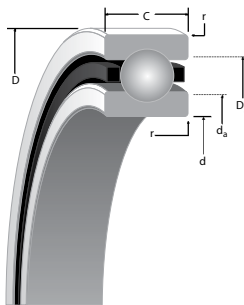




## BALL BEARINGS

### LIGHT MM200K (ISO 02) SERIES

#### DIMENSIONAL SIZES INCHES



#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### CONRAD CONSTRUCTION:

- Maximum complement of balls separated by two-piece land piloted cage.

| Bearing Number | d<br>Bore               | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.  | LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           |
|----------------|-------------------------|-----------------|---------------------------|---------------------|------|---------------------------------------------|----------------------|-------------------------------------------|
|                |                         |                 |                           |                     |      | C <sub>0</sub> (stat)                       | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>9</sub>)</sup> |
| INCH           | in./tol: +0; -0.000(μm) |                 |                           | in.                 | lbs. | lbs.                                        | RPM                  |                                           |
| MM201K         | 0.4724<br>(1.5)         | 1.2598<br>(2.5) | 0.394<br>(31)             | 7 x 15/64           | 0.08 | 680<br>610                                  | 1700<br>1700         | 52200<br>62600                            |
| MM202K         | 0.5906<br>(1.5)         | 1.378<br>(2.5)  | 0.4331<br>(31)            | 8 x 15/64           | 0.09 | 830<br>740                                  | 1900<br>1900         | 44000<br>52800                            |
| MM203K         | 0.6693<br>(1.5)         | 1.5748<br>(2.5) | 0.4724<br>(31)            | 8 x 17/64           | 0.14 | 1060<br>950                                 | 2380<br>2380         | 38500<br>46200                            |
| MM204K         | 0.7874<br>(2)           | 1.8504<br>(2.5) | 0.5512<br>(47)            | 8 x 5/16            | 0.22 | 1460<br>1320                                | 3190<br>3190         | 32800<br>39400                            |
| MM205K         | 0.9843<br>(2)           | 2.0472<br>(3)   | 0.5906<br>(47)            | 9 x 5/16            | 0.27 | 1760<br>1570                                | 3490<br>3490         | 27400<br>32900                            |
| MM206K         | 1.1811<br>(2)           | 2.4409<br>(3)   | 0.6299<br>(47)            | 9 x 3/8             | 0.41 | 2550<br>2.25                                | 4850<br>4850         | 23000<br>27600                            |
| MM207K         | 1.378<br>(2.5)          | 2.8346<br>(3)   | 0.6693<br>(47)            | 9 x 7/16            | 0.59 | 3450<br>3060                                | 6400<br>6400         | 19800<br>23800                            |
| MM208K         | 1.5748<br>(2.5)         | 3.1496<br>(3)   | 0.7087<br>(47)            | 9 x 1/2             | 0.74 | 4500<br>3970                                | 8130<br>8130         | 17700<br>21200                            |
| MM209K         | 1.7717<br>(2.5)         | 3.3465<br>(3)   | 0.748<br>(47)             | 9 x 1/2             | 0.83 | 4550<br>4090                                | 8160<br>8160         | 16000<br>19200                            |
| MM210K         | 1.9685<br>(2.5)         | 3.5433<br>(3)   | 0.7874<br>(47)            | 10 x 1/2            | 0.94 | 5200<br>4640                                | 8740<br>8740         | 14600<br>17500                            |
| MM211K         | 2.1654<br>(3)           | 3.937<br>(3)    | 0.8268<br>(59)            | 10 x 9/16           | 1.24 | 6550<br>5850                                | 10800<br>10800       | 13300<br>16000                            |
| MM212K         | 2.3622<br>(3)           | 4.3307<br>(3)   | 0.8661<br>(59)            | 10 x 5/8            | 1.60 | 8150<br>7190                                | 13100<br>13100       | 12100<br>14500                            |
| MM213K         | 2.5591<br>(3)           | 4.7244<br>(3)   | 0.9055<br>(59)            | 10 x 21/32          | 2.05 | 9000<br>8000                                | 14300<br>14300       | 11100<br>13300                            |
| MM214K         | 2.7559<br>(3)           | 4.9213<br>(3.5) | 0.9449<br>(59)            | 10 x 11/16          | 2.19 | 9800<br>8800                                | 15500<br>15500       | 10500<br>12600                            |
| MM215K         | 2.9528<br>(3)           | 5.1181<br>(3.5) | 0.9843<br>(59)            | 10 x 11/16          | 2.37 | 10000<br>8960                               | 15500<br>15500       | 9900<br>11900                             |
| MM216K         | 3.1496<br>(3)           | 5.5118<br>(3.5) | 1.0236<br>(59)            | 10 x 3/4            | 2.9  | 12000<br>10600                              | 18100<br>18100       | 9200<br>11000                             |

<sup>(N<sub>9</sub>)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |        |               |         | FLOATING                     |         |                   |         |        |
|--------------------------|---------------------------------|------|--------------------------|------|----------------|--------|---------------|---------|------------------------------|--------|---------------|---------|------------------------------|---------|-------------------|---------|--------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |      | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |        | Mounting Fits |         | Housing Bore<br>(Stationary) |         | Housing Clearance |         |        |
|                          | Max.                            | Min. | Max.                     | Min. |                |        |               |         | Min.                         | Max.   | Tight         | Loose   | Max.                         | Min.    | Max.              | Min.    |        |
| in.                      | in.                             | in.  | in.                      | in.  | in.            | in.    | in.           | in.     | in.                          | in.    | in.           | in.     | in.                          | in.     | in.               | in.     |        |
| 0.024                    | 0.66                            | 0.65 | 1.11                     | 1.10 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 1.2598                       | 1.2600 | 0.000         | 0.00045 | 1.26020                      | 1.26000 | 0.00070           | 0.00020 | MM201K |
| 0.024                    | 0.76                            | 0.75 | 1.23                     | 1.22 | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.3780                       | 1.3783 | 0.000         | 0.0005  | 1.37840                      | 1.37820 | 0.00070           | 0.00020 | MM202K |
| 0.024                    | 0.86                            | 0.85 | 1.41                     | 1.40 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.5748                       | 1.5751 | 0.000         | 0.0005  | 1.57520                      | 1.57500 | 0.00070           | 0.00020 | MM203K |
| 0.039                    | 1.03                            | 1.02 | 1.64                     | 1.63 | 0.7872         | 0.7874 | 0.0002        | 0.0002  | 1.8504                       | 1.8507 | 0.000         | 0.0005  | 1.85090                      | 1.85070 | 0.00080           | 0.00030 | MM204K |
| 0.039                    | 1.23                            | 1.22 | 1.86                     | 1.85 | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 2.0472                       | 2.0475 | 0.000         | 0.00055 | 2.04770                      | 2.04750 | 0.00080           | 0.00030 | MM205K |
| 0.039                    | 1.45                            | 1.44 | 2.21                     | 2.20 | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 2.4409                       | 2.4412 | 0.000         | 0.0006  | 2.44140                      | 2.44120 | 0.00080           | 0.00030 | MM206K |
| 0.039                    | 1.68                            | 1.66 | 2.57                     | 2.55 | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 2.8346                       | 2.8349 | 0.000         | 0.0006  | 2.83510                      | 2.83490 | 0.00080           | 0.00030 | MM207K |
| 0.039                    | 1.88                            | 1.86 | 2.88                     | 2.86 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 3.1496                       | 3.1499 | 0.000         | 0.0006  | 3.15010                      | 3.14990 | 0.00080           | 0.00030 | MM208K |
| 0.039                    | 2.08                            | 2.06 | 3.08                     | 3.06 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 3.3465                       | 3.3468 | 0.000         | 0.0006  | 3.34710                      | 3.34680 | 0.00090           | 0.00030 | MM209K |
| 0.039                    | 2.28                            | 2.26 | 3.28                     | 3.26 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 3.5433                       | 3.5436 | 0.000         | 0.0006  | 3.54390                      | 3.54360 | 0.00090           | 0.00030 | MM210K |
| 0.059                    | 2.51                            | 2.49 | 3.63                     | 3.61 | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 3.9370                       | 3.9373 | 0.000         | 0.0006  | 3.93770                      | 3.93740 | 0.00100           | 0.00040 | MM211K |
| 0.059                    | 2.75                            | 2.73 | 3.99                     | 3.97 | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 4.3307                       | 4.3310 | 0.000         | 0.0006  | 4.33140                      | 4.33110 | 0.00100           | 0.00040 | MM212K |
| 0.059                    | 3.00                            | 2.98 | 4.32                     | 4.30 | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 4.7244                       | 4.7247 | 0.000         | 0.0006  | 4.72510                      | 4.72480 | 0.00100           | 0.00040 | MM213K |
| 0.059                    | 3.18                            | 3.16 | 4.56                     | 4.54 | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 4.9213                       | 4.9216 | 0.000         | 0.0007  | 4.92210                      | 4.92170 | 0.00120           | 0.00040 | MM214K |
| 0.059                    | 3.39                            | 3.36 | 4.76                     | 4.73 | 2.9526         | 2.9530 | 0.0002        | 0.0005  | 5.1181                       | 5.1185 | 0.000         | 0.0007  | 5.11890                      | 5.11850 | 0.00110           | 0.00040 | MM215K |
| 0.079                    | 3.60                            | 3.57 | 5.12                     | 5.09 | 3.1494         | 3.1498 | 0.0002        | 0.0005  | 5.5118                       | 5.5122 | 0.000         | 0.0007  | 5.51260                      | 5.51220 | 0.00110           | 0.00040 | MM216K |

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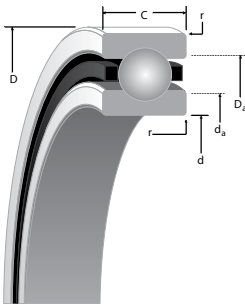




# BALL BEARINGS

## MEDIUM 2(3)MM300WI (ISO 03) SERIES

### DIMENSIONAL SERIES METRIC



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore         | D<br>O.D.   | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.   | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           |
|------------------------------|-------------------|-------------|---------------------------|---------------------|-------|---------------------------------------------------|----------------------|-------------------------------------------|---------------------------------------------------|----------------------|-------------------------------------------|
|                              |                   |             |                           |                     |       | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> |
| METRIC                       | mm/tol: +0; -(µm) |             |                           | mm                  | kg    | N                                                 |                      | RPM                                       | N                                                 |                      | RPM                                       |
| 301WI                        | 12<br>(4)         | 37<br>(6)   | 12<br>(80)                | 8 x 7.14            | 0.061 | 4700<br>4230                                      | 11000<br>11000       | 47600<br>57100                            | 4600<br>4060                                      | 10900<br>10900       | 42800<br>51400                            |
| 302WI                        | 15<br>(4)         | 42<br>(6)   | 13<br>(80)                | 10 x 6.75           | 0.087 | 5810<br>5170                                      | 12900<br>12900       | 38100<br>45700                            | 5600<br>5000                                      | 11600<br>11600       | 34300<br>41200                            |
| 303WI                        | 17<br>(4)         | 47<br>(6)   | 14<br>(80)                | 7 x 9.53            | 0.104 | 7280<br>6480                                      | 16900<br>16900       | 36800<br>44200                            | 7100<br>6300                                      | 16400<br>16400       | 33100<br>39700                            |
| 304WI                        | 20<br>(5)         | 52<br>(7)   | 15<br>(120)               | 8 x 10.32           | 0.137 | 10000<br>8900                                     | 21500<br>21500       | 32200<br>38600                            | 9650<br>8590                                      | 20900<br>20900       | 29000<br>34800                            |
| 305WI                        | 25<br>(5)         | 62<br>(7)   | 17<br>(120)               | 9 x 11.91           | 0.221 | 15300<br>13600                                    | 30500<br>30500       | 26200<br>31400                            | 14800<br>13200                                    | 29500<br>29500       | 23600<br>28300                            |
| 306WI                        | 30<br>(5)         | 72<br>(7)   | 19<br>(120)               | 10 x 13.49          | 0.328 | 22200<br>19800                                    | 34120<br>34120       | 22100<br>26500                            | 21500<br>19100                                    | 39900<br>39900       | 19900<br>23900                            |
| 307WI                        | 35<br>(6)         | 80<br>(7)   | 21<br>(120)               | 10 x 14.29          | 0.443 | 25600<br>22800                                    | 46200<br>46200       | 19200<br>23000                            | 24700<br>22000                                    | 44500<br>44500       | 17300<br>20800                            |
| 308WI                        | 40<br>(6)         | 90<br>(8)   | 23<br>(120)               | 11 x 15.88          | 0.608 | 35000<br>31200                                    | 59700<br>59700       | 16900<br>20300                            | 38900<br>30100                                    | 57500<br>57500       | 15200<br>18200                            |
| 309WI                        | 45<br>(6)         | 100<br>(8)  | 25<br>(120)               | 10 x 17.46          | 0.809 | 38700<br>34500                                    | 66500<br>66500       | 15100<br>18100                            | 37400<br>33300                                    | 64100<br>64100       | 13600<br>16300                            |
| 310WI                        | 50<br>(6)         | 110<br>(8)  | 27<br>(120)               | 10 x 19.05          | 1.046 | 46200<br>41200                                    | 77900<br>77900       | 13600<br>16300                            | 44700<br>39800                                    | 75100<br>75100       | 12200<br>14600                            |
| 311WI                        | 55<br>(7)         | 120<br>(8)  | 29<br>(150)               | 10 x 20.64          | 1.332 | 54600<br>48600                                    | 90200<br>90200       | 12400<br>14900                            | 52600<br>46800                                    | 86700<br>86700       | 11200<br>13400                            |
| 312WI                        | 60<br>(7)         | 130<br>(9)  | 31<br>(150)               | 10 x 22.23          | 1.665 | 63500<br>56600                                    | 103100<br>103100     | 11400<br>13700                            | 61100<br>54400                                    | 99100<br>99100       | 10300<br>12400                            |
| 313WI                        | 65<br>(7)         | 140<br>(9)  | 33<br>(150)               | 11 x 23.81          | 2.101 | 80500<br>71700                                    | 124400<br>124400     | 10500<br>12600                            | 77400<br>68900                                    | 119700<br>119700     | 9500<br>11400                             |
| 314WI                        | 70<br>(7)         | 150<br>(9)  | 35<br>(150)               | 11 x 25.40          | 2.548 | 91900<br>81800                                    | 139900<br>139900     | 9800<br>11800                             | 88300<br>78500                                    | 134500<br>134500     | 8800<br>10600                             |
| 319WI                        | 95<br>(7)         | 200<br>(10) | 45<br>(200)               | 10 x 34.93          | 5.587 | 155900<br>138800                                  | 204400<br>204400     | 7400<br>8900                              | 150400<br>133900                                  | 196800<br>196800     | 6700<br>8000                              |

<sup>(N<sub>g</sub>)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |       |                          |       | Shaft Diameter |        | Mounting Fits |       | FIXED                        |         |                               |       | FLOATING     |         |                   |       | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|-------|--------------------------|-------|----------------|--------|---------------|-------|------------------------------|---------|-------------------------------|-------|--------------|---------|-------------------|-------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |       | D <sub>a</sub> (Housing) |       |                |        |               |       | Housing Bore<br>(Stationary) |         | Mounting Fits<br>(Stationary) |       | Housing Bore |         | Housing Clearance |       |                                    |
|                          | Max.                            | Min.  | Max.                     | Min.  | Min.           | Max.   | Loose         | Tight | Min.                         | Max.    | Tight                         | Loose | Max.         | Min.    | Max.              | Min.  |                                    |
| mm                       | mm                              | mm    | mm                       | mm    | mm             | mm     | mm            | mm    | mm                           | mm      | mm                            | mm    | mm           | mm      | mm                | mm    |                                    |
| 1                        | 17.7                            | 17.4  | 32.1                     | 31.9  | 11.995         | 12.000 | 0.005         | 0.004 | 37.000                       | 37.006  | 0.000                         | 0.012 | 37.010       | 37.005  | 0.016             | 0.005 | 301WI                              |
| 1                        | 22.2                            | 22.0  | 35.7                     | 35.4  | 14.995         | 15.000 | 0.005         | 0.004 | 42.000                       | 42.006  | 0.000                         | 0.012 | 42.010       | 42.005  | 0.016             | 0.005 | 302WI                              |
| 1                        | 22.7                            | 22.5  | 42.0                     | 41.8  | 16.995         | 17.000 | 0.005         | 0.004 | 47.000                       | 47.006  | 0.000                         | 0.012 | 47.012       | 47.007  | 0.018             | 0.007 | 303WI                              |
| 1                        | 30.1                            | 29.9  | 46.6                     | 46.4  | 19.995         | 20.000 | 0.005         | 0.005 | 52.000                       | 52.006  | 0.000                         | 0.013 | 52.012       | 52.007  | 0.019             | 0.007 | 304WI                              |
| 1                        | 32.1                            | 31.9  | 55.8                     | 55.5  | 24.995         | 25.000 | 0.005         | 0.005 | 62.000                       | 62.008  | 0.000                         | 0.015 | 62.012       | 62.007  | 0.019             | 0.007 | 305WI                              |
| 1                        | 37.7                            | 37.5  | 65.2                     | 64.9  | 29.995         | 30.000 | 0.005         | 0.005 | 72.000                       | 72.008  | 0.000                         | 0.015 | 72.011       | 72.007  | 0.019             | 0.007 | 306WI                              |
| 1.5                      | 43.7                            | 43.2  | 72.1                     | 71.6  | 34.995         | 35.000 | 0.005         | 0.006 | 80.000                       | 80.008  | 0.000                         | 0.015 | 80.012       | 80.008  | 0.020             | 0.008 | 307WI                              |
| 1.5                      | 49.8                            | 49.3  | 81.3                     | 80.8  | 39.995         | 40.000 | 0.005         | 0.006 | 90.000                       | 90.008  | 0.000                         | 0.016 | 90.015       | 90.007  | 0.023             | 0.007 | 308WI                              |
| 1.5                      | 55.9                            | 55.4  | 90.2                     | 89.7  | 44.995         | 45.000 | 0.005         | 0.006 | 100.000                      | 100.008 | 0.000                         | 0.016 | 100.018      | 100.010 | 0.025             | 0.010 | 309WI                              |
| 2                        | 61.2                            | 60.7  | 99.8                     | 99.3  | 49.995         | 50.000 | 0.005         | 0.006 | 110.000                      | 110.008 | 0.000                         | 0.016 | 110.018      | 110.010 | 0.025             | 0.010 | 310WI                              |
| 2                        | 67.3                            | 66.8  | 108.7                    | 108.2 | 54.995         | 55.000 | 0.005         | 0.007 | 120.000                      | 120.008 | 0.000                         | 0.016 | 120.018      | 120.010 | 0.025             | 0.010 | 311WI                              |
| 2                        | 43.2                            | 72.6  | 117.9                    | 117.3 | 59.995         | 60.000 | 0.005         | 0.007 | 130.000                      | 130.009 | 0.000                         | 0.018 | 130.020      | 130.010 | 0.029             | 0.010 | 312WI                              |
| 2                        | 80.3                            | 79.8  | 126.8                    | 126.2 | 64.995         | 65.000 | 0.005         | 0.007 | 140.000                      | 140.009 | 0.000                         | 0.018 | 140.020      | 140.010 | 0.029             | 0.010 | 313WI                              |
| 2                        | 85.3                            | 84.8  | 135.6                    | 135.1 | 69.995         | 70.000 | 0.005         | 0.007 | 150.000                      | 150.009 | 0.000                         | 0.018 | 150.023      | 150.012 | 0.032             | 0.012 | 314WI                              |
| 3                        | 113.2                           | 112.4 | 183.3                    | 182.5 | 94.995         | 95.000 | 0.005         | 0.013 | 200.00                       | 200.011 | 0.000                         | 0.022 | 200.025      | 200.015 | 0.036             | 0.015 | 319WI                              |

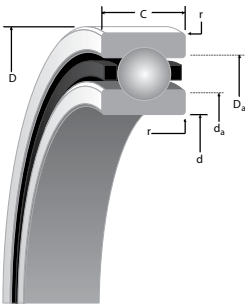




# BALL BEARINGS

## MEDIUM 2(3)MM300WI (ISO 03) SERIES

### DIMENSIONAL SERIES INCHES



D

#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### WI CONSTRUCTION:

- Incorporates low shoulder on non-thrust side of outer rings.
- Maximum complement of balls separated by one-piece cage piloted against a ground thrust shoulder land of the outer ring.

| Bearing Number<br>2MM or 3MM | d<br>Bore              | D<br>O.D.       | C<br>Width <sup>(1)</sup> | Ball Qty.<br>x Dia. | Wt.   | (2MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                | (3MM) LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                |
|------------------------------|------------------------|-----------------|---------------------------|---------------------|-------|---------------------------------------------------|----------------------|--------------------------------|---------------------------------------------------|----------------------|--------------------------------|
|                              |                        |                 |                           |                     |       | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(Ng)</sup> | C <sub>0</sub> (stat)                             | C <sub>e</sub> (dyn) | Limiting Speed <sup>(Ng)</sup> |
| INCH                         | in/toi: +0; -0.000(µm) |                 |                           | in.                 | lbs.  | lbs.                                              |                      | RPM                            | lbs.                                              |                      | RPM                            |
| 301WI                        | 0.4724<br>(1.5)        | 1.4567<br>(2.5) | 0.4724<br>(31)            | 8 x 9/32            | 0.13  | 1,060<br>950                                      | 2450<br>2450         | 47600<br>57100                 | 1040<br>920                                       | 2450<br>2450         | 42800<br>51400                 |
| 302WI                        | 0.5906<br>(1.5)        | 1.6535<br>(2.5) | 0.5118<br>(31)            | 10 x 17/64          | 0.19  | 1320<br>1160                                      | 2700<br>2700         | 38100<br>45700                 | 1270<br>1120                                      | 2600<br>2600         | 34300<br>41200                 |
| 303WI                        | 0.6693<br>(1.5)        | 1.8504<br>(2.5) | 0.5512<br>(31)            | 7 x 3/8             | 0.23  | 1630<br>1460                                      | 3900<br>3900         | 36800<br>44100                 | 1600<br>1420                                      | 3690<br>3690         | 33100<br>39700                 |
| 304WI                        | 0.7874<br>(2)          | 2.0472<br>(3)   | 0.5906<br>(47)            | 8 x 13/32           | 0.30  | 2200<br>2000                                      | 4840<br>4840         | 32200<br>38600                 | 2160<br>1930                                      | 4700<br>4700         | 29000<br>34800                 |
| 305WI                        | 0.9843<br>(2)          | 2.4409<br>(3)   | 0.6693<br>(47)            | 9 x 15/32           | 0.49  | 3450<br>3060                                      | 6850<br>6850         | 26200<br>31400                 | 3350<br>2970                                      | 6630<br>6630         | 23600<br>28300                 |
| 306WI                        | 1.1811<br>(2)          | 2.8346<br>(3)   | 0.748<br>(47)             | 10 x 17/32          | 0.72  | 4990<br>4440                                      | 9270<br>9270         | 22100<br>26500                 | 4820<br>4290                                      | 8960<br>8960         | 19900<br>23900                 |
| 307WI                        | 1.378<br>(2.5)         | 3.1496<br>(3)   | 0.8268<br>(47)            | 10 x 9/16           | 0.98  | 5700<br>5130                                      | 10400<br>10400       | 19200<br>23000                 | 5600<br>4940                                      | 10000<br>10000       | 17300<br>20800                 |
| 308WI                        | 1.5748<br>(2.5)        | 3.5433<br>(3)   | 0.9055<br>(47)            | 11 x 5/8            | 1.34  | 7800<br>7010                                      | 13400<br>13400       | 16900<br>20300                 | 7600<br>6770                                      | 12900<br>12900       | 15200<br>18200                 |
| 309WI                        | 1.7717<br>(2.5)        | 3.937<br>(3)    | 0.9843<br>(47)            | 10 x 11/16          | 1.78  | 8650<br>7750                                      | 15000<br>15000       | 15100<br>18100                 | 8500<br>7480                                      | 14400<br>14400       | 13600<br>16300                 |
| 310WI                        | 1.9685<br>(2.5)        | 4.3307<br>(3)   | 1.063<br>(47)             | 10 x 3/4            | 2.31  | 10400<br>9250                                     | 17500<br>17500       | 13600<br>16300                 | 10000<br>8940                                     | 16900<br>16900       | 12200<br>14600                 |
| 311WI                        | 2.1654<br>(3)          | 4.7244<br>(3)   | 1.1417<br>(59)            | 10 x 13/16          | 2.94  | 12200<br>10900                                    | 20300<br>20300       | 12400<br>14900                 | 11800<br>10500                                    | 19500<br>19500       | 11200<br>13400                 |
| 312WI                        | 2.3622<br>(3)          | 5.1181<br>(3.5) | 1.2205<br>(59)            | 10 x 7/8            | 3.67  | 14300<br>12700                                    | 23200<br>23200       | 11400<br>13700                 | 13700<br>12200                                    | 22300<br>22300       | 10300<br>12400                 |
| 313WI                        | 2.5591<br>(3)          | 5.5118<br>(3.5) | 1.2992<br>(59)            | 11 x 15/16          | 4.63  | 18000<br>16100                                    | 28000<br>28000       | 10500<br>12600                 | 17300<br>15500                                    | 26900<br>26900       | 9500<br>11400                  |
| 314WI                        | 2.7559<br>(3)          | 5.9055<br>(3.5) | 1.378<br>(59)             | 11 x 1              | 5.62  | 20800<br>18400                                    | 31500<br>31500       | 9800<br>11800                  | 20000<br>17700                                    | 30200<br>30200       | 8800<br>10600                  |
| 319WI                        | 3.7402<br>(3)          | 7.8740<br>(4)   | 1.7717<br>(79)            | 10 x 1 3/8          | 12.32 | 35100<br>31200                                    | 46000<br>46000       | 7400<br>8900                   | 33800<br>30100                                    | 44200<br>44200       | 6700<br>8000                   |

<sup>(Ng)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |      | Shaft Diameter |        | Mounting Fits |         | FIXED                        |        |               |         | FLOATING                     |         |                   |         | Bearing<br>Number<br>2MM or<br>3MM |
|--------------------------|---------------------------------|------|--------------------------|------|----------------|--------|---------------|---------|------------------------------|--------|---------------|---------|------------------------------|---------|-------------------|---------|------------------------------------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |      |                |        |               |         | Housing Bore<br>(Stationary) |        | Mounting Fits |         | Housing Bore<br>(Stationary) |         | Housing Clearance |         |                                    |
|                          | Max.                            | Min. | Max.                     | Min. | Min.           | Max.   | Loose         | Tight   | Min.                         | Max.   | Might         | Loose   | Max.                         | Min.    | Max.              | Min.    |                                    |
| in.                      | in.                             | in.  | in.                      | in.  | in.            | in.    | in.           | in.     | in.                          | in.    | in.           | in.     | in.                          | in.     | in.               | in.     |                                    |
| 0.039                    | 0.7                             | 0.69 | 1.27                     | 1.26 | 0.4722         | 0.4724 | 0.0002        | 0.00015 | 1.4567                       | 1.4570 | 0.000         | 0.0005  | 1.45710                      | 1.45690 | 0.00070           | 0.00020 | 301WI                              |
| 0.039                    | 0.88                            | 0.87 | 1.41                     | 1.4  | 0.5904         | 0.5906 | 0.0002        | 0.00015 | 1.6535                       | 1.6538 | 0.000         | 0.0005  | 1.65390                      | 1.65370 | 0.00070           | 0.00020 | 302WI                              |
| 0.039                    | 0.9                             | 0.89 | 1.66                     | 1.65 | 0.6691         | 0.6693 | 0.0002        | 0.00015 | 1.8504                       | 1.8507 | 0.000         | 0.0005  | 1.85090                      | 1.85070 | 0.00080           | 0.00030 | 303WI                              |
| 0.039                    | 1.19                            | 1.18 | 1.84                     | 1.83 | 0.7872         | 0.7874 | 0.0002        | 0.00020 | 2.0472                       | 2.0475 | 0.000         | 0.00055 | 2.04770                      | 2.04750 | 0.00080           | 0.00030 | 304WI                              |
| 0.039                    | 1.27                            | 1.26 | 2.2                      | 2.19 | 0.9841         | 0.9843 | 0.0002        | 0.00020 | 2.4409                       | 2.4412 | 0.000         | 0.0006  | 2.44140                      | 2.44120 | 0.00080           | 0.00030 | 305WI                              |
| 0.039                    | 1.49                            | 1.48 | 2.57                     | 2.56 | 1.1809         | 1.1811 | 0.0002        | 0.00020 | 2.8346                       | 2.8349 | 0.000         | 0.0006  | 2.83510                      | 2.83490 | 0.00080           | 0.00030 | 306WI                              |
| 0.059                    | 1.72                            | 1.7  | 2.84                     | 2.82 | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 3.1496                       | 3.1499 | 0.000         | 0.0006  | 3.15010                      | 3.14990 | 0.00080           | 0.00030 | 307WI                              |
| 0.059                    | 1.96                            | 1.94 | 3.2                      | 3.18 | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 3.5433                       | 3.5436 | 0.000         | 0.0006  | 3.54390                      | 3.54360 | 0.00090           | 0.00030 | 308WI                              |
| 0.059                    | 2.2                             | 2.18 | 3.55                     | 3.53 | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 3.9370                       | 3.9373 | 0.000         | 0.0006  | 3.93770                      | 3.93740 | 0.00100           | 0.00040 | 309WI                              |
| 0.079                    | 2.41                            | 2.39 | 3.93                     | 3.91 | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 4.3307                       | 4.3310 | 0.000         | 0.0006  | 4.33140                      | 4.33110 | 0.00100           | 0.00040 | 310WI                              |
| 0.079                    | 2.65                            | 2.63 | 4.28                     | 4.26 | 2.1652         | 2.1654 | 0.0002        | 0.00030 | 4.7244                       | 4.7247 | 0.000         | 0.0006  | 4.72510                      | 4.72480 | 0.00100           | 0.00040 | 311WI                              |
| 0.079                    | 2.88                            | 2.86 | 4.64                     | 4.62 | 2.3620         | 2.3622 | 0.0002        | 0.00030 | 5.1181                       | 5.1185 | 0.000         | 0.0007  | 5.11890                      | 5.11850 | 0.00110           | 0.00040 | 312WI                              |
| 0.079                    | 3.16                            | 3.14 | 4.99                     | 4.97 | 2.5589         | 2.5591 | 0.0002        | 0.00030 | 5.5118                       | 5.5122 | 0.000         | 0.0007  | 5.51260                      | 5.51220 | 0.00110           | 0.00040 | 313WI                              |
| 0.079                    | 3.36                            | 3.34 | 5.34                     | 5.32 | 2.7557         | 2.7559 | 0.0002        | 0.00030 | 5.9055                       | 5.9059 | 0.000         | 0.0007  | 5.90640                      | 5.90600 | 0.00120           | 0.00050 | 314WI                              |

D





# BALL BEARINGS

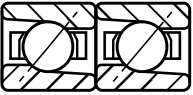
## MEDIUM 2(3)MM300WI (ISO 03) SERIES

### DUPLEX PERFORMANCE DATA

### MOUNTING ARRANGEMENTS



Suggested  
DB



Tandem  
DT



Special Applications  
DF

| Bearing Number<br>2MM or 3MM                          | PRELOAD |      |      |      | AXIAL STIFFNESS <sup>(1)</sup> |        |        |        | RADIAL STIFFNESS <sup>(1)</sup> |        |         | SPACER OFFSETS <sup>(1)</sup> |                 |                 |
|-------------------------------------------------------|---------|------|------|------|--------------------------------|--------|--------|--------|---------------------------------|--------|---------|-------------------------------|-----------------|-----------------|
|                                                       | DUX     | DUL  | DUM  | DUH  | X-light                        | Light  | Medium | Heavy  | Light                           | Medium | Heavy   | X-Light to Light              | Light to Medium | Medium to Heavy |
| N                                                     |         |      |      |      |                                |        |        |        |                                 |        |         |                               |                 |                 |
| N/μm                                                  |         |      |      |      |                                |        |        |        |                                 |        |         |                               |                 |                 |
| μm                                                    |         |      |      |      |                                |        |        |        |                                 |        |         |                               |                 |                 |
| <b>METRIC DUPLEX PERFORMANCE DATA 2MM300WI SERIES</b> |         |      |      |      |                                |        |        |        |                                 |        |         |                               |                 |                 |
| 2MM301WI                                              | —       | 20   | 70   | 180  | —                              | 17.49  | 27.81  | 44.25  | 98.82                           | 153.56 | 183.30  | —                             | 7.87            | 12.45           |
| 2MM302WI                                              | 20      | 40   | 110  | 220  | —                              | 27.46  | 40.93  | 57.19  | 143.24                          | 164.93 | 205.51  | —                             | 7.87            | 9.14            |
| 2MM303WI                                              | 40      | 70   | 160  | 310  | —                              | 26.58  | 38.83  | 54.57  | 147.44                          | 197.46 | 263.05  | —                             | 10.92           | 13.46           |
| 2MM304WI                                              | 40      | 90   | 220  | 400  | —                              | 33.06  | 49.85  | 66.46  | 181.72                          | 232.97 | 289.81  | —                             | 12.95           | 121.92          |
| 2MM305WI                                              | 90      | 160  | 330  | 620  | —                              | 46.17  | 65.24  | 88.50  | 247.83                          | 283.16 | 340.88  | —                             | 12.7            | 14.99           |
| 2MM306WI                                              | 90      | 180  | 440  | 780  | —                              | 49.50  | 74.68  | 98.47  | 271.27                          | 303.10 | 405.77  | —                             | 17.27           | 15.49           |
| 2MM307WI                                              | 110     | 220  | 560  | 1000 | —                              | 55.97  | 85.18  | 114.38 | 323.91                          | 388.10 | 478.70  | —                             | 18.8            | 17.78           |
| 2MM308WI                                              | 130     | 290  | 670  | 1220 | —                              | 64.71  | 94.62  | 127.85 | 364.67                          | 392.65 | 489.20  | —                             | 19.05           | 20.07           |
| 2MM309WI                                              | 180     | 330  | 780  | 1560 | —                              | 70.13  | 103.02 | 145.17 | 393.18                          | 472.58 | 588.36  | —                             | 20.57           | 25.15           |
| 2MM310WI                                              | 220     | 440  | 1000 | 1780 | —                              | 81.15  | 117.36 | 156.01 | 366.24                          | 496.89 | 637.86  | —                             | 22.35           | 22.86           |
| 2MM311WI                                              | 270     | 560  | 1110 | 2110 | —                              | 88.15  | 121.38 | 167.20 | 382.86                          | 582.42 | 724.61  | —                             | 21.34           | 27.69           |
| 2MM312WI                                              | 270     | 560  | 1330 | 2450 | —                              | 89.72  | 133.80 | 180.85 | 456.31                          | 632.26 | 802.44  | —                             | 27.94           | 28.19           |
| 2MM313WI                                              | 330     | 670  | 1670 | 3000 | —                              | 104.24 | 157.93 | 211.28 | 511.76                          | 668.64 | 846.52  | —                             | 30.48           | 28.96           |
| 2MM314WI                                              | 400     | 780  | 1890 | 3450 | —                              | 110.89 | 166.33 | 224.22 | 519.80                          | 703.80 | 876.25  | —                             | 32.26           | 32.00           |
| 2MM319WI                                              | 670     | 1330 | 3110 | 6230 | —                              | 140.44 | 206.03 | 290.33 | 726.88                          | 932.74 | 1183.02 | —                             | 41.05           | 50.24           |
| <b>METRIC DUPLEX PERFORMANCE DATA 3MM300WI SERIES</b> |         |      |      |      |                                |        |        |        |                                 |        |         |                               |                 |                 |
| 3MM301WI                                              | 40      | 90   | 180  | 310  | —                              | 58.59  | 76.61  | 96.37  | 94.10                           | 135.90 | 169.48  | —                             | 5.33            | 6.10            |
| 3MM302WI                                              | 40      | 90   | 180  | 360  | —                              | 66.46  | 86.75  | 115.08 | 115.96                          | 160.21 | 199.39  | —                             | 4.57            | 7.11            |
| 3MM303WI                                              | 40      | 110  | 270  | 440  | —                              | 63.66  | 89.02  | 109.49 | 132.92                          | 204.46 | 223.87  | —                             | 8.13            | 7.11            |
| 3MM304WI                                              | 90      | 160  | 360  | 620  | —                              | 79.23  | 108.96 | 136.77 | 159.51                          | 220.02 | 253.26  | —                             | 8.38            | 8.64            |
| 3MM305WI                                              | 110     | 220  | 530  | 890  | —                              | 101.62 | 142.19 | 174.90 | 189.59                          | 258.50 | 303.98  | —                             | 10.16           | 8.89            |
| 3MM306WI                                              | 135     | 270  | 670  | 1110 | —                              | 112.29 | 159.33 | 196.06 | 227.02                          | 306.77 | 356.10  | —                             | 11.68           | 9.91            |
| 3MM307WI                                              | 180     | 360  | 850  | 1560 | —                              | 134.85 | 187.84 | 241.01 | 267.42                          | 360.99 | 428.33  | —                             | 12.19           | 13.21           |
| 3MM308WI                                              | 220     | 440  | 1110 | 1780 | —                              | 150.41 | 214.08 | 259.20 | 275.64                          | 372.71 | 423.96  | —                             | 14.48           | 11.18           |
| 3MM309WI                                              | 270     | 530  | 1330 | 2220 | —                              | 165.98 | 235.94 | 290.51 | 332.14                          | 448.44 | 520.50  | —                             | 15.75           | 13.46           |
| 3MM310WI                                              | 310     | 620  | 1560 | 2670 | —                              | 178.75 | 254.13 | 316.57 | 360.12                          | 486.22 | 568.25  | —                             | 17.27           | 15.49           |
| 3MM311WI                                              | 400     | 780  | 1780 | 3110 | —                              | 198.16 | 272.32 | 342.10 | 407.34                          | 549.71 | 634.36  | —                             | 17.02           | 17.27           |
| 3MM312WI                                              | 450     | 890  | 2000 | 3560 | —                              | 213.38 | 291.21 | 367.81 | 450.02                          | 607.43 | 695.05  | —                             | 17.53           | 18.80           |
| 3MM313WI                                              | 560     | 1110 | 2670 | 4450 | —                              | 249.23 | 348.93 | 429.55 | 474.50                          | 640.48 | 740.18  | —                             | 20.83           | 18.29           |
| 3MM314WI                                              | 620     | 1220 | 2890 | 5120 | —                              | 262.52 | 365.02 | 460.34 | 492.87                          | 665.67 | 772.53  | —                             | 21.08           | 21.59           |
| 3MM319WI                                              | 1070    | 2110 | 4890 | 8900 | —                              | 328.81 | 453.52 | 578.22 | 655.70                          | 824.65 | 1029.29 | —                             | 28.19           | 30.99           |

Notes: <sup>(1)</sup> For DB or DF arrangements only. For other mounting arrangements contact your Timken representative.

## MEDIUM 2(3)MM300WI (ISO 03) SERIES

### SPEED CAPABILITY DATA

| Bearing Number         | Grease Capacity |      | Kluber Isoflex |       | Operating Speeds <sup>(2)</sup> |            |       | (DB Mounting) <sup>(1)</sup> |         |       |
|------------------------|-----------------|------|----------------|-------|---------------------------------|------------|-------|------------------------------|---------|-------|
|                        | NBU15           |      | NBU15          |       | DUL                             | Grease DUM | DUH   | DUL                          | Oil DUM | DUH   |
|                        | 25%             | 40%  | 15%            | 20%   |                                 |            |       |                              |         |       |
| <b>2MM300WI SERIES</b> |                 |      |                |       |                                 |            |       |                              |         |       |
| 2MM301WI               | 0.6             | 1.0  | 0.40           | 0.53  | 35700                           | 28600      | 19000 | 60700                        | 48600   | 32400 |
| 2MM302WI               | 0.7             | 1.2  | 0.49           | 0.65  | 28600                           | 22900      | 15200 | 48600                        | 38900   | 25900 |
| 2MM303WI               | 1.2             | 2.0  | 0.83           | 1.10  | 27600                           | 22100      | 14700 | 46900                        | 37500   | 25000 |
| 2MM304WI               | 1.5             | 2.5  | 1.03           | 1.38  | 24200                           | 19300      | 12900 | 41100                        | 32800   | 21900 |
| 2MM305WI               | 2.3             | 3.8  | 1.57           | 2.09  | 19700                           | 15700      | 10500 | 33400                        | 26700   | 17800 |
| 2MM306WI               | 3.5             | 5.6  | 2.35           | 3.14  | 16600                           | 13300      | 8800  | 28200                        | 22500   | 15000 |
| 2MM307WI               | 4.6             | 7.4  | 3.07           | 4.10  | 14400                           | 11500      | 7700  | 24500                        | 19600   | 13100 |
| 2MM308WI               | 6.4             | 10.2 | 4.25           | 5.66  | 12700                           | 10100      | 6800  | 21500                        | 17200   | 11500 |
| 2MM309WI               | 8.5             | 13.6 | 5.68           | 7.58  | 11300                           | 9100       | 6000  | 19300                        | 15400   | 10300 |
| 2MM310WI               | 11.1            | 17.8 | 7.40           | 9.90  | 10200                           | 8200       | 5400  | 17300                        | 13900   | 9200  |
| 2MM311WI               | 14.2            | 22.7 | 9.50           | 12.60 | 9300                            | 7400       | 5000  | 15800                        | 12600   | 8400  |
| 2MM312WI               | 17.7            | 28.3 | 11.80          | 15.80 | 8600                            | 6800       | 4600  | 14500                        | 11600   | 7800  |
| 2MM313WI               | 20.7            | 33.2 | 13.80          | 18.50 | 7900                            | 6300       | 4200  | 13400                        | 10700   | 7100  |
| 2MM314WI               | 25.2            | 40.3 | 16.80          | 22.40 | 7400                            | 5900       | 3900  | 12500                        | 10000   | 6700  |
| 2MM319WI               | 60.9            | 97.4 | 40.60          | 54.10 | 5600                            | 4400       | 3000  | 9400                         | 7500    | 5000  |
| <b>3MM300WI SERIES</b> |                 |      |                |       |                                 |            |       |                              |         |       |
| 3MM301WI               | 0.6             | 1.0  | 0.40           | 0.53  | 32130                           | 25740      | 17100 | 54630                        | 43740   | 29160 |
| 3MM302WI               | 0.7             | 1.2  | 0.49           | 0.65  | 25740                           | 20610      | 13680 | 43740                        | 35010   | 23310 |
| 3MM303WI               | 1.2             | 2.0  | 0.83           | 1.10  | 24840                           | 19890      | 13230 | 42210                        | 33750   | 22500 |
| 3MM304WI               | 1.5             | 2.5  | 1.03           | 1.38  | 21780                           | 17370      | 11610 | 36990                        | 29520   | 19710 |
| 3MM305WI               | 2.3             | 3.8  | 1.57           | 2.09  | 17730                           | 14130      | 9450  | 30060                        | 24030   | 16020 |
| 3MM306WI               | 3.5             | 5.6  | 2.35           | 3.14  | 14940                           | 11970      | 7920  | 25380                        | 20250   | 13500 |
| 3MM307WI               | 4.6             | 7.4  | 3.07           | 4.10  | 12960                           | 10350      | 6930  | 22050                        | 17640   | 11790 |
| 3MM308WI               | 6.4             | 10.2 | 4.25           | 5.66  | 11430                           | 9090       | 6120  | 19350                        | 15480   | 10350 |
| 3MM309WI               | 8.5             | 13.6 | 5.68           | 7.58  | 10170                           | 8190       | 5400  | 17370                        | 13860   | 9270  |
| 3MM310WI               | 11.1            | 17.8 | 7.40           | 9.90  | 9180                            | 7380       | 4860  | 15570                        | 12510   | 8280  |
| 3MM311WI               | 14.2            | 22.7 | 9.50           | 12.60 | 8370                            | 6660       | 4500  | 14220                        | 11340   | 7560  |
| 3MM312WI               | 17.7            | 28.3 | 11.80          | 15.80 | 7740                            | 6120       | 4140  | 13050                        | 10440   | 7020  |
| 3MM313WI               | 20.7            | 33.2 | 13.80          | 18.50 | 7110                            | 5670       | 3780  | 12060                        | 9630    | 6390  |
| 3MM314WI               | 25.2            | 40.3 | 16.80          | 22.40 | 6660                            | 5310       | 3510  | 11250                        | 9000    | 6030  |
| 3MM319WI               | 60.9            | 97.4 | 40.60          | 54.10 | 5040                            | 3960       | 2700  | 8460                         | 6750    | 4500  |

<sup>(1)</sup> For other mounting arrangement configurations refer to the engineering section on Permissible Speed calculation methods.

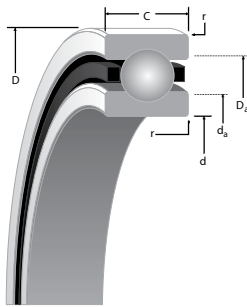
<sup>(2)</sup> For ceramic ball complements use 120% of speeds shown.



# BALL BEARINGS

## MEDIUM MM300K (ISO 03) SERIES

### DIMENSIONAL SIZES METRIC / INCH



#### SUPER PRECISION MM:

Running accuracy and performance meet ABEC 9 (ISO P2) levels. Non-critical features conform to ABEC 7 (ISO P4) requirements.

#### CONRAD CONSTRUCTION:

- Maximum complement of balls separated by two-piece land piloted cage.

| Bearing Number | d Bore                 | D O.D.          | C Width <sup>(1)</sup> | Ball Qty. x Dia.                  | Wt.   | LOAD RATINGS<br>(steel ball & ceramic ball) |                      |                                           |
|----------------|------------------------|-----------------|------------------------|-----------------------------------|-------|---------------------------------------------|----------------------|-------------------------------------------|
|                |                        |                 |                        |                                   |       | C <sub>0</sub> (stat)                       | C <sub>e</sub> (dyn) | Limiting Speed <sup>(N<sub>g</sub>)</sup> |
| METRIC         | in./tol: +0; - (µm)    |                 |                        | mm                                | kg    | N                                           |                      | RPM                                       |
| MM305K         | 25<br>(5)              | 62<br>(7)       | 17<br>(130)            | 7 x 11.9                          | 0.222 | 12200                                       | 26700                | 26,500                                    |
| MM306K         | 30<br>(5)              | 72<br>(7)       | 19<br>(130)            | 7 x 13.5                          | 0.327 | 15800                                       | 34000                | 22,300                                    |
| MM307K         | 35<br>(6)              | 80<br>(7)       | 21<br>(130)            | 7 x 14.3                          | 0.431 | 18500                                       | 37800                | 19,400                                    |
| MM308K         | 40<br>(6)              | 90<br>(8)       | 23<br>(130)            | 8 x 15.9                          | 0.594 | 22700                                       | 46300                | 17,100                                    |
| MM309K         | 45<br>(6)              | 100<br>(8)      | 25<br>(130)            | 8 x 17.5                          | 0.807 | 31600                                       | 59600                | 15,200                                    |
| MM310K         | 50<br>(6)              | 110<br>(8)      | 27<br>(130)            | 8 x 19.1                          | 1.052 | 37800                                       | 69400                | 13,800                                    |
| MM311K         | 55<br>(7)              | 120<br>(8)      | 29<br>(150)            | 8 x 20.6                          | 1.329 | 44500                                       | 81400                | 12,500                                    |
| MM312K         | 60<br>(7)              | 130<br>(9)      | 31<br>(150)            | 8 x 22.2                          | 1.665 | 51600                                       | 92500                | 11,500                                    |
| MM313K         | 65<br>(7)              | 140<br>(9)      | 33<br>(150)            | 8 x 23.8                          | 2.046 | 59600                                       | 105000               | 10,700                                    |
| MM314K         | 70<br>(7)              | 150<br>(9)      | 35<br>(150)            | 8 x 25.4                          | 2.486 | 68100                                       | 115600               | 9,900                                     |
| INCH           | in./tol: +0; - .000(X) |                 |                        | in.                               | lbs.  | lbs.                                        |                      | RPM                                       |
| MM305K         | 0.9843<br>(2)          | 2.4409<br>(3)   | 0.6693<br>(47)         | 7 x <sup>15</sup> / <sub>32</sub> | 0.49  | 2750                                        | 6000                 | 26,500                                    |
| MM306K         | 1.1811<br>(2)          | 2.8346<br>(3)   | 0.748<br>(47)          | 7 x <sup>17</sup> / <sub>32</sub> | 0.72  | 3550                                        | 7650                 | 22,300                                    |
| MM307K         | 1.378<br>(2.5)         | 3.1496<br>(3)   | 0.8268<br>(47)         | 7 x <sup>9</sup> / <sub>16</sub>  | 0.95  | 4150                                        | 8500                 | 19,400                                    |
| MM308K         | 1.5748<br>(2.5)        | 3.5433<br>(3)   | 0.9055<br>(47)         | 8 x <sup>5</sup> / <sub>8</sub>   | 1.31  | 5100                                        | 10400                | 17,100                                    |
| MM309K         | 1.7717<br>(2.5)        | 3.937<br>(3)    | 0.9843<br>(47)         | 8 x <sup>11</sup> / <sub>16</sub> | 1.78  | 7100                                        | 13400                | 15,200                                    |
| MM310K         | 1.9685<br>(2.5)        | 4.3307<br>(3)   | 1.063<br>(47)          | 8 x <sup>3</sup> / <sub>4</sub>   | 2.32  | 8500                                        | 15600                | 13,800                                    |
| MM311K         | 2.1654<br>(3)          | 4.7244<br>(3)   | 1.1417<br>(59)         | 8 x <sup>13</sup> / <sub>16</sub> | 2.93  | 10000                                       | 18300                | 12,500                                    |
| MM312K         | 2.3622<br>(3)          | 5.1181<br>(3.5) | 1.2205<br>(59)         | 8 x <sup>7</sup> / <sub>8</sub>   | 3.67  | 11600                                       | 20800                | 11,500                                    |
| MM313K         | 2.5591<br>(3)          | 5.5118<br>(3.5) | 1.2992<br>(59)         | 8 x <sup>15</sup> / <sub>16</sub> | 4.51  | 13400                                       | 23600                | 10,700                                    |
| MM314K         | 2.7559<br>(3)          | 5.9055<br>(3.5) | 1.378<br>(59)          | 8 x 1                             | 5.48  | 15300                                       | 26000                | 9,900                                     |

<sup>(N<sub>g</sub>)</sup> For a single, grease lubricated, spring preloaded bearing. This value to be used in permissible Operating Speed (Sp) calculation.

<sup>(1)</sup> Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup> ABMA STD 20 (r<sub>as</sub> max).

| r<br>Rad. <sup>(2)</sup> | Suggested<br>Shoulder Diameters |      |                          |       | Shaft Diameter |        | Mounting Fits |         | FIXED                        |         |               |        | FLOATING                     |         |                   |         |        |
|--------------------------|---------------------------------|------|--------------------------|-------|----------------|--------|---------------|---------|------------------------------|---------|---------------|--------|------------------------------|---------|-------------------|---------|--------|
|                          | d <sub>a</sub> (Shaft)          |      | D <sub>a</sub> (Housing) |       | Min.           | Max.   | Loose         | Tight   | Housing Bore<br>(Stationary) |         | Mounting Fits |        | Housing Bore<br>(Stationary) |         | Housing Clearance |         |        |
|                          | Max.                            | Min. | Max.                     | Min.  |                |        |               |         | Min.                         | Max.    | Tight         | Loose  | Max.                         | Min.    | Max.              | Min.    |        |
| mm                       | mm                              | mm   | mm                       | mm    | mm             | mm     | mm            | mm      | mm                           | mm      | mm            | mm     | mm.                          | mm.     | mm.               | mm      |        |
| 1                        | 32.1                            | 31.9 | 55.8                     | 55.5  | 24.995         | 25.000 | 0.005         | 0.005   | 62                           | 62.008  | 0.000         | 0.015  | 62.012                       | 62.007  | 0.019             | 0.007   | MM305K |
| 1                        | 37.7                            | 37.5 | 65.2                     | 64.9  | 29.995         | 30.000 | 0.005         | 0.005   | 72                           | 72.008  | 0.000         | 0.015  | 72.011                       | 72.007  | 0.019             | 0.007   | MM306K |
| 1.5                      | 43.7                            | 43.2 | 72.1                     | 71.6  | 34.995         | 35.000 | 0.005         | 0.006   | 80                           | 80.008  | 0.000         | 0.015  | 80.012                       | 80.008  | 0.020             | 0.008   | MM307K |
| 1.5                      | 49.8                            | 49.3 | 81.3                     | 80.8  | 39.995         | 40.000 | 0.005         | 0.006   | 90                           | 90.008  | 0.000         | 0.016  | 90.015                       | 90.007  | 0.023             | 0.007   | MM308K |
| 1.5                      | 55.9                            | 55.4 | 90.2                     | 89.7  | 44.995         | 45.000 | 0.005         | 0.006   | 100                          | 100.008 | 0.000         | 0.016  | 100.018                      | 100.010 | 0.025             | 0.010   | MM309K |
| 1.5                      | 61.2                            | 60.7 | 99.8                     | 99.3  | 49.995         | 50.000 | 0.005         | 0.006   | 110                          | 110.008 | 0.000         | 0.016  | 110.018                      | 110.010 | 0.025             | 0.010   | MM310K |
| 2                        | 67.3                            | 66.8 | 108.7                    | 108.2 | 54.995         | 55.000 | 0.005         | 0.007   | 120                          | 120.008 | 0.000         | 0.016  | 120.018                      | 120.010 | 0.025             | 0.010   | MM311K |
| 2                        | 43.2                            | 72.6 | 117.9                    | 117.3 | 59.995         | 60.000 | 0.005         | 0.007   | 130                          | 130.009 | 0.000         | 0.018  | 130.020                      | 130.010 | 0.029             | 0.010   | MM312K |
| 2                        | 80.3                            | 79.8 | 126.8                    | 126.2 | 64.995         | 65.000 | 0.005         | 0.007   | 140                          | 140.009 | 0.000         | 0.018  | 140.020                      | 140.010 | 0.029             | 0.010   | MM313K |
| 2                        | 85.3                            | 84.8 | 135.6                    | 135.1 | 69.995         | 70.000 | 0.005         | 0.007   | 150                          | 150.009 | 0.000         | 0.018  | 150.023                      | 150.012 | 0.032             | 0.012   | MM314K |
| in.                      | in.                             | in.  | in.                      | in.   | in.            | in.    | in.           | in.     | in.                          | in.     | in.           | in.    | in.                          | in.     | in.               | in.     |        |
| 0.039                    | 1.27                            | 1.26 | 2.2                      | 2.19  | 0.9841         | 0.9843 | 0.0002        | 0.0002  | 2.4409                       | 2.4412  | 0.0000        | 0.0006 | 2.44140                      | 2.44120 | 0.00080           | 0.0003  | MM305K |
| 0.039                    | 1.49                            | 1.48 | 2.57                     | 2.56  | 1.1809         | 1.1811 | 0.0002        | 0.0002  | 2.8346                       | 2.8349  | 0.0000        | 0.0006 | 2.83510                      | 2.83490 | 0.00080           | 0.0003  | MM306K |
| 0.059                    | 1.72                            | 1.7  | 2.84                     | 2.82  | 1.3778         | 1.3780 | 0.0002        | 0.00025 | 3.1496                       | 3.1499  | 0.0000        | 0.0006 | 3.15010                      | 3.14990 | 0.00080           | 0.0003  | MM308K |
| 0.059                    | 1.96                            | 1.94 | 3.2                      | 3.18  | 1.5746         | 1.5748 | 0.0002        | 0.00025 | 3.5433                       | 3.5436  | 0.0000        | 0.0006 | 3.54390                      | 3.54360 | 0.00090           | 0.0003  | MM308K |
| 0.059                    | 2.2                             | 2.18 | 3.55                     | 3.53  | 1.7715         | 1.7717 | 0.0002        | 0.00025 | 3.9370                       | 3.9373  | 0.0000        | 0.0006 | 3.93770                      | 3.93740 | 0.00100           | 0.0004  | MM309K |
| 0.059                    | 2.41                            | 2.39 | 3.93                     | 3.91  | 1.9683         | 1.9685 | 0.0002        | 0.00025 | 4.3307                       | 4.3310  | 0.0000        | 0.0006 | 4.33140                      | 4.33110 | 0.00100           | 0.0004  | MM310K |
| 0.079                    | 2.65                            | 2.63 | 4.28                     | 4.26  | 2.1652         | 2.1654 | 0.0002        | 0.0003  | 4.7244                       | 4.7247  | 0.0000        | 0.0006 | 4.72510                      | 4.72480 | 0.00100           | 0.0004  | MM311K |
| 0.079                    | 2.88                            | 2.86 | 4.64                     | 4.62  | 2.3620         | 2.3622 | 0.0002        | 0.0003  | 5.1181                       | 5.1185  | 0.0000        | 0.0007 | 5.11890                      | 5.11850 | 0.00110           | 0.0004  | MM312K |
| 0.079                    | 3.16                            | 3.14 | 4.99                     | 4.97  | 2.5589         | 2.5591 | 0.0002        | 0.0003  | 5.5118                       | 5.5122  | 0.0000        | 0.0007 | 5.51260                      | 5.51220 | 0.00110           | 0.0004  | MM313K |
| 0.079                    | 3.36                            | 3.34 | 5.34                     | 5.32  | 2.7557         | 2.7559 | 0.0002        | 0.0003  | 5.9055                       | 5.9059  | 0.0000        | 0.0007 | 5.90640                      | 5.90600 | 0.00120           | 0.00050 | MM314K |





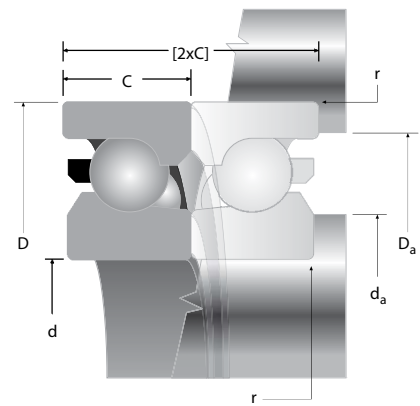


# BALL BEARINGS

## BALL SCREW SUPPORT SERIES

### DIMENSIONAL SIZES – METRIC SERIES (METRIC UNITS)

- Designed for maximum axial rigidity, low drag torque, and extreme control of lateral eccentricity.
- Manufactured to ABEC 9 axial tolerances.
- Nonseparable angular-contact type design (60° contact angle).
- Manufactured to ABEC 7 radial and envelope tolerances.
- Maximum complement of balls.
- Supplied prelubricated with heavy-duty grease NLGI #2.
- Packaged in DB arrangement [can be mounted in duplexed pairs and in multiplexed sets in either Back-to-Back (DB), Face-to-Face (DF) or Tandem (DT) arrangements].



| Bearing Number | d                 | D          | C                    | Wt.  | Ball Qty.<br>x Dia. | r<br>Rad. <sup>(2)</sup> | da (Shaft) |        | Da (Housing) |        | Shaft Dia. |        | Housing Dia. |      |
|----------------|-------------------|------------|----------------------|------|---------------------|--------------------------|------------|--------|--------------|--------|------------|--------|--------------|------|
|                | Bore              | O.D.       | Width <sup>(1)</sup> |      |                     |                          | Max.       | Min.   | Max.         | Min.   | Max.       | Min.   | Max.         | Min. |
| METRIC         | mm/tol: +0; -(µm) |            |                      | kg   | mm                  | mm                       | mm         | mm     | mm           | mm     | mm         | mm     | mm           | mm   |
| MM12BS32       | 12<br>(4)         | 32<br>(6)  | 10<br>(80)           | .04  | 11 x 4.8            | 0.8                      | 17.63      | 17.37  | 26.63        | 26.37  | 11.996     | 11.992 | 32.006       | 32   |
| MM15BS35       | 15<br>(4)         | 35<br>(6)  | 11<br>(80)           | .05  | 13 x 4.8            | 0.8                      | 20.63      | 20.37  | 29.63        | 29.37  | 14.996     | 14.992 | 35.006       | 35   |
| MM17BS47       | 17<br>(4)         | 47<br>(6)  | 15<br>(80)           | .13  | 12 x 7.9            | 0.8                      | 23.13      | 22.87  | 41.63        | 41.37  | 16.996     | 16.992 | 47.006       | 47   |
| MM20BS47       | 20<br>(5)         | 47<br>(6)  | 15<br>(120)          | .12  | 12 x 7.9            | 0.8                      | 26.13      | 25.87  | 41.63        | 41.37  | 19.995     | 19.99  | 47.006       | 47   |
| MM25BS52       | 25<br>(5)         | 52<br>(7)  | 15<br>(120)          | .14  | 13 x 7.9            | 0.8                      | 31.63      | 31.37  | 43.63        | 43.37  | 24.995     | 24.99  | 52.007       | 52   |
| MM25BS62       | 25<br>(5)         | 62<br>(7)  | 15<br>(120)          | .23  | 17 x 7.9            | 0.8                      | 35.13      | 34.87  | 56.13        | 55.87  | 24.995     | 24.99  | 62.007       | 62   |
| MM30BS62       | 30<br>(5)         | 62<br>(7)  | 15<br>(120)          | .21  | 17 x 7.9            | 0.8                      | 40.13      | 39.87  | 56.13        | 55.87  | 29.995     | 29.99  | 62.007       | 62   |
| MM30BS72       | 30<br>(5)         | 72<br>(7)  | 15<br>(120)          | .32  | 18 x 8.7            | 0.8                      | 40.13      | 39.87  | 56.13        | 55.87  | 29.995     | 29.99  | 72.007       | 72   |
| MM35BS72       | 35<br>(6)         | 72<br>(7)  | 15<br>(120)          | .29  | 18 x 8.7            | 0.8                      | 42.13      | 41.87  | 64.13        | 63.87  | 34.994     | 34.988 | 72.007       | 72   |
| MM35BS100      | 35<br>(6)         | 100<br>(8) | 20<br>(120)          | .86  | 18 x 12.7           | 0.8                      | 42.13      | 41.87  | 90.13        | 89.87  | 39.994     | 39.988 | 72.007       | 72   |
| MM40BS72       | 40<br>(6)         | 72<br>(7)  | 15<br>(120)          | .25  | 18 x 8.7            | 0.8                      | 47.13      | 46.87  | 64.13        | 63.87  | 44.994     | 44.988 | 75.007       | 75   |
| MM40BS90       | 40<br>(6)         | 90<br>(8)  | 15<br>(120)          | .49  | 24 x 8.7            | 0.8                      | 47.13      | 46.87  | 82.13        | 81.87  | 39.994     | 39.988 | 90.008       | 90   |
| MM40BS90-20    | 40<br>(6)         | 90<br>(8)  | 20<br>(120)          | .66  | 24 x 8.7            | 0.8                      | 47.13      | 46.87  | 82.13        | 81.87  | 39.994     | 39.998 | 90.008       | 90   |
| MM40BS90-23    | 40<br>(6)         | 90<br>(8)  | 23<br>(120)          | .75  | 24 x 8.7            | 0.8                      | 47.13      | 46.87  | 82.13        | 81.87  | 39.994     | 39.988 | 90.008       | 90   |
| MM40BS100      | 40<br>(6)         | 100<br>(8) | 20<br>(120)          | .82  | 18 x 12.7           | 0.8                      | 47.13      | 46.87  | 90.13        | 89.87  | 39.994     | 39.988 | 100.007      | 100  |
| MM45BS75       | 45<br>(6)         | 75<br>(7)  | 15<br>(120)          | .25  | 20 x 8.7            | 0.8                      | 52.13      | 51.87  | 69.13        | 68.87  | 39.994     | 39.988 | 72.007       | 72   |
| MM45BS100      | 45<br>(6)         | 100<br>(8) | 20<br>(120)          | .76  | 18 x 12.7           | 0.8                      | 54.13      | 53.87  | 90.13        | 89.87  | 44.994     | 44.988 | 100.008      | 100  |
| MM50BS90       | 50<br>(6)         | 90<br>(8)  | 15<br>(120)          | .41  | 24 x 8.7            | 0.8                      | 59.13      | 58.87  | 82.13        | 81.87  | 49.994     | 49.988 | 90.008       | 90   |
| MM50BS100      | 50<br>(6)         | 100<br>(8) | 20<br>(120)          | .71  | 18 x 12.7           | 0.8                      | 59.13      | 58.87  | 90.13        | 89.87  | 49.994     | 49.988 | 100.008      | 100  |
| MM55BS90       | 55<br>(7)         | 90<br>(8)  | 15<br>(150)          | .36  | 24 x 8.7            | 0.8                      | 63.13      | 62.87  | 82.13        | 81.87  | 54.993     | 54.986 | 90.008       | 90   |
| MM55BS120      | 55<br>(7)         | 120<br>(8) | 20<br>(150)          | 1.14 | 21 x 12.7           | 1                        | 65.13      | 64.87  | 110.13       | 109.87 | 54.993     | 54.986 | 120.008      | 120  |
| MM60BS120      | 60<br>(7)         | 120<br>(8) | 20<br>(150)          | 1.06 | 21 x 12.7           | 1                        | 70.13      | 69.87  | 110.13       | 109.87 | 59.993     | 59.986 | 120.008      | 120  |
| MM75BS110      | 75<br>(7)         | 110<br>(8) | 15<br>(150)          | .46  | 30 x 8.7            | 0.8                      | 84.13      | 83.87  | 102.13       | 101.87 | 74.993     | 74.986 | 110.008      | 110  |
| MM100BS150     | 100<br>(8)        | 150<br>(9) | 20<br>(200)          | 1.28 | 26 x 12.7           | 1                        | 110.13     | 109.87 | 138.13       | 137.87 | 99.992     | 99.984 | 150.009      | 150  |

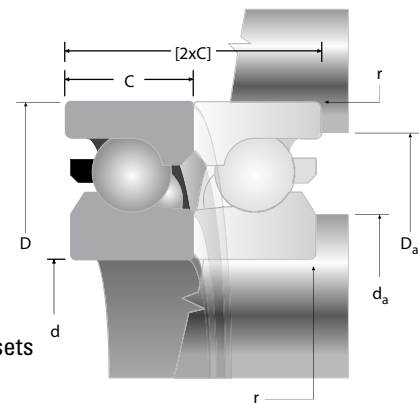
(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

(2) ABMA STD 20 (r<sub>as</sub> max).

## BALL SCREW SUPPORT SERIES

### DIMENSIONAL SIZES – METRIC SERIES (INCH UNITS)

- Designed for maximum axial rigidity, low drag torque, and extreme control of lateral eccentricity.
- Manufactured to ABEC 9 axial tolerances.
- Nonseparable angular-contact type design (60° contact angle).
- Manufactured to ABEC 7 radial and envelope tolerances.
- Maximum complement of balls.
- Supplied prelubricated with heavy-duty grease NLGI #2.
- Packaged in DB arrangement [can be mounted in duplexed pairs and in multiplexed sets in either Back-to-Back (DB), Face-to-Face (DF) or Tandem (DT) arrangements].



| Bearing Number | d                 | D               | C                    | Wt. <sup>(3)</sup> | Ball Qty.<br>x Dia. | r<br>Rad. <sup>(2)</sup> | da (Shaft) |        | Da (Housing) |        | Shaft Dia. |        | Housing Dia. |        |
|----------------|-------------------|-----------------|----------------------|--------------------|---------------------|--------------------------|------------|--------|--------------|--------|------------|--------|--------------|--------|
|                | Bore              | O.D.            | Width <sup>(1)</sup> |                    |                     |                          | Max.       | Min.   | Max.         | Min.   | Max.       | Min.   | Max.         | Min.   |
| INCH           | mm/tol: +0; -(µm) |                 |                      | lbs.               | in.                 | in.                      | in.        | in.    | in.          | in.    | in.        | in.    | in.          | in.    |
| MM12BS32       | 0.4724<br>(1.5)   | 1.2598<br>(2.5) | 0.3937<br>(31)       | 0.09               | 11 x 3/16           | 0.031                    | 0.6941     | 0.6839 | 1.0484       | 1.0382 | 0.4723     | 0.4721 | 1.2601       | 1.2598 |
| MM15BS35       | 0.5906<br>(1.5)   | 1.3780<br>(2.5) | 0.4331<br>(31)       | 0.11               | 13 x 3/16           | 0.031                    | 0.8122     | 0.8020 | 1.1665       | 1.1563 | 0.5904     | 0.5902 | 1.3782       | 1.3780 |
| MM17BS47       | 0.6693<br>(1.5)   | 1.8504<br>(2.5) | 0.5906<br>(31)       | 0.29               | 12 x 5/32           | 0.031                    | 0.9106     | 0.9004 | 1.6390       | 1.6287 | 0.6691     | 0.6690 | 1.8506       | 1.8504 |
| MM20BS47       | 0.7874<br>(2)     | 1.8504<br>(2.5) | 0.5906<br>(47)       | 0.26               | 12 x 5/32           | 0.031                    | 1.0287     | 1.0185 | 1.6390       | 1.6287 | 0.7872     | 0.7870 | 1.8506       | 1.8504 |
| MM25BS52       | 0.9843<br>(2)     | 2.0472<br>(3)   | 0.5906<br>(47)       | 0.37               | 13 x 5/32           | 0.031                    | 1.2453     | 1.2350 | 1.7177       | 1.7075 | 0.9841     | 0.9839 | 2.0475       | 2.0472 |
| MM25BS62       | 0.9843<br>(2)     | 2.4409<br>(3)   | 0.5906<br>(47)       | 0.51               | 17 x 5/32           | 0.031                    | 1.3831     | 1.3728 | 2.2098       | 2.1996 | 0.9841     | 0.9839 | 2.4412       | 2.4409 |
| MM30BS62       | 1.1811<br>(2)     | 2.4409<br>(3)   | 0.5906<br>(47)       | 0.46               | 17 x 5/32           | 0.031                    | 1.5799     | 1.5697 | 2.2098       | 2.1996 | 1.1809     | 1.1807 | 2.4412       | 2.4409 |
| MM30BS72       | 1.1811<br>(2)     | 2.8346<br>(3)   | 0.5906<br>(47)       | 0.71               | 18 x 11/32          | 0.031                    | 1.5799     | 1.5697 | 2.2098       | 2.1996 | 1.1809     | 1.1807 | 2.8349       | 2.8346 |
| MM35BS72       | 1.3780<br>(2.5)   | 2.8346<br>(3)   | 0.5906<br>(47)       | 0.64               | 18 x 11/32          | 0.031                    | 1.6587     | 1.6484 | 2.5248       | 2.5146 | 1.3777     | 1.3775 | 2.8349       | 2.8346 |
| MM35BS100      | 1.3780<br>(2.5)   | 3.9370<br>(3)   | 0.7874<br>(47)       | 1.90               | 18 x 1/2            | 0.031                    | 1.6587     | 1.6484 | 3.5484       | 3.5382 | 1.3777     | 1.3775 | 3.9373       | 3.9370 |
| MM40BS72       | 1.5748<br>(2.5)   | 2.8346<br>(3)   | 0.5906<br>(47)       | 0.55               | 18 x 11/32          | 0.031                    | 1.8555     | 1.8453 | 2.5248       | 2.5146 | 1.5746     | 1.5743 | 2.8349       | 2.8346 |
| MM40BS90       | 1.5748<br>(2.5)   | 3.5433<br>(3)   | 0.5906<br>(47)       | 1.08               | 24 x 11/32          | 0.031                    | 1.8555     | 1.8453 | 3.2335       | 3.2232 | 1.5746     | 1.5743 | 3.5436       | 3.5433 |
| MM40BS90-20    | 1.5748<br>(2.5)   | 3.5433<br>(3)   | 0.7874<br>(47)       | 1.46               | 24 x 11/32          | 0.031                    | 1.8555     | 1.8453 | 3.2335       | 3.2232 | 1.5746     | 1.5743 | 3.5436       | 3.5433 |
| MM40BS90-23    | 1.5748<br>(2.5)   | 3.5433<br>(3)   | 0.9055<br>(47)       | 1.65               | 24 x 11/32          | 0.031                    | 1.8555     | 1.8453 | 3.2335       | 3.2232 | 1.5746     | 1.5743 | 3.5436       | 3.5433 |
| MM40BS100      | 1.5748<br>(2.5)   | 3.9370<br>(3)   | 0.7874<br>(47)       | 1.81               | 18 x 1/2            | 0.031                    | 1.8555     | 1.8453 | 3.5484       | 3.5382 | 1.5746     | 1.5743 | 3.9373       | 3.9370 |
| MM45BS75       | 1.7717<br>(2.5)   | 2.9528<br>(3)   | 0.5906<br>(47)       | 0.55               | 20 x 11/32          | 0.031                    | 2.0524     | 2.0421 | 2.7217       | 2.7114 | 1.7714     | 1.7712 | 2.9530       | 2.9528 |
| MM45BS100      | 1.7717<br>(2.5)   | 3.9370<br>(3)   | 0.7874<br>(47)       | 1.68               | 18 x 1/2            | 0.031                    | 2.1311     | 2.1209 | 3.5484       | 3.5382 | 1.7714     | 1.7712 | 3.9373       | 3.9370 |
| MM50BS90       | 1.9685<br>(2.5)   | 3.5433<br>(3)   | 0.5906<br>(47)       | 0.90               | 24 x 11/32          | 0.031                    | 2.3280     | 2.3177 | 3.2335       | 3.2232 | 1.9683     | 1.9680 | 3.5436       | 3.5433 |
| MM50BS100      | 1.9685<br>(2.5)   | 3.9370<br>(3)   | 0.7874<br>(47)       | 1.57               | 18 x 1/2            | 0.031                    | 2.3280     | 2.3177 | 3.5484       | 3.5382 | 1.9683     | 1.9680 | 3.9373       | 3.9370 |
| MM55BS90       | 2.1654<br>(3)     | 3.5433<br>(3)   | 0.5906<br>(59)       | 0.79               | 24 x 11/32          | 0.031                    | 2.4854     | 2.4752 | 3.2335       | 3.2232 | 2.1651     | 2.1648 | 3.5436       | 3.5433 |
| MM55BS120      | 2.1654<br>(3)     | 4.7244<br>(3)   | 0.7874<br>(59)       | 2.51               | 21 x 1/2            | 0.039                    | 2.5642     | 2.5539 | 4.3358       | 4.3256 | 2.1651     | 2.1648 | 4.7247       | 4.7244 |
| MM60BS120      | 2.3622<br>(3)     | 4.7244<br>(3)   | 0.7874<br>(59)       | 2.34               | 21 x 1/2            | 0.039                    | 2.7610     | 2.7508 | 4.3358       | 4.3256 | 2.3619     | 2.3617 | 4.7247       | 4.7244 |
| MM75BS110      | 2.9528<br>(3)     | 4.3307<br>(3)   | 0.5906<br>(59)       | 1.01               | 30 x 11/32          | 0.031                    | 3.3122     | 3.3020 | 4.0209       | 4.0106 | 2.9525     | 2.9522 | 4.3310       | 4.3307 |
| MM100BS150     | 3.9370<br>(3)     | 5.9055<br>(3.5) | 0.7874<br>(79)       | 2.82               | 26 x 1/2            | 0.039                    | 4.3358     | 4.3256 | 5.4382       | 5.4280 | 3.9367     | 3.9364 | 5.9059       | 5.9055 |

<sup>(1)</sup>Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

<sup>(2)</sup>ABMA STD 20 (r<sub>as</sub> max).

<sup>(3)</sup>Single bearing.

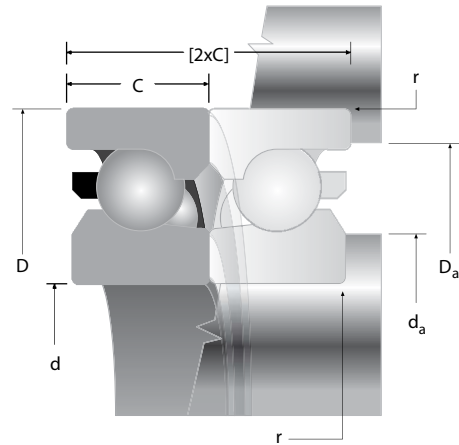


# BALL BEARINGS

## BALL SCREW SUPPORT SERIES

### DIMENSIONAL SIZES – INCH SERIES

- Designed for maximum axial rigidity, low drag torque, and extreme control of lateral eccentricity.
- Manufactured to ABEC 9 axial tolerances.
- Nonseparable angular-contact type design (60° contact angle).
- Manufactured to ABEC 7 radial and envelope tolerances.
- Maximum complement of balls.
- Supplied prelubricated with heavy-duty grease NLGI #2.
- Packaged in DB arrangement [can be mounted in duplexed pairs and in multiplexed sets in either Back-to-Back (DB), Face-to-Face (DF) or Tandem (DT) arrangements].



### INCHES DIMENSIONAL SIZES - BALL SCREW SUPPORT SERIES

| Bearing Number    | d Bore                |                 | D O.D.         | C Width <sup>(1)</sup> | Wt. <sup>(4)</sup><br>lbs. | Ball Qty.<br>x Dia.<br>in. | r<br>Rad. <sup>(2)</sup><br>in. | d <sub>a</sub> (Shaft) |         | D <sub>a</sub> (Housing) |         | Shaft Dia. |         | Housing Dia. |      |
|-------------------|-----------------------|-----------------|----------------|------------------------|----------------------------|----------------------------|---------------------------------|------------------------|---------|--------------------------|---------|------------|---------|--------------|------|
|                   | in/tol: +0; -0.000(X) |                 |                |                        |                            |                            |                                 | Max.                   | Min.    | Max.                     | Min.    | Max.       | Min.    | Max.         | Min. |
| <b>MM9306WI2H</b> | 0.7874<br>(2)         | 1.8504<br>(2.5) | 0.625<br>(47)  | 0.28                   | 12 x 5/16                  | 0.031                      | 1.083                           | 1.073                  | 1.641   | 1.631                    | 0.7872  | 0.787      | 1.8507  | 1.8504       |      |
| <b>MM9308WI2H</b> | 0.9385<br>(2)         | 2.4409<br>(3)   | 0.625<br>(47)  | 0.56                   | 17 x 5/16                  | 0.031                      | 1.321                           | 1.311                  | 2.179   | 2.169                    | 0.9383  | 0.9381     | 2.4412  | 2.4409       |      |
| <b>MM9310WI2H</b> | 1.5000<br>(2.5)       | 2.8346<br>(3)   | 0.6250<br>(47) | 0.62                   | 18 x 11/32                 | 0.031                      | 1.865                           | 1.855                  | 2.479   | 2.469                    | 1.4997  | 1.4994     | 2.8349  | 2.8346       |      |
| <b>MM9311WI3H</b> | 1.7510<br>(2.5)       | 3.0000<br>(3)   | 0.6250<br>(47) | 0.63                   | 20 x 11/32                 | 0.031                      | 2.057                           | 2.047                  | 2.672   | 2.662                    | 1.7507  | 1.7504     | 3.0003  | 3.0000       |      |
| <b>MM9313WI5H</b> | 2.2500<br>(3)         | 3.5433<br>(3)   | 0.6250<br>(59) | 0.80                   | 24 x 11/32                 | 0.031                      | 2.577                           | 2.567                  | 3.196   | 3.186                    | 2.2497  | 2.2494     | 3.5436  | 3.5433       |      |
| <b>MM9316WI3H</b> | 3.0000<br>(3)         | 4.3307<br>(3)   | 0.6250<br>(59) | 1.04                   | 30 x 11/32                 | 0.031                      | 3.380                           | 3.370                  | 4.000   | 3.990                    | 2.9997  | 2.9994     | 4.3310  | 4.3307       |      |
| <b>MM9321WI3</b>  | 4.0000<br>(3)         | 5.7087<br>(3.5) | 0.8750<br>(79) | 2.60                   | 37 x 3/8                   | 0.039                      | 4.418                           | 4.408                  | 5.301   | 5.291                    | 3.9997  | 3.9994     | 5.7091  | 5.7087       |      |
| <b>MM9326WI6H</b> | 5.0000<br>(3)         | 7.0866<br>(4)   | 0.8750<br>(98) | 3.85                   | 35 x 1/2                   | 0.039                      | 5.669                           | 5.659                  | 6.611   | 6.601                    | 4.9997  | 4.9994     | 7.0870  | 7.0866       |      |
| <b>MWTRIC</b>     | mm/tol: +0; -(mm)     |                 |                | kg                     | mm                         | mm                         | mm                              | mm                     | mm      | mm                       | mm      | mm         | mm      | mm           |      |
| <b>MM9306WI2H</b> | 20<br>(5)             | 47<br>(6)       | 15.88<br>(120) | 0.13                   | 12 x 7.9                   | 0.8                        | 27.508                          | 27.254                 | 41.681  | 41.427                   | 19.995  | 19.990     | 47.008  | 47.000       |      |
| <b>MM9308WI2H</b> | 23.8<br>(5)           | 62.0<br>(7)     | 15.88<br>(120) | 0.25                   | 17 x 7.9                   | 0.8                        | 33.553                          | 33.299                 | 55.347  | 55.093                   | 23.833  | 23.828     | 62.006  | 61.999       |      |
| <b>MM9310WI2H</b> | 38.1<br>(6)           | 72<br>(7)       | 15.88<br>(120) | 0.28                   | 18 x 8.7                   | 0.8                        | 47.371                          | 47.117                 | 62.967  | 62.713                   | 38.092  | 38.085     | 72.006  | 71.999       |      |
| <b>MM9311WI3H</b> | 44.5<br>(6)           | 76.2<br>(7)     | 15.88<br>(120) | 0.29                   | 20 x 8.7                   | 0.8                        | 52.248                          | 51.994                 | 67.869  | 67.615                   | 44.468  | 44.460     | 76.208  | 76.200       |      |
| <b>MM9313WI5H</b> | 57.2<br>(7)           | 90<br>(7)       | 15.88<br>(150) | 0.36                   | 24 x 8.7                   | 0.8                        | 65.456                          | 65.202                 | 81.178  | 80.924                   | 57.142  | 57.135     | 90.007  | 90.000       |      |
| <b>MM9316WI3H</b> | 76.2<br>(7)           | 110<br>(7)      | 15.88<br>(150) | 0.47                   | 30 x 8.7                   | 0.8                        | 85.852                          | 85.598                 | 101.600 | 101.346                  | 76.192  | 76.185     | 110.007 | 110.000      |      |
| <b>MM9321WI3</b>  | 101.6<br>(7)          | 145<br>(9)      | 22.23<br>(200) | 1.18                   | 37 x 9.5                   | 1                          | 112.217                         | 111.963                | 134.645 | 134.391                  | 101.592 | 101.585    | 145.011 | 145.001      |      |
| <b>MM9326WI6H</b> | 127<br>(7)            | 180<br>(10)     | 22.23<br>(250) | 1.75                   | 35 x 12.7                  | 1                          | 143.993                         | 143.739                | 167.919 | 167.665                  | 126.992 | 126.985    | 180.010 | 180.000      |      |

(1) Width tolerance of preloaded bearing set +0/-0.25 mm (+0/-0.010").

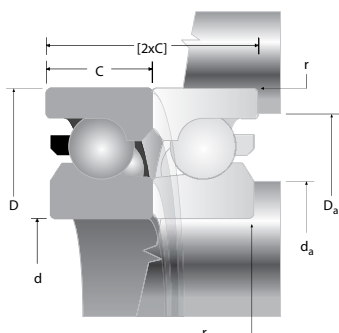
(2) Refer to engineering section for width tolerance of preloaded ball screw support bearings.

(3) ABMA Std. 20 (r<sub>as</sub> max).

(4) Single bearing.

## BALL SCREW SUPPORT SERIES

### PERFORMANCE DATA METRIC SERIES (METRIC UNITS)



| Bearing Number                            | Static Limiting Thrust Capacity <sup>(3)</sup><br>T <sub>L</sub> | Dynamic Axial Thrust Load Rating <sup>(1)(3)</sup><br>C <sub>ae</sub> | Max. Speed<br>RPM | Axial Spring Constant <sup>(3)</sup><br>N/μm | Drag Torque (preloaded set)<br>N-m | Preload <sup>(2)(3)</sup><br>(Heavy)<br>N |
|-------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------|----------------------------------------------|------------------------------------|-------------------------------------------|
| <b>METRIC SERIES - METRIC UNITS - DUH</b> |                                                                  |                                                                       |                   |                                              |                                    |                                           |
| MM12BS32DUH                               | 11400                                                            | 9500                                                                  | 7300              | 425                                          | 0.28                               | 1000                                      |
| MM15BS35DUH                               | 13700                                                            | 10400                                                                 | 6400              | 490                                          | 0.30                               | 1200                                      |
| MM17BS47DUH                               | 24900                                                            | 24900                                                                 | 4700              | 750                                          | 0.32                               | 3110                                      |
| MM20BS47DUH                               | 24900                                                            | 24900                                                                 | 4700              | 750                                          | 0.32                               | 3110                                      |
| MM25BS52DUH                               | 27100                                                            | 26000                                                                 | 4300              | 780                                          | .39                                | 2700                                      |
| MM25BS62DUH                               | 35600                                                            | 29800                                                                 | 3300              | 1050                                         | 0.44                               | 4450                                      |
| MM30BS62DUH                               | 35600                                                            | 29800                                                                 | 3300              | 1050                                         | 0.44                               | 4450                                      |
| MM30BS72DUH                               | 45400                                                            | 36300                                                                 | 2900              | 1260                                         | 0.44                               | 6230                                      |
| MM35BS72DUH                               | 45400                                                            | 36300                                                                 | 2900              | 1260                                         | 0.44                               | 6230                                      |
| MM40BS72DUH                               | 45400                                                            | 36300                                                                 | 2900              | 1260                                         | 0.44                               | 6230                                      |
| MM45BS75DUH                               | 50700                                                            | 38500                                                                 | 2700              | 1380                                         | 0.56                               | 6670                                      |
| MM40BS90DUH                               | 60900                                                            | 41400                                                                 | 2200              | 1660                                         | 0.82                               | 8010                                      |
| MM40BS90-20DUH                            | 60900                                                            | 41400                                                                 | 2200              | 1660                                         | .82                                | 8010                                      |
| MM40BS90-23DUH                            | 60900                                                            | 41400                                                                 | 2200              | 1660                                         | .82                                | 8010                                      |
| MM50BS90DUH                               | 60900                                                            | 41400                                                                 | 2200              | 1660                                         | 0.82                               | 8010                                      |
| MM55BS90DUH                               | 60900                                                            | 41400                                                                 | 2200              | 1660                                         | 0.82                               | 8010                                      |
| MM35BS100DUH                              | 93400                                                            | 71200                                                                 | 2000              | 1750                                         | 1.02                               | 12900                                     |
| MM40BS100DUH                              | 93400                                                            | 71200                                                                 | 2000              | 1750                                         | 1.02                               | 12900                                     |
| MM45BS100DUH                              | 93400                                                            | 71200                                                                 | 2000              | 1750                                         | 1.02                               | 12900                                     |
| MM50BS100DUH                              | 93400                                                            | 71200                                                                 | 2000              | 1750                                         | 1.02                               | 12900                                     |
| MM75BS110DUH                              | 77000                                                            | 44500                                                                 | 1700              | 2080                                         | 1.00                               | 9790                                      |
| MM55BS120DUH                              | 133400                                                           | 75600                                                                 | 1700              | 2150                                         | 1.36                               | 15570                                     |
| MM60BS120DUH                              | 133400                                                           | 75600                                                                 | 1700              | 2150                                         | 1.36                               | 15570                                     |
| MM100BS150DUH                             | 115600                                                           | 57400                                                                 | 1300              | 3400                                         | 2.18                               | 21350                                     |
| <b>METRIC SERIES - METRIC UNITS - QUH</b> |                                                                  |                                                                       |                   |                                              |                                    |                                           |
| MM12BS32QUH                               | 22800                                                            | 15400                                                                 | 5100              | 850                                          | 0.56                               | 2000                                      |
| MM15BS35QUH                               | 27400                                                            | 16850                                                                 | 4500              | 980                                          | 0.60                               | 2400                                      |
| MM17BS47QUH                               | 49800                                                            | 40500                                                                 | 3300              | 1510                                         | 0.64                               | 6230                                      |
| MM20BS47QUH                               | 49800                                                            | 40500                                                                 | 3300              | 1510                                         | 0.64                               | 6230                                      |
| MM25BS52QUH                               | 54300                                                            | 42300                                                                 | 3000              | 1560                                         | 0.49                               | 5400                                      |
| MM25BS62QUH                               | 71200                                                            | 48500                                                                 | 2300              | 2100                                         | 0.88                               | 8900                                      |
| MM30BS62QUH                               | 71200                                                            | 48500                                                                 | 2300              | 2100                                         | 0.88                               | 8900                                      |
| MM30BS72QUH                               | 90700                                                            | 58700                                                                 | 2000              | 2520                                         | 0.88                               | 12450                                     |
| MM35BS72QUH                               | 90700                                                            | 58700                                                                 | 2000              | 2520                                         | 0.88                               | 12450                                     |
| MM40BS72QUH                               | 90700                                                            | 58700                                                                 | 2000              | 2520                                         | 0.88                               | 12450                                     |
| MM45BS75QUH                               | 101400                                                           | 62700                                                                 | 1900              | 2770                                         | 1.12                               | 13340                                     |
| MM40BS90QUH                               | 121900                                                           | 67200                                                                 | 1500              | 3330                                         | 1.64                               | 16010                                     |
| MM50BS90QUH                               | 121900                                                           | 67200                                                                 | 1500              | 3330                                         | 1.64                               | 16010                                     |
| MM55BS90QUH                               | 121900                                                           | 67200                                                                 | 1500              | 3330                                         | 1.64                               | 16010                                     |
| MM35BS100QUH                              | 186800                                                           | 115600                                                                | 1400              | 3500                                         | 2.04                               | 25800                                     |
| MM40BS100QUH                              | 186800                                                           | 115600                                                                | 1400              | 3500                                         | 2.04                               | 25800                                     |
| MM45BS100QUH                              | 186800                                                           | 115600                                                                | 1400              | 3500                                         | 2.04                               | 25800                                     |
| MM50BS100QUH                              | 186800                                                           | 115600                                                                | 1400              | 3500                                         | 2.04                               | 25800                                     |
| MM75BS110QUH                              | 153900                                                           | 72100                                                                 | 1200              | 4170                                         | 2.00                               | 19570                                     |
| MM55BS120QUH                              | 266900                                                           | 122800                                                                | 1200              | 4310                                         | 2.72                               | 31140                                     |
| MM60BS120QUH                              | 266900                                                           | 122800                                                                | 1200              | 4310                                         | 2.72                               | 31140                                     |
| MM100BS150QUH                             | 231300                                                           | 93400                                                                 | 900               | 6790                                         | 4.36                               | 42700                                     |

(1) Based on 1500 hours L<sub>10</sub> life and permissible speed.

(2) Heavy preload is standard.

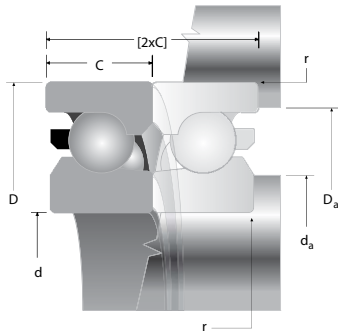
(3) Data presented is for a single bearing in a DUH set and for two bearings in a QUH set mounted DB or DF.



# BALL BEARINGS

## BALL SCREW SUPPORT SERIES

### PERFORMANCE DATA METRIC SERIES (INCH UNITS)



| Bearing Number                          | Static Limiting Thrust Capacity <sup>(3)</sup> | Dynamic Axial Thrust Load Rating <sup>(1)(3)</sup> | Max. Speed | Axial Spring Constant <sup>(3)</sup> | Drag Torque (preloaded set) | Preload <sup>(2)(3)</sup> (Heavy) |
|-----------------------------------------|------------------------------------------------|----------------------------------------------------|------------|--------------------------------------|-----------------------------|-----------------------------------|
|                                         | T <sub>L</sub>                                 | C <sub>ae</sub>                                    |            |                                      |                             |                                   |
|                                         | lbs.                                           | lbs.                                               | RPM        | 10 <sup>6</sup> lbs./in.             | in.-lbs.                    | lbs.                              |
| <b>METRIC SERIES - INCH UNITS - DUH</b> |                                                |                                                    |            |                                      |                             |                                   |
| MM12BS32DUH                             | 2600                                           | 2140                                               | 7300       | 2.4                                  | 2.48                        | 200                               |
| MM15BS35DUH                             | 3100                                           | 2340                                               | 6400       | 2.8                                  | 2.65                        | 300                               |
| MM17BS47DUH                             | 5600                                           | 5600                                               | 4700       | 4.3                                  | 2.83                        | 700                               |
| MM20BS47DUH                             | 5600                                           | 5600                                               | 4700       | 4.3                                  | 2.83                        | 700                               |
| MM25BS52DUH                             | 6100                                           | 5850                                               | 4300       | 4.5                                  | 3.45                        | 600                               |
| MM25BS62DUH                             | 8000                                           | 6700                                               | 3300       | 6                                    | 3.88                        | 1000                              |
| MM30BS62DUH                             | 8000                                           | 6700                                               | 3300       | 6                                    | 3.88                        | 1000                              |
| MM30BS72DUH                             | 10200                                          | 8160                                               | 2900       | 7.2                                  | 3.88                        | 1400                              |
| MM35BS72DUH                             | 10200                                          | 8160                                               | 2900       | 7.2                                  | 3.88                        | 1400                              |
| MM40BS72DUH                             | 10200                                          | 8160                                               | 2900       | 7.2                                  | 3.88                        | 1400                              |
| MM45BS75DUH                             | 11400                                          | 8660                                               | 2700       | 7.9                                  | 4.96                        | 1500                              |
| MM40BS90DUH                             | 13700                                          | 9310                                               | 2200       | 9.5                                  | 7.26                        | 1800                              |
| MM40BS90DUH-20                          | 13700                                          | 9310                                               | 2200       | 9.5                                  | 7.26                        | 1800                              |
| MM40BS90DUH-23                          | 13700                                          | 9310                                               | 2200       | 9.5                                  | 7.26                        | 1800                              |
| MM50BS90DUH                             | 13700                                          | 9310                                               | 2200       | 9.5                                  | 7.26                        | 1800                              |
| MM55BS90DUH                             | 13700                                          | 9310                                               | 2200       | 9.5                                  | 7.26                        | 1800                              |
| MM35BS100DUH                            | 21000                                          | 16010                                              | 2000       | 10                                   | 9.03                        | 2900                              |
| MM40BS100DUH                            | 21000                                          | 16010                                              | 2000       | 10                                   | 9.03                        | 2900                              |
| MM45BS100DUH                            | 21000                                          | 16010                                              | 2000       | 10                                   | 9.03                        | 2900                              |
| MM50BS100DUH                            | 21000                                          | 16010                                              | 2000       | 10                                   | 9.03                        | 2900                              |
| MM75BS110DUH                            | 17300                                          | 10000                                              | 1700       | 11.9                                 | 8.85                        | 2200                              |
| MM55BS120DUH                            | 30000                                          | 17000                                              | 1700       | 12.3                                 | 12.04                       | 3500                              |
| MM60BS120DUH                            | 30000                                          | 17000                                              | 1700       | 12.3                                 | 12.04                       | 3500                              |
| MM100BS150DUH                           | 26000                                          | 12900                                              | 1300       | 19.4                                 | 19.29                       | 4800                              |
| <b>METRIC SERIES - INCH UNITS - QUH</b> |                                                |                                                    |            |                                      |                             |                                   |
| MM12BS32QUH                             | 5100                                           | 3500                                               | 5100       | 4.9                                  | 4.96                        | 400                               |
| MM15BS35QUH                             | 6200                                           | 3800                                               | 4500       | 5.6                                  | 5.31                        | 500                               |
| MM17BS47QUH                             | 11200                                          | 9100                                               | 3300       | 8.6                                  | 5.65                        | 1400                              |
| MM20BS47QUH                             | 11200                                          | 9100                                               | 3300       | 8.6                                  | 5.65                        | 1400                              |
| MM25BS52QUH                             | 12200                                          | 9500                                               | 3000       | 8.9                                  | 6.90                        | 1200                              |
| MM25BS62QUH                             | 16000                                          | 10900                                              | 2300       | 12                                   | 7.78                        | 2000                              |
| MM30BS62QUH                             | 16000                                          | 10900                                              | 2300       | 12                                   | 7.78                        | 2000                              |
| MM30BS72QUH                             | 20400                                          | 13200                                              | 2000       | 14.4                                 | 7.78                        | 2800                              |
| MM35BS72QUH                             | 20400                                          | 13200                                              | 2000       | 14.4                                 | 7.78                        | 2800                              |
| MM40BS72QUH                             | 20400                                          | 13200                                              | 2000       | 14.4                                 | 7.78                        | 2800                              |
| MM45BS75QUH                             | 22800                                          | 14100                                              | 1900       | 15.8                                 | 9.92                        | 3000                              |
| MM40BS90QUH                             | 27400                                          | 15100                                              | 1500       | 19                                   | 14.51                       | 3600                              |
| MM50BS90QUH                             | 27400                                          | 15100                                              | 1500       | 19                                   | 14.51                       | 3600                              |
| MM55BS90QUH                             | 27400                                          | 15100                                              | 1500       | 19                                   | 14.51                       | 3600                              |
| MM35BS100QUH                            | 42000                                          | 26000                                              | 1400       | 20                                   | 18.05                       | 5800                              |
| MM40BS100QUH                            | 42000                                          | 26000                                              | 1400       | 20                                   | 18.05                       | 5800                              |
| MM45BS100QUH                            | 42000                                          | 26000                                              | 1400       | 20                                   | 18.05                       | 5800                              |
| MM50BS100QUH                            | 42000                                          | 26000                                              | 1400       | 20                                   | 18.05                       | 5800                              |
| MM75BS110QUH                            | 34600                                          | 16200                                              | 1200       | 23.8                                 | 17.70                       | 4400                              |
| MM55BS120QUH                            | 60000                                          | 27600                                              | 1200       | 24.6                                 | 24.08                       | 7000                              |
| MM60BS120QUH                            | 60000                                          | 27600                                              | 1200       | 24.6                                 | 24.08                       | 7000                              |
| MM100BS150QUH                           | 52000                                          | 21000                                              | 900        | 38.8                                 | 38.59                       | 9600                              |

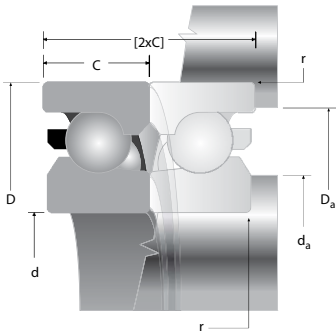
(1) Based on 1500 hours L<sub>10</sub> life and permissible speed.

(2) Heavy preload is standard.

(3) Data presented is for a single bearing in a DUH set and for two bearings in a QUH set mounted DB or DF.

**BALL SCREW  
SUPPORT SERIES**

**PERFORMANCE DATA  
INCH SERIES  
(INCH UNITS)**



| Bearing Number                                | Static Limiting Thrust Capacity <sup>(3)</sup><br>T <sub>L</sub> | Dynamic Axial Thrust Load Rating <sup>(1)(3)</sup><br>C <sub>ae</sub> | Max. Speed | Axial Spring Constant <sup>(3)</sup> | Drag Torque (preloaded set) | Preload <sup>(2)(3)</sup> (Heavy) |
|-----------------------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------|------------|--------------------------------------|-----------------------------|-----------------------------------|
|                                               | lbs.                                                             | lbs.                                                                  | RPM        | 10 <sup>6</sup> lbs./in.             | in.-lbs.                    | lbs.                              |
| <b>INCH SERIES - INCH UNITS - DUH / QUH</b>   |                                                                  |                                                                       |            |                                      |                             |                                   |
| MM9306W12HDUH                                 | 5600                                                             | 5600                                                                  | 4700       | 4.30                                 | 2.83                        | 700                               |
| MM9308W12HDUH                                 | 8000                                                             | 6700                                                                  | 3300       | 6.00                                 | 3.89                        | 1000                              |
| MM9310W12HDUH                                 | 10200                                                            | 8150                                                                  | 2900       | 7.20                                 | 3.89                        | 1400                              |
| MM9311W13HDUH                                 | 11400                                                            | 8650                                                                  | 2700       | 7.90                                 | 4.96                        | 1500                              |
| MM9313W15HDUH                                 | 13700                                                            | 9300                                                                  | 2200       | 9.50                                 | 7.26                        | 1800                              |
| MM9316W13HDUH                                 | 17300                                                            | 10000                                                                 | 1700       | 11.90                                | 8.85                        | 2200                              |
| MM9321W13DUH                                  | 26000                                                            | 12900                                                                 | 1300       | 19.40                                | 9.01                        | 4800                              |
| MM9326W16HDUH                                 | 42000                                                            | 21200                                                                 | 1000       | 20.70                                | 11.1                        | 6000                              |
| MM9306W12HQUH                                 | 11200                                                            | 9100                                                                  | 3300       | 8.60                                 | 5.66                        | 1400                              |
| MM9308W12HQUH                                 | 16000                                                            | 10900                                                                 | 2300       | 12.00                                | 7.78                        | 2000                              |
| MM9310W12HQUH                                 | 20400                                                            | 13200                                                                 | 2000       | 14.40                                | 7.78                        | 2800                              |
| MM9311W13HQUH                                 | 22800                                                            | 14100                                                                 | 1900       | 15.80                                | 9.92                        | 3000                              |
| MM9313W15HQUH                                 | 27400                                                            | 15100                                                                 | 1500       | 19.00                                | 14.52                       | 3600                              |
| MM9316W13HQUH                                 | 34600                                                            | 16200                                                                 | 1200       | 23.80                                | 17.7                        | 4400                              |
| MM9321W13QUH                                  | 52000                                                            | 21000                                                                 | 900        | 38.80                                | 18.02                       | 9600                              |
| MM9326W16HQUH                                 | 84000                                                            | 34400                                                                 | 700        | 41.40                                | 22.22                       | 12000                             |
|                                               | <b>N</b>                                                         | <b>N</b>                                                              | <b>RPM</b> | <b>N/μm</b>                          | <b>N-m</b>                  | <b>N</b>                          |
| <b>INCH SERIES - METRIC UNITS - DUH / QUH</b> |                                                                  |                                                                       |            |                                      |                             |                                   |
| MM9306W12HDUH                                 | 24900                                                            | 24900                                                                 | 4700       | 750                                  | 0.32                        | 3110                              |
| MM9308W12HDUH                                 | 35600                                                            | 29800                                                                 | 3300       | 1050                                 | 0.44                        | 4450                              |
| MM9310W12HDUH                                 | 45400                                                            | 36300                                                                 | 2900       | 1260                                 | 0.44                        | 6230                              |
| MM9311W13HDUH                                 | 50700                                                            | 38500                                                                 | 2700       | 1380                                 | 0.56                        | 6670                              |
| MM9313W15HDUH                                 | 60900                                                            | 41400                                                                 | 2200       | 1660                                 | 0.82                        | 8010                              |
| MM9316W13HDUH                                 | 77000                                                            | 44500                                                                 | 1700       | 2080                                 | 1                           | 9790                              |
| MM9321W13DUH                                  | 115700                                                           | 57400                                                                 | 1300       | 3400                                 | 1.02                        | 21350                             |
| MM9326W16HDUH                                 | 186800                                                           | 94300                                                                 | 1000       | 3630                                 | 1.26                        | 26690                             |
| MM9306W12HQUH                                 | 49800                                                            | 40500                                                                 | 3300       | 1510                                 | 0.64                        | 6230                              |
| MM9308W12HQUH                                 | 71200                                                            | 48500                                                                 | 2300       | 2100                                 | 0.88                        | 8900                              |
| MM9310W12HQUH                                 | 90700                                                            | 58700                                                                 | 2000       | 2520                                 | 0.88                        | 12450                             |
| MM9311W13HQUH                                 | 101400                                                           | 62700                                                                 | 1900       | 2770                                 | 1.12                        | 13340                             |
| MM9313W15HQUH                                 | 121900                                                           | 67200                                                                 | 1500       | 3330                                 | 1.64                        | 16010                             |
| MM9316W13HQUH                                 | 153900                                                           | 72100                                                                 | 1200       | 4170                                 | 2                           | 19570                             |
| MM9321W13QUH                                  | 231300                                                           | 93400                                                                 | 900        | 6800                                 | 2.04                        | 42700                             |
| MM9326W16HQUH                                 | 373600                                                           | 153000                                                                | 700        | 7250                                 | 2.51                        | 53380                             |

(1) Based on 1500 hours L<sub>10</sub> life and permissible speed.

(2) Heavy preload is standard.

(3) Data presented is for a single bearing in a DUH set and for two bearings in a QUH set mounted DB or DF.

D



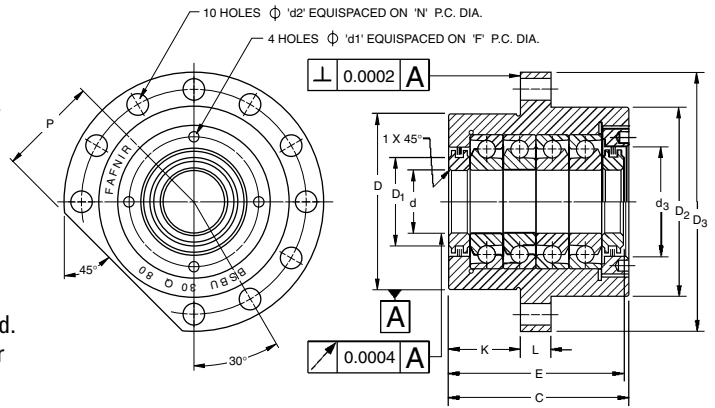


# BALL BEARINGS

## BSBU D

### STANDARD AND HEAVY-DUTY BEARINGS

- Designed and developed to give the machine manufacturer a ready-made unit providing excellent stiffness and accuracy in ball screw applications.
- Units combine the features of MM-BS-DU (Duplex) ball screw bearings with an accurately manufactured housing and laminar ring seals.
- Each unit is prepacked with a measured quantity of high quality bearing grease and requires no further lubrication.
- Units are supplied with the bearings in pairs mounted in the "DB" ("O") arrangement.
- Other bearing arrangements can be accommodated if required. Please consult your Timken representative with details of your requirements or for suggested shaft and housing fits.



### STANDARD SERIES – DIMENSIONAL TOLERANCES $\pm .13$ mm ( $\pm 0.005$ ") UNLESS OTHERWISE STATED.

| Shaft Dia. | Unit Number   | C      | d                | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | D                | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | E              | F      | K      | L      | N      | P      | Wt.     |
|------------|---------------|--------|------------------|----------------|----------------|----------------|------------------|----------------|----------------|----------------|----------------|--------|--------|--------|--------|--------|---------|
| mm         | (Bearing Set) | mm in. | mm in.           | mm in.         | mm in.         | mm in.         | mm in.           | mm in.         | mm in.         | mm in.         | mm in.         | mm in. | mm in. | mm in. | mm in. | mm in. | kg lbs. |
| 17         | BSBU17D60     | 47.0   | 17.000<br>16.996 | 4.3            | 6.6            | 36.0           | 60.000<br>59.987 | 26.0           | 64.0           | 90.0           | 44.26<br>43.24 | 42.5   | 32.0   | 13.0   | 76.0   | 32     | 1.1     |
|            | (MM17BS47DUH) | 1.85   | 0.6693<br>0.6691 | 0.17           | 0.26           | 1.42           | 2.3622<br>2.3617 | 1.02           | 2.52           | 3.54           | 1.742<br>1.702 | 1.67   | 1.26   | 0.51   | 2.99   | 1.26   | 2.42    |
| 20         | BSBU20D60     | 47.0   | 20.000<br>19.996 | 4.3            | 6.6            | 36.0           | 60.000<br>59.987 | 26.0           | 64.0           | 90.0           | 44.26<br>43.24 | 42.5   | 32.0   | 13.0   | 76.0   | 32     | 1.1     |
|            | (MM20BS47DUH) | 1.85   | 0.7874<br>0.7872 | 0.17           | 0.26           | 1.42           | 2.3622<br>2.3617 | 1.02           | 2.52           | 3.54           | 1.742<br>1.702 | 1.67   | 1.26   | 0.51   | 2.99   | 1.26   | 2.42    |
| 25         | BSBU25D80     | 52.0   | 25.000<br>24.996 | 4.3            | 9.2            | 50.0           | 80.000<br>79.987 | 40.0           | 88.0           | 120.0          | 50.26<br>49.24 | 59.5   | 32.0   | 15.0   | 102.0  | 44     | 2.3     |
|            | (MM25BS62DUH) | 2.05   | 0.9842<br>0.9841 | 0.17           | 0.36           | 1.97           | 3.1496<br>3.1491 | 1.57           | 3.46           | 4.72           | 1.979<br>1.938 | 2.34   | 1.26   | 0.59   | 4.02   | 1.73   | 5.06    |
| 30         | BSBU30D80     | 52.0   | 30.000<br>29.996 | 4.3            | 9.2            | 50.0           | 80.000<br>79.987 | 40.0           | 88.0           | 120.0          | 50.26<br>49.24 | 59.5   | 32.0   | 15.0   | 102.0  | 44     | 2.2     |
|            | (MM30BS62DUH) | 2.05   | 1.1811<br>1.1809 | 0.17           | 0.36           | 1.97           | 3.1496<br>3.1491 | 1.57           | 3.46           | 4.72           | 1.979<br>1.938 | 2.34   | 1.26   | 0.59   | 4.02   | 1.73   | 4.84    |
| 35         | BSBU35D90     | 52.0   | 35.000<br>34.995 | 4.3            | 9.2            | 60.0           | 90.000<br>89.985 | 46.0           | 98.0           | 130.0          | 50.26<br>49.24 | 66.5   | 32.0   | 15.0   | 113.0  | 49     | 3.2     |
|            | (MM35BS72DUH) | 2.05   | 1.378<br>1.3778  | 0.17           | 0.36           | 2.36           | 3.5433<br>3.5427 | 1.81           | 3.86           | 5.12           | 1.979<br>1.938 | 2.62   | 1.26   | 0.59   | 4.45   | 1.93   | 7.04    |
| 40         | BSBU40D90     | 52.0   | 40.000<br>39.995 | 4.3            | 9.2            | 60.0           | 90.000<br>89.985 | 46.0           | 98.0           | 130.0          | 50.26<br>49.24 | 66.5   | 32.0   | 15.0   | 113.0  | 49     | 3.1     |
|            | (MM40BS72DUH) | 2.05   | 1.5748<br>1.5746 | 0.17           | 0.36           | 2.36           | 3.5433<br>3.5427 | 1.81           | 3.86           | 5.12           | 1.979<br>1.938 | 2.62   | 1.26   | 0.59   | 4.45   | 1.93   | 6.82    |

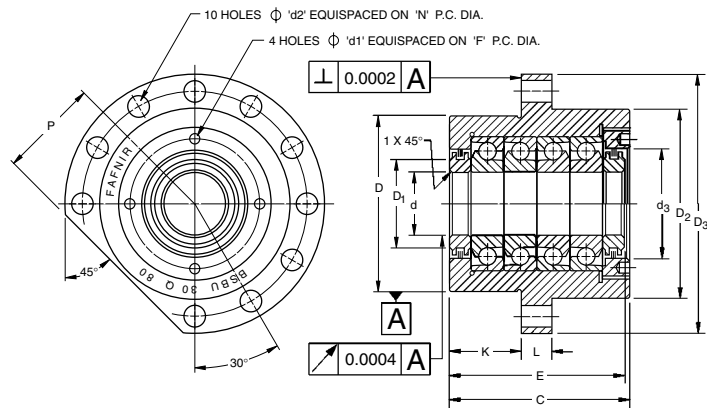
### HEAVY-DUTY SERIES

|    |                |      |                  |      |      |      |                    |      |       |       |                |      |      |      |       |      |        |
|----|----------------|------|------------------|------|------|------|--------------------|------|-------|-------|----------------|------|------|------|-------|------|--------|
| 35 | BSBU35D124     | 66.0 | 35.000<br>34.995 | 5.3  | 11.4 | 76.0 | 124.000<br>123.982 | 66.0 | 128.0 | 165.0 | 64.26<br>63.24 | 90.0 | 43.5 | 17.0 | 146.0 | 64   | 6.3    |
|    | (MM35BS100DUH) | 2.60 | 1.3780<br>1.3778 | 0.21 | 0.45 | 2.99 | 4.8819<br>4.8812   | 2.6  | 5.04  | 6.50  | 2.530<br>2.490 | 3.54 | 1.71 | 0.67 | 5.75  | 2.52 | 13.86  |
| 40 | BSBU40D124     | 66.0 | 40.000<br>39.995 | 5.3  | 11.4 | 76.0 | 124.000<br>123.982 | 66.0 | 128.0 | 165.0 | 64.26<br>63.24 | 90.0 | 43.5 | 17.0 | 146.0 | 64   | 6.1    |
|    | (MM40BS100DUH) | 2.60 | 1.5748<br>1.5746 | 0.21 | 0.45 | 2.99 | 4.8819<br>4.8812   | 2.6  | 5.04  | 6.50  | 2.530<br>2.490 | 3.54 | 1.71 | 0.67 | 5.75  | 2.52 | 13.42  |
| 45 | BSBU45D124     | 66.0 | 45.000<br>44.995 | 5.3  | 11.4 | 76.0 | 124.000<br>123.982 | 66.0 | 128.0 | 165.0 | 64.26<br>63.24 | 90.0 | 43.5 | 17.0 | 146.0 | 64   | 6.0    |
|    | (MM45BS100DUH) | 2.60 | 1.7716<br>1.7714 | 0.21 | 0.45 | 2.99 | 4.8819<br>4.8812   | 2.6  | 5.04  | 6.50  | 2.530<br>2.490 | 3.54 | 1.71 | 0.67 | 5.75  | 2.52 | 13.2   |
| 50 | BSBU50D124     | 66.0 | 50.000<br>49.995 | 5.3  | 11.4 | 76.0 | 124.000<br>123.982 | 66.0 | 128.0 | 165.0 | 64.26<br>63.24 | 90.0 | 43.5 | 17.0 | 146.0 | 64   | 5.9    |
|    | (MM50BS100DUH) | 2.60 | 1.9685<br>1.9683 | 0.21 | 0.45 | 2.99 | 4.8819<br>4.8812   | 2.6  | 5.04  | 6.50  | 2.530<br>2.490 | 3.54 | 1.71 | 0.67 | 5.75  | 2.52 | 12.898 |

## BSBU Q

### STANDARD AND HEAVY-DUTY BEARINGS

- Similar in design and features to the series BSBU D except MM-BS-QU Quadruplex bearings are used.
- Units are supplied with the bearings in quad sets mounted in the "DB" ("O") arrangement.
- Consult your Timken representative for suggested shaft.



### STANDARD SERIES – DIMENSIONAL TOLERANCES ± 0.005" ± .13 mm (± 0.005") UNLESS OTHERWISE STATED.

| Shaft Dia. | Unit Number                | C            | d                                    | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | D                                    | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | E                                | F            | K            | L            | N             | P            | Wt.          |
|------------|----------------------------|--------------|--------------------------------------|----------------|----------------|----------------|--------------------------------------|----------------|----------------|----------------|----------------------------------|--------------|--------------|--------------|---------------|--------------|--------------|
| mm         | (Bearing Set)              | mm in.       | mm in.                               | mm in.         | mm in.         | mm in.         | mm in.                               | mm in.         | mm in.         | mm in.         | mm in.                           | mm in.       | mm in.       | mm in.       | mm in.        | mm in.       | kg lbs.      |
| 17         | BSBU17Q60<br>(MM17BS47QUH) | 77.0<br>3.03 | 17.000<br>16.996<br>0.6693<br>0.6690 | 4.3<br>0.17    | 6.6<br>0.26    | 36.0<br>1.42   | 60.000<br>59.987<br>2.3622<br>2.3617 | 26.0<br>1.02   | 64.0<br>2.52   | 90.0<br>3.54   | 74.26<br>72.74<br>2.924<br>2.864 | 42.5<br>1.67 | 32.0<br>1.26 | 13.0<br>0.51 | 76.0<br>2.99  | 32.0<br>1.26 | 1.7<br>3.74  |
| 20         | BSBU20Q60<br>(MM20BS47QUH) | 77.0<br>3.03 | 20.000<br>19.996<br>0.7874<br>0.7872 | 4.3<br>0.17    | 6.6<br>0.26    | 36.0<br>1.42   | 60.000<br>59.987<br>2.3622<br>2.3617 | 26.0<br>1.02   | 64.0<br>2.52   | 90.0<br>3.54   | 74.26<br>72.74<br>2.924<br>2.864 | 42.5<br>1.67 | 32.0<br>1.26 | 13.0<br>0.51 | 76.0<br>2.99  | 32.0<br>1.26 | 1.7<br>3.74  |
| 25         | BSBU25Q80<br>(MM25BS62QUH) | 82.0<br>3.23 | 25.000<br>24.996<br>0.9842<br>0.9841 | 4.3<br>0.17    | 9.2<br>0.36    | 50.0<br>1.97   | 80.000<br>79.987<br>3.1496<br>3.1491 | 40.0<br>1.57   | 88.0<br>3.46   | 120.0<br>4.72  | 80.26<br>78.74<br>3.160<br>3.100 | 59.5<br>2.34 | 32.0<br>1.26 | 15.0<br>0.59 | 102.0<br>4.02 | 44.0<br>1.73 | 3.5<br>7.7   |
| 30         | BSBU30Q80<br>(MM30BS62QUH) | 82.0<br>3.23 | 30.000<br>29.996<br>1.1811<br>1.1809 | 4.3<br>0.17    | 9.2<br>0.36    | 50.0<br>1.97   | 80.000<br>79.987<br>3.1496<br>3.1491 | 40.0<br>1.57   | 88.0<br>3.46   | 120.0<br>4.72  | 80.26<br>78.74<br>3.160<br>3.100 | 59.5<br>2.34 | 32.0<br>1.26 | 15.0<br>0.59 | 102.0<br>4.02 | 44.0<br>1.73 | 3.4<br>7.48  |
| 35         | BSBU35Q90<br>(MM35BS72QUH) | 82.0<br>3.23 | 35.000<br>34.995<br>1.3780<br>1.3778 | 4.3<br>0.17    | 9.2<br>0.36    | 60.0<br>2.36   | 90.000<br>89.985<br>3.5433<br>3.5427 | 46.0<br>1.81   | 98.0<br>3.86   | 130.0<br>5.12  | 80.26<br>78.74<br>3.160<br>3.100 | 66.5<br>2.62 | 32.0<br>1.26 | 15.0<br>0.59 | 113.0<br>4.45 | 49.0<br>1.93 | 4.6<br>10.12 |
| 40         | BSBU40Q90<br>(MM40BS72QUH) | 82.0<br>3.23 | 40.000<br>39.995<br>1.5748<br>1.5746 | 4.3<br>0.17    | 9.2<br>0.36    | 60.0<br>2.36   | 90.000<br>89.985<br>3.5433<br>3.5427 | 46.0<br>1.81   | 98.0<br>3.86   | 130.0<br>5.12  | 80.26<br>78.74<br>3.160<br>3.100 | 66.5<br>2.62 | 32.0<br>1.26 | 15.0<br>0.59 | 113.0<br>4.45 | 49.0<br>1.93 | 4.5<br>9.9   |

### HEAVY-DUTY SERIES

|    |                              |               |                                      |             |              |              |                                        |             |               |              |                                    |              |              |              |               |              |               |
|----|------------------------------|---------------|--------------------------------------|-------------|--------------|--------------|----------------------------------------|-------------|---------------|--------------|------------------------------------|--------------|--------------|--------------|---------------|--------------|---------------|
| 35 | BSBU35Q124<br>(MM35BS100QUH) | 106.0<br>4.17 | 35.000<br>34.995<br>1.3780<br>1.3778 | 5.3<br>0.21 | 11.4<br>0.45 | 76.0<br>2.99 | 124.000<br>123.982<br>4.8819<br>4.8812 | 66.0<br>2.6 | 128.0<br>5.04 | 165.0<br>6.5 | 104.26<br>102.74<br>4.105<br>4.045 | 90.0<br>3.54 | 43.5<br>1.71 | 17.0<br>0.67 | 146.0<br>5.75 | 64.0<br>2.52 | 10.1<br>22.22 |
| 40 | BSBU40Q124<br>(MM40BS100QUH) | 106.0<br>4.17 | 40.000<br>39.995<br>1.5748<br>1.5746 | 5.3<br>0.21 | 11.4<br>0.45 | 76.0<br>2.99 | 124.000<br>123.982<br>4.8819<br>4.8812 | 66.0<br>2.6 | 128.0<br>5.04 | 165.0<br>6.5 | 104.26<br>102.74<br>4.105<br>4.045 | 90.0<br>3.54 | 43.5<br>1.71 | 17.0<br>0.67 | 146.0<br>5.75 | 64.0<br>2.52 | 9.7<br>21.34  |
| 45 | BSBU45Q124<br>(MM45BS100QUH) | 106.0<br>4.17 | 45.000<br>44.995<br>1.7716<br>1.7714 | 5.3<br>0.21 | 11.4<br>0.45 | 76.0<br>2.99 | 124.000<br>123.982<br>4.8819<br>4.8812 | 66.0<br>2.6 | 128.0<br>5.04 | 165.0<br>6.5 | 104.26<br>102.74<br>4.105<br>4.045 | 90.0<br>3.54 | 43.5<br>1.71 | 17.0<br>0.67 | 146.0<br>5.75 | 64.0<br>2.52 | 9.5<br>20.9   |
| 50 | BSBU50Q124<br>(MM50BS100QUH) | 106.0<br>4.17 | 50.000<br>49.995<br>1.9685<br>1.9683 | 5.3<br>0.21 | 11.4<br>0.45 | 76.0<br>2.99 | 124.000<br>123.982<br>4.8819<br>4.8812 | 66.0<br>2.6 | 128.0<br>5.04 | 165.0<br>6.5 | 104.26<br>102.74<br>4.105<br>4.045 | 90.0<br>3.54 | 43.5<br>1.71 | 17.0<br>0.67 | 146.0<br>5.75 | 64.0<br>2.52 | 9.3<br>20.46  |



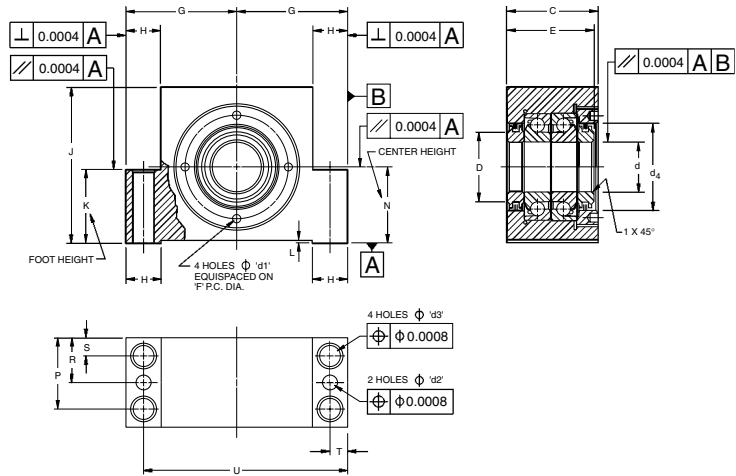


# BALL BEARINGS

## BSPB D

### STANDARD AND HEAVY-DUTY BEARINGS

- Design of bearing pillow block unit for ball screw applications.
- Incorporates similar features to the series BSBU D but is designed to bolt down onto a flat surface, parallel to the ball screw axis.
- In the standard unit, pilot holes for dowels are provided.
- Units with finished holes for dowels can be supplied by special order if required.
- Consult your Timken representative for suggested shaft.



### STANDARD SERIES – DIMENSIONAL TOLERANCES $\pm .13$ mm ( $\pm 0.005$ ") UNLESS OTHERWISE STATED.

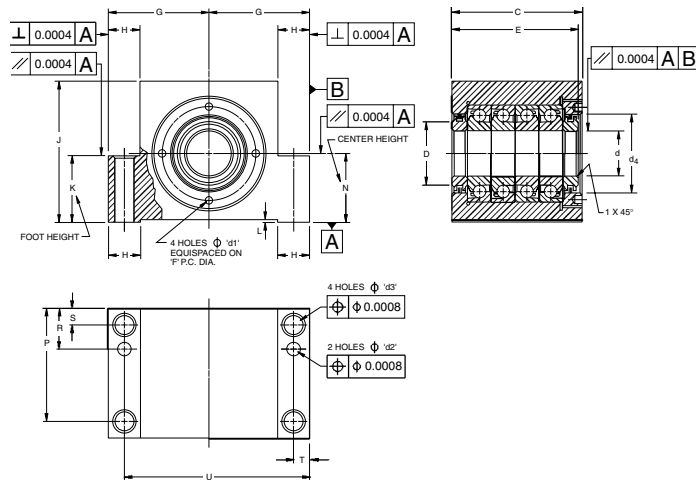
| Shaft Dia. | Unit Number   | C                | d                | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | D      | E              | F      | G                | H      | J      | K      | L      | N                | P      | R      | S      | T      | U      | Wt.     |
|------------|---------------|------------------|------------------|----------------|----------------|----------------|----------------|--------|----------------|--------|------------------|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|---------|
| mm         | (Bearing Set) | mm in.           | mm in.           | mm in.         | mm in.         | mm in.         | mm in.         | mm in. | mm in.         | mm in. | mm in.           | mm in. | mm in. | mm in. | mm in. | mm in.           | mm in. | mm in. | mm in. | mm in. | mm in. | kg lbs. |
| 17         | BSPB17D32     | 47.000<br>46.950 | 17.000<br>16.996 | 4.3            | 7.8            | 9.0            | 36.0           | 26.0   | 44.26<br>43.24 | 42.5   | 47.000<br>46.987 | 17     | 62     | 32.0   | 1.0    | 32.000<br>31.987 | 38.0   | 22.0   | 9.0    | 8.5    | 85.5   | 1.5     |
|            | (MM17BS47DUH) | 1.850<br>1.848   | 0.6693<br>0.6691 | 0.17           | 0.31           | 0.35           | 1.42           | 1.02   | 1.742<br>1.702 | 1.67   | 1.8504<br>1.8499 | 0.67   | 2.44   | 1.26   | 0.04   | 1.2598<br>1.2593 | 1.50   | 0.87   | 0.35   | 0.33   | 3.37   | 3.3     |
| 20         | BSPB20D32     | 47.000<br>46.950 | 20.000<br>19.996 | 4.3            | 7.8            | 9.0            | 36.0           | 26.0   | 44.26<br>43.24 | 42.5   | 47.000<br>46.987 | 17     | 62     | 32.0   | 1.0    | 32.000<br>31.987 | 38.0   | 22.0   | 9.0    | 8.5    | 85.5   | 1.5     |
|            | (MM20BS47DUH) | 1.850<br>1.848   | 0.7874<br>0.7872 | 0.17           | 0.31           | 0.35           | 1.42           | 1.02   | 1.742<br>1.702 | 1.67   | 1.8504<br>1.8499 | 0.67   | 2.44   | 1.26   | 0.04   | 1.2598<br>1.2593 | 1.50   | 0.87   | 0.35   | 0.33   | 3.37   | 3.3     |
| 25         | BSPB25D42     | 52.000<br>51.950 | 25.000<br>24.996 | 4.3            | 9.8            | 11.0           | 50.0           | 40.0   | 50.26<br>49.24 | 59.5   | 62.500<br>62.487 | 20     | 85     | 42.0   | 1.0    | 42.000<br>41.987 | 42.0   | 25.0   | 10.0   | 10.0   | 115.0  | 2.8     |
|            | (MM25BS62DUH) | 2.047<br>2.045   | 0.9842<br>0.9841 | 0.17           | 0.39           | 0.43           | 1.97           | 1.57   | 1.979<br>1.938 | 2.34   | 2.4606<br>2.4601 | 0.79   | 3.35   | 1.65   | 0.04   | 1.6535<br>1.6530 | 1.65   | 0.98   | 0.39   | 0.39   | 4.53   | 6.16    |
| 30         | BSPB30D42     | 52.000<br>51.920 | 30.000<br>29.996 | 4.3            | 9.8            | 11.0           | 50.0           | 40.0   | 50.26<br>49.24 | 59.5   | 62.500<br>62.487 | 20     | 85     | 42.0   | 1.0    | 42.000<br>41.987 | 42.0   | 25.0   | 10.0   | 10.0   | 115.0  | 2.7     |
|            | (MM30BS62DUH) | 2.047<br>2.045   | 1.1811<br>1.1809 | 0.17           | 0.39           | 0.43           | 1.97           | 1.57   | 1.979<br>1.938 | 2.34   | 2.4606<br>2.4601 | 0.79   | 3.35   | 1.65   | 0.04   | 1.6535<br>1.6530 | 1.65   | 0.98   | 0.39   | 0.39   | 4.53   | 5.94    |
| 35         | BSPB35D50     | 52.000<br>51.950 | 35.000<br>34.995 | 4.3            | 13.0           | 13.0           | 60.0           | 46.0   | 50.26<br>49.24 | 66.5   | 68.000<br>67.987 | 20.5   | 95     | 50     | 1.0    | 50.000<br>49.987 | 42.0   | 25.0   | 10.0   | 10.0   | 126.0  | 3.8     |
|            | (MM35BS72DUH) | 2.047<br>2.045   | 1.3780<br>1.3778 | 0.17           | 0.51           | 0.51           | 2.36           | 1.81   | 1.979<br>1.938 | 2.62   | 2.6772<br>2.6767 | 0.81   | 3.74   | 1.97   | 0.04   | 1.9685<br>1.9680 | 1.65   | 0.98   | 0.39   | 0.39   | 4.96   | 8.36    |
| 40         | BSPB40D50     | 52.000<br>51.950 | 40.000<br>39.995 | 4.3            | 13.0           | 13.0           | 60.0           | 46.0   | 50.26<br>49.24 | 66.5   | 68.000<br>67.987 | 20.5   | 95     | 50.0   | 1.0    | 50.000<br>49.987 | 42.0   | 25.0   | 10.0   | 10.0   | 126.0  | 3.7     |
|            | (MM40BS72DUH) | 2.047<br>2.045   | 1.5748<br>1.5746 | 0.17           | 0.51           | 0.51           | 2.36           | 1.81   | 1.979<br>1.938 | 2.62   | 2.6772<br>2.6767 | 0.81   | 3.74   | 1.97   | 0.04   | 1.9685<br>1.9680 | 1.65   | 0.98   | 0.39   | 0.39   | 4.96   | 8.14    |

### HEAVY-DUTY SERIES

|    |                |                  |                  |      |      |      |      |      |                |      |                  |      |       |      |      |                  |      |      |      |      |       |       |
|----|----------------|------------------|------------------|------|------|------|------|------|----------------|------|------------------|------|-------|------|------|------------------|------|------|------|------|-------|-------|
| 35 | BSPB35D65      | 66.000<br>65.950 | 35.000<br>34.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 64.26<br>63.24 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.7   |
|    | (MM35BS100DUH) | 2.598<br>2.596   | 1.3780<br>1.3778 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 2.530<br>2.490 | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 21.34 |
| 40 | BSPB40D65      | 66.000<br>65.950 | 40.000<br>39.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 64.26<br>63.24 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.5   |
|    | (MM40BS100DUH) | 2.598<br>2.596   | 1.5748<br>1.5746 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 2.530<br>2.490 | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.9  |
| 45 | BSPB45D65      | 66.000<br>65.950 | 45.000<br>44.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 64.26<br>63.24 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.3   |
|    | (MM45BS100DUH) | 2.598<br>2.596   | 1.7716<br>1.7714 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 2.530<br>2.490 | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.46 |
| 50 | BSPB50D65      | 66.000<br>65.950 | 50.000<br>49.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 64.26<br>63.24 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.1   |
|    | (MM50BS100DUH) | 2.598<br>2.596   | 1.9685<br>1.9683 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 2.530<br>2.490 | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.02 |

## BSPB Q BALL SCREW SUPPORT BEARING PILLOW BLOCK UNITS

- Similar in design and features to the Series BSPB D, except MM-BS-QU quadropex bearings are used.
- Units are supplied with the bearings in quad sets mounted in the "DB" ("O") arrangement.
- Consult your Timken representative for suggested shaft fits.



STANDARD SERIES – DIMENSIONAL TOLERANCES ±.13 mm (± 0.005") UNLESS OTHERWISE STATED.

| Shaft Dia. | Unit Number   | C              | d                | d <sub>1</sub> | d <sub>2</sub> | d <sub>3</sub> | d <sub>4</sub> | D      | E              | F      | G                | H      | J      | K      | L      | N                | P      | R      | S      | T      | U      | Wt.     |
|------------|---------------|----------------|------------------|----------------|----------------|----------------|----------------|--------|----------------|--------|------------------|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|---------|
| mm         | (Bearing Set) | mm in.         | mm in.           | mm in.         | mm in.         | mm in.         | mm in.         | mm in. | mm in.         | mm in. | mm in.           | mm in. | mm in. | mm in. | mm in. | mm in.           | mm in. | mm in. | mm in. | mm in. | mm in. | kg lbs. |
| 17         | BSPB17Q32     | 77.00<br>76.95 | 17.000<br>16.996 | 4.3            | 7.8            | 9.0            | 36.0           | 26.0   | 74.26<br>72.74 | 42.5   | 47.000<br>46.987 | 17     | 62     | 32.0   | 1.0    | 32.000<br>31.987 | 38.0   | 22.0   | 9.0    | 8.5    | 85.5   | 1.5     |
|            | (MM17BS47QUH) | 3.031<br>3.03  | 0.6693<br>0.6691 | 0.17           | 0.31           | 0.35           | 1.42           | 1.02   | 2.924<br>2.864 | 1.67   | 1.8504<br>1.8499 | 0.67   | 2.44   | 1.26   | 0.04   | 1.2598<br>1.2593 | 1.50   | 0.87   | 0.35   | 0.33   | 3.37   | 3.3     |
| 20         | BSPB20Q32     | 77.00<br>76.95 | 20.000<br>19.996 | 4.3            | 7.8            | 9.0            | 36.0           | 26.0   | 74.26<br>72.74 | 42.5   | 47.000<br>46.987 | 17     | 62     | 32.0   | 1.0    | 32.000<br>31.987 | 38.0   | 22.0   | 9.0    | 8.5    | 85.5   | 1.5     |
|            | (MM20BS47QUH) | 3.031<br>3.03  | 0.7874<br>0.7872 | 0.17           | 0.31           | 0.35           | 1.42           | 1.02   | 2.924<br>2.864 | 1.67   | 1.8504<br>1.8499 | 0.67   | 2.44   | 1.26   | 0.04   | 1.2598<br>1.2593 | 1.50   | 0.87   | 0.35   | 0.33   | 3.37   | 3.3     |
| 25         | BSPB25Q42     | 82.00<br>81.95 | 25.000<br>24.996 | 4.3            | 9.8            | 11.0           | 50.0           | 40.0   | 80.26<br>78.74 | 59.5   | 62.500<br>62.487 | 20     | 85     | 42.0   | 1.0    | 42.000<br>41.987 | 42.0   | 25.0   | 10.0   | 10.0   | 115.0  | 2.8     |
|            | (MM25BS62QUH) | 3.228<br>3.226 | 0.9842<br>0.9841 | 0.17           | 0.39           | 0.43           | 1.97           | 1.57   | 3.16<br>3.1    | 2.34   | 2.4606<br>2.4601 | 0.79   | 3.35   | 1.65   | 0.04   | 1.6535<br>1.6530 | 1.65   | 0.98   | 0.39   | 0.39   | 4.53   | 6.16    |
| 30         | BSPB30Q42     | 82.00<br>81.95 | 30.000<br>29.996 | 4.3            | 9.8            | 11.0           | 50.0           | 40.0   | 80.26<br>78.74 | 59.5   | 62.500<br>62.487 | 20     | 85     | 42.0   | 1.0    | 42.000<br>41.987 | 42.0   | 25.0   | 10.0   | 10.0   | 115.0  | 2.7     |
|            | (MM30BS62QUH) | 3.228<br>3.226 | 1.1811<br>1.1809 | 0.17           | 0.39           | 0.43           | 1.97           | 1.57   | 3.16<br>3.1    | 2.34   | 2.4606<br>2.4601 | 0.79   | 3.35   | 1.65   | 0.04   | 1.6535<br>1.6530 | 1.65   | 0.98   | 0.39   | 0.39   | 4.53   | 5.94    |
| 35         | BSPB35Q50     | 82.00<br>81.95 | 35.000<br>34.995 | 4.3            | 13.0           | 13.0           | 60.0           | 46.0   | 80.26<br>78.74 | 66.5   | 68.000<br>67.987 | 20.5   | 95     | 50     | 1.0    | 50.000<br>49.987 | 42.0   | 25.0   | 10.0   | 10.0   | 126.0  | 3.8     |
|            | (MM35BS72QUH) | 3.228<br>3.226 | 1.3780<br>1.3778 | 0.17           | 0.51           | 0.51           | 2.36           | 1.81   | 3.16<br>3.1    | 2.62   | 2.6772<br>2.6767 | 0.81   | 3.74   | 1.97   | 0.04   | 1.9685<br>1.9680 | 1.65   | 0.98   | 0.39   | 0.39   | 4.96   | 8.36    |
| 40         | BSPB40Q50     | 82.00<br>81.95 | 40.000<br>39.995 | 4.3            | 13.0           | 13.0           | 60.0           | 46.0   | 80.26<br>78.74 | 66.5   | 68.000<br>67.987 | 20.5   | 95     | 50.0   | 1.0    | 50.000<br>49.987 | 42.0   | 25.0   | 10.0   | 10.0   | 126.0  | 3.7     |
|            | (MM40BS72QUH) | 4.173<br>4.171 | 1.5748<br>1.5746 | 0.17           | 0.51           | 0.51           | 2.36           | 1.81   | 4.105<br>4.045 | 2.62   | 2.6772<br>2.6767 | 0.81   | 3.74   | 1.97   | 0.04   | 1.9685<br>1.9680 | 1.65   | 0.98   | 0.39   | 0.39   | 4.96   | 8.14    |

### HEAVY-DUTY SERIES

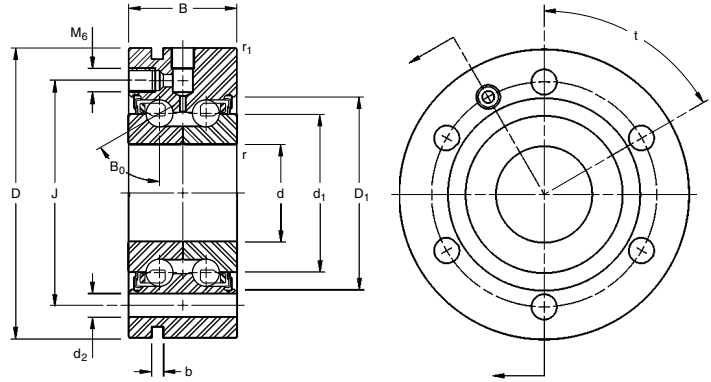
|    |                |                  |                  |      |      |      |      |      |                  |      |                  |      |       |      |      |                  |      |      |      |      |       |       |
|----|----------------|------------------|------------------|------|------|------|------|------|------------------|------|------------------|------|-------|------|------|------------------|------|------|------|------|-------|-------|
| 35 | BSPB35Q65      | 106.00<br>105.95 | 35.000<br>34.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 104.26<br>102.74 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.7   |
|    | (MM35BS100QUH) | 3.228<br>3.226   | 1.3780<br>1.3778 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 3.16<br>3.1      | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 21.34 |
| 40 | BSPB40Q65      | 106.00<br>105.95 | 40.000<br>39.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 104.26<br>102.74 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.5   |
|    | (MM40BS100QUH) | 4.173<br>4.171   | 1.5748<br>1.5746 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 4.105<br>4.045   | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.9  |
| 45 | BSPB45Q65      | 106.00<br>105.95 | 45.000<br>44.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 104.26<br>102.74 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.3   |
|    | (MM45BS100QUH) | 4.173<br>4.171   | 1.7716<br>1.7714 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 4.105<br>4.045   | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.46 |
| 50 | BSPB50Q65      | 106.00<br>105.95 | 50.000<br>49.995 | 5.3  | 11.8 | 18.0 | 76.0 | 66.0 | 104.26<br>102.74 | 90.0 | 95.000<br>94.987 | 30.0 | 130.0 | 65.0 | 1.0  | 65.000<br>64.987 | 53.0 | 32.0 | 13.0 | 15.0 | 175.0 | 9.1   |
|    | (MM50BS100QUH) | 4.173<br>4.171   | 1.9685<br>1.9683 | 0.21 | 0.46 | 0.71 | 2.99 | 2.6  | 4.105<br>4.045   | 3.54 | 3.7402<br>3.7396 | 1.18 | 5.12  | 2.56 | 0.04 | 2.5590<br>2.5585 | 2.09 | 1.26 | 0.51 | 0.59 | 6.89  | 20.02 |



# BALL BEARINGS

## SEALED, DOUBLE-ROW BALL SCREW SUPPORT BEARINGS FLANGED STYLE

### MMF SERIES



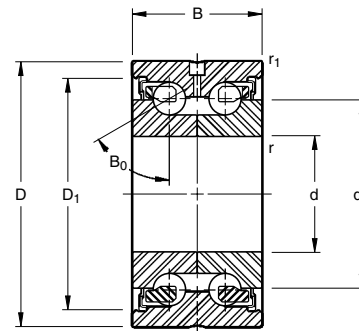
MMF Series Flanged

#### METRIC AND INCH DIMENSIONAL SIZES

| Bearing Number   | Bore<br>d/Tol       | O.D.<br>D/Tol       | Width<br>B/Tol     | Wt.   | Outer<br>Rs <sub>1</sub><br>r <sub>1</sub> | Inner<br>Rs<br>r | Min.<br>D <sub>1</sub> | Max.<br>d <sub>1</sub> | Housing<br>Shoulder<br>Dia. | Shaft<br>Shoulder<br>Dia. | d <sub>2</sub><br>Hole<br>Dia. | Holes | b    | Pitch<br>Circle<br>J | Hole<br>Spacing<br>t | Contact<br>Angle<br>B <sub>0</sub> | Heavy<br>Series |
|------------------|---------------------|---------------------|--------------------|-------|--------------------------------------------|------------------|------------------------|------------------------|-----------------------------|---------------------------|--------------------------------|-------|------|----------------------|----------------------|------------------------------------|-----------------|
| METRIC           |                     | mm +/- (-µm)        |                    |       | kg                                         | mm               | mm                     | mm                     | mm                          | mm                        | mm                             | Qty.  |      | mm                   | degrees              |                                    |                 |
| MMF512BS55PP DM  | 12<br>(3.8)         | 55<br>(7.6)         | 25<br>(254)        | 0.40  | 0.6                                        | 0.3              | 33.1                   | 25.0                   | 32.0                        | 19.0                      | 6.5                            | 3     | 3    | 42                   | 120                  | 60                                 |                 |
| MMF515BS60PP DM  | 15<br>(3.8)         | 60<br>(7.6)         | 25<br>(254)        | 0.47  | 0.6                                        | 0.3              | 37.0                   | 27.6                   | 34.5                        | 21.5                      | 6.5                            | 3     | 3    | 46                   | 120                  | 60                                 |                 |
| MMF517BS62PP DM  | 17<br>(3.8)         | 62<br>(7.6)         | 25<br>(254)        | 0.49  | 0.6                                        | 0.3              | 37.8                   | 28.4                   | 36.5                        | 23.5                      | 6.5                            | 3     | 3    | 48                   | 120                  | 60                                 |                 |
| MMF520BS68PP DM  | 20<br>(5.1)         | 68<br>(7.6)         | 28<br>(254)        | 0.64  | 0.6                                        | 0.3              | 43.2                   | 34.5                   | 42.5                        | 27.5                      | 6.5                            | 4     | 3    | 53                   | 90                   | 60                                 |                 |
| MMF525BS75PP DM  | 25<br>(5.1)         | 75<br>(7.6)         | 28<br>(254)        | 0.76  | 0.6                                        | 0.3              | 49.5                   | 40.6                   | 48.0                        | 33.5                      | 6.5                            | 4     | 3    | 58                   | 90                   | 60                                 |                 |
| MMF530BS80PP DM  | 30<br>(5.1)         | 80<br>(7.6)         | 28<br>(254)        | 0.84  | 0.6                                        | 0.3              | 54.3                   | 45.6                   | 53.5                        | 38.5                      | 6.5                            | 6     | 3    | 63                   | 60                   | 60                                 |                 |
| MMF540BS100PP DM | 40<br>(6.4)         | 100<br>(7.6)        | 34<br>(254)        | 1.50  | 0.6                                        | 0.3              | 68.7                   | 57.5                   | 67.0                        | 49.0                      | 8.5                            | 4     | 3    | 80                   | 90                   | 60                                 |                 |
| MMF550BS115PP DM | 50<br>(6.4)         | 115<br>(7.6)        | 34<br>(254)        | 1.37  | 0.6                                        | 0.3              | 82.6                   | 71.5                   | 81.0                        | 63.0                      | 8.5                            | 6     | 3    | 94                   | 60                   | 60                                 |                 |
| MMF550BS140PP DM | 50<br>(6.4)         | 140<br>(8.9)        | 54<br>(254)        | 4.89  | 0.6                                        | 0.6              | 99.6                   | 81.1                   | 98.5                        | 66.0                      | 10.5                           | 12    | 3    | 113                  | 30                   | 60                                 | H               |
| MMF560BS145PP DM | 60<br>(7.6)         | 145<br>(8.9)        | 45<br>(254)        | 4.28  | 0.6                                        | 0.6              | 100.0                  | 89.0                   | 98.0                        | 72.0                      | 8.5                            | 8     | 3    | 120                  | 45                   | 60                                 |                 |
| INCHES           |                     | in. +/- (-x)        |                    |       | lbs.                                       | in.              | in.                    | in.                    | in.                         | in.                       | in.                            | Qty.  |      | in.                  | degrees              |                                    |                 |
| MMF512BS55PP DM  | 0.4724<br>(0.00015) | 2.1654<br>(0.0003)  | 0.9843<br>(0.0100) | 0.88  | 0.024                                      | 0.012            | 1.304                  | 0.905                  | 1.260                       | 0.748                     | 0.256                          | 3     | .118 | 1.654                | 120                  | 60                                 |                 |
| MMF515BS60PP DM  | 0.5906<br>(0.00015) | 2.3622<br>(0.0003)  | 0.9843<br>(0.0100) | 1.04  | 0.024                                      | 0.012            | 1.456                  | 1.088                  | 1.358                       | 0.846                     | 0.256                          | 3     | .118 | 1.811                | 120                  | 60                                 |                 |
| MMF517BS62PP DM  | 0.6693<br>(0.00015) | 2.4409<br>(0.0003)  | 0.9843<br>(0.0100) | 1.08  | 0.024                                      | 0.012            | 1.490                  | 1.117                  | 1.437                       | 0.925                     | 0.256                          | 3     | .118 | 1.890                | 120                  | 60                                 |                 |
| MMF520BS68PP DM  | 0.7874<br>(0.0002)  | 2.6772<br>(0.0003)  | 1.1024<br>(0.0100) | 1.42  | 0.024                                      | 0.012            | 1.700                  | 1.357                  | 1.673                       | 1.083                     | 0.256                          | 4     | .118 | 2.087                | 90                   | 60                                 |                 |
| MMF525BS75PP DM  | 0.9843<br>(0.0002)  | 2.9528<br>(0.0003)  | 1.1024<br>(0.0100) | 1.68  | 0.024                                      | 0.012            | 1.943                  | 1.599                  | 1.890                       | 1.319                     | 0.256                          | 4     | .118 | 2.283                | 90                   | 60                                 |                 |
| MMF530BS80PP DM  | 1.1811<br>(0.0002)  | 3.1496<br>(0.0003)  | 1.1024<br>(0.0100) | 1.86  | 0.024                                      | 0.012            | 2.138                  | 1.795                  | 2.106                       | 1.516                     | 0.256                          | 6     | .118 | 2.480                | 60                   | 60                                 |                 |
| MMF540BS100PP DM | 1.5748<br>(0.00025) | 3.937<br>(0.0003)   | 1.3386<br>(0.0100) | 3.41  | 0.024                                      | 0.012            | 2.704                  | 2.264                  | 2.638                       | 1.929                     | 0.335                          | 4     | .118 | 3.150                | 90                   | 60                                 |                 |
| MMF550BS115PP DM | 1.9685<br>(0.00025) | 4.5276<br>(0.0003)  | 1.3386<br>(0.0100) | 4.37  | 0.024                                      | 0.012            | 3.250                  | 2.815                  | 3.189                       | 2.408                     | 0.335                          | 6     | .118 | 3.701                | 60                   | 60                                 |                 |
| MMF550BS140PP DM | 1.9685<br>(0.00025) | 5.5118<br>(0.00035) | 2.1260<br>(0.0100) | 10.78 | 0.024                                      | 0.024            | 3.919                  | 3.192                  | 3.878                       | 2.598                     | 0.413                          | 12    | .118 | 4.449                | 30                   | 60                                 | H               |
| MMF560BS145PP DM | 2.3622<br>(0.0003)  | 5.7087<br>(0.00035) | 1.7717<br>(0.0100) | 9.43  | 0.024                                      | 0.024            | 3.938                  | 3.308                  | 3.858                       | 2.835                     | 0.335                          | 8     | .118 | 4.724                | 45                   | 60                                 |                 |

**SEALED, DOUBLE-ROW  
BALL SCREW SUPPORT BEARINGS  
CARTRIDGE STYLE**

**MMN SERIES**



MMN Series

**METRIC AND INCH DIMENSIONAL SIZES**

| Bearing Number   | Bore<br>d/Tol       | O.D.<br>D/Tol       | Width<br>B/Tol     | Wt.  | Outer<br>R <sub>1</sub> | Inner<br>r | Min.<br>d <sub>1</sub> | Max.<br>dia. | Housing<br>Shoulder<br>Dia. | Shaft<br>Shoulder<br>Dia. | Contact<br>Dia.<br>B <sub>0</sub> | Heavy<br>Series |
|------------------|---------------------|---------------------|--------------------|------|-------------------------|------------|------------------------|--------------|-----------------------------|---------------------------|-----------------------------------|-----------------|
| METRIC           | mm +0/- (µm)        |                     |                    | kg   | mm                      | mm         | mm                     | mm           | mm                          | mm                        | degrees                           |                 |
| MMN512BS42PP DM  | 12<br>(3.8)         | 42<br>(6.4)         | 25<br>(254)        | 0.20 | 0.6                     | 0.3        | 33.1                   | 25.0         | 32.0                        | 19.0                      | 60                                |                 |
| MMN515BS45PP DM  | 15<br>(3.8)         | 45<br>(6.4)         | 25<br>(254)        | 0.23 | 0.6                     | 0.3        | 37.0                   | 27.6         | 34.5                        | 21.5                      | 60                                |                 |
| MMN517BS47PP DM  | 17<br>(3.8)         | 47<br>(6.4)         | 25<br>(254)        | 0.24 | 0.6                     | 0.3        | 37.8                   | 28.4         | 36.5                        | 23.5                      | 60                                |                 |
| MMN520BS52PP DM  | 20<br>(5.1)         | 52<br>(7.6)         | 28<br>(254)        | 0.32 | 0.6                     | 0.3        | 43.2                   | 34.5         | 42.5                        | 27.5                      | 60                                |                 |
| MMN525BS57PP DM  | 25<br>(5.1)         | 57<br>(7.6)         | 28<br>(254)        | 0.35 | 0.6                     | 0.3        | 49.3                   | 40.6         | 48.0                        | 33.5                      | 60                                |                 |
| MMN530BS62PP DM  | 30<br>(5.1)         | 62<br>(7.6)         | 28<br>(254)        | 0.40 | 0.6                     | 0.3        | 54.3                   | 45.6         | 53.5                        | 38.5                      | 60                                |                 |
| MMN540BS75PPDM   | 40<br>(6.4)         | 75<br>(7.6)         | 34<br>(254)        | 0.64 | 0.6                     | 0.3        | 68.7                   | 57.5         | 67.0                        | 49.0                      | 60                                |                 |
| MMN550BS90PP DM  | 50<br>(6.4)         | 90<br>(7.6)         | 34<br>(254)        | 0.91 | 0.6                     | 0.3        | 82.6                   | 71.5         | 81.0                        | 63.0                      | 60                                |                 |
| MMN550BS110PP DM | 50<br>(6.4)         | 110<br>(8.9)        | 54<br>(254)        | 2.42 | 0.6                     | 0.6        | 99.6                   | 81.1         | 98.5                        | 66.0                      | 60                                | H               |
| MMN560BS110PP DM | 60<br>(7.6)         | 110<br>(8.9)        | 45<br>(254)        | 1.82 | 0.6                     | 0.6        | 100.0                  | 84.0         | 98.0                        | 72.0                      | 60                                |                 |
| INCHES           | in. +0/-(x)         |                     |                    | lbs. | in.                     | in.        | in.                    | in.          | in.                         | in.                       | degrees                           |                 |
| MMN512BS42PP DM  | 0.4724<br>(0.00015) | 1.6535<br>(0.00025) | 0.9843<br>(.0100)  | 0.44 | 0.024                   | 0.012      | 1.304                  | 0.985        | 1.259                       | 0.748                     | 60                                |                 |
| MMN515BS45PP DM  | 0.5906<br>(0.00015) | 1.7717<br>(0.00025) | 0.9843<br>(0.0100) | 0.50 | 0.024                   | 0.012      | 1.456                  | 1.088        | 1.358                       | 0.846                     | 60                                |                 |
| MMN517BS47PP DM  | 0.6693<br>(0.00015) | 1.8504<br>(0.00025) | 0.9843<br>(0.0100) | 0.54 | 0.024                   | 0.012      | 1.490                  | 1.117        | 1.437                       | 0.925                     | 60                                |                 |
| MMN520BS52PP DM  | 0.7874<br>(0.0002)  | 2.0472<br>(0.0003)  | 1.1024<br>(0.0100) | 0.70 | 0.024                   | 0.012      | 1.700                  | 1.357        | 1.673                       | 1.083                     | 60                                |                 |
| MMN525BS57PP DM  | 0.9843<br>(0.0002)  | 2.2441<br>(0.0003)  | 1.1024<br>(0.0100) | 0.78 | 0.024                   | 0.012      | 1.943                  | 1.599        | 1.890                       | 1.319                     | 60                                |                 |
| MMN530BS62PP DM  | 1.1811<br>(0.0002)  | 2.4409<br>(0.0003)  | 1.1024<br>(0.0100) | 0.88 | 0.024                   | 0.012      | 2.138                  | 1.795        | 2.106                       | 1.516                     | 60                                |                 |
| MMN540BS75PPDM   | 1.5748<br>(0.00025) | 2.9528<br>(0.0003)  | 1.3386<br>(0.0100) | 1.42 | 0.024                   | 0.012      | 2.704                  | 2.264        | 2.638                       | 1.929                     | 60                                |                 |
| MMN550BS90PP DM  | 1.9685<br>(0.00025) | 3.5433<br>(0.0003)  | 1.3386<br>(0.0100) | 2.02 | 0.024                   | 0.012      | 3.250                  | 2.815        | 3.189                       | 2.408                     | 60                                |                 |
| MMN550BS110PP DM | 1.9685<br>(0.00025) | 4.3307<br>(0.00035) | 2.1260<br>(0.0100) | 5.34 | 0.024                   | 0.024      | 3.919                  | 3.192        | 3.878                       | 2.598                     | 60                                | H               |
| MMN560BS110PP DM | 2.3622<br>(0.0003)  | 4.3307<br>(0.00035) | 1.7717<br>(0.0100) | 4.02 | 0.024                   | 0.024      | 3.938                  | 3.308        | 3.858                       | 2.835                     | 60                                |                 |

D





## BALL BEARINGS

### EX-CELL-O SPINDLE BEARINGS

- “EX” Series (Timken® Fafnir® WI construction) designed to meet Ex-Cell-O replacement requirements for inch nominal spindles with bore and O.D. tolerances nominal to plus.
- “XWO” Series (Timken Fafnir WO separable construction) designed to meet Ex-Cell-O replacement requirements for inch nominal spindles with bore and O.D. tolerances nominal to minus.
- Measurement of shafts and housings (or reconditioning of parts) should determine replacement bearing style.
- Shafts and housings should be checked (and reworked) to avoid improper shaft and housing fits.
- Preload selection should be based on operating speed and lubrication system of spindle.

### MM-EX

#### REPLACEMENT BEARINGS - FOR EX-CELL-O SPINDLES

| Bearing Number      | Ex-Cell-O Part No. | Preload lbs. | Bore (in.) |        | O.D. (in.) |        | Width - Pair (in.) |        | Maximum Speed (RPM) |
|---------------------|--------------------|--------------|------------|--------|------------|--------|--------------------|--------|---------------------|
|                     |                    |              | Max.       | Min.   | Max.       | Min.   | Max.               | Min.   |                     |
| MM20EXCR DU FS223   | 20                 | 0            | 0.3752     | .3750  | 1.1252     | 1.1250 | 0.6875             | 0.6775 | 65000               |
| MM30EXCR DU FS223   | 30                 | 0            | 0.6252     | .6250  | 1.5002     | 1.5000 | 1.0000             | 0.9900 | 35000               |
| MM30EXCR DU 5 #     | 30                 | 5            | 0.6252     | .6250  | 1.5002     | 1.5000 | 1.0000             | 0.9900 | 25000               |
| MM50EXCR DU FS223   | 50                 | 0            | 0.8127     | .8125  | 2.0002     | 2.0000 | 1.0000             | 0.9900 | 30000               |
| MM50EXCR DU 10 #    | 50                 | 10           | 0.8127     | .8125  | 2.0002     | 2.0000 | 1.0000             | 0.9900 | 18000               |
| MM50EXCR DU 50 #    | 50                 | 50           | 0.8127     | .8125  | 2.0002     | 2.0000 | 1.0000             | 0.9900 | 5000                |
| *MM55EXCR DU 10 #   | 55                 | 10           | 0.8127     | .8125  | 2.0002     | 2.0000 | 1.0000             | 0.9900 | 22000               |
| MM57EXCR DU FS223   | 57                 | 0            | 1.0627     | 1.0625 | 2.2502     | 2.2500 | 1.0000             | 0.9900 | 30000               |
| MM57EXCR DU 10 #    | 57                 | 10           | 1.0627     | 1.0625 | 2.2502     | 2.2500 | 1.0000             | 0.9900 | 15000               |
| MM57EXCR DU 50 #    | 57                 | 50           | 1.0627     | 1.0625 | 2.2502     | 2.2500 | 1.0000             | 0.9900 | 5000                |
| MM67EXCR DU FS223   | 67                 | 0            | 1.2502     | 1.2500 | 2.4377     | 2.4375 | 1.2500             | 1.2400 | 30000               |
| MM67EXCR DU 10 #    | 67                 | 10           | 1.2502     | 1.2500 | 2.4377     | 2.4375 | 1.2500             | 1.2400 | 12500               |
| MM67EXCR DU 30 #    | 67                 | 30           | 1.2502     | 1.2500 | 2.4377     | 2.4375 | 1.2500             | 1.2400 | 7500                |
| MM67EXCR DU 75 #    | 67                 | 75           | 1.2502     | 1.2500 | 2.4377     | 2.4375 | 1.2500             | 1.2400 | 4500                |
| MM90EXCR DU 20 #    | 90                 | 20           | 1.6252     | 1.6250 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 10000               |
| MM90EXCR DU 100 #   | 90                 | 100          | 1.6252     | 1.6250 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 4500                |
| MM90EXCR DU 150 #   | 90                 | 150          | 1.6252     | 1.6250 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 2700                |
| MM90EXCR DU 250 #   | 90                 | 250          | 1.6252     | 1.6250 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 900                 |
| **MM92EXCR DU 20 #  | 92                 | 20           | 1.7502     | 1.7500 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 12000               |
| **MM92EXCR DU 100 # | 92                 | 100          | 1.7502     | 1.7500 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 4500                |
| **MM92EXCR DU 150 # | 92                 | 150          | 1.7502     | 1.7500 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 2700                |
| **MM92EXCR DU 250 # | 92                 | 250          | 1.7502     | 1.7500 | 3.4377     | 3.4375 | 1.6250             | 1.6150 | 900                 |
| MM115EXCR DU 30 #   | 115                | 30           | 2.2502     | 2.2500 | 4.7502     | 4.7500 | 2.2500             | 2.2400 | 5000                |
| MM115EXCR DU 250 #  | 115                | 250          | 2.2502     | 2.2500 | 4.7502     | 4.7500 | 2.2500             | 2.2400 | 3600                |
| MM115EXCR DU 350 #  | 115                | 350          | 2.2502     | 2.2500 | 4.7502     | 4.7500 | 2.2500             | 2.2400 | 1800                |
| MM135EXCR DU 20 #   | 135                | 20           | 1.2502     | 1.2500 | 2.6877     | 2.6875 | 1.2500             | 1.2400 | 8000                |
| MM135EXCR DU 75 #   | 135                | 75           | 1.2502     | 1.2500 | 2.6877     | 2.6875 | 1.2500             | 1.2400 | 4000                |
| MM155EXCR DU 150 #  | 155                | 150          | 2.7502     | 2.7500 | 4.7502     | 4.7500 | 2.2500             | 2.2400 | 4000                |
| MM155EXCR DU 300 #  | 155                | 300          | 2.7502     | 2.7500 | 4.7502     | 4.7500 | 2.2500             | 2.2400 | 1800                |
| MM165EXCR DU 200 #  | 165                | 200          | 3.5002     | 3.5000 | 6.3127     | 6.3125 | 3.0000             | 2.9900 | 2800                |
| MM165EXCR DU 400 #  | 165                | 400          | 3.5002     | 3.5000 | 6.3127     | 6.3125 | 3.0000             | 2.9900 | 1200                |

These bearings not intended for new design applications. Consult your local Timken representative.

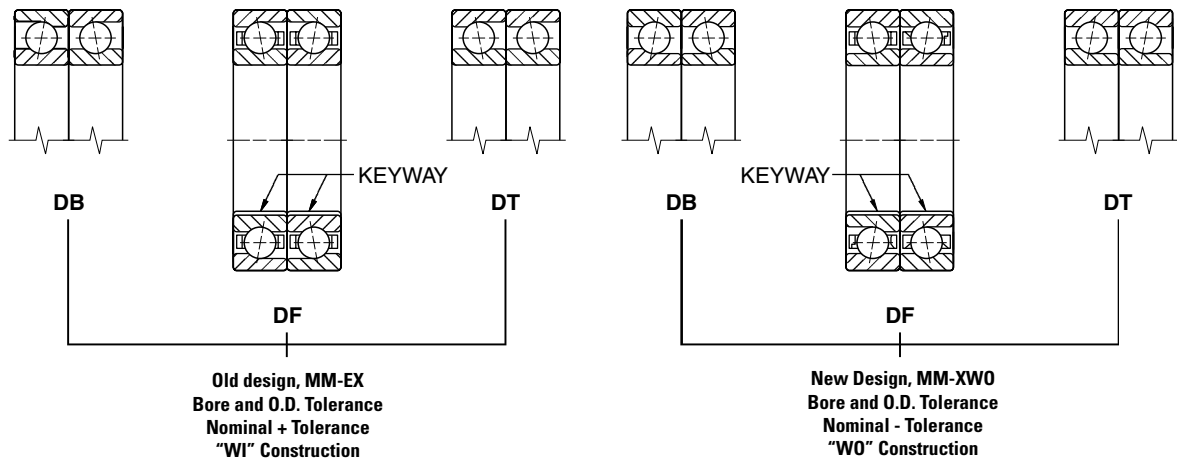
Do not interchange with MM-XWO.

\* Four slots in outer ring faces.

\*\* No keyway in bore.

FS-223 Zero to negative preload.

TIMKEN MM-EX AND MM-XWO BEARINGS FOR REPLACEMENT ON EX-CELL-O SPINDLES



MM-XWO

REPLACEMENT BEARINGS - FOR EX-CELL-O SPINDLES

| Bearing Number      | Ex-Cell-O Part No. | Preload lbs. | Bore (in.) |         | O.D. (in.) |        | Width - Pair (in.) |        | Maximum (RPM) |       |       |
|---------------------|--------------------|--------------|------------|---------|------------|--------|--------------------|--------|---------------|-------|-------|
|                     |                    |              | Max.       | Min.    | Max.       | Min.   | Max.               | Min.   | Grease        | Oil   | Mist  |
| MM20XWOCRDU E9103A  | XLO 20-107         | 0            | 0.37500    | 0.37485 | 1.1250     | 1.1248 | 0.6875             | 0.6675 | 40000         | 65000 | 80000 |
| MM30XWOCRDU E9103C  | XLO 30-57          | 10           | 0.62500    | 0.62485 | 1.5000     | 1.4998 | 1.0000             | 0.9800 | 27000         | 30000 | 35000 |
| MM30XWOCRDU E9103A  | XLO 30-107         | 0            | 0.62500    | 0.62485 | 1.5000     | 1.4998 | 1.0000             | 0.9800 | 35000         | 40000 | 60000 |
| MM55XWOCRDU E9103E  | XLO 55-27          | 50           | 0.81250    | 0.81235 | 2.0000     | 1.9998 | 1.0000             | 0.9800 | 5000          | 8000  | 12000 |
| MM55XWOCRDU E9103C  | XLO 55-57          | 20           | 0.81250    | 0.81235 | 2.0000     | 1.9998 | 1.0000             | 0.9800 | 20000         | 22000 | 24000 |
| MM55XWOCRDU E9103A  | XLO 55-107         | 0            | 0.81250    | 0.81235 | 2.0000     | 1.9998 | 1.0000             | 0.9800 | 24000         | 27000 | 45000 |
| MM57XWOCRDU E9103F  | XLO 57-17          | 100          | 1.06250    | 1.06235 | 2.2500     | 2.2498 | 1.0000             | 0.9800 | 2000          | 4000  | 6000  |
| MM57XWOCRDU E9103C  | XLO 57-57          | 20           | 1.06250    | 1.06235 | 2.2500     | 2.2498 | 1.0000             | 0.9800 | 18000         | 20000 | 22000 |
| MM57XWOCRDU E9103A  | XLO 57-107         | 0            | 1.06250    | 1.06235 | 2.2500     | 2.2498 | 1.0000             | 0.9800 | 22000         | 25000 | 35000 |
| MM67XWOCRDU E9103F  | XLO 67-17          | 90           | 1.25000    | 1.24980 | 2.4375     | 2.4373 | 1.2500             | 1.2300 | 36000         | 4500  | 6000  |
| MM67XWOCRDU E9103C  | XLO 67-57          | 20           | 1.25000    | 1.24980 | 2.4375     | 2.4373 | 1.2500             | 1.2300 | 12500         | 15000 | 20000 |
| MM67XWOCRDU E9103A  | XLO 67-107         | 0            | 1.25000    | 1.24980 | 2.4375     | 2.4373 | 1.2500             | 1.2300 | 16000         | 20000 | 30000 |
| MM90XWOCRDU E9103F  | XLO 90-17          | 250          | 1.62500    | 1.62480 | 3.4375     | 3.4372 | 1.6250             | 1.6050 | 1000          | 2000  | 4000  |
| MM90XWOCRDU E9103D  | XLO 90-47          | 175          | 1.62500    | 1.62480 | 3.4375     | 3.4372 | 1.6250             | 1.6050 | 3000          | 5000  | 8000  |
| MM90XWOCRDU E9103C  | XLO 90-57          | 100          | 1.62500    | 1.62480 | 3.4375     | 3.4372 | 1.6250             | 1.6050 | 5000          | 7000  | 11000 |
| MM90XWOCRDU E9103A  | XLO 90-77          | 20           | 1.62500    | 1.62480 | 3.4375     | 3.4372 | 1.6250             | 1.6050 | 10000         | 14000 | 20000 |
| MM115XWOCRDU E9103E | XLO 115-27         | 300          | 2.25000    | 2.24980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 1000          | 2000  | 3000  |
| MM115XWOCRDU E9103C | XLO 115-47         | 150          | 2.25000    | 2.24980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 3000          | 4500  | 7000  |
| MM115XWOCRDU E9103A | XLO 115-77         | 30           | 2.25000    | 2.24980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 6000          | 8000  | 15000 |
| MM135XWOCRDU E9103C | XLO 135-67         | 50           | 1.25000    | 1.24980 | 2.6875     | 2.6873 | 1.2500             | 1.2300 | 6000          | 7000  | 12000 |
| MM135XWOCRDU E9103A | XLO 135-10         | 70           | 1.25000    | 1.24980 | 2.6875     | 2.6873 | 1.2500             | 1.2300 | 15000         | 19000 | 28000 |
| MM155XWOCRDU E9103D | XLO 155-37         | 300          | 2.75000    | 2.74980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 1000          | 2000  | 3000  |
| MM155XWOCRDU E9103B | XLO 155-67         | 150          | 2.75000    | 2.74980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 4000          | 5000  | 6500  |
| MM155XWOCRDU E9103A | XLO 155-87         | 50           | 2.75000    | 2.74980 | 4.7500     | 4.7496 | 2.2500             | 2.2300 | 6000          | 7000  | 10000 |
| MM165XWOCRDU E9103E | XLO 165-27         | 800          | 3.50000    | 3.49975 | 6.3125     | 6.3121 | 3.0000             | 2.9800 | 500           | 1000  | 2000  |
| MM165XWOCRDU E9103C | XLO 165-57         | 250          | 3.50000    | 3.49975 | 6.3125     | 6.3121 | 3.0000             | 2.9800 | 2000          | 3000  | 5000  |
| MM165XWOCRDU E9103A | XLO 165-87         | 50           | 3.50000    | 3.49975 | 6.3125     | 6.3121 | 3.0000             | 2.9800 | 5000          | 6500  | 9000  |

Do not interchange with MM-EX.  
MM-XWO produced to nominal minus tolerance.





# **BALL BEARINGS**



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**TIMKEN**



## GLOBAL LOCATIONS

|                       | Offices | Plants | Distribution/<br>Service Centers | Technology<br>Facilities |
|-----------------------|---------|--------|----------------------------------|--------------------------|
| <b>ARGENTINA</b>      |         |        |                                  |                          |
| Buenos Aires          | •       |        | •                                |                          |
| <b>AUSTRALIA</b>      |         |        |                                  |                          |
| Ballarat              | •       |        | •                                |                          |
| Brisbane              | •       |        |                                  |                          |
| Melbourne             | •       |        |                                  |                          |
| Perth                 | •       |        |                                  |                          |
| Sydney                | •       |        |                                  |                          |
| <b>BELGIUM</b>        |         |        |                                  |                          |
| Brussels              | •       |        |                                  |                          |
| <b>BRAZIL</b>         |         |        |                                  |                          |
| São Paulo             | •       | ••     | •                                |                          |
| Tamboré               |         |        | •                                |                          |
| <b>CANADA</b>         |         |        |                                  |                          |
| Bedford               |         | •      |                                  |                          |
| Edmonton              | •       |        |                                  |                          |
| Montreal              | •       |        |                                  |                          |
| St. Thomas            | •       | •      |                                  |                          |
| Toronto               | •       |        |                                  |                          |
| <b>CHINA</b>          |         |        |                                  |                          |
| Beijing               | •       |        |                                  |                          |
| Chengdu               | •       |        |                                  |                          |
| Hong Kong             | •       |        |                                  |                          |
| Shanghai              | •       |        | •                                |                          |
| Wuxi                  | •       | ••     |                                  |                          |
| Yantai                | •       | •      |                                  |                          |
| <b>CZECH REPUBLIC</b> |         |        |                                  |                          |
| Brno                  | •       |        |                                  | •                        |
| Olomouc               | •       | •      |                                  |                          |
| Prague                | •       |        |                                  |                          |

GLOBAL LOCATIONS - *continued*

|                 | Offices | Plants | Distribution/<br>Service Centers | Technology<br>Facilities |
|-----------------|---------|--------|----------------------------------|--------------------------|
| <b>ENGLAND</b>  |         |        |                                  |                          |
| Coventry        | •       |        | •                                |                          |
| Leicester       | •       | •      |                                  |                          |
| Northampton     | •       | •      |                                  |                          |
| Pontefract      | •       |        |                                  |                          |
| Sheffield       | •       |        | •                                |                          |
| Wednesfield     | •       |        |                                  |                          |
| Wolverhampton   | •       | ••     |                                  |                          |
| <b>FRANCE</b>   |         |        |                                  |                          |
| Colmar          | •       | •      |                                  | •                        |
| Fogeres         |         | •      |                                  |                          |
| Les Ulis        | •       |        |                                  |                          |
| Moult           | •       | •      |                                  |                          |
| Paris           | •       |        |                                  |                          |
| Strasbourg      | •       |        | •                                |                          |
| Vierzon         | •       | •      |                                  | •                        |
| <b>GERMANY</b>  |         |        |                                  |                          |
| Haan            | •       |        |                                  |                          |
| Halle-Westfalen | •       | •      | •                                | •                        |
| Hannover        | •       |        |                                  |                          |
| Stuttgart       | •       |        |                                  |                          |
| <b>HUNGARY</b>  |         |        |                                  |                          |
| Budapest        | •       |        |                                  |                          |
| <b>INDIA</b>    |         |        |                                  |                          |
| Bangalore       | •       |        |                                  | •                        |
| Calcutta        | •       |        |                                  |                          |
| Jamshedpur      | •       | •      |                                  |                          |
| New Delhi       | •       |        |                                  |                          |
| Pune            | •       |        |                                  |                          |
| <b>ITALY</b>    |         |        |                                  |                          |
| Brescia         | •       | •      |                                  |                          |

|                                      | Offices | Plants | Distribution/<br>Service Centers | Technology<br>Facilities |
|--------------------------------------|---------|--------|----------------------------------|--------------------------|
| <b>JAPAN</b><br>Yokohama             | ●       |        |                                  |                          |
| <b>KOREA</b><br>Seoul                | ●       |        |                                  |                          |
| <b>MEXICO</b><br>Mexico City         | ●       |        | ●                                |                          |
| <b>NETHERLANDS</b><br>Medemblik      | ●       | ●      | ●                                |                          |
| <b>POLAND</b><br>Sosnowiec<br>Warsaw | ●<br>●  | ●      |                                  |                          |
| <b>ROMANIA</b><br>Ploiesti           | ●       | ●      |                                  | ●                        |
| <b>RUSSIA</b><br>Moscow              | ●       |        |                                  |                          |
| <b>SINGAPORE</b><br>Singapore        | ●       |        | ●                                |                          |
| <b>SOUTH AFRICA</b><br>Benoni        | ●       | ●      | ●                                |                          |
| <b>SPAIN</b><br>Bilbao<br>Madrid     | ●<br>●  | ●      | ●                                |                          |
| <b>TAIWAN</b><br>Taipei              | ●       |        |                                  |                          |
| <b>TURKEY</b><br>Istanbul            | ●       |        |                                  |                          |

GLOBAL LOCATIONS - continued

|                               | Offices | Plants  | Distribution/<br>Service Centers | Technology<br>Facilities |
|-------------------------------|---------|---------|----------------------------------|--------------------------|
| <b>UNITED STATES</b>          |         |         |                                  |                          |
| Altavista, VA                 |         | ●       |                                  |                          |
| Anaheim (Los Angeles), CA     | ●       |         |                                  |                          |
| Ann Arbor, MI                 | ●       |         |                                  |                          |
| Atlanta, GA                   | ●       |         |                                  |                          |
| Bettendorf, IA                | ●       |         |                                  |                          |
| Boca Raton, FL                | ●       |         |                                  |                          |
| Bucyrus, OH                   |         | ●       | ●                                |                          |
| Cairo, GA                     |         | ●       |                                  |                          |
| Canton (Ball Ground), GA      |         | ●       |                                  |                          |
| Canton, OH                    | ●       | ●●●●●●● |                                  | ●                        |
| Carlyle, IL                   |         | ●       |                                  |                          |
| Charlotte, NC                 | ●       |         |                                  |                          |
| Chicago, IL                   | ●       |         |                                  |                          |
| Cincinnati, OH                | ●       |         |                                  |                          |
| Cleveland, OH                 | ●       |         |                                  |                          |
| Clinton, SC                   |         | ●       |                                  |                          |
| Columbus (Tryon Peak), NC     |         | ●       |                                  |                          |
| Dahlonega, GA                 |         | ●       |                                  |                          |
| Detroit, MI                   | ●       |         |                                  |                          |
| Eaton (St. Clair), OH         |         | ●       |                                  |                          |
| Franklin (Sandycreek), PA     |         |         | ●                                |                          |
| Gaffney, SC                   |         | ●       |                                  |                          |
| Gilbert, AZ                   | ●       | ●       |                                  |                          |
| Hartford, CT                  | ●       |         |                                  |                          |
| Honea Path, SC                |         | ●       |                                  |                          |
| Houston, TX                   | ●       |         |                                  |                          |
| Indianapolis, IN              | ●       |         |                                  |                          |
| Iron Station (Lincolnton), NC |         | ●       |                                  |                          |
| Irving (Dallas), TX           | ●       |         |                                  |                          |
| Jacksonville, FL              | ●       |         |                                  |                          |
| Kansas City, KS               | ●       |         |                                  |                          |
| Keene, NH                     | ●       | ●●      |                                  | ●                        |
| Knoxville, TN                 | ●       | ●       |                                  |                          |

|                                  | Offices   | Plants    | Distribution/<br>Service Centers | Technology<br>Facilities |
|----------------------------------|-----------|-----------|----------------------------------|--------------------------|
| <b>UNITED STATES - continued</b> |           |           |                                  |                          |
| Latrobe, PA                      | ●         | ● ●       | ●                                | ●                        |
| Lebanon, NH                      | ●         | ●         |                                  | ●                        |
| Lenexa, KS                       |           | ●         |                                  |                          |
| Los Alamitos, CA                 | ●         | ●         |                                  |                          |
| Marlborough, MA                  | ●         |           |                                  |                          |
| Milwaukee, WI                    | ●         |           |                                  |                          |
| New Philadelphia, OH             |           | ●         |                                  |                          |
| Niles, OH                        |           | ●         |                                  |                          |
| Norcross, GA                     |           | ●         |                                  | ●                        |
| Northborough, MA                 |           |           | ●                                |                          |
| Ogden, UT                        |           | ●         |                                  |                          |
| Peoria, IL                       | ●         |           |                                  |                          |
| Philadelphia, PA                 | ●         |           |                                  |                          |
| Pittsburgh, PA                   | ●         |           |                                  |                          |
| Pulaski, TN                      |           | ●         |                                  |                          |
| Randalman (Asheboro), NC         |           | ●         |                                  |                          |
| Rutherfordton (Shiloh), NC       |           | ●         |                                  |                          |
| Seattle, WA                      | ●         |           |                                  |                          |
| South Bend, IN                   |           | ●         |                                  |                          |
| Spartanburg (Duncan), SC         |           |           | ●                                |                          |
| Sterling Heights (Detroit), MI   |           |           | ● ●                              |                          |
| Sylvania, GA                     |           | ●         |                                  |                          |
| Torrington, CT                   | ●         |           |                                  | ●                        |
| Union (Tyger River), SC          |           | ●         |                                  |                          |
| Vienna (Youngstown), OH          | ●         |           | ●                                |                          |
| Walhalla, SC                     |           | ●         |                                  |                          |
| Wauseon, OH                      | ●         |           | ●                                |                          |
| White House (Nashville), TN      |           |           | ●                                |                          |
| <b>VENEZUELA</b>                 |           |           |                                  |                          |
| Caracas                          | ●         |           |                                  |                          |
| <b>TOTAL</b>                     | <b>92</b> | <b>62</b> | <b>24</b>                        | <b>13</b>                |



# TIMKEN

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